Environmental Assessment

Sublette Mule Deer Mitigation Plan

May 20, 2016

Revised Final Environmental Assessment

Pinedale Field Office

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/WY/PL-13/023+1110

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List of Acronyms:

ACEC	Area of Critical Environmental Concern
AIRFA	American Indian Religious Freedom Act
APE	Area of Potential Effect
APP	Area of Proposed Project(s)
AQRV	Air Quality Related Values
ARMPA	Approved Resource Management Plan Amendment
ARPA	Archaeological Resources Protection Act
AUM	Animal Unit Months
BACT	Best Available Control Technology
BLM	Bureau of Land Management
BMP	Best Management Practices
CASTNet	Clean Air Status and Trends Network
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO_2	Carbon Dioxide
DDCT	Density and Disturbance Calculation Tool
EA	Environmental Assessment
EO	Executive Order
EPA	Environmental Protection Agency
ERMA	Extensive Recreation Management Area
ESA	Endangered Species Act
ESD	Ecological Site Description
FAR	Functioning at Risk
FEIS	Final Environmental Impact Statement
FLPMA	Federal Land Policy and Management Act
GHG	Greenhouse Gases
GHMA	General Habitat Management Area
JIO	Jonah Interagency Office
IM	Instruction Memorandum
LPI	Line Point Intercept
MBTA	Migratory Bird Treaty Act
Mg/L	milligrams per liter
MLRA	Major Land Resource Area
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NI	Not Impacted
NO_x	Nitrogen Oxides
NP	Not Present
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
OHV	Off Highway Vehicle
PA	Programmatic Agreement
PAPA	Pinedale Anticline Project Area

PAS	Pinedale Anticline Surface
PFC	Proper Functioning Condition
PFO	Pinedale Field Office
PHMA	Primary Habitat Management Area
PI	Potential Impact
PM	Particulate Matter
PM_{10}	Particulate Matter Less Than 10 Microns
$PM_{2.5}$	Particulate Matter Less Than 2.5 Microns
PUP	Pesticide Use Plan
RMP	Resource Management Plan
ROD	Record of Decision
SCCD	Sublette County Conservation District
SEIS	Supplemental Environmental Impact Statement
SFA	Sagebrush Focal Area
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SOP	Standard Operating Procedure
SRMA	Special Recreation Management Area
TPY	Tons per Year
UGRB	Upper Green River Basin
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compounds
VRM	Visual Resource Management
WAAQS	Wyoming Ambient Air Quality Standards
WAQSR	Wyoming Air Quality Standards and Regulations
WARMS	Wyoming Air Resources Monitoring System
WDEQ-ADQ	Wyoming Department of Environmental Quality-Air Quality Division
WEI	Wind Erodibility Index
WGFC	Wyoming Game and Fish Commission
WGFD	Wyoming Game and Fish Department
WMMM	Wildlife Monitoring and Mitigation Matrix
WSA	Wilderness Study Area
WY	Wyoming
WYNDD	Wyoming Natural Diversity Database
WYSHPO	Wyoming State Historic Preservation Office

1.0 INTRODUCTION

1.1 Identifying Information

1.1.1 Title, EA and Project Type

Sublette Mule Deer Mitigation Plan Environmental Assessment, DOI-BLM-WY-D010-2016-0049.

1.1.2 Location of Proposed Actions

The project area is located in mule deer habitat in central Sublette County, Wyoming, within the Bureau of Land Management (BLM) Pinedale Field Office (PFO). The legal location of the project occurs within portions of T32N R108W; T32N R109W; T32N R110W; T33N R108W; T33N R109W; T33N R110W; T33N R111W; T33N R112W; T33N R113W; T34N R113W. Map 1 and Map 2 delineate the broader area where proposed project would occur; Map 1 delineates treatment locations, while Map 2 delineates mule deer crucial winter range in the region.

1.1.3 Name and Location of Preparing Office

JIO/PAPO Office
1625 West Pine St.
PO Box 768
Pinedale, WY 82941

1.2 Introduction

Throughout the Intermountain West mule deer populations are in decline. While there are numerous reasons, declining habitat quality is regularly identified as a key contributor. In 2007, the Wyoming Game and Fish Department (WGFD) adopted the Wyoming Mule Deer Initiative (Mule Deer Working Group 2007) with the intention of completing key herd unit management plans based on the broader Initiative goals and objectives. Habitat quality was identified as one of ten issues facing mule deer populations.

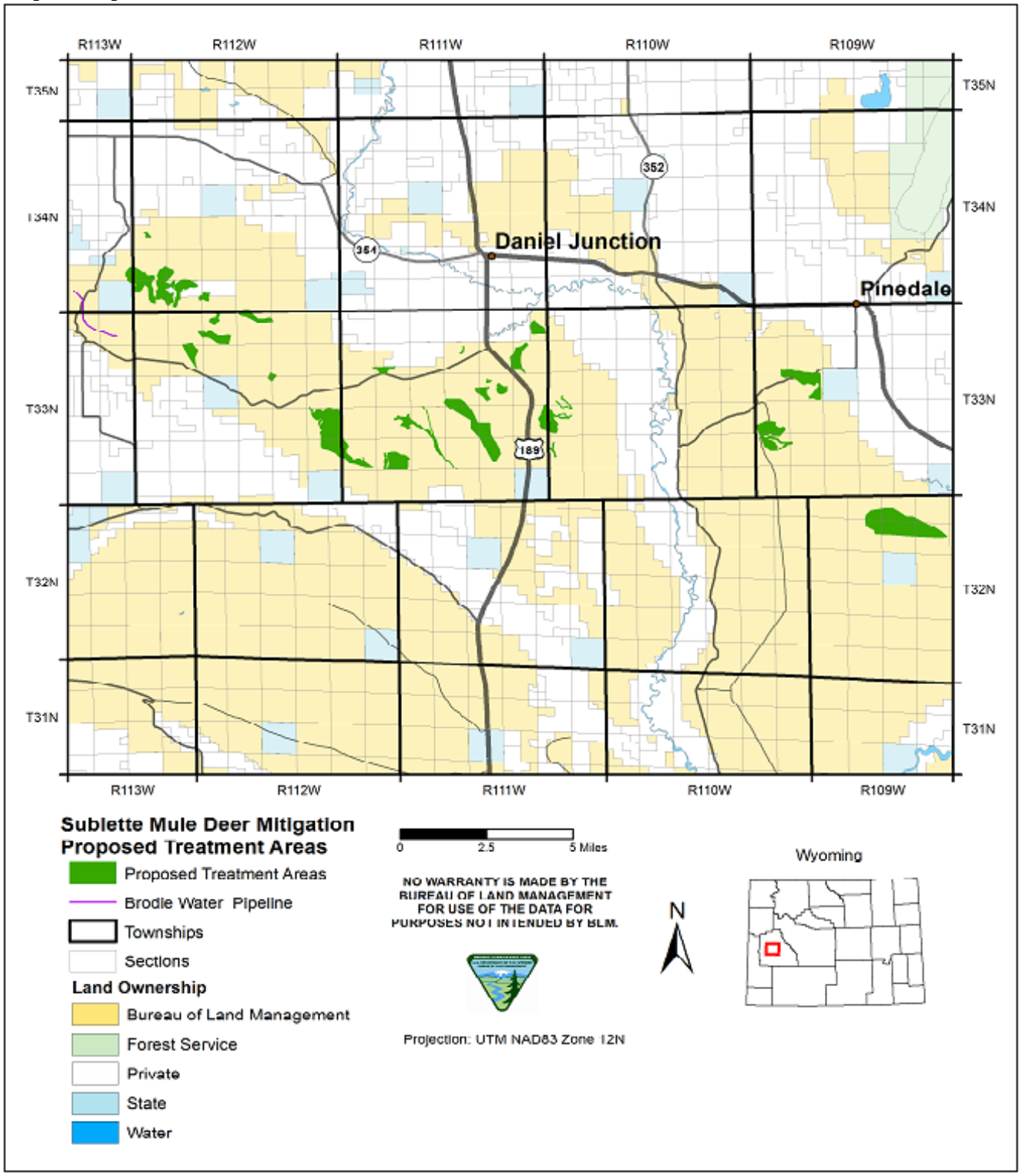
The project area occurs within mule deer crucial winter range, lower elevation segments of migration routes and transitional ranges used as mule deer move to and from summer and winter ranges. Summer ranges are typically in high elevation, montane habitats while winter ranges occur near valley floors where snow pack is reduced. This project's focus is in transitional and winter ranges closer to the valley floor.

This Environmental Assessment (EA) and the 10 Year Sublette Mule Deer Mitigation Plan (PAPO 2012) are direct responses to the recorded mule deer population decline, designed to identify and implement habitat enhancements for mitigating impacts to mule deer that have resulted from gas development on the Pinedale Anticline (henceforth called the Mesa). To address this goal BLM and WGFD surveyed the conditions of winter and transitional ranges, identified areas where habitat could be improved, and recommended various types of treatments to improve these habitats. In addition, future assessment areas have been, and will continue to be, identified.

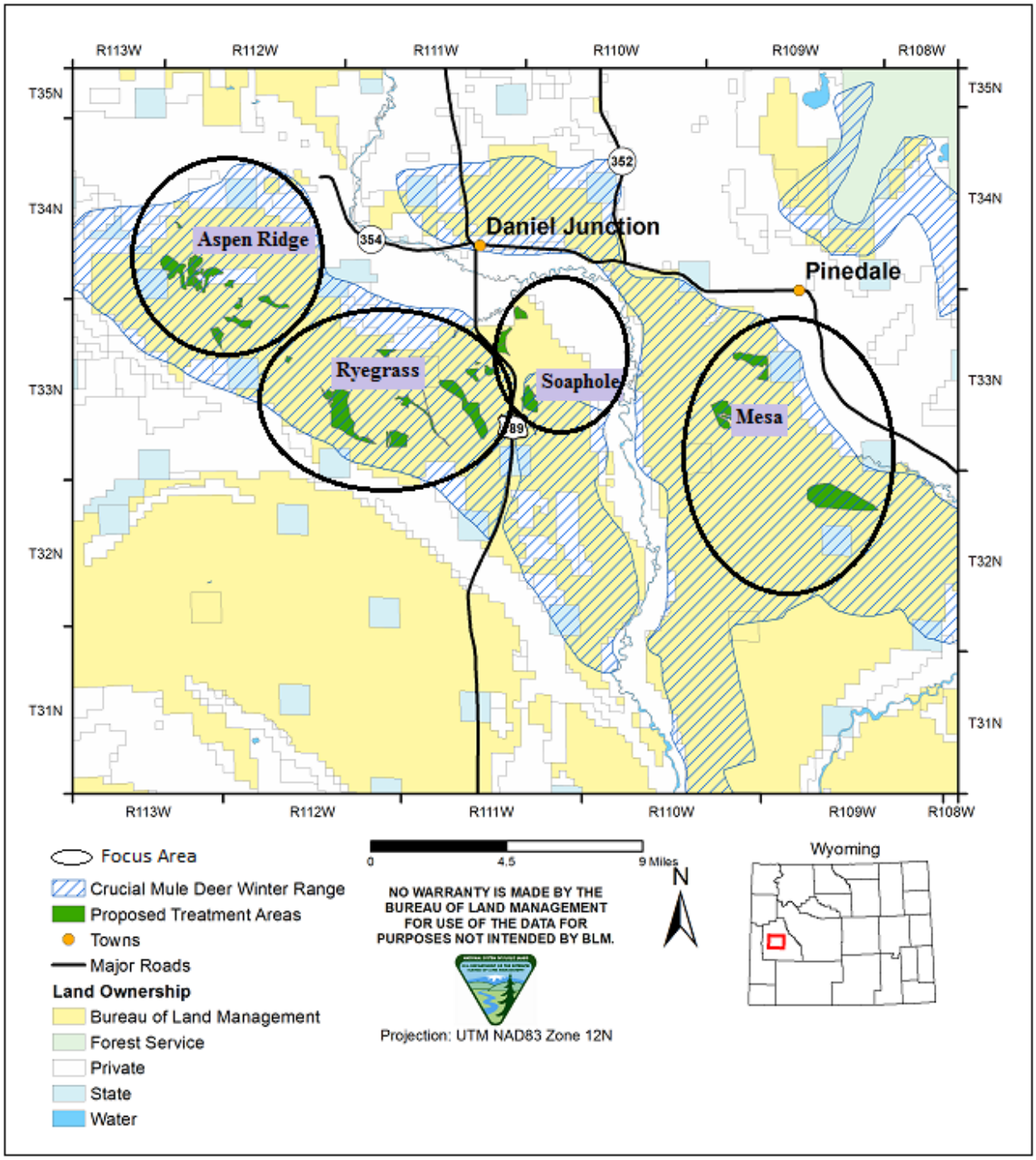
Due to the multiple use mission of public lands and public interest in wildlife, the Pinedale Anticline Project Office (PAPO) is working to cooperate with livestock grazing permittees, oil and gas operators, cooperating agencies and other interested parties to ensure project success and allow for site-specific coordination. Significant land uses in the proposed project area include livestock grazing, natural gas development/production, and recreation. Coordination with interested parties has been, and will continue to be, conducted by the PAPO staff.

The majority of the proposed treatments are to occur on lands managed by the BLM, although some treatments are proposed on private land. The regions, hereafter called Focus Areas, in which treatments would occur, are named Aspen Ridge, Ryegrass, Soapholes and the Mesa. Map 2 depicts the location of each of these focus areas. The Pinedale Anticline gas field is located on the Mesa. The Aspen Ridge, Soapholes and Ryegrass focus areas are located west of the Mesa. They were designated as unavailable for oil and gas leasing in the 2008 Pinedale Resource Management Plan (RMP), and are undergoing little to no energy development related to pre-existing valid leases. All four focus areas have been identified as important mule deer transitional ranges or winter ranges through the collaring and tracking of mule deer that winter on the Mesa (Sawyer and Kaufman 2009, Sawyer and Nielson 2011a, BLM 2012a, Sawyer and Nielson 2012, Sawyer and Nielson 2014). Crucial winter ranges tend to be at low elevations, thus receiving limited precipitation and snowpack relative to higher elevation locations. There are segments of transitional ranges proposed for treatment in this project that are slightly higher in elevation and precipitation than the winter range on the Mesa. Proposed treatments are in sagebrush steppe, mixed shrub, mountain big sagebrush, mixed mountain shrub and aspen communities.

Map 1: Proposed treatment locations



Map 2: Proposed treatment locations, mule deer crucial winter range and Focus Areas



1.3 Background

In 2008, the BLM signed the Record of Decision (ROD) for the Supplemental Environmental Impact Statement (SEIS) Anticline Oil and Gas Exploration and Development Project in Sublette County, Wyoming. The ROD (BLM 2008a), signed September 12, 2008, acknowledged "some impacts to resources from implementing this ROD (e.g., wildlife habitat and vegetation resources) are not likely to

be adequately mitigated on site (BLM 2008a, p. 30)." Thus, gas operators (operators) made commitments to provide funding for both on and off-site mitigation, to better provide effective mitigation. As indicated in the ROD, "The mitigation process utilizes performance-based measures to proactively react to emerging and undesirable changes, specifically declines in populations, early enough to assure both effective mitigation responses and a fluid pace of development over the life of the project. In that regard, this process is designed to provide certainty to the affected agencies and the public that impacts to wildlife will be addressed before consequences become severe or irreversible by monitoring changes and responding early (BLM 2008a, p. B-4)." A wildlife monitoring and mitigation matrix (WMMM) was established through the ROD to identify wildlife population thresholds which, upon being met, result in required mitigation for the species whose population is in decline.

The PAPO was created by the Anticline Project ROD to provide overall management of on-site monitoring and on and off-site mitigation activities. The PAPO obtains, collects, stores and distributes monitoring information to support the adaptive management process and analyzes mitigation projects primarily focusing on mule deer, pronghorn and Greater Sage-Grouse.

Wildlife monitoring and mitigation included monitoring changes to mule deer numbers in Sublette County, Wyoming, and using the average number of individuals recorded in 2004-2005 and 2005-2006 as a baseline value by which to judge population size change. A 15% decline in mule deer population in any year, or cumulatively over multiple years, compared to the population change in the reference area, would trigger a required mitigation response (BLM 2008a).

From 2009-10 and 2010-11, mule deer abundance on the Mesa declined by greater than 15% relative to reference area population size changes, thereby triggering mitigation efforts under the Anticline ROD (Sawyer and Nielson 2012, 2014). The PAPO introduced a plan to various energy companies, publics, and agencies to address mitigation efforts for mule deer. The goals of the effort were to inform the interested publics and to request added input on the plan. As a result of this 2011 habitat assessment, areas within Sublette County were identified for various traditional and nontraditional habitat enhancements, which are discussed in this plan entitled the 10 Year Sublette Mule Deer Mitigation Plan (PAPO 2012). Areas selected for this assessment were based primarily on information collected through collared mule deer from studies related to the development and identified in the ROD for development of the anticline (BLM 2008a). This EA considers potential impacts from implementation of portions of the 10 Year Sublette Mule Deer Mitigation Plan on primarily BLM-administered public lands.

Habitat treatment in the Aspen Ridge, Ryegrass, Soapholes and Mesa Focus Areas is the proposed response to required mitigation, and is the focus of this document. Other areas of high importance will be addressed in future documents, as noted in the 10 Year Mitigation Plan. Additional follow-up projects, currently in their initial planning stages, are envisioned to address habitat improvement needs elsewhere in mule deer habitat, and will be evaluated in future documents. These projects will likely involve further on-site mitigation on the Mesa, and will extend through transitional mule deer ranges in regions such as Cora Butte, Webb Draw and Merna Butte out onto USDA Forest Service lands northwest of the Mesa. While habitat assessments have been completed for portions of these regions, the National Environmental Policy Act (NEPA) process has not yet begun.

1.4 Purpose and Need

In response to hitting the mule deer population decline threshold, the PAPO proposes to conduct an array of vegetation management activities to improve mule deer habitat both on-site and off-site.

The purpose of the proposed habitat treatments is to increase mule deer populations by improving habitat quality and vegetation condition in transitional ranges and crucial winter ranges. Improving habitat condition allows for improved body condition which allows for greater reproductive success and reduced mortality on winter ranges (Adamczewski et al. 1998, Gustine, Barboza and Lawler 2010, Tollefson et al. 2010), thereby increasing the potential for population growth. Additionally, the proposed actions support the Pinedale RMP objective to maintain and enhance big game habitats. The need for the proposed action is to respond to a proposal submitted by the WGFD to conduct vegetation treatments on public land.

The purpose of the proposed pipeline and troughs is to provide additional water sources in the West Aspen Ridge and Brodie Draw Allotments. The need for the pipeline and troughs is to provide more water for wildlife, to improve livestock distribution and to facilitate livestock deferment within treatment areas by shifting livestock concentrations away from the proposed treatment sites. The purpose of the proposed exclosure is to improve the habitat and water quality of Onion Springs. The need for the exclosure is the prevention of impacts associated with livestock grazing at Onion Springs.

The overall goal of the proposed actions are to improve habitat quality on crucial winter range and transitional habitats used by mule deer in order to increase reproductive success, and to do so in a manner that considers input from all interested parties.

Goal 1: Improve habitat quality of mule deer seasonal and crucial winter ranges.

Goal 2: Increase the availability and duration of available surface water, improve the distribution of livestock and pull livestock away from treatment areas to enhance treatment recovery.

1.4.1 Decision to be Made

Based on the analysis in this EA, the BLM will decide whether or not to authorize any of the proposed actions, the No Action Alternative or select a combination of Alternative Action options. The EA provides the BLM with analysis from which the final decisions will be made.

1.5 Scoping and Public Involvement

1.5.1 Scoping Process

The public, private industry and other agencies have been involved throughout the development of the proposed and alternative actions. Public scoping for the joint proposal between the BLM, PAPO and WGFD was conducted between November 1 and December 14, 2012. The public was invited to attend a field tour to examine representative sites proposed for treatment on November 1, 2012. That same evening, a scoping meeting was held at the BLM Pinedale Field Office (PFO), located at 1625 West Pine Street, Pinedale, WY 82941. Public comments were solicited during the site visit and meeting as well as through distribution of the 10-year Sublette Mule Deer Mitigation Plan proposal. Based on internal agency review of the proposal, a clarification notice was issued to address and clarify the proposal timeline, application of NEPA to private lands and related issues. Upon review of the initial

comments on the proposal, additional input was sought via a meeting on 11/20/2012. On November 28, 2012 the public scoping comment period deadline was extended from November 30 until December 14, 2012.

Meetings with individual permittees occurred in early 2014. Due to staffing changes within PAPO in 2014, a second round of meetings with permittees occurred in December 2014 to ensure post-treatment deferment would be implemented, and determine how deferment would occur.

1.5.2 Summary of Public Scoping Comments

Forty scoping comments on the "10-year Sublette Mule Deer Mitigation Plan" were reviewed. Six-hundred four (604) individual comments were identified and similar comments were placed into general comment categories. The scoping comments fell into six principal groups:

1. The degree of permittee involvement in developing the plan proposal and the involvement of other interested parties in the NEPA process;
2. What is the purpose and need for the mitigation plan;
3. How the specific plan treatments were designed and how they would be implemented;
4. How livestock grazing and livestock operators would be affected economically;
5. Comments on how plan treatments might impact wildlife and other environmental resources;
6. Additional reference materials received that were evaluated for use in the preparation of this EA. A list of these references is included at the end of Appendix E.

1.6 Conformance

The proposed project would comply with all applicable federal, state, and local laws, plans, and permits required for this type of activity. These proposed actions are subject to the Pinedale RMP, as approved on November 26, 2008, as amended by the Greater Sage-Grouse Approved Resource Management Plan Amendment, 2015 (BLM 2015). The plans have been reviewed and the proposed actions, as mitigated, conform to the land use plan terms and conditions as required by 43 CFR 1610.5 (BLM 2008b). RMP decisions relevant and pertaining to this proposal include:

- Livestock Grazing Management, pages 2-17 and 2-18;
- Vegetation Management, pages 2-37 and 2-38;
- Watershed and Water Quality Management, pages 2-41 to 2-43;
- Wildlife and Fish Habitat Management, pages 2-45 to 2-52.
- Appendix C – Required Design Features, Vegetation Treatments/Fire and Fuels Management, pages 131 to 133;

<u>Other Authorities</u>

This EA fulfills the National Environmental Policy (NEPA) of 1969 requirement. The proposed actions are in accordance with 43 Code of Federal Regulations (CFR) 1610.5-3(a); 43 CFR Part 4100 et al – Grazing Administration; Federal Land Policy and Management Act (FLPMA) of 1976, as amended; Taylor Grazing Act of 1934; Endangered Species Act (ESA) of 1983, as amended; The Clean Air Act as amended; Clean Water Act of 1977; National Historic Preservation Act (NHPA), as amended; Migratory

Bird Treaty Act (MBTA) of 1918, as amended; and the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing, August 12, 1997.

The BLM proposes to implement the undertaking to comply with all relevant Federal regulations, policies, and laws; and implementing these policies subject to the requirements of the National Environmental Policy Act of 1969 and ensuring its compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, (NHPA) 16 U.S.C.470f, and its implementing regulations, 36 C.F.R. 800; and the Wyoming State Protocol.

The BLM and Wyoming State Historic Preservation Office (WYSHPO) have chosen to develop a Programmatic Agreement (PA) pursuant to 36 CFR Part 800.14(b)(ii) of the regulations implementing Section 106 of the National Historic Preservation Act to employ a phased approach to historic property identification as allowed under 36 CFR Part 800.4(b)(2) to determine effects (direct and/or indirect) to historic properties. The PA between the BLM and the WYSHPO regarding the Sublette Mule Deer Habitat Improvement Projects in Sublette County, Wyoming was executed in August 2014 and used to manage the Sec. 106 requirements of this project as well as any additional habitat treatment projects related to the Sublette Mule Deer Herd Unit (BLM 2014).

The Resource Management Plan (RMP) for the Pinedale Field Office was recently revised with the Approved Resource Management Plan Amendment (ARMPA) for Greater Sage-Grouse in September, 2015. This revision was in response to the U.S. Fish and Wildlife Service 12-month Finding that the Greater Sage-Grouse was "warranted, but precluded" for listing as a threatened or endangered species. The proposed action was determined to be consistent with the direction outlined in the ARMPA.

1.7 Issues identified

How can impacts on livestock grazing permittees be minimized?

How can mule deer population declines be mitigated through habitat treatments? What are the most effective treatment methods?

What are the most appropriate methods for monitoring vegetation recovery?

How can treatments intended to help mule deer be modified to also benefit Greater Sage-Grouse?

How can we maximize the short-term and long-term benefits of the proposed treatments for the existing vegetation and wildlife communities?

2.0 ALTERNATIVES

2.1 Alternatives Considered but Eliminated from Detailed Analysis

Over the course of project development numerous alternatives were eliminated. Larger treatment polygons were considered, but eliminated from analysis because the allowable amount of disturbance under the Density and Disturbance Calculation Tool (DDCT) would have been exceeded, and also due to economic concerns expressed by permittees. These included: 1) an Alternative for which an

additional 1,819 acres were proposed within the Soaphole Focus Area; 2) an Alternative for which an additional 490 acres of treatment were proposed in the Soaphole Focus Area and 70 fewer acres of treatment were proposed in the Mesa Focus Area and 3) an Alternative that included both the alternatives listed above. In these alternatives, the additional polygons came too close to active Greater Sage-Grouse leks or 100-year floodplains, or were considered unacceptable by permittees. An alternative with an additional 475 acres of prescribed fire and an additional 626 acres of Tebuthiuron (Spike®) treatment was considered but eliminated due to concerns by public commenters and permittees, that fire could not be controlled well enough to treat in a mosaic pattern or could escape control (or, in the case of Tebuthiuron (Spike®), be over applied), thereby reducing habitat quality and potential for regrowth, and because prescribed fire is not an acceptable treatment method in much of the Area of Proposed Projects (APP) due to low precipitation. Mandatorily seeding several sites in the Ryegrass and Soapholes Focus Areas was considered, but eliminated due to concerns that seed sources could be contaminated with cheatgrass seeds. An alternative in which the Brodie Draw pipeline was not included as an action alternative was considered but eliminated because Goal 2 (Section 1.4) would not be met by such an alternative. More extensive treatments in the Mesa Focus Area were considered but eliminated due to concerns that decreases in sagebrush cover could cause short-term harm to mule deer.

2.2 Elements Common to all Action Alternatives

Elements common to all three action alternatives include:

Treatment Types

1. Mechanical treatments could consist of using a mower, a Lawson aerator or Dixie harrow to implement treatments. See Appendix G for more information.
2. Herbicides used for treatment could include Tebuthiuron (Spike®) and Glyphosate (Roundup®). See Appendix G for more information.
3. Prescribed fire would be ignited and reignited by drip torch and allowed to burn through existing vegetation. See Appendix G for more information.

Fencing and Deferment

1. The Mule Deer Project implementation would be conducted without changing the terms and conditions of the grazing permits.
2. All treatment areas would be deferred from grazing for two growing seasons, unless vegetation recovery dictates otherwise.
3. All grazing deferment would be accomplished either by temporary fencing, use of a rider, or both, unless other alternatives are worked out with the permittee. A seasonal employee would be hired to both ride and maintain any temporary fences by PAPO. The rider would be paid for by PAPO funding.
4. Proposed electric fencing could be substituted for wire fencing when deferring livestock, and would be maintained by the aforementioned rider.
5. Proposed electric fencing would be onsite only for the duration of livestock grazing, being built as soon as possible before livestock arrive and being removed as soon as possible after livestock are moved from the allotment.

6. Should electric fencing fail to keep livestock out of deferred treatment areas, temporary wire fencing or another method of successful deferment will be used.
7. All permanent fences would be built to meet wildlife friendly specifications.
8. Long term maintenance of the Onion Springs exclosure fence would be performed by BLM. The maintenance of Brodie Draw troughs and tanks would be performed by the permittee. All other maintenance for previously existing permanent structures would revert to permittees after project completion and normal scheduled use has resumed.
9. Actual locations of fences would be sited based on standard operating procedures (SOPs), with permittee coordination, Greater Sage-Grouse considerations, feasibility studies and engineering oversight.
10. Livestock trailing would be allowed in all cases as needed to facilitate scheduled livestock use during treatment and established periods. Close coordination would be conducted with permittees to ensure that projects do not affect access or the trailing-related needs, and trailing damage to treatments is minimized.
11. All projects within assigned allotments would be conducted with close permittee coordination to ensure minimization of livestock operation conflicts.
12. Areas planned for deferment would be coordinated with permittees to minimize disruption of operations. Scheduling prior to treatment would determine project schedules, dates of treatment and length of deferment.
13. Grazing deferment would occur only within proposed treatment areas, not entire allotments.
14. During vegetation management project design, consider the utility of using livestock to strategically reduce fine fuels (Diamond et al. 2009), and implement grazing management that will accomplish this objective (Davies et al. 2011, Launchbaugh et al. 2007). Consult with ecologists to minimize impacts to native perennial grasses.
15. Strategically place and maintain pre-treated strips/areas (e.g., mowing, herbicide application, and strictly managed grazed strips) to aid in controlling wildfire, should wildfire occur near key habitats or important restoration areas (such as where investments in restoration have already been made).
16. Design vegetation treatments in Greater Sage-Grouse habitats to strategically reduce wildfire threats in the greatest area. This may involve spatially arranging new vegetation treatments with past treatments, vegetation with fire-resistant seral stages, natural barriers, and roads in order to constrain fire spread and growth. This may require vegetation treatments to be implemented in a more linear versus block design (Launchbaugh et al. 2007).

<u>Water and Water Projects</u>

1. With the exception of Onion Springs, a 500 foot buffer would be maintained around 100-year flood plains, in which no treatments will occur.
2. Onion Springs would be fenced with wildlife friendly fencing in order to reduce livestock trampling and improve hydrologic conditions.
3. A 100 foot buffer would be maintained around intermittent and ephemeral drainages, in which no treatments would occur, to minimize the potential for negative impacts to water quality.

4. Both water-related projects would be evaluated by BLM engineers and/or range staff prior to completion.
5. Water developments that involve watering tanks/troughs would have wildlife escape apparatus.

Project Specific Management Objectives

1. The Management Objectives described in Chapter 1 are the same for all action alternatives.

Scheduling

1. While projects are outlined by year, flexibility in treatment implementation year would be allowed to address any needs that arise in relation to the projects (e.g. burn windows, seasonal wildlife restrictions, deferment issues, etc.).

Mitigation Measures

1. A Cultural Survey would occur prior to treatment in accordance with the signed Programmatic Agreement (PA). See Appendix C. All ground disturbing activities would have Class III cultural surveys completed prior to implementation. If historic properties are located, the treatment area will be redesigned to avoid impacts. A 100 foot protective buffer would be used to mitigate direct impacts to sacred sites.
2. The BLM would continue to consult with appropriate Tribes through the life of the project regarding historic properties of religious and cultural significance.
3. Standard weed prevention and control measures would apply. See Appendix F.
4. All treatment sites would be monitored for post-treatment weed establishment.
5. All applicable wildlife seasonal restrictions would apply to all treatments. See Appendix I for all seasonal wildlife stipulations.
6. Treatment areas within 0.6 miles of an active lek would not reduce sagebrush canopy cover below 15%, as based on sagebrush canopy cover from pre-treatment monitoring.
7. In Sagebrush Focal Areas (SFAs), Primary Habitat Management Areas (PHMAs) and Greater Sage-Grouse Core Areas the desired condition is to maintain all lands ecologically capable of producing sagebrush (but no less than 70%) with a minimum of 15% sagebrush cover or as consistent with specific ecological site conditions (BLM 2015). In accordance with this criteria, all treatment sites would be managed to achieve a minimum sagebrush canopy cover (or total shrub cover in the case of mixed shrub communities) of 15% to meet suitability requirements within 15 years.
8. Sagebrush cover would not be reduced below 5% on any treatment site.
9. A buffer of 500 feet would be maintained between proposed treatments and previous improvements and water sources, where appropriate.
10. BLM would seek opportunities to reduce emissions, including best available control technologies (BACT) when implementing the proposed actions.
11. Possible disturbances to special status plants would be avoided by conducting pre-work reconnaissance using approved protocols. Surveys would be conducted prior to ground disturbing activities, prescribed fire, or herbicide applications. Treatment areas would be modified accordingly to avoid impacts to special status plant species.

12. Ecological Site Descriptions (ESDs) will be considered during treatment implementation, with regards to treatment method, treatment locations within the treatment areas and expectations for post-treatment recovery.

Seeding Treatments

1. Standard seed requirements/stipulations would apply.
2. Seeding would be done in the fall, during or following treatments, depending on location and staff recommendations. Either broadcast or drill seeding would be done, based on staff recommendations and previous success of methods.
3. Seed mixes would be created based upon information in ESDs and may be tailored to each specific treatment site as needed. Specialized mixes would be based upon a combination of factors including previous monitoring data and species that are highly valuable to wildlife and livestock. If seeding is not successful, depending upon the ecological status, the site would be revisited to determine the best course of action. This would be determined through monitoring.
4. Seeding mixes and rates would be determined by biologists prior to treatment and dependent upon the results of pre-treatment sampling. If a proposed treatment area contains multiple ESDs or multiple, distinct soil types more than one seed mix could be applied.
5. Shrub plantings would be done in the fall, unless otherwise determined by staff, to allow shrubs access to water produced by spring snowmelt.
6. Emphasize the use of native plant species, recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions.

Mechanical Treatments

1. To the extent possible, mechanical treatments would be done parallel with (not perpendicular to) topographic contours.
2. In order to ensure treatments promote use by Greater Sage-Grouse all mechanical treatments would be performed in a mosaic pattern, as opposed to treatment blocks.
3. Mowing would be implemented utilizing slope and contours to minimize straight lines, thus replicating the natural patterns of the landscape in order to minimize visual impacts
4. All mechanical treatments would be done in the fall and conform to relevant seasonal stipulations.
5. All mechanical treatments proposed in sagebrush communities would involve the use of a mower, Dixie Harrow or a Lawson Aerator. The treatment method would be determined on a site by site basis based on effectiveness of the individual treatment, prior success, and staff recommendations. Where a 20% treatment is identified for a site, treatment widths would be 120 meters or less.
6. The possible presence of cheatgrass and rabbitbrush would be evaluated and considered prior to treatment.
7. Use vegetation treatment prescriptions that minimize undesirable effects on vegetation or soils (e.g., minimize mortality of desirable plant species and reduce risk of hydrophobicity).

Prescribed Fire Treatments

1. Prescribed burns would involve hand ignitions conducted during fall.
2. All prescribed burning would be conducted in accordance with required timing stipulations.
3. The possible presence of cheatgrass and rabbitbrush would be evaluated and considered.

4. Prescribed burns would be conducted in accordance with the State of Wyoming's Smoke Management program contained in Chapter 10, Section 4 of the Wyoming Air Quality Standards and Regulation (WAQSR). As a state-permitted activity through an approved State Implementation Plan (SIP) program, these activities are exempt from the requirements of General Conformity review.
5. Design vegetation treatments in areas of high fire frequency which facilitate firefighter safety, reduce the potential acres burned and the fire risk to Greater Sage-Grouse habitat. Additionally, develop maps for Greater Sage-Grouse habitat which spatially display existing fuels treatments that can be used to assist suppression activities.
6. Provide training to fuels treatment personnel on Greater Sage-Grouse biology, habitat requirements, and identification of areas utilized locally.
7. Where applicable, design fuels treatment objective to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patterns which most benefit Greater Sage-Grouse habitat.
8. Use burning prescriptions which minimize undesirable effects on vegetation or soils (e.g., minimize mortality of desirable perennial plant species and reduce risk of annual grass invasion).

Herbicide Treatments

1. Tebuthiuron (Spike®) treatments would include soil sampling to aid in determining rates of application. Applications would target a sagebrush thinning rate of 50% in accordance with the legal label.
2. Tebuthiuron (Spike®) would be used in pellet form, dispersed aerially, and applications would maintain a 500 foot buffer from perennial water sources.
3. Glyphosate (Roundup®) applications would be performed on foot, or from a vehicle.
4. Glyphosate (Roundup®) applications would maintain a 500 foot buffer from perennial water sources.
5. Herbicide applications would be implemented during spring or fall months.
6. A pesticide use permit (PUP) would be developed prior to any herbicide work, and if possible, coordinated with other ongoing efforts (e.g. Wyoming Range Mule Deer Project).
7. Deferment of the treatment area would begin when signs of sagebrush mortality begin to appear. The BLM would be responsible for determining when sagebrush mortality begins.

Objectives and Monitoring Parameters

The following parameters would be monitored to determine if objectives are successfully met for this project. Monitoring protocols may be modified on an as-needed basis as agency protocols are updated utilizing best available science and methods.

1. ***Objectives for Wyoming Big Sagebrush:***

- Increase age class diversity of key shrubs to a minimum of 5% “young” and 20% “mature” age classes within 20 years.

  Monitoring: Macroplot shrub belts with a minimum of 5 belts, 25 meters in length. Additionally, 500 total points using LPI, to be conducted in 5 25m transects, to be conducted at height of forb phenology, will be used to determine sagebrush cover.

2. ***Objectives for Mountain Big Sagebrush Communities:***

- Increase age class diversity of key shrubs to a minimum of 10% “young” and 25% “mature” age classes within 15 years.
  Monitoring: Macroplot shrub belts with a minimum of 5 belts, 25 meters in length.

3. *Objectives for Mixed Mountains Shrub Communities:*

- Increase annual leader growth length of bitterbrush to be at least 20% greater in treated areas than in adjacent, untreated areas.
  Monitoring: Minimum of 3 pace transects with 10 plants per transect in control and treatment areas, following WGFD shrub Production and Utilization monitoring protocols for leader measurements.

- Increase cover of mountain shrubs to at least 10% greater than prior to treatment. Snowberry cover increases will not be considered because the shrub is so prevalent in mountain shrub communities in the APP.
  Monitoring: Macroplot shrub belts with a minimum of 5 belts, 25 meters in length.

4. Objectives for Enhanced Pipeline Reclamation:

- Increase shrub cover within the right-of-way to 10% in 20 years.
  Monitoring: 500 total points using LPI, to be conducted in a linear arrangement (to remain within the pipeline) and to be conducted at height of forb phenology. 25 quadrats will be used to identify the presence of forbs.

1. Pre-treatment monitoring would be conducted on all established monitoring sites prior to implementation.
2. Post-treatment monitoring would be conducted 1, 2, 5, and 15 years following implementation.
3. More frequent monitoring may be conducted, if desired.
4. Monitoring instructions would be kept to ensure all data collection is consistent and repeatable.

2.3 Alternative 1 (Proposed Action)

Alternative 1 (Proposed Action) includes habitat treatments of up to 3,415 acres. Mechanical treatments consisting of using a mower, Lawson aerator, and Dixie harrow would occur on up to 3,118 acres, herbicide treatments using Tebuthiuron (Spike®) and Glyphosate (Roundup®) would occur on up to 235 acres, and prescribed fire would occur on up to 49 acres. Herbicide and mechanical applications would be designed to thin sagebrush and increase production of key herbaceous species. Fire would kill a majority of existing vegetation in treatment areas in order to improve establishment rates of planted mountain shrubs, by reducing competition, thereby enhancing the mixed mountain shrub community. More information on proposed treatment methods, tools for implementation and desired results can be found in Appendix G. The treatments are intended to occur over a four year time period; however, the timeframe could be expanded if necessary for implementation of treatments. Under Alternative 1 (Proposed Action), up to 80% of the polygons proposed for mechanical treatments could be treated. Treatment implementation and deferment would be coordinated with grazing permittees to ensure successful habitat recovery.

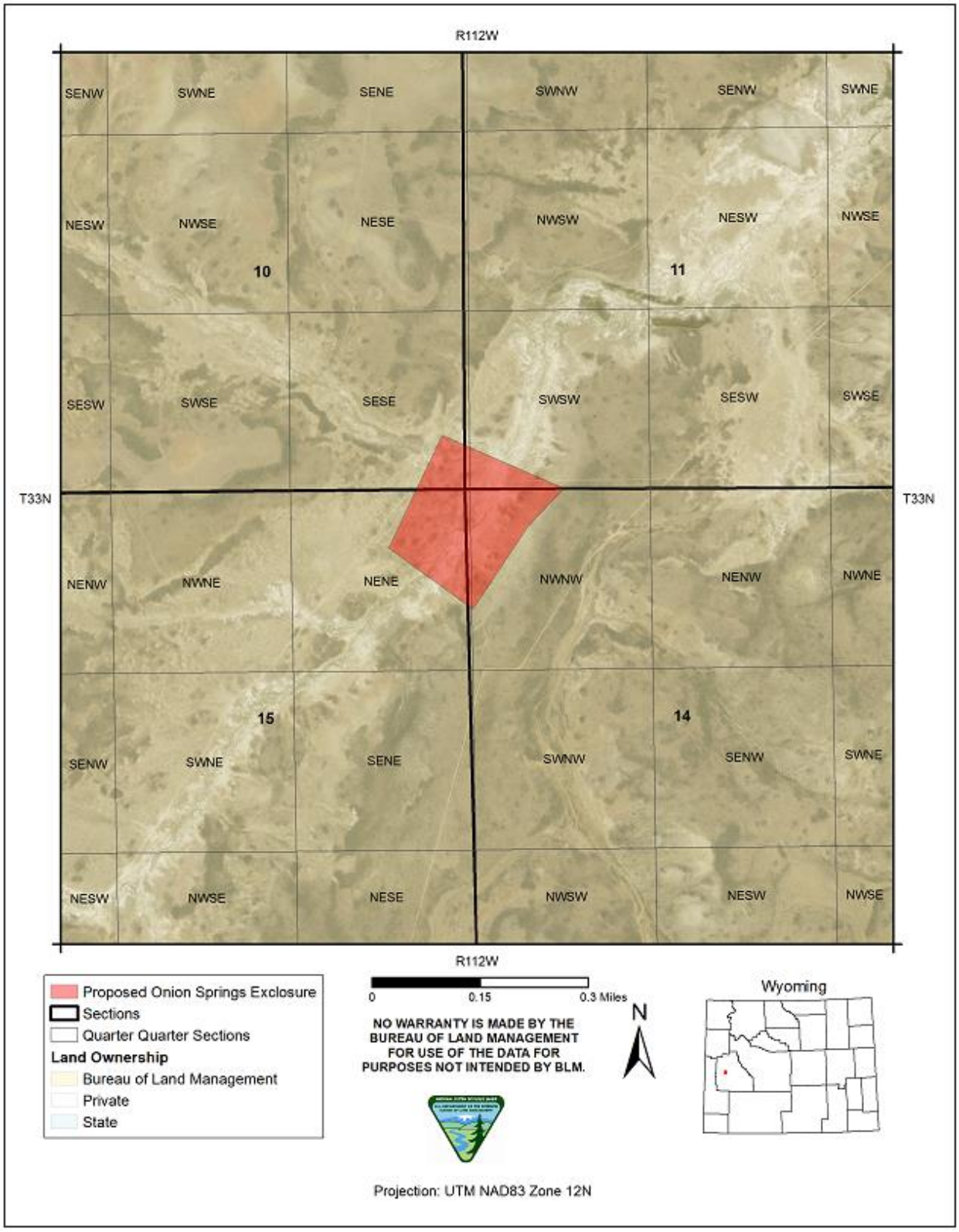
The proposal also includes building a 3 acre permanent exclosure around Onion Springs. The exclosure would be located in T 33 N R112 W SEC 10 SESE, Sec 11 SWSW, Sec 15 NWNE, Sec. 14 NWNW (Map 3) and would exclude livestock from Onion Springs. The exclosure would consist of metal pipe for posts and a possible combination of the following: a metal pipe top rail, all metal pipe rails, or barbed wire with the lowest rail being smooth wire. All rails and wires would be spaced according to BLM Manual 1741-1 wildlife friendly fence specifications.

The proposed action also includes the installation of a water pipelines to new water tanks from an existing well. The Brodie Draw well was drilled 10 years ago in T 33 N R 113 W SEC 2 of the NE (Map 4) in the West Aspen Ridge Allotment. The proposal includes: 1) install 1 mile pipeline from the Brodie Draw well to the northwest to 2 new stock tanks in the West Aspen Ridge Allotment (troughs T 34 N R 113 W SEC 35 of the SENW quarter quarter section); and 2) install 1 mile of pipeline to the southeast in the Brodie Draw Allotment that would end at two troughs in an old, non-functional reservoir (troughs T 33 N R 113 W SEC 1 of the NWSE section (Map 4). The stock tanks would be equipped with float valves to prevent overflow and also equipped with wildlife escape apparatus. High density polyethylene pipe would be used for the pipeline and a tracked dozer with a ripper claw attached, a pickup and trailer, and a backhoe would be used to install the new pipeline under the county road and installing the troughs. The pipe is in rolls and would be placed on the trailer in front of the dozer and then threaded over the dozer into the ripper claw. Once the claw is driven into the ground it buries the pipe about 24 inches deep and then the trench is back filled behind the dozer.

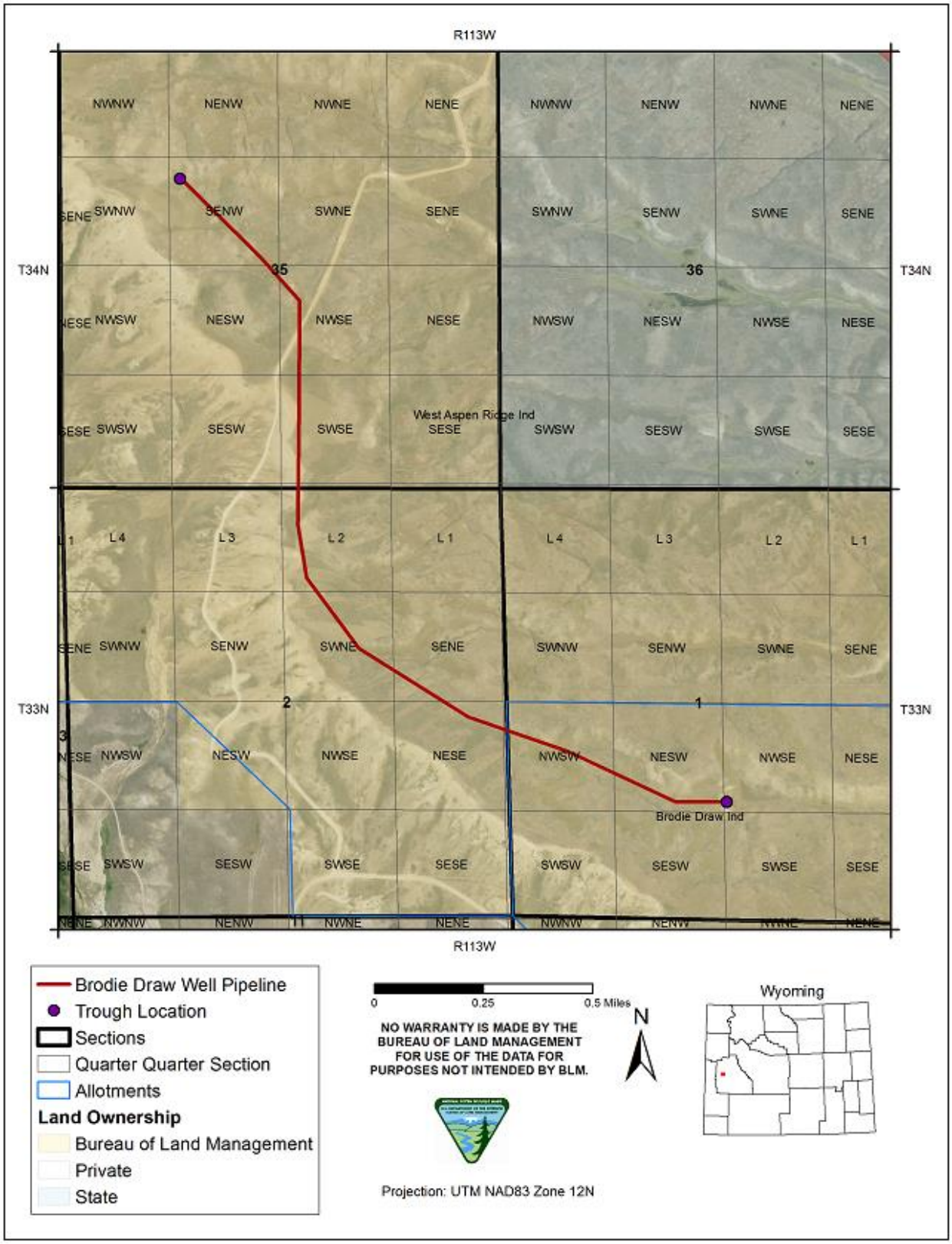
The construction of the Brodie Draw well pipeline would create new surface disturbance. However, to minimize the impacts, the pipeline going to the north of the well in West Aspen Ridge Allotment would follow an existing power line and two track road right-of-way for 1.0 mile; from here, the other 1.0 mile would be new surface disturbance. The pipeline would cross Sublette County Road 23-116 and the BLM would need a permit from Sublette County to cross the county road. A backhoe would be used to dig the trench across the county road, a metal pipe would be placed across the road, and the poly pipe would be threaded through the metal pipe. The trench would be backfilled from the material that was removed, compacted and smoothed. The pipe would be buried deep enough so that it would not impact routine county road maintenance.

Vegetation treatments would be rested from livestock grazing for 2 years to allow for recovery of the desired species. Rest of the treated areas would be accomplished in a variety of ways. In the Brodie Draw, West Aspen Ridge, and Jewett Ryegrass allotments (Map 14), rest could be accomplished by deferring one allotment while using the other two. Specifics of the treatment and deferment schedule would be coordinated with the grazing permittee in these allotments annually. Other treated areas would be rested through the use of temporary fencing or a livestock herder (Table 3). For any treatments where a herder or deferment is found to be insufficient to achieve rest, temporary fence could be constructed to ensure an adequate rest period for vegetation recovery.

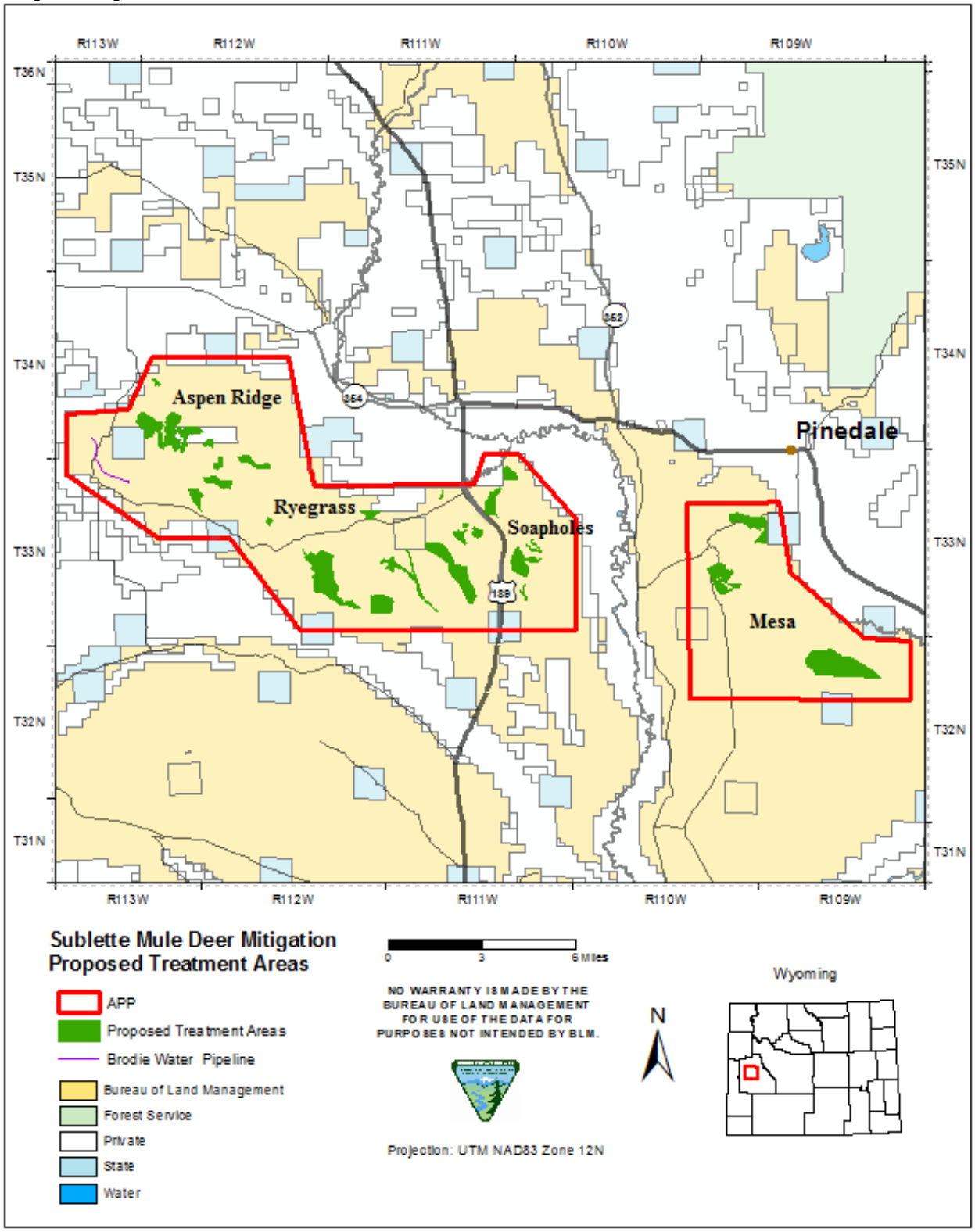
Map 3: Location of the proposed Onion Springs exclosure



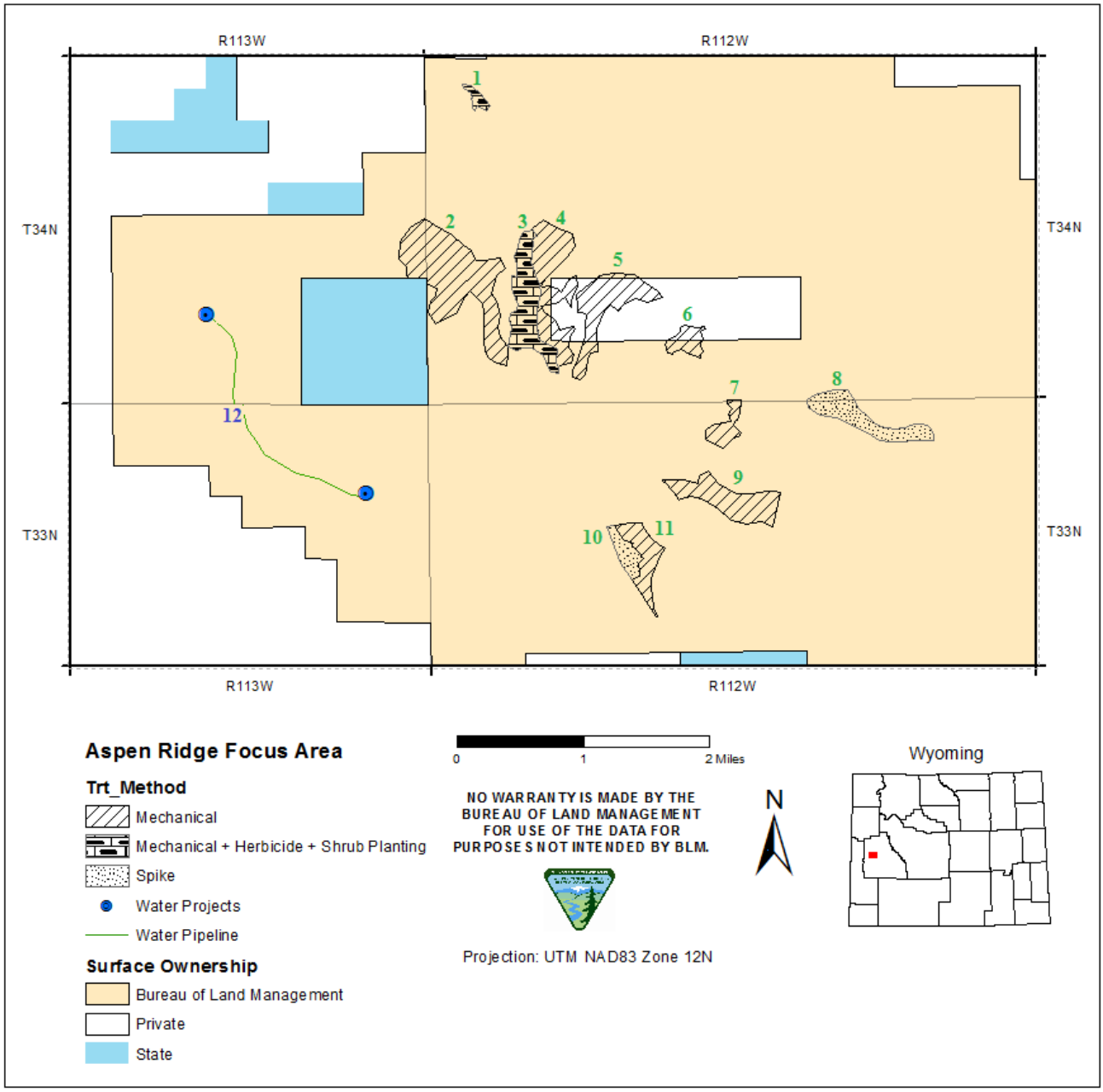
Map 4: Location of proposed Brodie Draw pipeline



Map 5: Proposed habitat treatments shown within APP.



Map 6: Aspen Ridge Focus Area proposed treatments.



Site 1 - The treatment would entail implementing mechanical treatments where the slopes are shallow enough to make such an action feasible, and applying Tebuthiuron (Spike®)20P where slopes are too steep for a tractor to drive. Up to 10-acres may be treated by Glyphosate (Roundup®) application followed by planting mountain shrubs. These shrubs would include bitterbrush (*Purshia tridentata*), serviceberry (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana*), and golden currant (*Ribes aureum*). The intention of a Glyphosate (Roundup®) application would be to create a site with minimal competition in which mountain shrubs could establish. The treatment is intended to treat the shrub community, not the aspen stand. Temporary fencing would be used to defer livestock grazing at the treatment location. The objectives for this treatment would be to increase cover of mountain shrubs, to

increase annual leader growth of mountain shrubs compared to untreated areas and to increase age class diversity of mountain big sagebrush.

Site 2 - The treatment would entail mechanically treating up to 138 acres of the 275 acre site. The west side of the proposed treatment area would be treated at a lower intensity than the eastern side in order to ensure sagebrush canopy cover would not fall below 15%. Temporary fencing would be used to defer the treatment. The objectives for this treatment would be to increase age class diversity of mountain big sagebrush sage by encouraging the establishment of young plants.

Site 3 - The treatment would entail implementing mechanical treatments where the slopes are shallow enough to make such an action feasible and to apply Tebuthiuron (Spike®) 20P where slopes are too steep for a tractor to drive. Up to 20 acres may be treated by Glyphosate (Roundup®) application followed by planting started shrubs. These shrubs would include bitterbrush, serviceberry, chokecherry, and golden currant. The intention of a Glyphosate (Roundup®) application would be to create a site with minimal competition in which mountain shrubs could establish. The treatment is intended to treat the shrub community, not the aspen stand. Temporary fencing would be used to defer the treatment in the James Ryegrass allotment and rotation in the Brodie Draw allotment. The objectives for this treatment would be to increase cover of mountain shrubs, to increase annual leader growth of mountain shrubs compared to untreated areas and to increase age class diversity of mountain big sagebrush.

Site 4 - Up to 114 of the 142 acres would be mechanically treated. Temporary fencing would be used to defer the treatment in the James Ryegrass allotment and rotation in the Brodie Draw allotment. The objective for this treatment would be to increase age class diversity of mountain big sage by encouraging the establishment of young plants.

Site 5 - The treatment would entail mechanically treating up to 100 of the 122 acres. Grazing rotation or deferment of allotments would be used to defer the treatment, if possible. If not possible, temporary fence would be constructed to ensure an adequate rest period for vegetation recovery. The objectives for this treatment are to increase age class diversity of mountain big sage by encouraging the establishment of young plants.

Site 6 - Up to 27 of the 33 acres would be mechanically treated. If necessary, treatment acreage would be reduced to ensure sagebrush canopy cover would not be reduced below 15%, on lands managed by BLM. Grazing rotation or deferment of allotments would be used to defer the treatment, if possible. If not possible, temporary fence would be constructed to ensure an adequate rest period for vegetation recovery. The objective for this treatment would be to increase age class diversity of mountain big sage by encouraging the establishment of young plants.

Site 7 - The treatment would entail mechanically treating up to 27 of the 34 acres. Grazing rotation or deferment of allotments would be used to defer the treatment, if possible. If not possible, temporary fence would be constructed to ensure an adequate rest period for vegetation recovery. The objectives for this treatment are to increase age class diversity of mountain big sagebrush by encouraging the establishment of young plants.

Site 8 - Up to all 96 acres of the site would be treated with Tebuthiuron (Spike®). The northwest and southeast portions of the proposed treatment area would receive lighter Tebuthiuron (Spike®) treatment rates to ensure sagebrush canopy cover remains above 15%. Grazing rotation or deferment of allotments

would be used to defer the treatment, if possible. If not possible, temporary fence would be constructed to ensure an adequate rest period for vegetation recovery. The objectives are to increase the age class diversity of sagebrush and, by allowing competitive release of the mountain shrub community, increase leader growth of mountain shrubs.

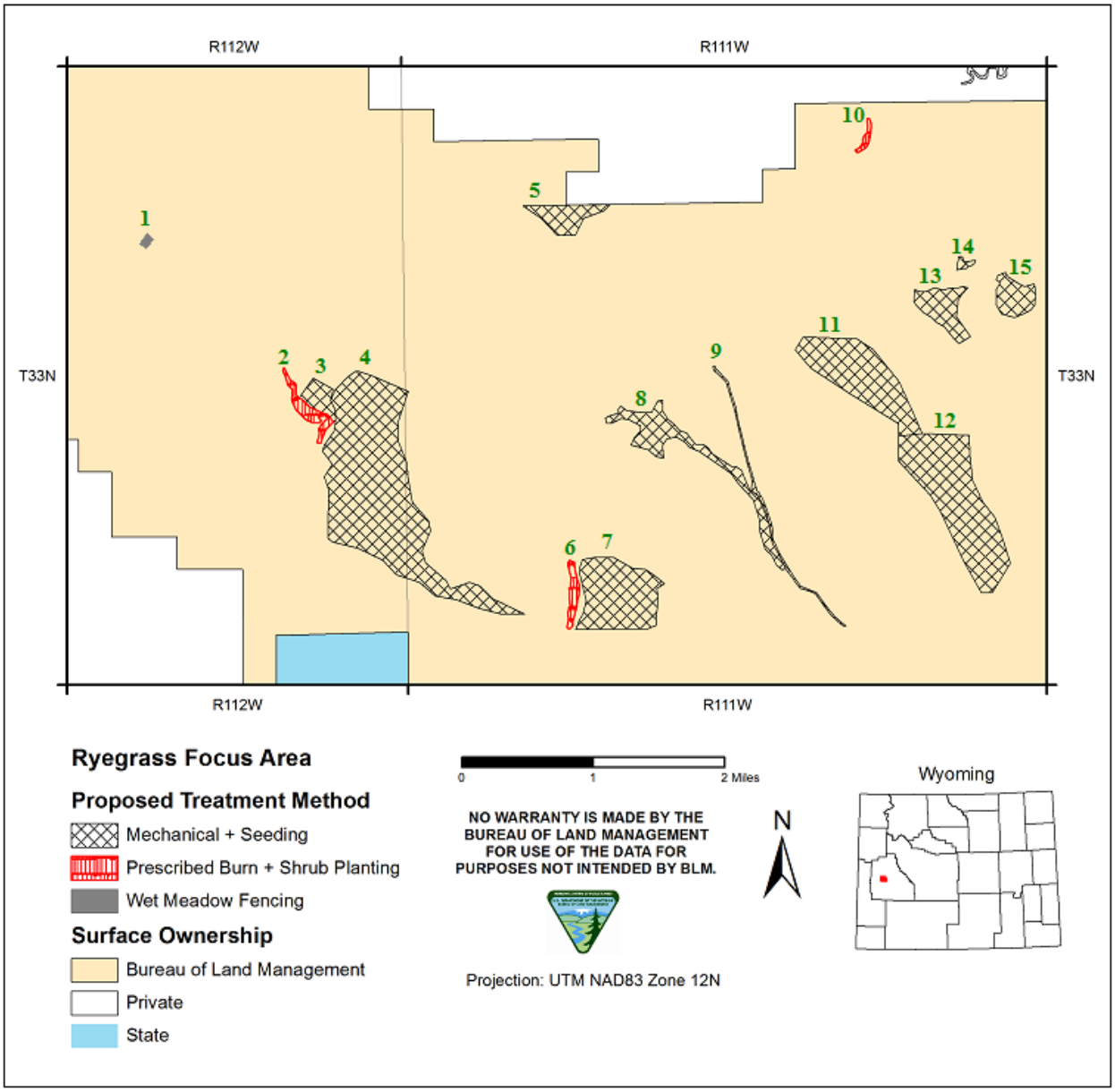
Site 9 - The treatment would entail mechanically treating up to 92 acres of the 115-acre proposed treatment area. Grazing rotation or deferment of allotments would be used to defer the treatment, if possible. If not possible, temporary fence would be constructed to ensure an adequate rest period for vegetation recovery. The objective for this treatment is to increase age class diversity of mountain big sage.

Site 10 - Up to 33 acres of the 33 acre site would be treated with Tebuthiuron (Spike®). The objectives are to increase the age class diversity of sagebrush and, by allowing competitive release of the mountain shrub community and increase leader growth of mountain shrubs.

Site 11 - The treatment would entail mechanically treating up to 142 acres of the 178 acre site. Grazing rotation or deferment of allotments would be used to defer the treatment, if possible. If not possible, temporary fence would be constructed to ensure an adequate rest period for vegetation recovery. The treatment objectives would be to increase the age class diversity of mountain and Wyoming big sagebrush.

Site 12 - The pipeline would run southeast to an existing reservoir called Jimmies Reservoir. The reservoir is no longer functional; however, the detention dam was reported in good condition in 2010. Water would be piped into two troughs in the bottom of the reservoir. Within the existing reservoir footprint is predominately bare ground with low-moderate grass cover and little to no litter accumulation. The pipeline running northwest would be attached to troughs as well. The objectives would be to increase water distribution across the APP and increase the duration of water availability.

Map 7: Ryegrass Focus Area proposed treatments.



Site 1 - The treatment would entail fencing an approximately three acre site surrounding the spring. The fencing would be permanent and wildlife friendly. The objectives are to improve vegetative and hydrologic conditions. Special consideration would be given, and plans altered, if any sensitive plant species were found.

Site 2 - Up to 26 acres of this site would be treated with prescribed fire, followed by planting mountain shrubs. Fire is not to be prescribed in zones with less than 12" of annual precipitation, and while this site is not in an area that receives greater than 12" of precipitation, the accumulation of snowpack on this east facing slope increases effective precipitation to greater than 12." This is demonstrated by the growth of mountain sagebrush, mixed mountain shrubs and grass and forb species associated with precipitation greater than 11". Grazing rotation would be used to defer the treatment. The objectives

would be to increase the age class diversity of sagebrush, increase mountain shrub cover and increase leader growth of mountain shrubs. Prescribed fire would be preferable to herbicide because herbicide applications may leave residual herbicide in the soil, potentially reducing the establishment rates of planted shrubs. Fire would also be preferable to mechanical treatments because mechanical treatments cannot create enough mortality of grasses or shrubs to reduce competition; as a result successful shrub establishment would be very limited. Planting mountain shrubs is intended to enhance the mixed mountain shrub community, which is no longer prevalent or present on many sites due to browsing by wildlife

Site 3 - Up to 24 of the 30 acres would be mechanically treated. Grazing rotation or deferment of allotments would be used to defer the treatment, if possible. If not possible, temporary fence would be constructed to ensure an adequate rest period for vegetation recovery. The objectives for the site are to increase the age class diversity of sagebrush and increase species richness.

Site 4 - The treatment would entail mechanically treating up to 480 of the 600 acres. Grazing rotation or deferment of allotments would be used to defer the treatment, if possible. If not possible, temporary fence would be constructed to ensure an adequate rest period for vegetation recovery. The objectives are to increase sagebrush age class diversity and to increase species richness.

Site 5 Up to 42 acres of the 53 acre site would be treated mechanically. Temporary fencing would be used to defer the treatment. The objectives are to increase sagebrush age class diversity, and to increase species richness.

Site 6 - Up to 17 acres of the 17 acres site would be treated using prescribed burning followed by planting bare root shrubs. Species to be planted would include bitterbrush, chokecherry and serviceberry. Fire is not to be prescribed in zones with less than 11" of annual precipitation, and while this site does not receive over 12" of precipitation, the accumulation of snowpack increases effective precipitation to greater than 12." This is seen by the growth of mountain sagebrush, mixed mountain shrubs and grass and forb species associated with higher precipitation zones. Temporary fencing would be used to defer livestock grazing at the treatment location. The objectives would be to increase the age class diversity of sagebrush, increase mountain shrub cover and increase leader growth of mountain shrubs.

Site 7 - The treatment would entail mechanically treating up to 91 acres of 183 acre site. The northeast portion of the proposed treatment area would receive less treatment than the eastern side in order to ensure sagebrush canopy cover would not fall below 15%. Temporary fencing would be used to defer livestock grazing in the treatment area. The objective would be to increase sagebrush age class diversity and to increase species richness.

Site 8 - Up to 22 acres of the 111 acre site would be treated mechanically. Treatment rate would be only 20% of the proposed treatment area to ensure sagebrush cover would not be reduced below 15% canopy cover. Temporary fencing would be used to defer livestock grazing in the treatment area. The objective would be to increase sagebrush age class diversity and to increase species richness.

Site 9 - The treatment would entail mechanically treating up to 17 acres of the site, in order to reduce the prevalence of rhizomatous grasses, followed by seeding of sagebrush and other shrubs. Temporary

fencing would be used to defer livestock grazing at the treatment location. Objectives for this treatment are to increase species richness and to increase the establishment of young shrubs.
Site 10 - Up to six acres of the six acre site would be treated by prescribed burning, followed by planting of mountain shrubs. Species to be planted would include bitterbrush, chokecherry and serviceberry. Fire is not to be prescribed in zones with less than 11" of annual precipitation, and while this site does not receive over 12" of precipitation, the accumulation of snowpack increases effective precipitation to greater than 12." This is seen by the growth of mountain sagebrush, mixed mountain shrubs and grass and forb species associated with higher precipitation zones. The following spring bare root shrubs would be hand planted. Temporary fencing would be used to defer livestock grazing in the treatment area. The objectives would be to increase the age class diversity of sagebrush, increase mountain shrub cover and increase leader growth of mountain shrubs.

Site 11 - The treatment would entail mechanically treating up to 157 acres within this 196 acre site. Temporary fencing would be used to defer livestock grazing at the treatment location. The objectives would be to increase sagebrush age class diversity and to increase species richness.

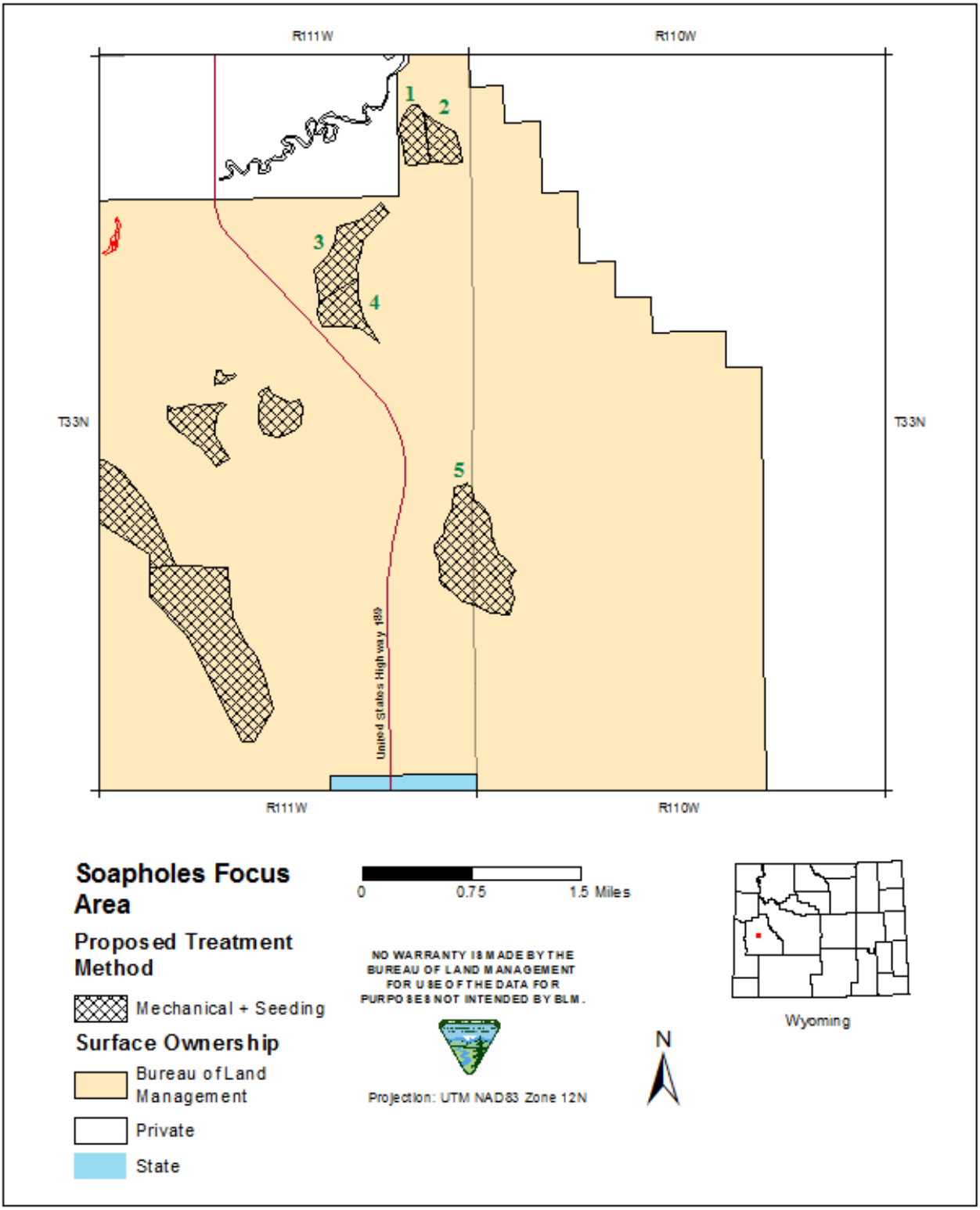
Site 12 - Up to 240 acres within this 300 acre site would be mechanically treated. Temporary fencing would be used to defer livestock grazing at the treatment location.

Site 13 - The treatment entails mechanically treating up to 48 acres of the 60 acre site. Temporary fencing would be used to defer livestock grazing in the treatment area. The objectives for this site would be to increase sagebrush age class diversity and to increase species richness.

Site 14 - Up to four acres of this five acre mixed shrub site would be treated mechanically followed immediately by seeding or shrub plantings the following spring. If shrub planting were to occur the planting would be limited to a single, east facing slope within the treatment area. Species to be planted would include bitterbrush. Temporary fencing would be used to defer livestock grazing in the treatment area. The objectives would be to increase sagebrush age class diversity and increase leader growth of antelope bitterbrush.

Site 15 - Up to 37 acres of the 46 acre site would be mechanically treated. Temporary fencing would be used to defer livestock grazing at the treatment location. The site has topography that would preclude electric fencing, and is in close proximity to water, so the site would be seeded with shrubs but not with grasses.

Map 8: Soapholes Focus Area proposed treatments.



Site 1 - The treatment would entail mechanically treating up to 21 acres of this 42 acre site. Objectives for this treatment would be to increase sagebrush age class diversity and to increase species richness.

The site would be deferred from grazing through temporary electric fencing in place only for the duration of livestock use on the allotment.

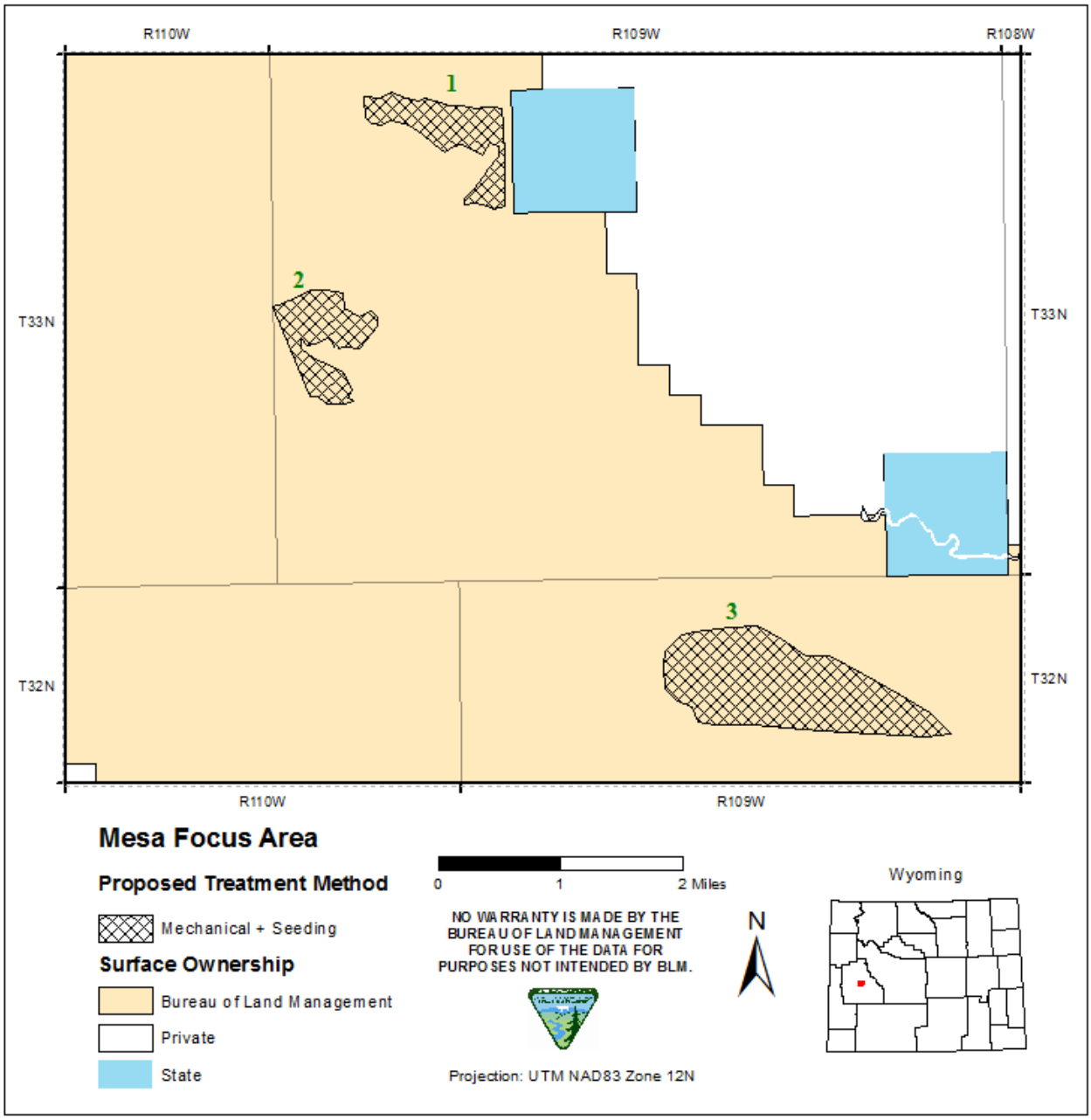
Site 2 - Up to 19 acres of this 37 acre site would be mechanically treated. The site would be deferred from grazing through temporary electric fencing in place only for the duration of livestock use on the allotment. Objectives for this treatment would be to increase sagebrush age class diversity and to increase species richness.

Site 3 - The treatment would entail mechanically treating up to 42 acres of this 83 acre site. The site would be deferred from grazing through temporary electric fencing in place only for the duration of livestock use on the allotment. Objectives for this treatment are to increase sagebrush age class diversity and to increase species richness.

Site 4 - Up to 26 acres of this 51 acre site, excluding sloped areas with little to no Wyoming big sagebrush, would be mechanically treated. The site would be deferred from grazing through temporary electric fencing in place only for the duration of livestock use on the allotment. Objectives for this treatment are to increase sagebrush age class diversity and to increase species richness.

Site 5 - Up to 153 acres of this 191 acre site would be mechanically treated, excluding steep slopes with little to no sagebrush. A rider would be used to move cattle off of treatment areas to defer the treatment. Objectives for this treatment are to increase sagebrush age class diversity, and to increase species richness.

Map 9: Mesa Focus Area proposed treatments.



Site 1 - Up to 212 of the 265 acres would be mechanically treated. Temporary electric fencing would be used to defer livestock grazing in the treatment area. Objectives for this treatment would be to increase sagebrush age class diversity and to increase species richness.

Site 2 - The treatment would entail mechanically treating up to 204 acres of the 255 acre site. Temporary fencing would be used to defer livestock grazing in the treatment area. Objectives for this treatment would be to increase sagebrush age class diversity and to increase species richness.

Site 3 - Up to 657 acres of the 821 acre site would be mechanically treated. Temporary electric fencing would be used to defer livestock grazing in the treatment area. Objectives for this treatment would be to increase sagebrush regeneration, increase age class diversity, and to increase species richness.

2.4 Alternative 2

Alternative 2 proposes habitat treatments of up to 2,361 acres. Mechanical treatments would occur on up to 2,104 acres, herbicide treatments would occur on 195 acres, prescribed fire would be used to treat 49 acres and water projects on up to 13 acres. The treatments are intended to occur over a four year time period; however, the timeframe could be expanded if necessary for implementation of treatments. The Brodie Draw pipeline and fencing of Onion Springs would be developed as described in elements common to all. Within the proposed treatment polygons the treatments would be 50% of the polygon. Treatment implementation and deferment would be coordinated with grazing permittees to ensure successful habitat recovery. See Tables 1 and 2 for more details.

2.5 Alternative 3

Alternative 3 proposes habitat treatments of up to 1,010 acres. Mechanical treatments would occur on up to 841 acres, herbicide treatments would occur on up to 156 acres, water projects on up to 13 acres and prescribed fire would not be used. The treatments are intended to occur over a four year time period; however, the timeframe could be expanded if necessary for implementation of treatments. The Brodie Draw well pipeline and fencing of Onion Springs would be developed as described in elements common to all. Within the proposed treatment polygons the treatments would be 20% of the polygon. Treatment implementation and deferment would be coordinated with grazing permittees to ensure successful habitat recovery. See Tables 1 and 2 for more details.

2.6 Alternative 4 (No Action Alternative)

Under the no action alternative the proposed habitat treatments would not be implemented, the Brodie Draw well pipeline would not be constructed and fence surrounding Onion Springs would not be constructed.

Table 1: Summary and comparison of proposed actions.

Proposed Focus Area	**Site #**	**Grazing Allotment**	**Proposed Treatment Description**	**Alt. 1 (Acres)**	**Alt. 2 (Acres)**	**Alt. 3 (Acres)**	**Objectives of Treatment**	**Proposed Year**

Proposed Focus Area	Site #	Grazing Allotment	Proposed Treatment Description	Alt. 1 (Acres)	Alt. 2 (Acres)	Alt. 3 (Acres)	Objectives of Treatment	Proposed Year
Aspen Ridge	1	James Ryegrass	Mechanical treatment followed by herbicide application followed by mountain shrub planting. If mechanical is not feasible in locations Tebuthiuron (Spike®) 20P will be substituted.	10 (as mech and herbicide)	6 (as mech and herbicide)	3 (as mech and herbicide)	All mixed mountain shrub objectives and mountain big sage objective	Year 1
Aspen Ridge	2	West Aspen Ridge	Mechanical treatment in a mosaic pattern.	138	138	55	Mountain big sage objective	Year 4
Aspen Ridge	3	James Ryegrass & East Aspen Ridge	Mechanical treatment followed by herbicide application followed by mountain shrub planting. If mechanical is not feasible in locations Tebuthiuron (Spike®) 20P will be substituted.	96 (as mech and herbicide)	60 (as mech and herbicide)	24 (as mech and herbicide)	All mixed mountain shrub objectives and mountain big sage objective	Year 1
Aspen Ridge	4	James Ryegrass & East Aspen Ridge	Mechanical treatment in a mosaic pattern.	115	71	28	Mountain big sage objective	Year 1
Aspen Ridge	5	East Aspen Ridge	Mechanical treatment in a mosaic pattern.	98	61	24	Mountain big sage objective	Year 1
Aspen Ridge	6	East Aspen Ridge	Mechanical treatment in a mosaic pattern.	27	17	7	Mountain big sage objective	Year 1
Aspen Ridge	7	East Aspen Ridge	Mechanical treatment in a mosaic pattern.	27	17	7	Mountain big sage objective	Year 1

Proposed Focus Area	Site #	Grazing Allotment	Proposed Treatment Description	Alt. 1 (Acres)	Alt. 2 (Acres)	Alt. 3 (Acres)	Objectives of Treatment	Proposed Year
Aspen Ridge	8	East Aspen Ridge	Tebuthiuron (Spike®) 20P will be applied at a rate intended to kill half of the existing sagebrush.	96	96	96	Mountain big sage objective and inc. leader growth of mountain shrubs	Year 1
Aspen Ridge	9	East Aspen Ridge	Mechanical treatment in a mosaic pattern.	90	56	11	Mountain big sage objective	Year 1
Aspen Ridge	10	East Aspen Ridge	Tebuthiuron (Spike®) 20P will be applied at a rate intended to kill half of the existing sagebrush.	33	33	33	Mountain big sage objective and increased leader growth of mountain shrubs	Year 1
Aspen Ridge	11	East Aspen Ridge	Mechanical treatment in a mosaic pattern.	51	34	13	Mountain big sage objective	Year 1
Aspen Ridge	12	West Aspen Ridge, Brodie Draw and East Aspen Ridge	Install buried water pipeline and connect water pipeline to drinking tanks.	<10	<10	<10	Increase water availability and duration, and enhanced pipeline objectives.	Year 1
Ryegrass	1	Round Valley Ryegrass	Permanent fencing of Onion Spring	3	3	3	Drainage improvement objective	Year 1
Ryegrass	2	Jewett-Ryegrass	Prescribed burn using hand ignition, followed by planting of bare root shrubs	26	26	No treatment	All mixed mountain shrub objectives	Year 2
Ryegrass	3	Jewett-Ryegrass	Mechanical treatment in a mosaic pattern followed by seeding	24	15	6	All mountain big sage and mixed shrub objectives	Year 2

Proposed Focus Area	Site #	Grazing Allotment	Proposed Treatment Description	Alt. 1 (Acres)	Alt. 2 (Acres)	Alt. 3 (Acres)	Objectives of Treatment	Proposed Year
Ryegrass	4	Jewett-Ryegrass	Mechanical treatment in a mosaic pattern followed by seeding	480	300	120	All Wyoming big sage objectives	Year 2
Ryegrass	5	Round Valley Ryegrass	Mechanical treatment in a mosaic pattern followed by seeding	42	27	11	All Wyoming big sage objectives	Year 4
Ryegrass	6	Horse Creek-Ryegrass	Prescribed burn using hand ignition, followed by planting of bare root shrubs	17	17	No treatment	All mixed mountain shrub objectives	Year 3
Ryegrass	7	Horse Creek-Ryegrass	Mechanical treatment in a mosaic pattern followed by seeding	92	92	37	All Wyoming big sage objectives	Year 3
Ryegrass	8	Round Valley Ryegrass	Mechanical treatment in a mosaic pattern followed by seeding	22	22	13	All Wyoming big sage objectives	Year 4
Ryegrass	9	Round Valley Ryegrass	Mechanical treatment in a mosaic pattern followed by seeding, on a previously disturbed pipeline	17	11	4	Enhanced pipeline reclamation objective	Year 4
Ryegrass	10	Lower Horse Creek	Prescribed burn using hand ignition, followed by planting of bare root shrubs	6	6	No treatment	All mountain big sage and mixed shrub objectives	Year 2
Ryegrass	11	Round Valley Ryegrass	Mechanical treatment in a mosaic pattern followed by seeding	157	98	39	All Wyoming big sage objectives	Year 2

Proposed Focus Area	Site #	Grazing Allotment	Proposed Treatment Description	Alt. 1 (Acres)	Alt. 2 (Acres)	Alt. 3 (Acres)	Objectives of Treatment	Proposed Year
Ryegrass	12	Round Valley Ryegrass	Mechanical treatment in a mosaic pattern followed by seeding	240	150	60	All Wyoming big sage objectives	Year 4
Ryegrass	13	Lower Horse Creek	Mechanical treatment in a mosaic pattern followed by seeding	48	30	12	All Wyoming big sage objectives	Year 2
Ryegrass	14	Lower Horse Creek	Mechanical treatment in a mosaic pattern followed by seeding and bare root stock planting	4	2	1	All Wyoming big sage objectives and increased mountain shrub leader growth	Year 2
Ryegrass	15	Lower Horse Creek	Mechanical treatment in a mosaic pattern followed by seeding	37	23	9	All Wyoming big sage objectives	Year 2
Soapholes	1	Q5	Mechanical treatment in a mosaic pattern followed by seeding.	21	21	8	All Wyoming big sage objectives	Year 3
Soapholes	2	Q5	Mechanical treatment in a mosaic pattern followed by seeding.	19	19	7	All Wyoming big sage objectives	Year 1
Soapholes	3	Q5	Mechanical treatment in a mosaic pattern followed by seeding.	42	42	17	All Wyoming big sage objectives	Year 3
Soapholes	4	Q5	Mechanical treatment in a mosaic pattern followed by seeding.	26	26	10	All Wyoming big sage objectives	Year 1
Soapholes	5	Grindstone-Soapholes	Mechanical treatment in a mosaic pattern followed by seeding.	152	96	38	All Wyoming big sage objectives	Year 3

Proposed Focus Area	Site #	Grazing Allotment	Proposed Treatment Description	Alt. 1 (Acres)	Alt. 2 (Acres)	Alt. 3 (Acres)	Objectives of Treatment	Proposed Year
Mesa	1	Mount Airy	Mechanical treatment in a mosaic pattern followed by seeding	212	132	53	All Wyoming big sage objectives	Year 4
Mesa	2	Mount Airy	Mechanical treatment in a mosaic pattern followed by seeding	204	128	51	All Wyoming big sage objectives	Year 2
Mesa	3	Mount Airy	Mechanical treatment in a mosaic pattern followed by seeding	657	410	164	All Wyoming big sage objectives	Year 1

Table 2: Summary of maximum treatment acres proposed in each alternative, as described by treatment type.

Treatment Type	Alternative 1 (Proposed Action) Treatment (Acres)	Alternative 2 Treatment (Acres)	Alternative 3 Treatment (Acres)	Alternative 4 (No Action) Treatment (Acres)
Mechanical Treatments	3118	2104	841	0
Herbicide Treatments	235	195	156	0
Prescribed Fire Treatments	49	49	0	0
Water Projects	<13	<13	<13	0
Total Acreage	**3415**	**2361**	**1010**	**0**

Table 3: Alternative 1 (Proposed Action) proposed treatments summary and deferment method.

Site	Herbicide App	Prescribed Burn	Mechanical Treatment	Shrub Planting	Deferment Method
Aspen Ridge Focus Area					
Site 1	x		x	x	WF
Site 2			x		EF or WF
Site 3	x		x	x	Rt on East Aspen Ridge EF on James Ryegrass
Site 4			x		Rt on East Aspen Ridge EF on James Ryegrass
Site 5			x		Rt
Site 6			x		Rt
Site 7			x		Rt

Site 8	x		x		Rt
Site 9			x		Rt
Site 10	x		x		Rt
Site 11			x		Rt
Site 12					Rt (for pipeline recovery)

Site	Herbicide App	Prescribed Burn	Mechanical Treatment	Shrub Planting	Deferment Method
Ryegrass Focus Area					
Site 1					Permanent Exclosure
Site 2		x		x	Rt
Site 3			x		Rt
Site 4			x		Rt
Site 5			x		WF
Site 6		x		x	EF
Site 7			x		WF
Site 8			x		WF
Site 9			x		WF
Site 10		x		x	EF
Site 11			x		WF
Site 12			x		WF
Site 13			x		EF
Site 14			x		EF
Site 15			x		EF
Mesa Focus Area					
Site 1			x		EF
Site 2			x		EF
Site 3			x		EF
Soaphole Focus Area					
Site 1			x		EF
Site 2			x		EF
Site 3			x		EF
Site 4			x		EF
Site 5			x		Rd

x = potential impacts from treatment
Rd = rider
Rt = rotation
EF = electric fencing (temporary)
WF = wire fence (temporary)

3.0 AFFECTED ENVIRONMENT

Table 3 lists resources typically considered in environmental analyses. For each resource, a determination is made whether that resource is present and would be affected by the alternatives in this

EA. Those resources determined to be Not Present (NP) or No Impact (NI) are not considered further in this EA.

Table 4: Resources and issues considered; Interdisciplinary Team checklist.

Determination	Resource	Rationale for Determination
RESOURCES AND ISSUES CONSIDERED (INCLUDES SUPPLEMENTAL AUTHORITIES APPENDIX 1 H-1790-1)		
NP	Areas of Critical Environmental Concern	Trappers Point ACEC is located near the APP, but no treatments are proposed within the 3,988 acre trapper Point ACEC.
NP	Environmental Justice	There are no known disadvantaged populations that would be adversely impacted by the proposed project.
NP	Lands with Wilderness Characteristics	The project areas were inventoried for lands with wilderness characteristics following the procedures identified in BLM Manual 6310 – Conducting Wilderness Characteristics Inventory on BLM Lands. No lands were identified as have wilderness characteristics. Reference HD01 inventory records.
NP	Special Management Areas	No special management areas (i.e.: Areas of Critical Environmental Concern or BLM Natural Areas) exist in the APP.
NP	Prime and Unique Farmlands	No prime or unique farmlands are present in the APP.
NP	Wilderness Study Area	The project area contains no Wilderness Study Areas (WSA).
NP	Wild and Scenic Rivers	The APP contains no wild or scenic rivers.
NP	Wild Horses and Burros	Wild horses and burros are not present in the APP.
NP	Woodlands and Forestry	There are no forests present in the APP.
NI	Fish Habitat	No treatments would occur within fish habitat or 500' of any body of water.
NI	Geology / Mineral Resources/Energy Production	Neither current not future energy production would be impacted by the proposed treatments. Geologic and Mineral Resources would not be impacted because only the top few inches of soil would be affected.
PI	Air Quality (Ozone, Greenhouse gas emissions)	Short-term impacts to air quality may occur. Emissions due to planned activities would result in insignificant impacts due to very short duration and minimal volumes. A discussion follows in the 'Air Quality' section.
PI	Cultural Resources	These concerns are addressed with a signed PA. A discussion follows in the 'Cultural Resources' section, and please see Appendix C for a full inventory.
PI	Livestock Grazing	Several allotments are contained within the APP. Livestock would be rotated out of the allotments proposed for work through previously agreed to deferments, or be kept out of treated areas via a rider or fencing. A discussion follows in the 'Livestock Grazing' section.
PI	Native American Religious Concerns	These concerns have been addressed with the state SHPO office in cooperation with the Tribes, as noted in the PA. A discussion follows in the 'Cultural Resources' section.
PI	Paleontological Resources	Paleontological resources have been noted in the APP but activity is unlikely to impact these resources. A discussion follows in the 'Paleontology' section.
PI	Recreation (Land Access, Hunting, Fishing, Off-Highway Vehicles, ERMAs)	The sites receive use for multiple forms of recreation. A discussion follows in the 'Recreation' section.
PI	Socioeconomics	A discussion follows in the 'Socioeconomics' section.
PI	Soils	There would be potential for erosion, due to a reduction in vegetative cover, in specific treatment sites. Best management practices (BMPs) would be implemented to minimize

Determination	Resource	Rationale for Determination
		effects. A discussion follows in the 'Soils' section.
PI	Vegetation (ecological sites, WY BLM Sensitive Species, federally Endangered, Threatened and Candidate species and invasive species/noxious weeds (EO 13112))	The proposed actions were designed to alter plant community characteristics, such as structure, diversity and age classification. The project area potentially contains 5 Wyoming BLM Sensitive Species, and 1 federally listed species. Disturbance within proposed treatment areas could allow for the establishment of weeds. A detailed SOP for invasive plants is included in Appendix F. A discussion follows in the 'Vegetation Resources' section.
PI	Visual Resource Management	A discussion follows in the 'Visual Resource Management' section.
PI	Water Resources (Surface/ground water and water quality)	Buffer zones, topography, vegetation and ground cover, project design features and natural ecosystem functions would act to minimize or eliminate any sediment from treatment areas entering waterways. A discussion follows in the 'Water Quality' section.
PI	Wetlands/Riparian Zones and Floodplains	The proposed actions avoid wetlands and riparian areas, with the exception of a single exclosure to protect a spring source. A discussion follows in the 'Wetland and Riparian Zones' section.
PI	Wildland Fuels and Fire	The risk of a wildland fire would be decreased through implementation of the proposed actions. A discussion follows in the 'Wildland Fire' section.
PI	Wildlife (big game, raptors, migratory birds, WY BLM Sensitive Species, federally Endangered, Threatened and Candidate species)	Numerous wildlife species are found in the APP. Treatments were designed for mule deer habitat, but other species may be affected by project implementation. A discussion of impacts follows in the 'Wildlife' section.

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

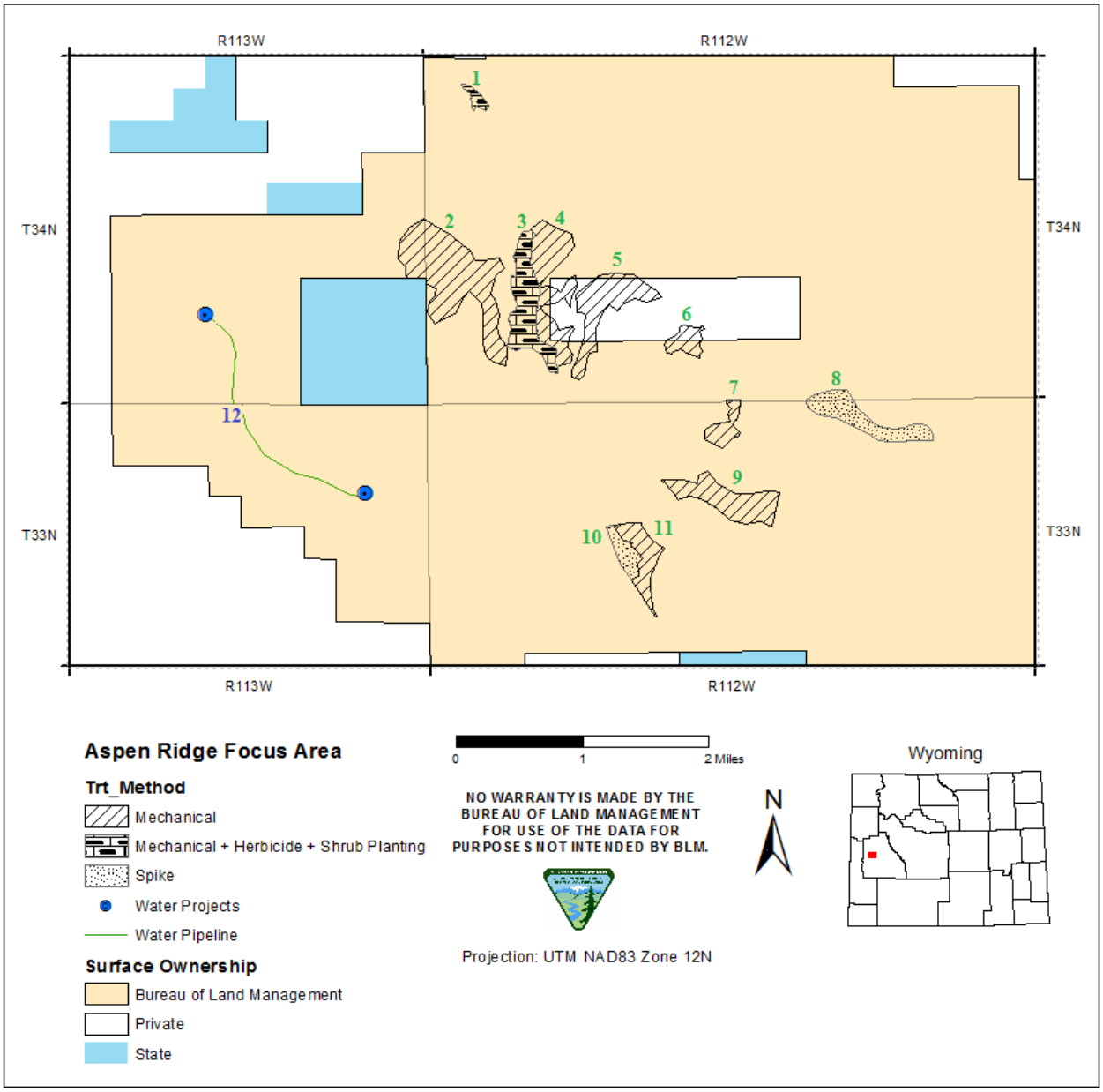
3.0.1 Site Descriptions

Maps 10-13 delineate each proposed treatment in its respective focus area.

Aspen Ridge Focus Area

Aspen Ridge is the northwestern edge of the Ryegrass region. The entire region is crucial winter range for mule deer. All BLM managed land is designated as SFA for Greater Sage-Grouse, and all other land is designated as PHMA. As such, all proposed treatment areas are partially or entirely within SFA and PHMA. Aspen Ridge reaches approximately 7,700 feet of elevation, making it slightly higher than the other treatment areas, with annual precipitation to 10-19 inches (North Wind 2009). Topography is rolling to semi-steep hills. Vegetation is characterized by predominately mountain big sagebrush cover at higher elevations and Wyoming big sagebrush at lower elevations. There are occasional patches of mountain shrub communities including snowberry (*Symphoricarpos oreophilus*), antelope bitterbrush, currant and chokecherry. The understory includes grasses and forbs. East facing slopes accumulate snow banks, and the increased snow cover results in small pockets of mountain shrub communities and occasional isolated stands of aspens.

Map 10: Aspen Ridge Focus Area proposed treatments.



Site 1 – This area is characterized by a band of dense, younger aspens and below the aspens is high canopy cover, mature mountain big sagebrush with interspersed mountain shrubs. Shrub canopy cover is greater than 25%. Grass and forb diversity is high with moderate cover. Below the band of aspens, mature and decadent mountain big sagebrush or snowberry are dominant. Snowberry is the most common mountain shrub, being distributed over the entire site.

Site 2 – This west facing slope has two distinct vegetation communities. There are exposed slopes with a sparse cover of early sage, Sandberg bluegrass and matting forbs that are prevalent near the top of the treatment area (the eastern edge). These slopes would not be treated. Farther downhill, these exposed slopes become the minority of the treatment area being replaced by mountain big sagebrush. The overstory is moderate to moderate-high cover sagebrush, predominately of the mature and decadent age

class. Sagebrush canopy cover is approximately 25%. Little recruitment of young shrubs is occurring. The understory contains moderate diversity and cover of grasses and forbs.

Site 3 – The entire site is an east facing slope that accumulates snow. The slope is approximately 15 degrees and declines in elevation from west to east. The top of the slope is dominated by dense mature and decadent mountain big sage with very rare, interspersed snowberry and antelope bitterbrush. Down slope is an isolated band of aspens. The aspens range from 5-20 ft. tall, are dense and generally in good health with active regeneration occurring. Understory beneath the aspens is highly variable with patches of high understory cover and areas with high levels of exposed soil. Below the band of aspens, mature and decadent mountain big sagebrush or snowberry is dominant. Shrub canopy cover is greater than 25%. Patches of other mountain shrubs are present. Understory cover and diversity are high for both forbs and graminoids.

Site 4 – The far western portion of this area is characterized by moderate cover composed of mountain shrubs and mountain big sagebrush on relatively steep slopes. The majority of the proposed treatment area is dominated by mature and decadent mountain big sagebrush with high canopy cover. Sagebrush canopy cover is greater than 25%, measured at 54% canopy cover in pre-treatment monitoring. Understory contains graminoids and forbs, with a higher cover of matting forbs than desired. The few drainages are dominated by clayey soils and early sage; these areas would not be treated. Mountain shrub communities exist in isolated patches on east facing slopes.

Site 5 – This site is a low point below and west of Aspen Ridge. The vegetation community is characterized by heavy cover of mature and decadent mountain big sagebrush. Some recruitment of young sagebrush is occurring but these recruits appear to have very low growth rates, and recruitment is lower than desired. Sagebrush canopy cover is greater than 25%. Native grasses are moderately common but diversity is not high, and matting forbs are most common. The north end of the proposed treatment area is small, gentle slopes, while the southern end contains steeper topography with very heavy sage cover in draws that accumulate snow and moisture.

Site 6 – The site is dominated by mountain big sagebrush of mature and decadent age classes and moderately heavy cover that varies slightly with topography. Sagebrush canopy cover is greater than 25%. The site is on a north facing slope. Understory diversity and cover are moderate with numerous grasses present and roughly equal diversity of matting and non-matting forbs in late spring.

Site 7 – This site is surrounded by numerous small, slightly sloped hills in the vicinity. The proposed treatment area is the semi-flat top of one such hill and the associated south and east facing slopes. Topography is too flat to allow for heavy snow accumulation that creates mountain shrub communities. Sagebrush cover is heavy and characterized by a mix of mature and decadent plants. Sagebrush canopy cover is greater than 25%. Grass and forb cover is moderate but productivity is low-moderate compared to nearby sites.

Site 8 – This proposed treatment site is generally a north facing slope, with segments of hillside facing east. North facing slopes are characterized by moderate to heavy cover of mountain big sage. Sagebrush canopy cover is greater than 25%. Young plants are present but rare, with mature and adult plants being most common. Understory cover and diversity are moderate, with greater cover of graminoids than forbs. East facing slopes are marked by increased shrub cover and diversity because mountain shrubs are

present at moderate to high cover. Hedging of these mountain shrubs is notable. On the east facing slopes understory cover increases slightly compared to north facing slopes. Steepness of slopes may make mechanical treatment challenging or unfeasible over portions of the proposed treatment site.

Site 9 - The site is a north facing slope. The north end of the proposed treatment area is an intermittently wet drainage. The drainage is not wet enough to exclude sagebrush. Sagebrush cover outside the drainage is moderate with moderate to low productivity. Sagebrush canopy cover is greater than 25%. The majority of the sagebrush are decadent. Young sagebrush are rare or absent. Graminoids are moderate cover with healthy diversity. Forb cover is moderate, but diversity is low relative to other mountain big sage sites. Productivity is higher in the drainage.

Site 10 – The site is characterized by high cover, matures, moderate productivity mountain big sagebrush with interspersed patches of mountain shrubs. Shrub canopy cover is greater than 25%. Snowberry is most common, followed by antelope bitterbrush. Mountain shrubs appear heavily hedged and new recruitment is minimal. Understory productivity is moderate to high where mixed mountain shrubs are common and low-moderate elsewhere.

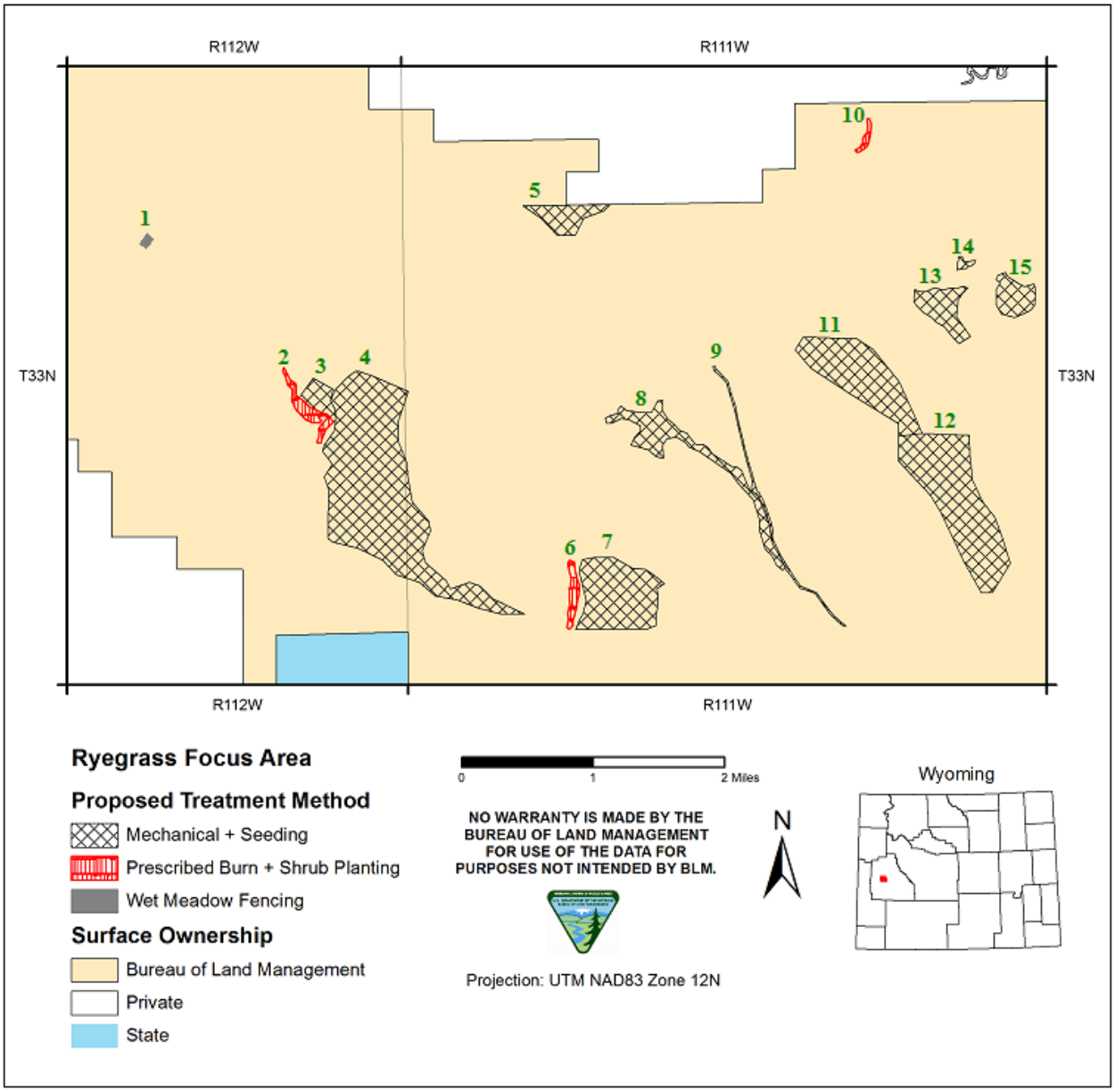
Site 11 – The site is characterized by high to moderate cover, mature, moderate-to-low productivity mountain big sagebrush and Wyoming big sagebrush. Sagebrush canopy cover is greater than 25%. Shrub cover and age-class is variable with topography and soils. Understory productivity is low to moderate. Sagebrush is almost exclusively mature or decadent with minimal new recruitment.

Site 12 – The Brodie Draw pipeline is proposed for this site. An existing water well, Permit No. P24512P, is located atop a higher elevation ridge. The water well yields 3 gallons per minute (gpm). The pipeline will run downhill from this ridge, through two lightly sloped drainages, one running northwest and the other running southeast. Both drainages have high cover of graminoids, grasses and sedges, of short stature with interspersed rabbitbrush and sagebrush. Rabbitbrush is less common than Wyoming big sagebrush, although it is of greater stature than the sagebrush. Neither shrub represents more than 10% ground cover within either drainage. The slopes of both hills that feed into the draw have high cover of grass, sagebrush and rabbitbrush, with cover ranked in that respective order. Forbs are present but not common.

Ryegrass Focus Area

The Ryegrass focus area is west of Pinedale. Precipitation averages 10-14 inches annually. The large majority of this region is crucial winter range for mule deer (see Map 2 for details). All BLM managed land is designated as SFA for Greater Sage-Grouse, and all other land is designated as PHMA. As such, all proposed treatment areas entirely within SFA and PHMA. Topography varies from small buttes and associated drainages to rolling hills and draws. Rolling hills are the predominant landscape feature. Vegetation is predominantly Wyoming big sage, with interspersed patches of rabbitbrush (*Chrysothamnus* spp.) and basin big sagebrush. Basin big sagebrush growth is determined by soils and moisture, while rabbitbrush distribution is more heavily determined by disturbance and land management. The understory is largely composed of Sandberg bluegrass (*Poa secunda*), Letterman's needlegrass (*Achnatherum lettermanii*), bottlebrush squirreltail (*Elymus elymoides*), western wheatgrass (*Pascopyrum smithii*), thickspike wheatgrass (*Elymus lanceolatus*), Hood's phlox (*Phlox hoodii*), pussytoes (*Antennaria rosea*), trifolium (*Trifolium* spp.), longleaf phlox (*Phlox longifolia*) and buckwheat species (*Eriogonum* spp.).

Map 11: Ryegrass Focus Area proposed treatments.



Site 1 – This site contains Onion Springs and is the proposed 3 acre exclosure. The spring and adjacent area is characterized by high cover of graminoids and patches of bare ground, likely caused by sodic conditions. The area immediately surrounding the spring is hummocked. No shrubs are present.

Site 2 – This site is characterized by heavy winter snowloading, resulting in mountain big sagebrush at low to moderate cover and interspersed mixed mountain shrubs. Basin wildrye (*Leymus cinereus*) is common. Grass diversity and cover is moderate. Forb diversity is moderate and cover is low. Chokecherry and serviceberry are present in sporadic patches, and generally tall but heavily browsed. Predominant winds are from west to east, so snow accumulates on the protected east face of this slope when deposited there by the wind. Sagebrush canopy cover is approximately 15%.

Site 3 – This site is bowl shaped, and is characterized by high cover of mature Wyoming big sagebrush. There are patches of sagebrush cover where the majority of plants are decadent. Sagebrush canopy cover is greater than 25%. Grass diversity is high and cover is moderate to high. Grass diversity is less at the bottom of the bowl, than around the periphery. Forb diversity and cover is moderate.

Site 4 – The site is characterized by moderate canopy cover, mature, moderately productive Wyoming big sagebrush. Sagebrush cover is heavier in valleys, draws and east facing slopes than more exposed locations that do not accumulate snow or act as seasonal drainages. Sagebrush canopy cover is variable but greater than 25% over most of the site. Several grass species and forb species are found consistently across the site but diversity is low to moderate, depending on location; sites with increased snow accumulation generally have higher diversity.

Site 5 – This site is characterized by moderate canopy cover, decadent, low productivity Wyoming big sagebrush at density. Sagebrush canopy cover is approximately 25%. The understory has low cover and diversity of grasses and forbs, with high bare ground. Sod forming grasses are the most common grass, with bunchgrasses being most common under sagebrush.

Site 6 – This area is characterized by heavy winter snowloading, resulting in high canopy cover, with moderate to high productivity, of mature mountain sagebrush and interspersed patches of mixed mountain shrubs. Sagebrush canopy cover is greater than 25%. Snowberry is the most common mountain shrub. Predominate winds are from west to east, so snow accumulates on the protected east face of this slope when deposited there by the wind. Grass diversity and cover are moderate. Forb diversity and cover is moderate. Green rabbitbrush is very sparse.

Site 7 – The site is characterized by moderate canopy cover, mature, low to moderate productivity Wyoming big sagebrush. Sagebrush cover is heavier in valleys, draws and east facing slopes than more exposed locations that do not accumulate snow or act as seasonal drainages. While variable with topography, sagebrush canopy cover is approximately 25% and much higher in sites conducive to sagebrush growth. Several grass species and forb species are found consistently across the site but diversity is low to moderate, depending on location; sites with increased snow accumulation generally have higher diversity.

Site 8 – This site contains two distinct plant communities; one community within a seasonal gully and another above the gully. To the north the gully is predominately graminoids with moderate forb cover. Ground cover is high and productivity is moderate. Farther south in the drainage graminoid cover remains high, forbs become sparse and shrub cover develops. The sagebrush flats above the drainage also vary on a north-south gradient. To the north Wyoming big sage cover is sparse to moderate, the age class is predominately mature and green rabbitbrush is prevalent. Grass and shrub cover are low, and bare soil cover is high. Farther south sagebrush cover increases, as does the proportion of decadent plants. Rabbitbrush becomes less common. Basin big sage is present bordering the drainage. Grass cover becomes moderate, with a corresponding decrease in bare ground. Forbs are still rare and lacking diversity.

Site 9 – This buried pipeline and the associated surface disturbance is characterized by high grass cover and moderate grass diversity. Forbs and shrubs are rare and diversity is low. Sagebrush canopy cover is approximately 5%.

Site 10 – This area is characterized by heavy winter snowloading, resulting in high canopy cover, high productivity, mature mountain sagebrush. Sagebrush canopy cover is greater than 25%. Grass and forb diversity are high and cover is moderate. Green rabbitbrush is present but rare. Predominant winds are from west to east, so snow accumulates on the protected east face of this slope when deposited there by the wind. Snowberry occurs as dispersed individuals but is consistently present across the site. A dense stand of mature, hedged chokecherry and bitterbrush is present.

Site 11 – This site is characterized by moderate and high Wyoming big sage cover and minimal litter on the soil surface. Sagebrush canopy cover is greater than 25%, measured at 28.2%, 35.4% and 35.4% at three pre-treatment monitoring sites. Limited forbs and grass exist on the site. The sagebrush is mature or decadent and moderately productive, but there is little to no recruitment of young plants.

Site 12 – This site is contiguous with Site 11 and has very similar characteristics. Sagebrush canopy cover is greater than 25%, measured at 29.8% and 32.4% at two pre-treatment monitoring sites.

Site 13 – This site is characterized by heavy cover of moderate stature Wyoming big sagebrush, most of which is mature. Decadent sagebrush is common and young sagebrush are uncommon. Sagebrush canopy cover is greater than 25%, measured at 30.2% and 33.4% at two pre-treatment monitoring sites. Sandberg bluegrass and matting forbs are present and moderately productive. Diversity of grasses and non-matting forbs is low.

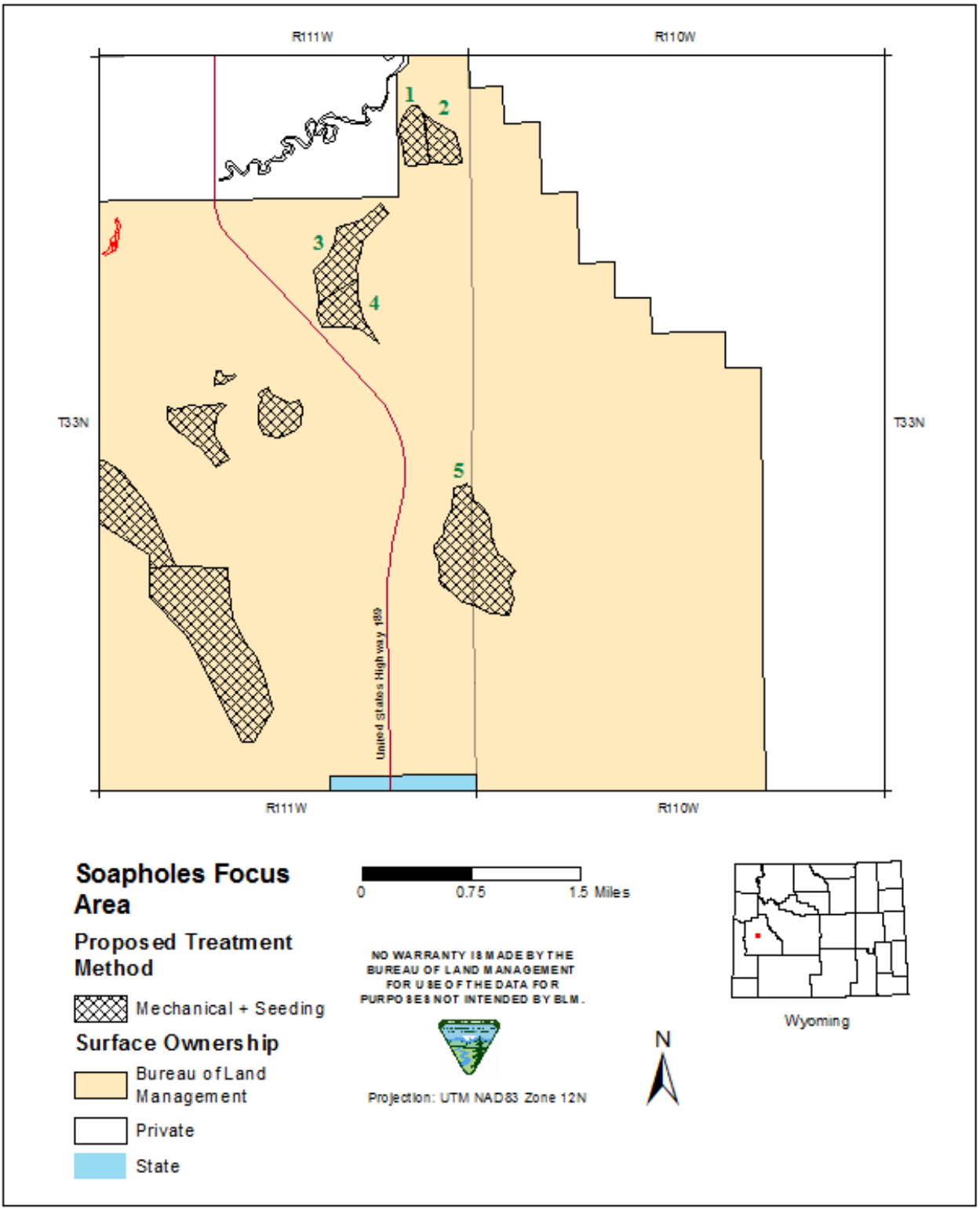
Site 14 – The area is characterized by moderate canopy cover, low to moderate productivity, decadent sagebrush. Grass and forbs are sparse. Antelope bitterbrush is present in patches where slopes face east; these plants are very hedged. Shrub canopy cover is slightly greater than 25%. Tall statured green rabbitbrush is present in low densities on the southwest side of the proposed treatment area.

Site 15 – This site is a gently sloped bowl with an accumulation of salt/carbonates at the bottom. The center of the site has low to moderate sagebrush cover. Other parts of the site are characterized by moderate to high cover of shorter statured Wyoming big sagebrush, most of which is mature. Decadent sagebrush are common and young sagebrush are rare. Sagebrush canopy cover is variable, generally averaging 25%, and measured at 30.4% outside of the “bowl” of salt/carbonate accumulation.

Soapholes Focus Area

The Soapholes focus area is west of Pinedale. Precipitation averages 10-14 inches annually. The southern portion of this region is crucial winter range for mule deer (see Map 1 for details). All BLM managed land is delineated as SFA for Greater Sage-Grouse, and all other land is designated as PHMA. As such, all proposed treatment areas are entirely within SFA. Topography varies from small buttes and associated drainages to rolling hills and draws. Rolling hills are the predominant landscape feature. Topographic depressions, called soapholes, sporadically dot the landscape. These soapholes are boggy much of the year due to slightly saline surface or sub-surface water accumulations. Vegetation within the Soapholes is distinct and predominately graminoids. Vegetation on the rest of the landscape is composed of species similar to the Ryegrass Focus Area, although compositions are not identical.

Map 12: Soapholes Focus Area proposed treatments.



Site 1 – This site is characterized by moderate density Wyoming big sagebrush with low to moderate productivity. The sagebrush is predominately decadent and little regeneration is occurring. Sagebrush

canopy cover is greater than 25%, measured at 36.2% at one pre-treatment monitoring site. There are isolated clumps of basin big sagebrush across the site. Forbs exist at low densities. Multiple species of native grasses are present at moderate densities. Rabbitbrush exists in the understory, but is rare.

Site 2 – This site is contiguous with Site 1 and ecologically very similar. Sagebrush canopy cover is greater than 25%, measured at 36.2% at another, separate pre-treatment monitoring site.

Site 3 – This site is characterized by moderate density Wyoming big sagebrush with low productivity. The sagebrush is predominately mature or decadent and little regeneration is occurring. Sagebrush canopy cover is greater than 25%, measured at 34.4% at one pre-treatment monitoring site. There are isolated clumps of basin big sagebrush across the site. Forbs exist at low densities. Multiple species of native grasses are present at low densities; rhizomatous grasses are most common. Rabbitbrush exists in the understory.

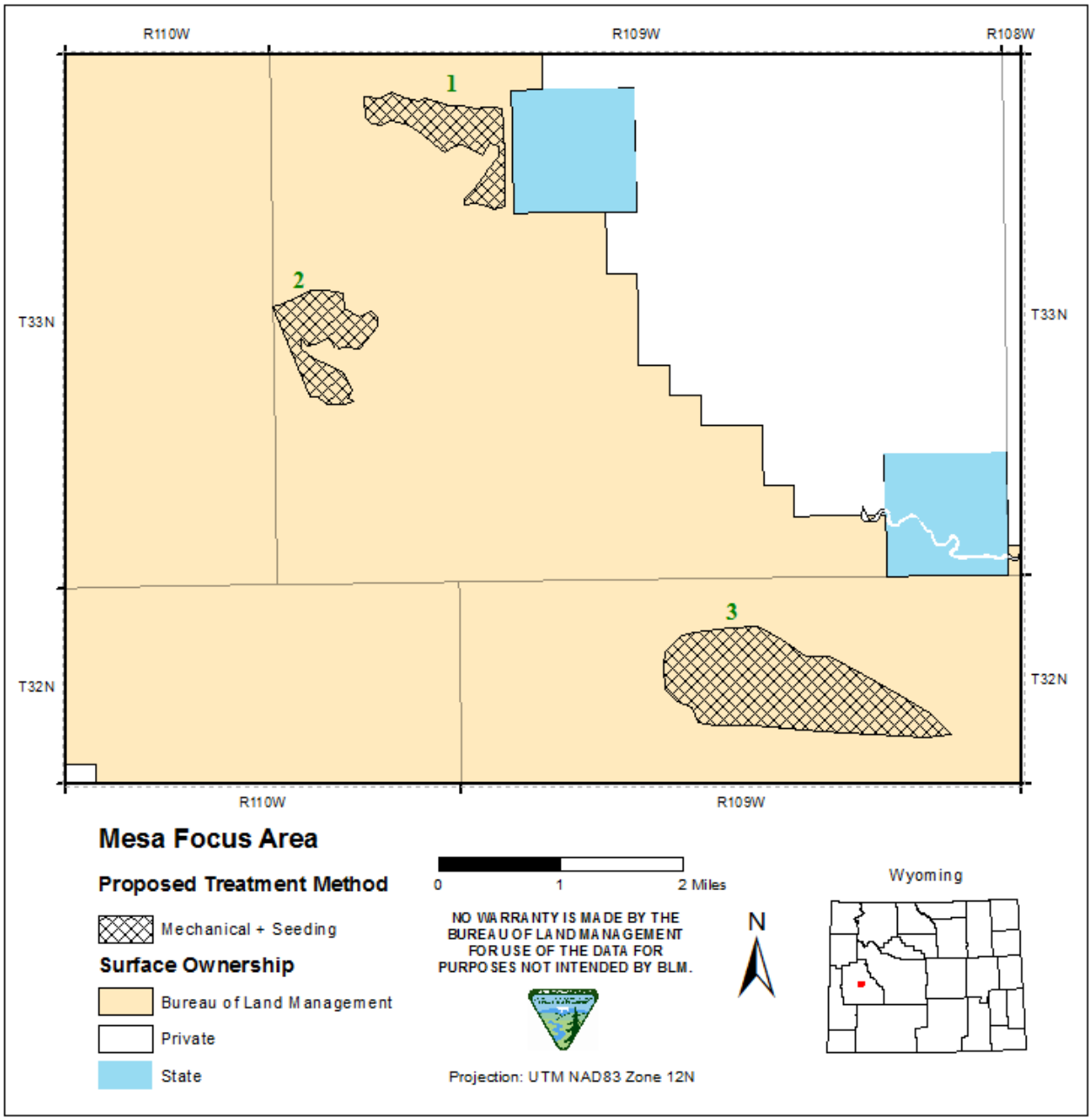
Site 4 - This site is contiguous with Site 3 and ecologically very similar. Sagebrush canopy cover is greater than 25%. The primary difference is the existence of exposed, rocky slopes on the eastern edge of the treatment area.

Site 5 – This site is characterized by moderate to high density, mature Wyoming big sagebrush with low productivity. Sagebrush canopy cover is variable with topography, being lighter near the top of the slope and greater than 25% over the lower elevation portions of the proposed treatment site. Young sagebrush are largely absent. Few grass and forb species exist consistently across the site.

Mesa Focus Area

The Mesa focus area lies south of Pinedale and is the regional epicenter of energy development. The entire area is crucial winter range for mule deer. While the flanks of the Mesa are delineated as SFA or PHMA, the treatments are within designated General Habitat Management Area (GHMA). The topography is largely flat with some rolling hills and draws. The Green River is in close proximity to the west. Steep and barren or rocky slopes exist on the western flank of the Mesa. The northern end of the Mesa is wetter than the southern end by a small margin, and is dominated by Wyoming big sage with interspersed grasses and forbs. Farther south sagebrush remains present but Sandberg bluegrass becomes more common. Across the area vegetation is predominantly Wyoming big sage, with interspersed patches of green rabbitbrush (*Chrysothamnus viscidiflorus*) and basin big sagebrush (*Artemisia tridentata* spp. *tridentata*).

Map 13: Mesa Focus Area proposed treatments.



Site 1 – Sagebrush cover across the site is variable from low-moderate to high. The areas with lower cover generally have shorter statured plants that are classified as decadent. Little to no recruitment is occurring, and productivity is low. Sagebrush canopy cover is greater than 25%. Areas with increased sagebrush cover contain nearly equal proportions of adult and decadent sagebrush all of which is normal stature and of moderate productivity. Sandberg bluegrass and rhizomatous grasses are the most frequently encountered graminoids, and are common. Forb cover and diversity is low and predominately matting forbs.

Site 2 – This site has high cover of tall statured sagebrush. Productivity is moderate, but recruitment of young sagebrush is low to absent. More sagebrush plants are mature than decadent. Sagebrush canopy

cover is greater than 25%, measured at 33.8% on one pre-treatment monitoring site. Some rabbitbrush is present, but is sparse and short-statured, and generally plants are isolated. Grass diversity is low, while cover is moderate.

Site 3 – This site is characterized by moderate to heavy sagebrush cover. Most sagebrush are decadent. Stature is variable in a patchy distribution. Productivity is low to moderate, varying between stands of sagebrush. Sagebrush canopy cover is greater than 25%. Green rabbitbrush is present but uncommon and short-statured. Sandberg bluegrass is prevalent. Grass cover is moderate but diversity is limited. Matting forbs are most common of the present forb species.

3.1 Air Quality

Regional air quality is influenced by the interaction of meteorology, climate, the magnitude and spatial distribution of local and regional air pollutant sources, and the chemical properties of emitted air pollutants.

To protect human health and welfare, the Clean Air Act (CAA) requires the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for pollutants harmful to public health or the environment. The Wyoming Department of Environmental Quality-Air Quality Division (WDEQ) monitors and enforces air-quality standards. Wyoming Ambient Air Quality Standards (WAAQS) and NAAQS identify maximum limits for concentrations of criteria air pollutants at all locations to which the public has access. The WAAQS and NAAQS are legally enforceable standards.

Criteria air pollutants, Hazardous Air Pollutants (HAPs), and Air Quality Related Values (AQRVs), such as visibility and atmospheric deposition are the components of air resources which the BLM must consider and analyze to address the potential effects of federal actions on air resources as part of the planning and decision making process.

The EPA has set NAAQS for the following criteria pollutants: ozone (O_3), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter ($PM_{2.5}$ and PM_{10}), and lead (Pb). Air-pollutant concentrations greater than the NAAQS represent a risk to human health. If the air quality in a geographic area meets the NAAQS, it is designated as an *attainment* area; areas that do not meet the NAAQS for any of the criteria pollutants, are designated *nonattainment* areas for that pollutant and must develop comprehensive state plans to reduce concentrations to a safe level.

The project area is located in the Upper Green River Basin (UGRB) 'marginal' nonattainment area for ozone as designated by the EPA on April 30, 2012 based on the 2008 8-hour average ozone standard of 75 parts per billion (ppb). The formal designation went into effect on July 20, 2012.

As a result of the marginal nonattainment designation, the BLM must comply with General Conformity regulations in 40 CFR 93 Subpart B and Chapter 8, Section 3 of the Wyoming Air Quality Standards and Regulations (WAQSR). Under these regulations, the BLM is required to conduct a General Conformity analysis and cannot approve any action that would cause or contribute to a new violation of the NAAQS or increase the frequency or severity of any existing violation.

The BLM must include a conformity analysis based on annual emissions from the proposed project for the alternative selected. Federal actions estimated to have an annual net emissions increase less than the de minimis threshold of 100 tons/year of oxides of nitrogen (NOx) or VOCs (precursor pollutants that form ozone in the atmosphere) do not require additional analysis under the General Conformity regulations and may be authorized by the BLM. The BLM's conformity analysis excludes any portion of the proposed project that requires a permit under the state of Wyoming's New Source Review (NSR) or Prevention of Significant Deterioration (PSD) programs since permitted activities are presumed to conform to the State of Wyoming's SIP under the General Conformity regulations.

Refer to Appendix A (http://tinyurl.com/hlaf8v7 for a detailed discussion of the NAAQS and WAAQS, criteria air pollutants, the UGRB marginal ozone nonattainment designation, HAPs, and AQRVs. Also refer to The Pinedale Resource Management Plan (RMP, November 26, 2008, Sec. 2.3.1, Air Quality Management, p. 2-10).

Climate Change and Green House Gases

Climate change refers to any significant change in the measure of climate, such as precipitation and temperature, lasting for an extended period (decades or longer). Temperatures in western Wyoming are expected to increase by 0.25ºF to 0.4ºF per decade and precipitation is expected to decrease by 0.1 to 0.6 inches per decade (DOI-BLM-WY-030-2011-123-EA Sec. 3.2.2.1.2).

Several activities, conditions, and events that occur in the PFO management area contribute to climate change, including: large wildfires, activities using combustion engines, changes to the natural carbon cycle, changes to radioactive forces and reflectivity, and emissions of greenhouse gases (GHGs). Some GHGs, such as carbon dioxide (CO_2) and methane (CH_4), occur naturally. These and other GHGs, including nitrous oxides (NOx), and fluorinated gases are created and emitted through human activities, including oil and gas development.

Currently, the WDEQ does not have regulations regarding GHGs, although these emissions are regulated indirectly by various other regulations. The BLM must consider GHGs and climate change as part of the planning and decision making process.

Refer to Appendix A (http://tinyurl.com/hlaf8v7) for a detailed discussion of GHS and climate change. Also refer to the Pinedale Resource Management Plan (RMP, November 26, 2008, Sec. 2.3.1, Air Quality Management, p. 2-10).

3.2 Cultural Resources

The proposed Sublette Mule Deer project area is located within the cultural subregions designed in the 2008 BLM FEIS for the Pinedale Field Office as "Ryegrass" and "The Mesa" (BLM 2008b, 3.3.2).

The Ryegrass subregion is characterized by a rolling sagebrush upland steppe flanked by streams that derive from the Wyoming Range. In the Ryegrass, prior cultural resource inventories, primarily in the form of linear geophysical inventory, have occurred in a grid pattern throughout the proposed project area(s). This work provides a cross section of inventory that can provide a context for expected site types and densities within the proposed project areas. This area is known to contain sparse concentrations of cultural resources primarily associated with prehistoric use of the significant wildlife migration corridors

and local riverine resources. Historic sites on BLM administered land in the Ryegrass are sparse and typified by historic stock camps and historic debris scatters. The Ryegrass area has largely been unaffected by natural gas development occurring in adjacent areas of the Pinedale Field Office.

The Mesa subregion is dominated by The Mesa, a large flat-topped bench formed of erosional sediment from the Pleistocene glacial outwash. This feature is bounded by the Green River drainage to the west and the New Fork drainage to the east and forms a major wildlife migration corridor. This migration corridor is the location of numerous related prehistoric occupations of varying size and complexity. The prehistoric site types known for this area are generally composed of open camps with remnant thermal features and lithic artifacts along the Mesa flanks, with stone alignments and features located along the Mesa edges. The 'Mesa' subregion is located in the Pinedale Anticline Project Area gas development field and is currently under development. This development activity has resulted in hundreds of Class III block and linear inventories of the 'Mesa' subregion. These inventories indicate a relatively high concentration of significant prehistoric archaeological sites along the flanks of The Mesa and a paucity of sites on the flat-topped bench. Historic sites in the area are generally rare; however, The Mesa is the location of a portion of "The Green River Drift" stock driveway, a National Register Listed historic property.

3.2.1 Native American Religious Concerns

Native American Tribes have identified some of the features located in the 'Ryegrass' and 'Mesa' subregion to be of cultural and religious importance to them. These locales are treated as confidential and are not disclosed in public documents per prior Tribal request. The Eastern Shoshone Tribe of the Wind River Reservation, The Northern Arapaho Tribe of the Wind River Reservation, The Shoshone-Bannock Tribes of the Fort Hall Reservation and The Ute Tribe of the Ouray and Uintah Reservation are consulting parties to this EA and in the development of the Section 106 PA developed for this project (BLM 2014). A summary of the Tribal Consultation undertaken for this project is contained in Appendix C of the PA document.

BLM engages in ongoing proactive consultation with affected Native Americans, in particular the Shoshone, concerning the identification and management of cultural resources. In 2004, consultation with the Shoshone Tribe resulted in a set of Tribal guidelines for buffer zones for development (e.g. seismic activity, construction, power lines) near Native American sites. These guidelines, dictated from Tribal elder Richard Ferris, Sr., are frequently used by BLM but stand as non-binding recommendations. The Shoshone rely upon information provided to them by BLM to determine sensitive sites, practicalities, and general project information.

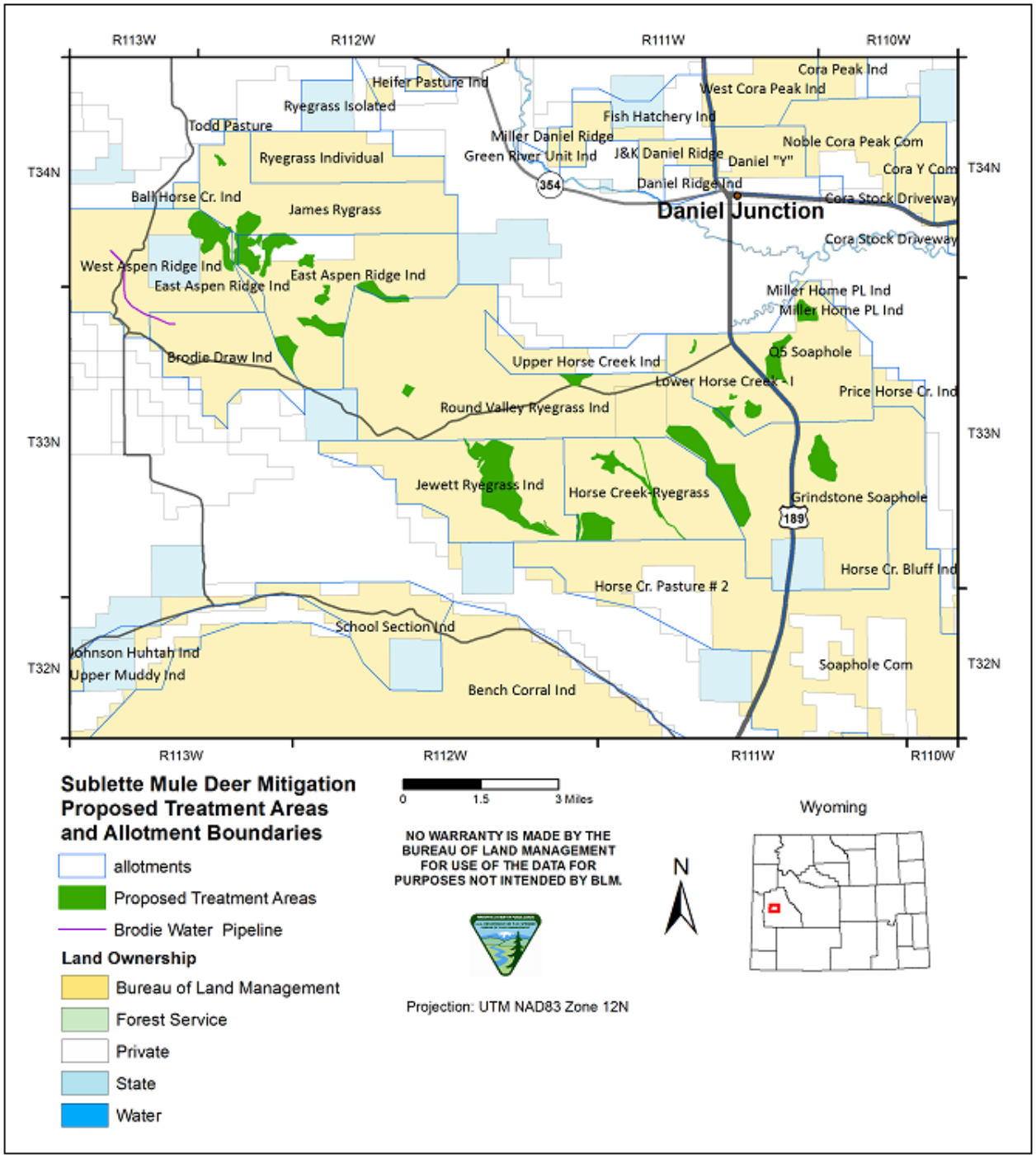
The BLM will continue to consult with appropriate Indian Tribes through the life of the project regarding historic properties of religious and cultural significance in accordance with the NHPA, the Native American Graves Protection and Repatriation Act (NAGPRA), Archaeological Resources Protection Act of 1979 (ARPA), American Indian Religious Freedom Act of 1978 (AIRFA), Executive Order 13007 Sacred Sites, and their implementing regulations.

3.3 Livestock Grazing

Proposed treatments occur within 11 different grazing allotments, all managed by the Pinedale Field Office BLM (Maps 14 and 15). The allotments encompass 49,587 acres of BLM, 1,231 acres of state land and 748 acres of private lands. Maps 14 and 15 show grazing allotments relative to treatment

locations. Table 5 shows the land ownership within the 11 allotments, and Table 6 shows permitted use within each allotment.

Map 14: Allotments within Aspen Ridge, Ryegrass and Soaphole focus areas



Map 15: Allotments within Mesa focus Area

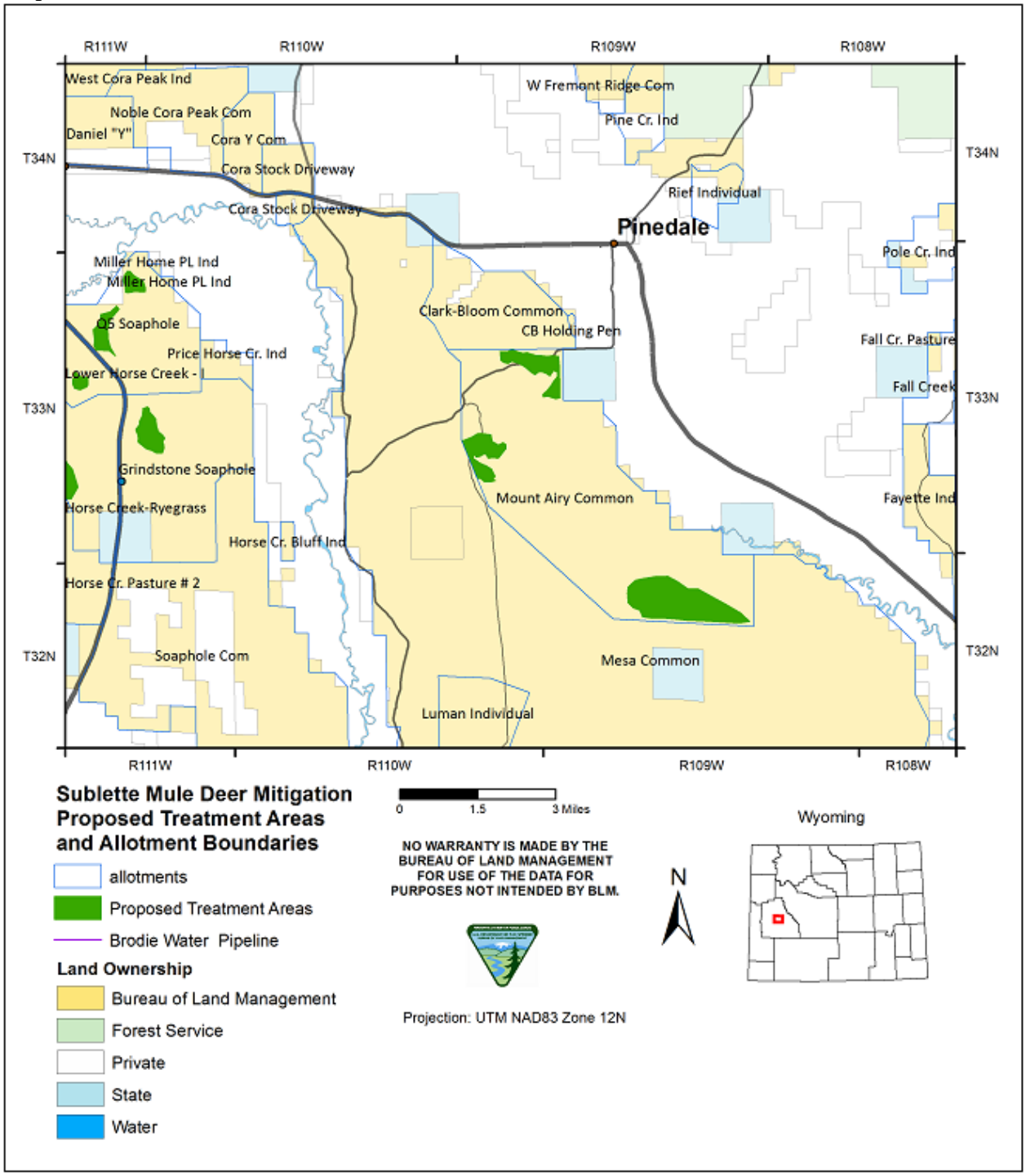


Table 5: Land ownership status by allotment

Allotment		BLM	State	Private	Total
ID #	**Name**				
00747	West Aspen Ridge Individual	3,531	640	0	4,771
22006	East Aspen Ridge Individual	4,232	0	633	4,865
02049	Mount Airy Common	9,732	0	7	9,739
02088	Horse Creek-Ryegrass	3,636	0	0	3,636
02118	Jewett Ryegrass Individual	3,882	0	36	3,918
02143	Grindstone Soaphole	4,182	383	0	4,565
02144	Lower Horse Creek Individual	1,871	0	5	1,876
02171	Brodie Draw Individual	2,278	0	0	2,278
02174	Q5 Soaphole	2,605	0	72	2,677
12102	James Ryegrass	3,538	0	0	3,538
12205	Round Valley Ryegrass Individual	10,100	208	0	10,308

Table 6: Permitted use per allotment

Allotment	Category	Livestock # and type		Dates of Use	BLM Acres	BLM AUMs
West Aspen Ridge	M	560	C	5/8 – 6/30	3,531	845
East Aspen Ridge	M	548	C	5/8 – 6/30	4,232	846
Mount Airy Common	I	756	C	5/16 – 6/25	9,732	757
Horse Creek Ryegrass	I	594	C	6/15 – 7/7	3,636	449
Jewett Ryegrass	M	307	C	5/22 – 6/30	3,882	404
		10	H	5/15 – 9/1	3,882	36
Grindstone Soaphole	I	343	C	5/10 – 6/30	4,182	586
Q5 Soaphole	I	473	C	5/16 – 6/20	2,605	560
		6	H	5/1 – 5/31	2,605	6
James Ryegrass Ind.	I	363	C	6/1 – 7/31	3,585	728
Round Valley Ryegrass	M	754	C	5/15 – 7/5	10,100	1,289

***Category:** M=Maintain, C=Custodial, I=Improve
***Livestock Type:** C=Cattle, H=Horses

3.4 Paleontology

Rock units representing more than 500 million years of geologic time are present in the area. Many of these units contain paleontological resources. The potential for a given geologic formation to contain paleontological resources varies by formation and age. As the potential for paleontological resources increases, the need for mitigating surface disturbing activities also increases. More information can be found in Appendix J, with examples of corresponding management considerations or actions.

3.5 Recreation

Popular outdoor activities in the project area include fishing, hunting, hiking, camping, wildlife observation, mountain biking, horseback riding, antler collection, and Off Highway Vehicle (OHV) use. The 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation revealed that 961,000

residents and nonresidents 16 years or older fished, hunted, or observed wildlife in Wyoming. The most popular activity was wildlife watching, followed by fishing and then hunting. Wyoming had the third-highest hunting participation rate, after South Dakota and Alaska/Mississippi, at 18% (USFWS 2011).

A portion of the Green and New Fork River Special Recreation Management Area (SRMA) is within the APP. A SRMA is a special area designation where significant public recreation issues or management concerns occur. Special or intensive types of management are typically needed. Detailed recreation planning is required and greater managerial investment (e.g., facilities, supervision, etc.) is likely.

The 2008 RMP places management emphasis on the Green and New Forks Rivers SRMA. The Management Objective for the Green and New Fork Rivers SRMA is to manage each zone to provide opportunities for the public to achieve targeted, high-quality recreation activities and experiences that produce significant benefits to the visiting public (BLM 2008b, page 2-29). BLM's 2008 ROD and RMP recreation objectives include:

- Maintain or enhance the health and viability of recreation-dependent natural resources and settings within the planning area.

- Manage SRMAs to provide for current and future recreation opportunities, using the Recreation Opportunity Spectrum as a guide to maintain, promote, or modify recreation activities, settings, and experiences.

- Provide an array of resource-dependent dispersed recreation opportunities, such as hunting, fishing, motorized use, and open space (BLM 2008b).

Other than the Green and New Fork River SRMA, the project area is entirely within an Extensive Recreation Management Areas (ERMA). An ERMA is an area not specifically designated as a SRMA, and includes all BLM-administered lands outside SRMAs where dispersed recreation activity generally occurs (BLM 2008b). Management levels should be low and focus only on management activities intended to maintain public health and safety.

No developed campgrounds occur within the project area. Dispersed camping within 200 feet of streams or in riparian areas is allowed, but could be restricted or prohibited if resource damage occurs (BLM 2008b). Pursuant to BLM's 2008 RMP, commercial operators camping within 200 feet of streams or in riparian areas will be considered on a case-by-case basis and could be restricted or prohibited if resource damage occurs.

Big game hunting within the project area includes elk, pronghorn antelope, white-tailed deer, mule deer, and moose. A variety of bird species are also hunted including ducks, geese, and Greater Sage-Grouse. Antler hunting in the spring is a popular family activity for many people. Antler Hunting Season is May 1 to Dec. 31 on public lands west of the Continental Divide in Wyoming. Antler hunting is prohibited between January 1 and April 30 (WGFD 2012).

Greater Sage-Grouse hunting occurs within the project area. The hunting season opens on September 20th and closes September 30th (WGFD 2014). The "daily bag limit," or the maximum number of Greater

Sage-Grouse that may be legally taken in a single day, is two birds. In 2011, 565 hunters harvested 1,720 Greater Sage-Grouse statewide (WGFD 2012).

Within the entire APP, OHV use is limited to existing or designated roads and trails. Off-road vehicle travel is permitted only to accomplish necessary tasks and only if such travel would not result in resource damage. Necessary tasks are defined as work requiring the use of a motor vehicle, such as picking up big game kills, repairing range improvements, managing livestock, and conducting mineral activities where surface disturbance does not total more than five acres, as described in the provisions of 43 CFR 3809~~.1-3~~. BLM administered lands in the Ryegrass and Mesa big game winter ranges are closed to motorized vehicle use (but not human presence) each year from January 1 until April 30 (BLM 2012b). Within the Ryegrass winter range, a portion of Aspen Ridge at the intersection of the James Ryegrass, West Aspen Ridge Individual, and East Aspen Ridge Individual allotments, is closed for OHV use (BLM 2008b).

3.6 Socioeconomics

Sublette County is a sparsely populated rural area in western Wyoming. It has an area of 4,883 square miles (12,650 km^2) and a population of 10,247 as of 2010 (USCB 2010 and 2011). The county seat is Pinedale. Pinedale is at the center of a Rocky Mountain gas boom that began in 2000 and accelerated five years later after Hurricane Katrina knocked out Gulf supplies, forcing up prices (The Economist 2007). Sublette County populations grew 73% between 2000 and 2010 (USCB 2000 and 2010a).

The main economic uses of the APP are livestock grazing and natural gas development (on the eastern portion of the APP). The 11 grazing allotments are used by local ranchers mainly in May and June. Many of those using these allotments use ranching as their primary source of income.

Livestock ranching has been a featured element of the economies of Sublette County and the towns of Pinedale, Big Piney, and Boulder for over a century. Ranching enterprises contribute year-round revenue in the form of services and supply purchases, and modest contributions of employment. Since around 2000, with the increase in year -round natural gas development, ranching revenues have declined as a proportion of the overall economic portfolio of the county. On an individual basis, however, ranching is a central source of income for families employed in or engaged directly or indirectly in this industry. Livestock herds are a primary source of this income.

In 2007, agriculture provided 4% of the employment in Sublette County, with not quite 100 employees. The average wages for a job in the agriculture, forestry, fishing and hunting sector was $20,099 in 2001. In 2007, oil and gas provided over 94% of the county's taxable value (Sublette County Socioeconomic Impact Study 2008). Of over 34 million calves produced in the United States in 2012, about 660,000 (about 1.9%) came from Wyoming (USDA NASS 2012).

3.7 Soils

Many different soil types exist within the proposed treatment areas. The elevation gradient runs from approximately 6,900 to 7,700 feet (ESRI 2010) with slopes from 0 to 25% within the proposed treatment areas. Soils within the project sites have formed from a wide variety of geologic material, ranging from geologic parent material rock (residuum) to material transported by wind (aeolian deposits), water (alluvium), and gravity (colluvium) (BLM 2008b; USDA 2012). The project site areas are primarily rangeland, without prime farmland soils. The soil information was gathered from the United States

Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey of Sublette County, Wyoming.

Table 7 provides an overview of the major soil types and pertinent characteristics within the proposed project area. A 'major soil' is defined as a soil type covering greater than 50 acres within the project area (NRCS Web Soil Survey, 2013).

Table 7: Soil types in proposed treatment areas

Soil Type	Erosion Hazard (water)	Hydrologic Group	Wind Erosion Index	Fire Damage Susceptibility
Cheeseman-Pagoda complex, 2-15%slopes	Slight	B	48	Moderately susceptible
Cortyzack-Ryedraw complex, 4-25% slopes, dissected	Slight	B	56	Moderately susceptible
Foursees-Badland complex, 8-45% slopes	Moderate	B	48	Highly susceptible
Golphco-Broback complex, 4-25% slopes	Moderate	B	56	Moderately susceptible
Golphco-Mountairy complex, 4-15% slopes	Slight	B	56	Moderately susceptible
Havermom-Sandbranch-Giarch complex, 0-4% slopes	Slight	D	48	Moderately susceptible
Jemdilon gravelly loam, 1-4% slopes	Slight	C	38	Moderately susceptible
Millerlake-Brodie-Conwaycreek complex, 6-25% slopes	Moderate	B	86	Moderately susceptible
Obadia-Ravenhole-Rallod complex, 4-25% percent slopes	Slight	D	48	Slightly susceptible
Spang-Ferball-Ceek complex, 2-15%slopes	Slight	A	86	Moderately susceptible
Taffom-Conpeak-Badland complex, 15-60% slopes	Moderate	B	48	Moderately susceptible

Soil Type	Erosion Hazard (water)	Hydrologic Group	Wind Erosion Index	Fire Damage Susceptibility
Sandbranch-Scooby complex, 1-8% slopes	Slight	C	86	Moderately susceptible
Golphco-Chinatown complex, 4-30% slopes	Slight	B	48	Moderately susceptible
Fonce fine sandy loam, 0-4% slopes	Slight	B	86	Moderately susceptible

The erosion hazard rating is based on slope and soil erosion factor K. Erosion factor K indicates the susceptibility of soil to sheet and rill erosion by water and the degree of soil loss from off-road and off-trail areas after disturbance activities that expose 50-75% of the soil surface (NRCS Web Soil Survey, 2013). The hazard is described as "slight," "moderate," "severe," or "very severe." A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions; "moderate" indicates that some erosion is likely and that erosion-control measures may be needed; "severe" indicates that erosion is very likely and that erosion-control measures, including re-vegetation of bare areas, are advised; and "very severe" indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Other factors that may impact the erosion potential of soils in the project area include their hydrologic group, and wind erodibility index (WEI). A soil's hydrologic group is a measure of the soils water permeability. The group ratings represent the runoff potential of a soil when thoroughly wet. Group A has low runoff potential; Group B has moderately low runoff potential; Group C has moderately high runoff potential; and Group D has high runoff potential (NRCS Web Soil Survey, 2013). The WEI represents the susceptibility of the soil to wind erosion in tons per acre per year. Soils with a WEI rating of 8 and over are highly susceptible to wind erosion with the severity increasing as the rating increases (NRCS Web Soil Survey, 2013). Wind erosion is common in these areas. According to NRCS, a value over 8 is classified as highly erodible. The majority of soils within the APP are highly erodible.

The Fire Damage Susceptibility ratings represent the relative risk of creating a water repellent layer, volatilization of essential soil nutrients, destruction of soil biological activity, and vulnerability to water and wind erosion before reestablishing adequate cover on the burned site. "Highly susceptible" indicates that the soil has one or more features that increase the likelihood of soil damage by fire. "Moderately susceptible" indicates the soil has features that are moderately likely for damage to occur. "Slightly susceptible" indicates the soil has features that generally make it unlikely for damage to occur (NRCS Web Soil Survey, 2013).

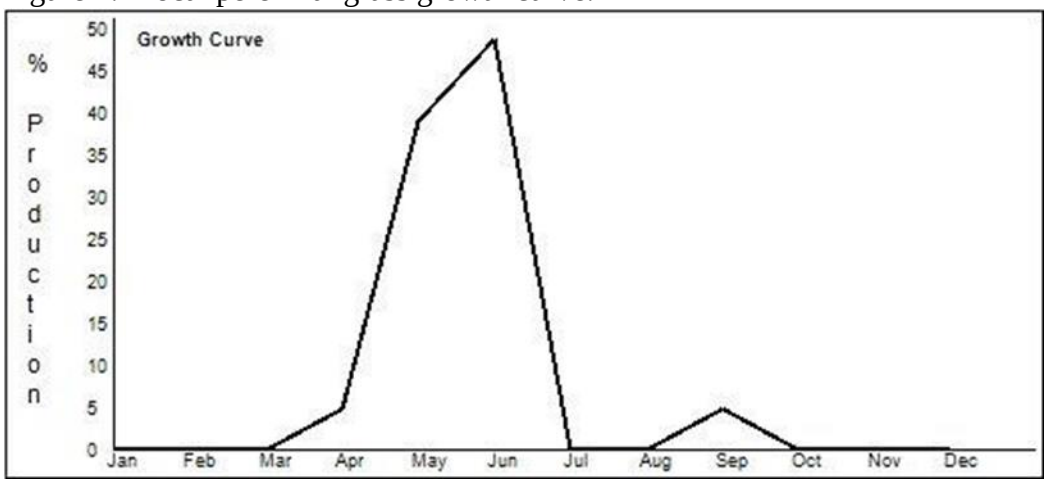
Biological crusts, primarily club mosses, when present within the proposed treatment areas, are generally found under sagebrush canopies.

3.8 Vegetation Resources

3.8.1 Rangeland Vegetation

The upland growing season in the region is from the end of April until June (Figure 1) and the plants get a limited amount of regrowth from the end of August through September, with regrowth quantity dependent on precipitation and soil moisture availability.

Figure 1: Local perennial grass growth curve.



NRCS Ecological Site Description. Accessed at <https://esis.sc.egov.usda.gov/ESDReport>

The Jewett Ryegrass Individual, Brodie Draw Individual, West Aspen Ridge Individual, East Aspen Ridge Individual and portions of Round Valley Ryegrass Individual Allotment are predominantly composed of a Big Sage/Bunchgrass vegetation community. This plant community offers the most biological diversity of shrubs, grasses, and forbs (Cagney et al. 2010). It also provides the highest quality Greater Sage-Grouse nesting and early brood-rearing habitat and ample forage for livestock and wildlife. The transition to this state occurs when sagebrush advances on the transitional bunchgrass community.

The Horse Creek Ryegrass, Lower Horse Creek, Q5 Soaphole, Mt. Airy Common, James Ryegrass, Grindstone Soaphole Allotment, and Lower Pasture of Round Valley Ryegrass allotments fall within the Wyoming Big Sage/Rhizomatous Grass-Bluegrass state. This state contains a sagebrush canopy with an herbaceous plant community dominated by rhizomatous grasses and bluegrasses. However, native plant communities are still present within the allotment. The transition to this state was caused by historic grazing practices and continuous season long grazing. This state produces less forage than the sagebrush/bunchgrass state, but with quality grazing management it offers reasonable herbaceous productivity (Cagney et al. 2010).

Several previous vegetation treatments have been done in some allotments to improve plant health, wildlife habitat, and vegetation age class and diversity. These treatments were generally intended to change the plant communities from a Sagebrush/Rhizomatous Grass/Bluegrass state to the Bunchgrass/Sagebrush state. This restoration pathway is facilitated by a driving disturbance; the transition is unlikely to occur in a management timeframe by grazing management alone. Past habitat improvement treatments within the APP are shown within Section 4.14 (Cumulative Impacts).

Ecological Sites

The NRCS has divided up the United States into several different Major Land Resource Areas (MLRAs). MLRAs are geographic areas with similar elevation, topography, soils, geology, climate, water, biological resources, and land use (Cagney et al. 2010). The allotments within the project area encompasses two MLRAs (MLRA 34A Cool Central Desertic Basins and Plateaus; MLRA 43B Central Rocky Mountains). The NRCS has made revisions to the MLRAs based on soil and precipitation zones and divided them up into Ecological Site Descriptions (ESDs). The dominant Ecological Sites within James Ryegrass Allotment are shown below (Table 8). For Ecological Sites within all other allotments please see Appendix H.

Table 8: James Ryegrass Allotment (Aspen Ridge Focus Area) Ecological Sites

Ecological Site	BLM acres	Percent of Allotment
Loamy 10-14" Foothills and Basins West R034AY222WY	744	21
Loamy 15-19" Foothills and Mountains West R043BY222WY	503	14
Coarse Upland 10-14" Foothills and Basins West R034AY208WY	587	16
Coarse Upland 15-19" Foothills and Mountains West R043BY208WY	194	5
Shallow Clayey 10-14" Foothills and Basins West R034AY258WY	613	17
Gravelly 15-19" Foothills and Mountains West R043BY212WY	182	5
Sub Irrigated 10-14"Foothills and Basins West R034AY274WY	2	-
Shallow Loamy 10-14"Foothills and Basins West R034AY262WY	1	-
Minor Components	759	21
Total:	**3585**	**99**

3.8.2 Threatened, Endangered, Candidate, and BLM Sensitive Plant Species

No plants listed or proposed under the Endangered Species Act are known or suspected to occur within any allotments within the APP. Sensitive species are not known or suspected to exist within the James Ryegrass, West Aspen Ridge, Brodie Draw, Round Valley Ryegrass, Horse Creek Ryegrass, Lower Horse Creek, Mount Airy,Q5 Soaphole and Grindstone Soaphole Allotments; however, BLM designated sensitive species are known or suspected to exist within East Aspen Ridge and Jewett Ryegrass allotments.

East Aspen Ridge Individual Allotment

A population of meadow pussytoes (*Antennaria arcuate)* has been documented within the allotment (WYNDD 2014) and is currently designated sensitive by the Wyoming BLM. Meadow pussytoes is a white-wooly perennial herb that spreads by conspicuously arching wooly stolons and is a facultative wetland plant found mainly in subirrigated, alkaline meadows of broad, open valleys on Quaternary deposits. In Sublette County Wyoming, hummocks are present where meadow pussytoes is known to occur. These hummocks provide the meadow pussytoes with an array of moisture availability and

vegetation conditions. The organic soil content of hummocks and high vegetation cover on top enhance water retention and ameliorate soil temperature. The population in East Aspen Ridge is also unique since it occurs on an area where marl is accumulated. Marl is a calcium carbonate or lime rich mud that precipitates out of water and accumulates in biological processes of freshwater and marine systems and is restricted to alkaline fens. Flowering starts in late June (July) and fruiting from mid-July to mid-August. Meadow pussytoes decreases in areas with tall or dense vegetation (Heidel 2013). Known colonies within BLM exclosures have been found to be in decline or locally extirpated where grazing has been prevented and vegetation cover has become denser and taller. Higher cover can promote greater water retention in the soil, creating microsites that appear to be too wet for meadow pussytoes. Where shrubs have replaced graminoid vegetation colonies of meadow pussytoes have also declined. Livestock use is often concentrated in and along these areas where meadow pussytoes is present.

Jewett Ryegrass Individual Allotment

A population of the large-fruited bladderpod (*Lesquerella macrocarpa*) has been documented within the allotment (WYNDD 2014) and is currently designated sensitive by the Wyoming BLM. This plant is recognized by its rosette of oval to oblanceolate leaves, and its inflated globe-shaped fruits on recurved stalks. The fruit walls are slightly hairy on the outside and glabrous on the inside. It typically occurs within sparsely-vegetated habitat of Gardner saltbush-squirreltail (*Atriplex gardneri-Elymus elymoides*) communities or at the unvegetated margins of them, on barren, fine-textured soils. It is absent from areas dominated by sagebrush or high cover of grasses. Flowering occurs from mid-May to late June, depending on spring moisture conditions and fruiting has been observed from late May to July (Heidel 2009). Livestock use of occupied habitat where the Large-fruited bladderpod is present is limited due to the amount of forage and lack of water. Trampling of plants and the crumbly substrate may directly affect the species or foster erosion if use is concentrated. Small scale management practices may have disproportionately large effects on trampling from decisions like salt block placement and water developments to fence construction.

3.8.3 Invasive, Non-native Species, and Noxious Weeds

The State of Wyoming has designated 26 weeds as noxious and Sublette County has placed 6 additional species on their declared list of weeds. Of these 32 species, there are 9 species which are present within certain portions of the allotments.

Table 9: James Ryegrass Allotment noxious weeds

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Musk thistle	*Carduus nutans*

Table 10: West Aspen Ridge Individual Allotment noxious weeds

Common Name	Scientific Name
Black henbane	*Hyoscyamus niger*
Canada thistle	*Cirsium arvense*
Musk thistle	*Carduus nutans*
Hoary cress	*Cardaria draba*
Western water hemlock	*Cicuta douglasii*

Table 11: Brodie Draw Individual Allotment noxious weeds

Common Name	Scientific Name
Black henbane	*Hyoscyamus niger*
Canada thistle	*Cirsium arvense*
Musk thistle	*Carduus nutans*
Hoary cress	*Cardaria draba*
Cheatgrass	*Bromus tectorum*
Houndstongue	*Cynoglossum officinale*

Table 12: East Aspen Ridge Individual Allotment noxious weeds

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Musk thistle	*Carduus nutans*

Table 13: Jewett Ryegrass Individual Allotment noxious weeds

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Musk thistle	*Carduus nutans*

Table 14: Round Valley Ryegrass Individual Allotment noxious weeds

Common Name	Scientific Name
Black henbane	*Hyoscyamus niger*
Canada thistle	*Cirsium arvense*
Field bindweed	*Convolvulus arvensis*
Hoary cress	*Cardaria draba*
Houndstongue	*Hieracium cynoglossoides*
Musk thistle	*Carduus nutans*
Perennial sowthistle	*Sonchus arvensis*

Table 15: Horse Creek - Ryegrass Allotment noxious weeds

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Musk thistle	*Carduus nutans*

Table 16: Lower Horse Creek Allotment noxious weeds

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Musk thistle	*Carduus nutans*
Cheatgrass	*Bromus tectorum*
Hoary cress	*Cardaria draba*

Table 17: Q5 Soaphole Allotment noxious weeds

Common Name	Scientific Name
Black henbane	*Hyoscyamus niger*
Canada thistle	*Cirsium arvense*

Field bindweed	*Convolvulus arvensis*
Musk thistle	*Carduus nutans*

Table 18: Grindstone Soaphole Allotment noxious weeds

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Musk thistle	*Carduus nutans*
Cheatgrass	*Bromus tectorum*

Table 19: Mount Airy Common Allotment noxious weeds

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Musk thistle	*Carduus nutans*

3.9 Visual Resource Management (VRM)

Visual resources, as defined by the BLM, are the visible physical features of a landscape (e.g. land, water, vegetation, structures and other features). All land has inherent visual values that warrant different levels of management. BLM utilizes a Visual Management System to categorize the visual resources on public lands. The proposed project sites are all within Class III Visual Management areas (BLM 2008b). Projects with potential to generate visible change are evaluated for contrast in line, form, color and texture. The Class III Objective is to partially retain the existing characteristics of the landscape, while allowing a moderate level of change. The change may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominate natural features of the characteristic landscape.

The project area is comprised of good quality, natural scenery and few structures, such as commercial features and residential subdivisions. A few ranches in pastoral settings are located along the Green River. Other than US Highway 191, several county and BLM roads, the project area transportation features are sparse and generally accessed by high clearance vehicles.

The landscape is predominately undisturbed sagebrush steppe habitats on gently rolling terrain. The most prominent geographic features include Aspen Ridge, Grindstone Butte, and the Green River with associated wetlands. Large areas are dominated by Wyoming and mountain big sagebrush/grass and shorter, sparser early sagebrush/grass communities.

3.10 Water Resources

3.10.1 Surface and Groundwater

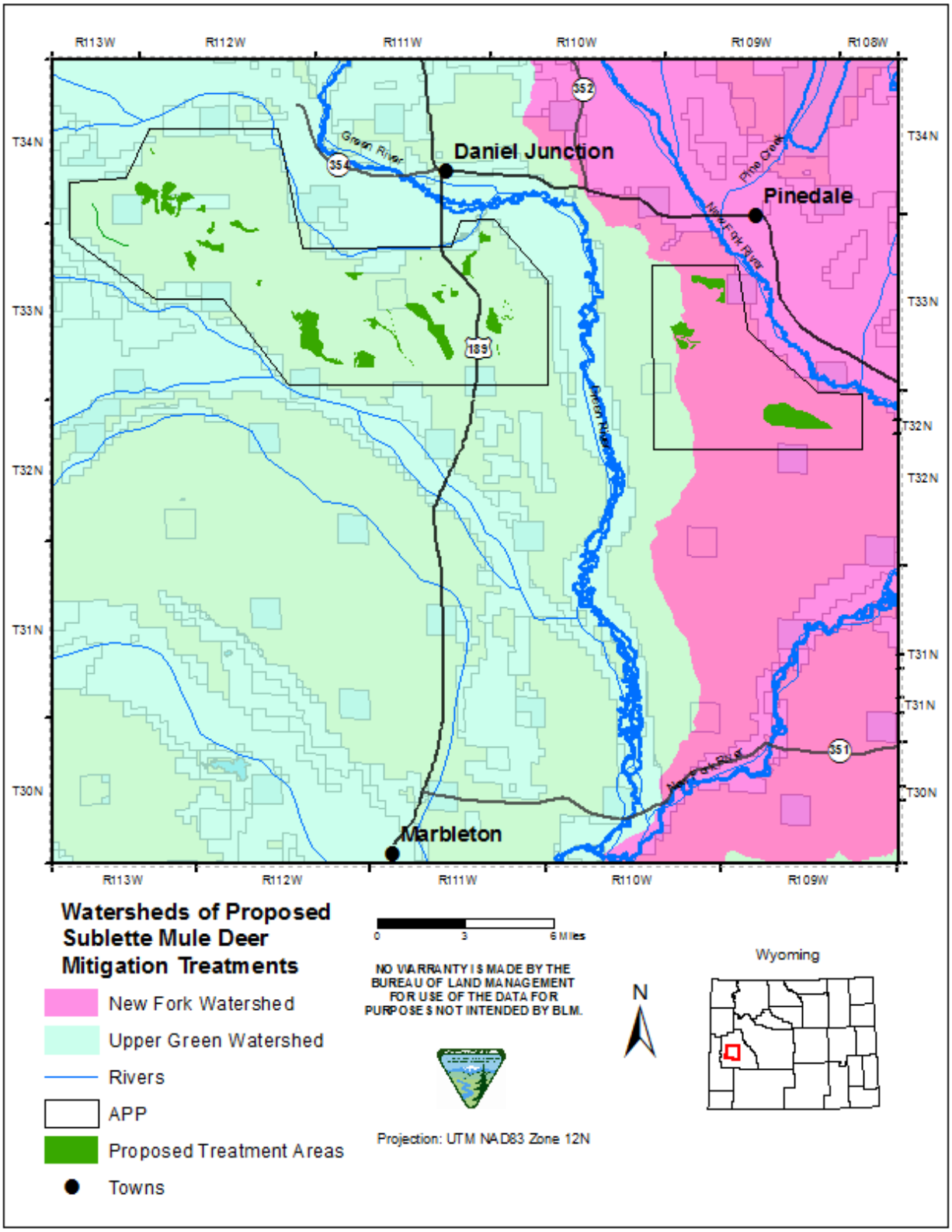
The APP lies within the Upper Green River and New Fork River watersheds in the Green River Basin of the Upper Colorado hydrologic region. The Green River runs through an alluvial valley within the APP, to the east of the Mesa and to the west of Aspen Ridge, Ryegrass and Soapholes. The major tributary to the Green River is the New Fork River, which drains the area east of the APP and follows its own alluvial valley through a rolling plateau area, crossing south of the Mesa and joining the Green River in the vicinity of Big Piney.

The focus areas are bounded by the New Fork River, the upper Green River, Horse Creek, and North Cottonwood and Cottonwood Creeks, all large perennial streams. The presence of obligate wetland vegetation can indicate that subsurface water is available in these areas.

With the exception of the fencing of Onion Springs, none of the treatments or water improvements are located within the 100-year floodplain of the perennial streams or within the 500-foot buffer of any range improvement.

There are 54 water wells within the boundaries of the proposed actions: 13 domestic, 3 domestic/stock, 16 stock, and 19 miscellaneous water wells. None of the treatment sites are within 500 feet of any shallow water well. There are two industrial water wells within or adjacent to the Mesa Focus Area, Site 1 (Permit Nos. P144089W and P144088W).

Map 16: Watersheds and streams in the APP.



3.10.2 Water Quality

Water quality in naturally occurring surface water in the region is excellent. Sublette County had zero percent surface waters with reported problems according to state and Environmental Protection Agency (EPA) data (Good Guide 2011). Surface water monitoring by the Sublette County Conservation District (SCCD), for which physical, chemical and biological parameters are collected, began in 2000. The WDEQ has established surface water quality standards for all streams in the state. No exceedances of these standards have been detected from the data collected by the SCCD from 2000-2014 at the PAS (Pinedale Anticline Surface) water sampling sites. Non-detections of all hydrocarbon parameters were observed for the same time frame (SCCD 2015).

Beginning in 2001, the SCCD identified water wells near natural gas activity within the PAPA. Sampling of water wells began in 2004 to meet the requirements of natural gas operators within the PAPA by the BLM through the 2001 ROD. Results for 2011 indicate that several domestic wells exceeded the drinking water standard, very few domestic/stock wells exceeded the drinking water standard, and zero stock wells exceeded the livestock standard (SCCD 2015). As none of these documented wells are within the APP, they will not be discussed further.

3.11 Wetlands and Riparian Zones

3.11.1 Wetland and Riparian Resources

There are several lotic (flowing water) and lentic (standing water) riparian systems in the project area. Proper Functioning Condition (PFC) assessments were conducted on these systems in August 2009. Ryegrass Draw, located within the East Aspen Ridge Allotment, consists of a natural alkaline fen. This site was assessed in August of 2009 and found to be in Functioning at Risk condition. The main reasons for this rating were compaction of the site and accelerated hummocking. This site supports riparian sedges, rushes, Meadow pussytoes, and Hoary willow (*Salix candida*). The soil is a histosol soil which is high in organic matter that is formed under anaerobic conditions with low amounts of decomposition. The minor component of this map unit is the Todd hole, which is calcareous. This calcareous layer is a high concentration of calcium carbonates which is formed under anaerobic conditions. The calcareous layer creates a natural mineral layer at the surface due to water evaporation.

Table 20: Riparian Functioning Condition for riparian areas in APP

Reach or Wetland	Type	Size	PFC rating
Ryegrass Draw	Lentic	14 acres	FAR*
Onion Creek	Lotic	2 miles	PFC
Brodie Draw	Lotic	1.5 miles	PFC
1814 Pond	Lentic	2 acres	PFC

*FAR – functioning at risk – the area is in functional condition, but an existing soil, water, or vegetation attribute makes them susceptible to degradation. The minimum standard for riparian areas in BLM is Proper Functioning Condition.

Onion Creek, in the Round Valley Ryegrass Individual allotments, was determined to be in proper functioning condition. Onion Creek is a low energy, alkaline system dominated by salt-tolerant species such as Baltic rush, inland saltgrass, and greasewood on adjacent uplands. Although a few raw outside banks were present, the PFC rating was determined due to diversity, composition, and cover of obligate wetland plants, regular floodplain inundation, and overall bank stability. Onion Spring is located at the

upper end of this stream reach, and was recommended by the ID team at the time of the PFC assessment for fencing due to extensive trampling of the spring source.

Brodie Draw, in the West Aspen Ridge Individual and Brodie Draw Individual allotments, was assessed in August 2009 and found to be in proper functioning condition. The assessment team found that there were a few small headcuts in this system, which appeared to receive a lot of grazing pressure.

The 1814 Pond is a spring development and dam that were constructed in 1942 and 1951, respectively. This system was found to be in proper functioning condition, with good riparian vegetation cover and composition and a nearly-constant water level provided by the underlying spring. This pond had some trampling at the water's edge and some badger holes in the dam.

There are no riparian areas within Jewett Ryegrass, Horse Creek Ryegrass, Lower Horse Creek, Mount Airy, Q5 Soaphole, and Grindstone Soaphole Allotments.

The Allotments within the project area do not encompass any streams on Wyoming's list of impaired waters: http://deq.state.wy.us/wqd/watershed/Downloads/305b/2008/2008%20Integrated%20Report.pdf

3.11.2 Floodplains

The proposed fencing of Onion Spring is located within the 100 year floodplain of Onion Creek, a tributary of Horse Creek. No other treatment sites are within 500 feet of a 100 year floodplain.

3.12 Wildland Fuels and Fire

The project area falls mainly within the Horse Creek/Cottonwood Creek Fire Management Unit. Wildland fire frequency in the area is low. Lightning-caused fire accounts for the majority of ignitions. Human caused fire is possible with ignitions coming from recreational users and industrial operations. Fire activity typically occurs between July 1 and September 30.

Fuels in the greater project area vary from low-elevation sagebrush communities to high-elevation mixed aspen/conifer stands. Fire behavior varies greatly between vegetation types. Sagebrush/grass fuels that are present throughout the project area can present hazardous fuel conditions in summer and fall once live fuel moistures in the Sagebrush fall below 120%. The mixed conifer and Aspen/conifer fuel types can exhibit a high resistance to fire control and make the initial fire control attack difficult. High stand densities on some slopes can enhance the possibility of a crown fire. Aspen stands with little or no conifer encroachment typically exhibit low resistance to fire control and in some cases can act as natural fire breaks.

3.13 Wildlife

3.13.1 Big Game Species

Mule deer, pronghorn, moose and elk can all be found within the APP. Deer and pronghorn are the most prevalent big game species and occur at the highest densities. When present, elk are typically migrating through the APP and move frequently.

Mule Deer
The APP provides multiple important seasonal habitats for mule deer. Designated habitat types include; crucial winter range, winter, winter/yearlong, and spring/summer/fall (Table 21, Map 17). The project area also provides important annual migration corridors and transitional habitat.

Pronghorn
The project area is characterized by designated crucial winter range and spring/summer/fall seasonal habitats (Table 21 and Map 17). The project area also provides habitat important in seasonal migrations.

Moose
Designated moose habitats within the project area include crucial winter range, winter/yearlong, and spring/summer/fall (Table 21 and Map 17).

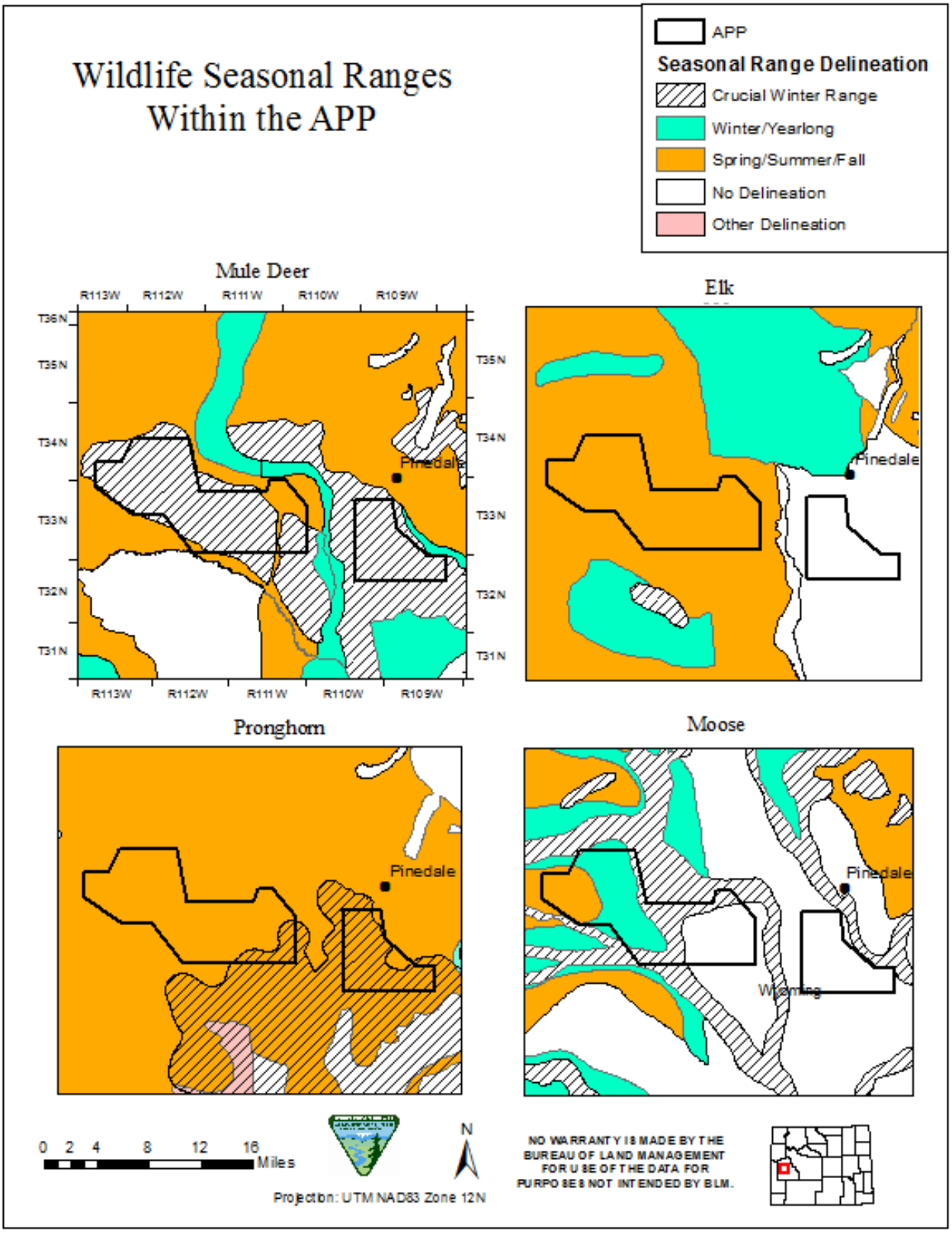
Elk
Within the project area seasonal spring/summer/fall habitat has been designated for elk (Table 21 and Map 17).

Table 21: Designated big game habitats, total acreage and percent of the APP

	Habitat Type	**Mule Deer** ***acres(% area)***	**Pronghorn** ***acres(% area)***	**Moose** ***acres(% area)***	**Elk** ***acres(% area)***
Sublette Habitat Project Area	Crucial Winter Range	65862 (92%)	21619 (30%)	11408 (16%)	0
	Winter/Yearlong	0	0	17434 (24%)	0
	Spring/Summer/ Fall	5715 (8%)	71578 (100%)	8899 (12%)	52399 (73%)

Data from 2013 WGFD habitat delineations.

Map 17: Delineation of big game seasonal ranges within the APP



3.13.2 Federally Listed Threatened, Endangered, Proposed and Candidate Species (TEPC)

Further discussion of Federally Listed, Proposed, and Candidate species that have potential to occur within the Pinedale Field Office but are not addressed below can be found in Appendix K.

Colorado River Fish Critical Habitat

The endangered bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*) are known to exist downstream. Critical habitat is designated for Colorado River Fish in Colorado and Utah in downstream riverine habitat in the Yampa, Green, and Colorado River systems (see 50 CFR 17.95(e)). All project alternatives would result in water depletions below the de minimus threshold, and as such would not contribute to the destruction or adverse modification of designated critical habitat for these four species.

Depletions include evaporative losses and/or consumptive use of surface or groundwater within the affected basin, often characterized as diversions less return flows. Project elements that could be associated with depletions include, but are not limited to, ponds (detention/recreation/irrigation storage/stock watering), wells, and diversion structures.

3.13.3 BLM Sensitive Species, Raptors and Migratory Birds

The potential for BLM Sensitive Species to be present within the APP was analyzed, and the following species were found to exist or potentially exist within the APP.

Greater Sage-Grouse

Greater Sage-Grouse, are an obligate species dependent upon sagebrush for nearly all components of its lifecycle. In general Greater Sage-Grouse require a mosaic of sagebrush habitats with access to seasonal use areas. Quality nesting and early brood rearing habitat is characterized by 15-25% sagebrush and >15% grass and forb cover. Grasses and succulent forbs taller than 18cm provide food and nesting residual cover. Breeding (lekking) occurs in suitable open spaces adjacent to nesting habitat. Late summer brood-rearing requires upland sagebrush habitat (10-25% cover) for loafing/roosting and riparian areas to provide succulent grass and forb forage species. Winter habitat is driven by access to suitable sagebrush canopy cover >25cm above the snow (10-30% canopy cover) (Braun 2006). During winter, sagebrush provides the primary food source and cover from harsh conditions.

Seasonal use habitats within the project area include potential nesting, early brood rearing, winter habitat, breeding (occupied leks), and late brood rearing habitat. The majority of the project area (79%) falls within a Priority Habitat Management Area (PHMA) designated in the ARMPA. There are a total of 22 occupied leks within the area (Table 22).

Table 22: Greater Sage-Grouse habitat acreage within the APP

	GHMA acres (% area)	SFA acres (% area)	PHMA acres (% area)	Number of Leks
Project Area	14,827 (21%)	49,704 (69%)	56,789 (79%)	22

Pygmy Rabbit

Pygmy rabbits are known to occur within the Mesa Focus Area, and suspected to occur throughout the Aspen Ridge, Ryegrass and Soaphole Focus Areas (Hayden-Wing 2014). They are typically associated with tall dense stands of sagebrush in loose, deep soils where they dig their own burrows, often found at the base of tall sagebrush plants. Sagebrush not only provides cover from predators but comprises the majority of the pygmy rabbit diet (Green & Flinders 1980).

Sagebrush Obligate Songbirds

Species such as the sage thrasher, sagebrush sparrow and Brewer's sparrow, are likely to occur within the project area. These species utilize sagebrush and its associated vegetation component as nesting and foraging habitat.

Raptors

The majority of raptor nesting occurs outside of the project area along the adjacent Green and New Fork river riparian corridors and within the isolated upland aspen stands on the western edge of the project area. Raptors found in the project area may include but are not limited to: red-tailed hawk, Swainson's hawk, American kestrel, bald eagle, golden eagle, ferruginous hawk, osprey, rough-legged hawk, northern harrier, great-horned owl, short-eared owl and burrowing owl.

Amphibians

The western boreal toad (northern Rocky Mountain population), northern leopard frog, and Columbia spotted frog are typically associated with habitat features that include but are not limited to wet meadows, shallow permanent water sources, small streams, and functioning livestock reservoirs (Keinath & McGee 2005, Smith & Keinath 2004, Patla & Keinath 2005).

Suitable western boreal toad habitat occurs along riparian corridors and within upland wet meadows and creeks within the APP. Breeding occurrences of Columbia spotted frog within the project area have been documented since 1993 (WYNDD 2014). While permanent upland water sources occur within the project area the lack of suitable northern leopard frog adult summer habitat (grass meadows) makes it unlikely the species is present.

White-tailed Prairie Dog

White-tailed prairie dogs inhabit colonies called towns found at altitudes ranging between 5,000 and 10,000 feet in desert grasslands and shrub grasslands. Occupied towns have been documented within the project area.

Long-billed Curlew

Nesting and breeding has been documented with the PFO and along the Horse Creek corridor (Orabona et.al. 2012, WYNDD 2014). Key spring and summer forage consists of insects associated with agricultural fields and meadows. Suitable habitat is present within the project area. This species is typically associated with the sub-irrigated lowland areas. Projects outlined in any of the proposed actions are not located within suitable habitat. There would be no impacts to existing habitats or populations. See Appendix K for additional analysis.

Mountain Plover

Unlike other plover species, mountain plover are not found near water and in this area will only inhabit short grass prairies and areas of sparse vegetation or bare ground. Potential habitat has been identified within the project area.

4.0 ENVIRONMENTAL EFFECTS

The purpose of this chapter is to analyze and disclose the environmental consequences of the Proposed Actions. The analysis is guided by the regulations set forth by the Council on Environmental Quality (CEQ), which call for analysis of the direct, indirect, and cumulative impacts of the Proposed Actions (40 Code of Federal Regulations [CFR] 1500-1508). Direct effects are those caused by an action and occurring at the same time and place as the action (e.g., removal of vegetation when a pipeline is inserted).

Direct and Indirect Effects

Direct impacts are generally attributable to implementation of an alternative that affects a specific resource, and generally occur at the same time and place. Indirect effects are caused by the action but typically occur at later time or location than the action. Indirect impacts can result from one resource affecting another (e.g., soil erosion and sedimentation affecting water quality) or can occur in a different time or place, but can be reasonably expected to occur. Short-term impacts result in changes to the environment that are stabilized or mitigated rapidly, do not result in any long-term effects, and typically occur for less than 5 years. Long-term impacts result in lasting effects that typically occur for more than 5 years.

Cumulative impacts are those that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Direct and indirect impacts are described together under each resource section and cumulative impacts are presented in Cumulative Effects section (4.14.1 to 4.14.13).

4.1 Air Quality

4.1.1 Air Quality and Ozone

This section describes potential impacts on a National Ambient Air Quality Standards (NAAQS) and Wyoming Ambient Air Quality Standards (WAAQS), Hazardous Air Pollutants (HAPs) and Air Quality Related Values (AQRV's) from activities and emissions associated with the proposed action and alternatives, as well as impacts from other regional sources located in southwest Wyoming.

Direct/Indirect Effects common to all alternatives

Air quality impacts from the proposed action would occur from air pollutants emitted during mechanical treatments consisting of a mower, a Lawson aerator or Dixie harrow; applying herbicides including Tebuthiuron (Spike®) and Glyphosate (Roundup®); and prescribed fire using drip torch.

These would include exhaust from vehicular traffic, mowers, aerators, harrowers, herbicides, fugitive dust, smoke, gas emissions from any other equipment used during the operation. Pollutants from these activities could include ozone (O_3), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter ($PM_{2.5}$ and PM_{10}), and lead (Pb, volatile organic carbons (VOC), and hazardous air pollutants (HAPs). Ozone formation may occur from nitrous oxides (NOx) and VOC emissions.

All of these treatments would be short-term and temporary. Long-term enhancement of habitat would in some cases improve the air quality in localized area by reducing fugitive emissions by stabilizing soil.

Mitigations. Air quality impacts can be mitigated by implementing Best Management Practices (BMPs) and/or applying emissions control technologies.

General Conformity. The proposed action cannot be authorized until the BLM has completed a conformity analysis for the proposed action.

Ozone becomes elevated in the Upper Green River Basin when there is a presence of ozone-forming precursor emissions including Nitrous Oxide (NO_x) and Volatile Organic Compounds (VOCs) coupled with strong temperature inversions, low winds, snow cover, and bright sunlight. The high ozone season in the Upper Green River Basin Non-attainment area is from January 4 through March 31. All mechanical treatments are proposed to take place in the fall, and therefore seasonal factors should not exacerbate the impact to ozone levels.

Air quality standards for allowable emissions are based on health effects to humans. These standards are intended to protect sensitive members of the population.

<u>Alternative 1 (Proposed Action)</u>
Effects to humans from smoke are usually limited to fire management personnel conducting prescribed fires. BLM and WGFD would manage smoke in compliance with federal, state, and local requirements to minimize its effects on workers, adjoining lands and neighbors, natural and cultural resources, and roads. The greatest threat to air quality would be smoke impacts on sensitive receptors (e.g. residents).

Prior to any prescribed burns, an approved prescribed fire plan would detail the specific conditions for the prescribed fire, such as winds, temperatures, and humidity. The conditions of the prescribed fire plan must be met for any burn. Considerations in the prescribed fire plans include safety, economic factors, air quality, and public health. With BMPs and prescribed fire plans in place no long term impacts to air quality are expected.

The primary products of combustion of organic materials as in prescribed fires include carbon dioxide, water vapor, carbon monoxide, particulate matter, hydrocarbons, nitrogen oxides, and trace minerals. During a prescribed fire, high concentrations of carbon monoxide, other gases, and particulate matter can be released, affecting air quality. During mowing, equipment emissions and dust may have slight, short-term negative impacts to air quality. With BMPs and prescribed fire plans in place, the localized impact would be negligible to minor due to the short-term emissions from heavy machinery and prescribed burns.

Overall, the activities would temporarily increase some criteria pollutants. However, with BMPs and prescribed fire plans in place, the localized impact would be negligible to minor due to the short-term emissions from heavy machinery and prescribed burns.

A general conformity analysis conducted for Alternative 1 (Proposed Action) indicates that the project, as designed, has been evaluated in accordance with the requirements of 40 CFR 93.153 subpart B and

Chapter 8, Section 3 of the WAQSR and has been determined to conform with all applicable local, state, and federal air quality laws, regulations, and statutes for the following reason: potential maximum total direct and indirect emissions are below de minimus threshold levels for NOx and VOCs. The BLM has determined that the proposed action meets General Conformity requirements and can be approved. The proposed action emissions inventory and associated BLM review are included in Appendix D.

Alternative 2
The acreage for this alternative is 1,219 acres less than for Alternative 1 (Proposed Action), therefore, there would be fewer impacts to air quality anticipated from this alternative.

Alternative 3
No additional impacts would be anticipated. The acreage for this alternative is 2,361acres less than for Alternative 1 (Proposed Action), therefore, there would be fewer impacts to air quality anticipated from this alternative. The lack of prescribed fire would further reduce any impacts to air quality.

Alternative 4 (No Action Alternative)
No additional impacts to air quality or ozone would be expected if this alternative were selected.

4.1.2 Global Climate Change

Impacts Common to All Action Alternatives
Greenhouse gas (GHG) emissions are expected to occur from heavy equipment operation and prescribed fire. The total emissions would not exceed the 25,000 metric tons of CO_2 equivalent GHG emissions, which is the presumptive effects threshold from the Council on Environmental Quality's (CEQ) draft guidance on NEPA's analysis of climate change (CEQ 2010). Therefore, modeling was not required. Thus, the climate change impacts would be negligible and short-term due to the temporary and short nature of the emissions.

The assessment of greenhouse gases (GHGs) emissions and climate change is in its formative phase. It is currently not feasible to know with certainty the net effects from the proposed action on climate. The inconsistency in results of scientific models used to predict climate change at the global scale coupled with the lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future effects of decisions made at this level.

Alternative 1 (Proposed Action)
It is still unknown what the net direct or indirect effects the proposed action would have on climate (Pinedale RMP, Sec. 4.19-3).

Alternative 2
It is still unknown what the net direct or indirect effects the proposed action would have on climate (Pinedale RMP, Sec. 4.19-3).

Alternative 3
It is still unknown what the net direct or indirect effects the proposed action would have on climate (Pinedale RMP, Sec. 4.19-3).

Alternative 4 (No Action Alternative)

If the no action alternative is selected there would be no impacts to global climate from the proposed action.

4.2 Cultural Resources

The proposed Sublette Mule Deer project has the potential to adversely impact NHPA eligible historic properties. All treatment areas on federal lands proposed for surface disturbance have been surveyed for cultural resources to fulfill the requirement for compliance with 54 USC 306108 of the NHPA. The BLM and WYSHPO have chosen to develop a Programmatic Agreement (PA) pursuant to 36 Code of Federal Regulations (CFR) Part 800.14(b)(ii) of the regulations implementing 54 USC 306108 of the NHPA to employ a phased approach to historic property identification as allowed under 36 CFR Part 800.4(b)(2). The PA addresses the entirely of the NHPA consultation process and was executed in July 2014 (Appendix C).

Class III cultural resource inventories have been completed for the proposed project areas and known significant historic properties would be avoided by project redesign per conditions of the PA (CRA Inc. 2014).

Impacts to cultural resources would be avoided through implementation of the procedures detailed in the PA as a result of consultation with the Tribes and the SHPO. Surveys were conducted prior to project implementation and known cultural resources will be avoided. Indirect effects would be avoided as the types of projects involve temporary changes to the vegetation of the area per conditions of the PA (BLM 2014). Any unanticipated archaeological discoveries would be addressed through the PA Discovery Plan (Appendix C).

The BLM would implement the undertaking to comply with all relevant Federal regulations, policies, and laws and implementing these policies subject to the requirements of NEPA and ensuring its compliance with 54 UCS 306108, and its implementing regulations, 36 C.F.R. 800; and the Wyoming State Protocol.

4.2.1 Native American Religious Concerns

Impacts Common to All Action Alternatives

The preferred strategy for treating potential adverse effects on sacred sites and other resources of religious concern to Native American Tribal groups is avoidance. A 100 foot protective buffer would be used to mitigate direct impacts to sacred sites. The Tribal recommendation is a visual inspection (on-site examination) for anything considered sensitive. In the case of the Sublette Mule Deer Project PA, distances were established through consultation with the Shoshone Tribe and Tribal guidelines for buffer zones for development near Native American sites.

Through site avoidance procedures detailed in the PA, as a result of consultation with the Tribes and the SHPO, impacts to resources of Native American religious concern are addressed through avoidance. No direct or indirect impacts should be realized.

The BLM would continue to consult with appropriate Tribes through the life of the project regarding historic properties of religious and cultural significance in accordance with the NHPA, the Native

American Graves Protection and Repatriation Act (NAGPRA), ARPA, American Religious Freedom Act of 1978 (AIRFA), Executive Oder 13007 Sacred Sites, and their implementing regulations.

Alternative 1 (Proposed Action)
The 3,415 acres of proposed treatment in Alternative 1 (Proposed Action) have been inventoried for cultural resources. All known sites of Native American Religious concern would be avoided by project redesign.

Alternative 2
Impacts would be similar to those described for the Proposed Action, but would occur on a smaller area (2,361acres).

Alternative 3
Impacts would be similar to those described for the Proposed Action, but would occur on a smaller area (1,010 acres).

Alternative 4 (No Action Alternative)
Under the No Action Alternative there would be no effects to important Native American Religious Concerns.

4.3 Livestock Grazing

Impacts Common to All Action Alternatives

Exclosure/Fencing
The installation of fencing to protect Onion Spring would protect the spring source, providing a cleaner and more dependable water source for livestock. This exclosure would not limit livestock access to water. The exclosure would not entail additional livestock management and therefore potential impacts to grazing from its installation would be negligible.

Table 23: Proposed new exclosure fencing (common to all action alternatives)

Focus Area	Site #	Affected Acreage	Year
Ryegrass (Onion Spring)	1	<5	Year 1

Water Improvements
Water developments are designed to provide new water sources for livestock, but would also increase water availability for wildlife. This could lead to improved livestock distribution, increased weight gains and improvements in herd health. All identified water-related projects will be evaluated by BLM Engineers and Range staff prior to completion.

Livestock would be relocated during the installation of a pipeline in the West Aspen Ridge Allotment and Brodie Draw Allotment. Short-term impacts to livestock would be negligible due to close cooperation with the affected permittees. Ultimately the provision of water at an additional drinking location in the Brodie Draw Allotment would create beneficial impacts to livestock. These changes would also have beneficial effects to the allotment as a whole.

Mechanical Vegetation Treatments
Chemical treatment would require deferment of the treated area when the chemical begins to act on shrubs. Impacts would be similar to those described under Deferment, below. Treatment with the Lawson Aerator/Dixie Harrow should result in a long-term increase in available forage. Seeding and planting treatments would also require deferment of livestock grazing, and should result in habitat and forage improvements in the long term.

Deferment
Periods of deferment would follow all chemical and mechanical treatments or prescribed burns. In the short-term, most areas would be fenced to incorporate needed deferment periods. Since actual treatment implementation could vary due to logistical or other planning needs, the aforementioned impacts could also vary in magnitude relative to scheduled grazing periods. Deferments would not change permit terms and conditions.

Use of a herder is proposed as an option to achieve rest of the treated areas. The effectiveness of herding livestock away from herded areas can vary depending on topography of the allotment, distribution of water, experience level of the herder, and familiarity of the livestock with being herded. If herding proves to be unsuccessful in achieving the appropriate level of rest, then fencing would be used to ensure proper rest from grazing and recovery of the vegetation community.

In the case of the East Aspen Ridge, Brodie Draw and Jewett Ryegrass Allotments, deferment from livestock grazing would be accommodated by deferring one allotment and using the other two. This primarily relates to the East Aspen Ridge and Jewett Ryegrass Allotments, as vegetation projects are not being proposed in the Brodie Draw Allotment. This accommodation would minimize the severity of the potential impact to this permittee's livestock grazing operations. Deferment periods and durations associated with treatments and prescribed burns have not yet been determined and are dependent upon meeting the stated objectives of the proposed project. However, if necessary, treatment areas within the East Aspen Ridge and Jewett Ryegrass Allotments could also be fenced temporarily to provide the needed deferment period.

When vegetation treatments on public lands necessitate deferment from livestock grazing, stocking rates on private lands could be temporarily raised to account for lost grazing on public lands. The increased pressure on private lands (often found in or near riparian corridors) may lead to higher utilization. This project would not result a reduction to AUMs, nor would it result in a movement of cattle off permitted allotments. Cattle would be kept out of only small portions of their allotments by fencing or a rider who moves cattle off of seeded and/or treated areas during plant reestablishment.

<u>Alternative 1 (Proposed Action)</u>
Water improvements, exclosures/fencing and deferment would have the impacts discussed above.

Prescribed Burns
Prescribed burns would occur on a total of 49 acres in three different allotments. Table 35 presents details of proposed burn treatments under this alternative.

Table 24: Alternative 1 (Proposed Action) proposed prescribed burns

Focus Area	Site #	Acres	Proposed Year
Ryegrass	2	26	Year 2
Ryegrass	7	17	Year 3
Ryegrass	11	6	Year 2

Prescribed fire would result in the short-term deferment of livestock grazing to allow for vegetation recovery. Over the long-term, vegetation recovery following treatment should provide improved forage for livestock. Management of these sites would be determined on a permit-by-permit basis in close cooperation with the permittee.

Summary of Effects
The installation of exclosures/fencing would not reduce the total amount of acres and AUMs, and would create negligible to minor, adverse impacts to grazing. Water projects would largely benefit livestock with the provision of water, though long-term maintenance would increase management activities of permittees. The short-term deferment of livestock grazing due to prescribed burning, mechanical vegetation treatment, and vegetation seeding/planting would create minor, adverse impacts. After coordination with permittees, adverse impacts from meeting livestock grazing objectives, increased maintenance and operational costs, and reduced available forage (short-term only) would be minor in the short- and long-term. Water improvement projects would benefit rangeland resources overall, including conservation benefits to Greater Sage-Grouse habitat.

Alternative 2
Impacts would be similar to those described for the Proposed Action, but would occur over a smaller area as described in Tables 2 and 3 (2.9). The changes would be minimal and include a reduction in the acreage of mechanical treatments. Neither herbicide application acreage, prescribed burn acreage, year of treatment nor deferment method would change. Overall impacts would remain minor in both the short- and long-term due to necessary deferment/deferment pursuant all treatment types and efforts to meet livestock grazing objectives.

Alternative 3
Impacts would be similar to those described for the Proposed Action, but would occur over a smaller area (Tables 2 and 3). There would be no impacts from prescribed fire.

Alternative 4 (No Action Alternative)
Direct impacts of the proposed action would not occur. Natural changes in vegetative composition and cover would occur over time due to vegetation succession. In the long term, plant succession could lead to diminished vegetation diversity on the allotments, possibly leading to decreased available forage and diminished grazing opportunities, and no net conservation gain to Greater Sage-Grouse habitat.

4.4 Paleontology

Impacts Common to All Action Alternatives
Compression and trampling caused by off highway vehicle (OHV) use, cattle, and wildlife can adversely affect fossils. This can lead to dislodging, breakage and loss of provenience (Ross 1976) of individual fossils and destruction of known and undiscovered localities. “Badlands” (areas containing high

amounts of shale and clay) are the most susceptible to damage and erosion problems affecting fossils. Areas of sandstone and limestone outcrops are sometimes used by animals as “rubbing areas” which can also dislodge and break fossils embedded in the matrix. Such areas should be inventoried prior to any development.

The geologic formations (Wasatch or Green River) that hold high potential for yielding fossil material are present within the APP. However, there is no surface expression of either formation in the areas to be treated. The possibility of impacts from the proposed actions to paleontological resources is low.

Alternative 1 (Proposed Action)
No additional impacts are anticipated.

Alternative 2
No additional impacts are anticipated.

Alternative 3
No additional impacts are expected.

Alternative 4 (No Action Alternative)
There would be no impacts to paleontological resources from project activities. No additional paleontological resources would be inventoried.

4.5 Recreation

Impacts Common to All Action Alternatives
Noise and or dust from the use of heavy machinery for both treatments could create short-term adverse impacts and diminish the recreational experience for persons pursuing dispersed recreation activities. Adverse impacts to dispersed recreation would be negligible in the long-term.

If treatments occur during big and small game hunting seasons, reduced access to treatment areas could reduce recreational opportunities such as hunting and OHV use. These closures would affect small acreages for short periods of time. Advance notice of treatments would minimize short term impacts as visitors could adjust their access and continue to pursue their activities elsewhere.

Improved wildlife habitat would benefit big and small game hunting opportunities and experiences over the long term.

No impacts to fishing opportunities are anticipated due to the distant proximity of treatments from the Green River.

Alternative 1 (Proposed Action)
In the short-term, prescribed burn treatments and the use of heavy machinery could create minor, adverse impacts to OHV use. Closure of OHV trails and roads in and directly surrounding the proposed allotments during the burn period could create minor, short-term adverse recreation impacts, such as hunters relocating to other areas.

Alternative 2

Impacts would be similar to the proposed action although fewer acres of habitat treatment by all methods could reduce anticipated benefits to hunters.

Alternative 3
Impacts would be similar to the proposed action although prescribed burns would be eliminated and less acres of habitat treatment by other methods could further reduce anticipated benefits to hunters.

Alternative 4 (No Action Alternative)
Under this Alternative short-term reductions in recreation availability would not occur. However, the benefits to habitat quality for wildlife would not be realized. Indirect benefits to improved hunting opportunities would not occur.

4.6 Socioeconomics

Impacts Common to All Action Alternatives
The socioeconomic impacts analysis identifies and considers how actions associated with the proposed project might affect the local social and economic systems. Sublette County, Wyoming represents the project area and the state of Wyoming is used for purposes of comparison.

Treatments completed to improve species composition and diversity, create variable age classes in the shrub communities, and improve forage production would benefit livestock producers and permittees in the long term. The need for required grazing deferment in treated areas would be mitigated through schedules developed between the permittees and the BLM. These adjustments could cause short-term impacts to affected permittees. There would be impacts to livestock operations in the form of increased maintenance of watering facilities for the permittee grazing in West Aspen Ridge Individual allotment and Brodie Draw Individual allotment, because of the proposed Brodie Draw pipeline. Due to close cooperation with affected permittees, these costs are expected to be the minimum necessary required to protect the resources involved. Recreational opportunities would only be limited during the actual treatments occurring so only negligible possible impacts are anticipated to tourism. The proposed project would not affect jobs, wages, or demographics in Sublette County.

Alternative 1 (Proposed Action)
No additional impacts would be anticipated.

Alternative 2
No additional impacts would be anticipated. The reduction in treatment acreage would not reduce deferment requirements or maintenance costs, so costs to permittees would remain the same as in the Proposed Action.

Alternative 3
Impacts would be similar to those described for Alternative 2.

Alternative 4 (No Action Alternative)
Under the No Action Alternative the present socioeconomic situation would not be affected in the short-term. In the long term, plant succession could lead to diminished vegetation diversity on the allotments, possibly leading to decreased available forage and diminished grazing opportunities.

4.7 Soils

Elements Common to All Action Alternatives

Significant vegetation removal and surface disturbance would be the primary causes of accelerated soil erosion on uplands. The removal of vegetation could increase the erosive force of overland water flow, decrease soil strength, reduce infiltration, increase runoff, alter soil structure, and reduce protection of the surface from raindrop impact (BLM 2008b). Vegetation removal and surface disturbance would be temporary. Mechanical and chemical treatments would not remove nor kill all vegetation. Remaining vegetation on the treatment sites would reduce erosion and compaction and provide for water infiltration. Litter created from the treatment would remain on site where it would provide protection from raindrop impacts for the soil, accumulate snow, soil and litter moving in the wind and create an improved microclimate for seed establishment. Mowing would kill only tall sagebrush, leaving the understory intact. Aerating and harrowing would kill vegetation of all heights and sizes, but would not result in 100% mortality within treated areas, so both shrubs and grasses would remain alive post-treatment to stabilize soils. Treating in a mosaic pattern would result in bands of more exposed soils with undisturbed vegetation and soils interspersed. Over the short-term, vegetated areas would slow overland water movement speed and help maintain soil stability and porosity. Burns could expose a large portion of the soil, thereby increasing erosion potential, depending on fire intensity and surface area burned. Best management practices (BMPs) would help ensure that burn intensity would not sterilize the seed bank within the soil. Several mountain shrub species regenerate after fire, and plantings would occur as early as possible the first spring post burn. Over the long-term, vegetation would regrow in treated areas and impacts would become negligible.

Table 7 (Section 3.7) describes the treatment types according to soils described in the affected environment. All of the soil types are susceptible to wind erosion. The greatest risk of erosion would come from soil erosion hazards of a moderate level, and hydrologic group B, coupled with the susceptibility to wind erosion. Treatment occurs on eight out of the fourteen soil types that could cause soil erosion from water in the short-term. Risk of fire damage to soil would be moderate based on the Fire Damage Susceptibility ranking for the soils in areas where prescribed burning would occur. Soil impacts from the Proposed Actions are expected to be short-term due to careful consideration of soil types and proposed treatments, as well as regrowth expected to occur the spring following treatment.

Alternative 1 (Proposed Action)

Alternative 1 (Proposed Action) represents the greatest quantity of disturbance. Soil impacts would increase accordingly with increased project sizes. Erosion would be most likely in Alternative 1 (Proposed Action), because the treatment acreage is the highest of all alternatives. Impacts to the soils under all alternatives would assume that seeding and vegetation re-growth would be successful. Mosaic treatment patterns and BMPs implemented for burns followed by renewed vegetation regrowth should result in a net benefit to soils.

Alternative 2

The type of impacts would be similar to Alternative 1 (Proposed Action) but less negative, short-term impacts due to less number of acres being treated.

Alternative 3

Alternative 3 would not include prescribed burns, further reducing the possible impacts to soils; thus, fewer negative, short-term impacts could occur than under Alternatives 1 and 2.

Alternative 4 (No Action Alternative)
There would be no impacts to soil stability, erosion, compaction, or water infiltration due to vegetation treatment activities. Expected long term benefits to the vegetation community, which could increase soil stability and soil development, would not occur.

4.8 Vegetation Resources

4.8.1 Rangeland Vegetation

Impacts Common to All Action Alternatives
All proposed treatments would create an opportunity for new shrubs, grasses and forbs to expand into this plant community by opening the canopy and would thereby benefit rangeland resources, as well as providing a net conservation benefit to Greater Sage-Grouse.

Mechanical treatments select against large stature shrubs and would allow new young shrubs, grasses and forbs to access nutrients that were previously committed to mature plants. Mature and decadent Wyoming big sagebrush plants that are mechanically treated would likely create a terminal stump, and since local sagebrush species do not reproduce from root material, no regeneration would occur. Mountain shrubs that have the ability to regenerate from root material would expand from any of the proposed treatments. The resulting shift in plant composition would result in increased mule deer forage quantity and quality, increased plant diversity, and increased diversity in shrub age classes. Recovery would occur across all landscapes and species on various timelines as determined by precipitation and historic disturbance regimes. For example, wetter mountain sage and mixed mountain shrub communities would recover more rapidly than Wyoming big sage stands due to higher precipitation. In general, grasses and forbs are likely to reestablish into treated sites more rapidly than sagebrush due to life history adaptations that make them more adapted to disturbance.

Mechanical treatments would have adverse, minor short-term impacts on sagebrush and other vegetation growing on-site as plants may be uprooted, damaged, destroyed, or experience structural damage. Mechanical treatments would be coupled with seeding to revegetate all affected sites. Improvement of vegetation communities important for wildlife and livestock habitat via these treatments could have long-term, moderate beneficial effects. Where biological crusts are present, treatments are likely to create a short-term reduction, but would not completely eliminate the soil crusts within the treatment areas due to the mosaic pattern of treatment.

Tebuthiuron (Spike®) applications would target sagebrush, resulting in reduced sagebrush canopy cover and reduced dominance. As a result understory species would be expected to increase in cover and productivity. Glyphosate (Roundup®) applications would target all plant species and regrowth would need to occur from seeds or plantings. For both herbicides, shrub skeletons would remain on the landscape until natural decomposition occurs.

Direct effects of herbicide treatments would include killing and/or reducing the vigor of sagebrush in the area. Where herbicide is used, non-target plants interspersed with target vegetation may experience a range of impacts including no effect, reduced productivity, abnormal growth, or death depending on the sensitivity of the plant. Infrequent impacts to individual plants would not have substantial impacts on plant populations, plant communities, or ecological processes, and these risks can be minimized by

following Best Management Practices (BMPs) and Standard Operating Practices (SOPs). In the short-term, herbicide application could have minor impacts on non-target species; however, herbaceous species would have a long term benefit from the thinning of sagebrush. Both sage and herbaceous understory engage in direct competition for moisture and space.

Installation of fencing could have temporary negligible to minor adverse effects on vegetation as plants could be compacted or removed during installation and maintenance. Most fencing would be temporary and would be removed once project objectives are met. Permanent fencing at Onion Springs would be built to protect the spring source from livestock trampling. The exclosure would improve cover quality for Greater Sage-Grouse, and increase forage availability for wildlife riders. Fences may be used to accommodate deferment from livestock grazing. Installation of fencing would have beneficial effects on vegetation over the long-term.

Installation of the Brodie Draw pipeline would result in disturbance to vegetation, including soil compaction where tractors operate, the disturbance of soil and vegetation where the pipeline is installed, and trampling around the water troughs. Soil compaction from the tractor may result in minor reductions to vegetation cover for multiple years. The removal and replacement of soil from the pipeline trench will result in short-term reductions to plant cover, but rapid recovery would be expected by grass and forb species. Sagebrush recovery in this thin, however, linear band could take 10-50 years. Vegetation surrounding the southern set of troughs is unlikely to change because the troughs are in a dysfunctional reservoir that has minimal vegetative cover. The northern set of troughs would be placed in a site that is currently vegetated, and this vegetation would be trampled out for as long as water is present in the troughs.

Alternative 1 (Proposed Action)

Fire treatments would result in mortality for all shrubs, regardless of stature. Numerous impacts would occur to upland vegetation as a result of implementing prescribed fires. The primary impact would be the removal of vegetation due to the fire (woody species and herbaceous cover), and recovery of certain vegetative species after fire. The proposed actions would remove portions of mature and decadent sagebrush and replace them with grasses, forbs, and new, young shrub seedlings. Burning existing shrubs would allow the establishment of new shrub seedlings, changing and varying their overall age structure in the project area. Removal of portions of dense shrub stands would also allow increased herbaceous vegetation establishment, which increases ground cover and improves watershed health. By creating a mosaic of burned and unburned areas, forage production, vegetative diversity, “edge effect,” and wildlife/livestock distribution would be improved, as well as net conservation gain for Greater Sage-Grouse.

The direct result of the burn would be the removal of varying portions of dense stands of sagebrush, conifers, decadent aspen, and mountain shrubs from the treated areas. Most, if not all, of the aboveground plant biomass would be removed from burned areas, potentially increasing surface erosion in the short-term. Herbaceous vegetation would be completely removed and grasses at the edges of burned areas would be heated and killed if not removed. Shrubs within the burn zones would be partially to completely denuded. In many cases portions of trunks and limbs would remain as blackened skeletons within the burned area. The edges of the burned areas may contain partially burned shrubs and mortality would be anticipated to be high through the next growing season.

Burning completely kills sagebrush and it is unlikely to immediately recolonize the area because of its non-sprouting growth form. Mountain big sagebrush recolonizes burned sites primarily by off-site seed, or seed from plants, which survive in unburned patches. Herbaceous vegetation would replace the sagebrush in areas where burned and it would be expected to take from 30 to 50 years in Wyoming big sagebrush communities for the sagebrush to re-establish to pre-burn levels of density, cover, and age class. Mountain shrubs, including snowberry, serviceberry, and mountain mahogany reproduce to varying extents by sprouting around and from the stubs of the burned plants and should increase in cover and density relatively quickly after the burn. Aspen would expand rapidly in the burned areas due to its ability to send up hundreds to thousands of suckers (shoots) after a fire. Implementation of either alternative would decrease conifer encroachment into aspen areas, thus benefitting aspen communities.

Prescribed burning would have short-term adverse impacts on vegetation, but long-term beneficial effects on plant communities. Fire can temporarily reduce competition for moisture, nutrients and light and stimulate vegetative reproduction. It may also stimulate the flowering of some species and influence community composition and successional stages. Many of these results are highly dependent upon the time of the fire, duration, intensity and frequency with which fires occur. The planting of shrubs such as chokecherry, bitterbrush and serviceberry would enhance the recovery of the communities following fire, and would accelerate the recovery of shrub species important for wildlife habitat.

While fire encourages new growth of many plant species, it can also increase the likelihood that undesirable plant species would establish, including noxious weeds. Prescribed burn areas would be monitored and treated with herbicide if noxious species were detected post-fire.

Impacts of Alternative 1 (Proposed Action) would be direct, adverse and negligible to minor in the short- term due to vegetation compaction or destruction caused by mechanical treatments, application of herbicides, and prescribed burning. BMPs would minimize the extent of potential adverse effects to vegetation. Additionally, there would be direct and indirect, beneficial and minor to moderate effects at treatment sites over the long-term. Native vegetation cover would be increased, enhancing native plant communities, improving habitat for wildlife, improving ecological function, and reducing future threat of rangeland fire to Greater Sage-Grouse and sagebrush habitat in the Great Basin.

Alternative 2

Potential impacts of mechanical treatment and herbicide applications would be reduced from Alternative 1, as this alternative would reduce treated acres. This would decrease benefits to mountain shrub communities, species diversity and sagebrush age class diversity.

The long-term beneficial effects of these treatments would outweigh the short-term adverse effects. Treating fewer acres would not change fencing and grazing deferment because the number of treated sites would not be reduced; only the treated acres per site would be decreased. The short-term effects of damaging vegetation to install fencing would remain comparable to Alternative 1 (Proposed Action).

Alternative 3

Impacts would be similar to those described for Alternative 1, but would occur over a reduced acreage. There would be no short-term impacts or long term vegetation benefits from prescribed fire treatments.

Alternative 4 (No Action Alternative)

Under the No Action Alternative, vegetation at the proposed sites would continue to provide limited diversity. The sagebrush communities consist of various sagebrush species including early sage, low sage, fringed sage, bud sage, black sage, Wyoming big sage, mountain big sage and basin big sage. Other shrub communities are present, but to a lesser degree, including antelope bitterbrush, chokecherry, serviceberry and snowberry in the higher precipitation areas, to saltbush communities containing Gardner's saltbush and winterfat in the lower precipitation areas (BLM 2012a).

While not true for all sites, site conditions such as some of those in the Ryegrass Area, have illustrated declines in condition relative to reference plant communities, particularly based in the lack of the taller stature bunchgrasses such as basin wildrye, bluebunch wheatgrass, Indian ricegrass, and needle-and-thread. Additionally, there appear to be declines of important shrub communities, in particular mixed shrubs containing such species as serviceberry, chokecherry, and others. This is due primarily to conditions that many proposed treatments suggest, such as seeding or planting of shrubs, to increase overall diversity for mule deer, Greater Sage-Grouse, and other wildlife species that rely on sagebrush systems for their survival. If the No Action Alternative is chosen, continued declines in vegetation diversity could be expected. This alternative would not meet the intent of the Greater Sage-Grouse Implementation Strategy of conserving and restoring habitat.

4.8.2 Threatened, Endangered, Candidate, and BLM Plant Sensitive Species

Impacts Common to All Action Alternatives
Adverse impacts to special status plants would not be anticipated due to pre-treatment reconnaissance.

Alternative 1 (Proposed Action)
The proposed action represents the largest treatment acreage to be treated, and as a result of using pre-work surveys, no adverse impacts to special status plants are anticipated.

Alternative 2
No additional impacts would be anticipated.

Alternative 3
No additional impacts would be anticipated.

Alternative 4 (No Action Alternative)
Under the No Action Alternative special status plant species would remain as they are and populations would continue to change as they are currently doing under existing management. No changes in rates of propagation or density are expected and no additional impacts are expected under this alternative.

4.8.3 Invasive and Non-invasive noxious weeds

Impacts Common to All Action Alternatives
Development of new watering sources and the associated pipeline, construction of temporary fencing, and the permanent exclosure around Onion Springs would cause soil disturbance which could allow for the establishment of weeds. Mechanical vegetation treatments that remove vegetation would also provide sites for weed establishment. These weeds, once established, may spread from the project site into adjacent undisturbed areas. Invasive species are hardy and competitive, and may reduce the recovery rate of desired vegetation in the treatment sites. The likelihood for the introduction of weeds

and invasive species in areas that are presently weed-free is low. Through monitoring, and weeds that are found will be treated in conjunction with Sublette County Weed and Pest. Treatment of weeds in the allotments is done by utilizing Integrated Pest Management techniques and is handled through a Cooperative Agreement between BLM and the Sublette County Weed & Pest District's program.

Equipment used to implement treatments would be washed upon arrival and prior to any treatment implementation.

Alternative 1 (Proposed Action)
Removal of vegetation through prescribed fire would create temporary bare ground situations, which could allow invasive species to be established.

Alternative 2
Impacts would be similar to those described for Alternative 1, but would occur over a smaller area.

Alternative 3
Impacts would be similar to those described for Alternative 1, but over a smaller area. In addition, there would be no impacts from prescribed fire on weed establishment.

Alternative 4 (No Action Alternative)
Invasive species would be expected to propagate at the current rates. The risk of increasing weed prevalence through the proposed actions would not occur.

4.9 Visual Resource Management

Impacts Common to All Alternatives
The proposed actions within the project area are to meet the VRM Class III Objective "to retain the existing character of the landscape". Actions proposed include prescribed fire, mowing vegetation, herbicide application, the installation of a fence and associated water developments. These actions would be noticed by the casual observer, most prominently in the short-term. The total area of vegetation treatments and distribution is proportionally small to the overall landscape, approximately 4.7%. With successful revegetation (beyond 5 years), the impacts in the long-term would become unnoticeable to the casual observer. These lands are remote and accessed by relatively few people who are generally accepting of typical land management practices; area visitors are potentially less sensitive to short-term changes in scenic quality. The project sites are not within the foreground (three miles), or background (15 miles) view of any scenic byways, residential areas or major attractions.

Mowing would create a linear edge that may draw one's attention for several years after treatment. However, mowing would be implemented with consideration for utilizing slope and contours to minimize straight lines, thus replicating the natural patterns of the landscape. The application of Tebuthiuron (Spike®) 20P would be expected to have the least visual impact. Due to the extensive acreages of decadent and dying sagebrush communities found within some areas of the West, it is probable the 50 percent mortality treatment would be seen as another decadent sagebrush community and generate no long-term adverse visual impacts to the casual observer. Water projects and associated change(s) in vegetation would not dominate the viewshed. The changes would comply with the areas' VRM Class III Objective. As such, long-term visual impacts from the project would be minor.

The exclosure fence and water development would remain a long-term visual intrusion. The project is small in scale, and similar to other rangeland structures. The average visitor would likely not notice an adverse change in the scenic quality. The long term impacts would be moderate and not dominate the viewshed in terms of change to landscape line, form, color and texture.

The management of vegetation diversity and density would be less than a moderate change within the landscape. The project sites are not within the foreground (three miles), or background (15 miles) view of any scenic byways, or major recreation areas.

Alternative 1 (Proposed Action)
The effects of prescribed fire in the short-term are blackened vegetation and or the absence of vegetation within a mosaic pattern of burned and unburned areas. Within several growing seasons these areas would revegetate with grasses and forbs. The more vibrant green color of grasses would obscure the blackened stubble. With plant succession, over time the native shrubs would gradually encroach and the predominant green-grey color of sagebrush would return. Generally, such vegetation changes are considered as adding diversity and color to an otherwise monolith landscape of same color and textures. As revegetation occurs, this change in line form, color and texture would be pleasing to the casual observer.

Alternative 2
Impacts would be similar to those described for the Proposed Action; however fewer acres treated by all methods would generate less short-term visual impacts. Long term visual effects to the characteristic landscape would be negligible.

Alternative 3
Impacts would be similar to those described for the Proposed Action; however, no prescribed fire and fewer acres by other treatment methods would generate the least amount of short and long-term visual effects. Long term visual effects to the characteristic landscape would be negligible.

Alternative 4 (No Action Alternative)
Under this Alternative no immediate changes to visual resources would occur.

4.10 Water Resources

4.10.1 Surface and Groundwater

Impacts Common to All Action Alternatives
No treatments would occur within a 500 foot buffer around wetland/riparian areas and floodplains, with the exception of fencing Onion Springs, to maintain vegetative cover and reduce runoff and nutrient and sediment loading. The exclosure of Onion Springs would be expected to enhance riparian characteristics, and would not increase potential for runoff and nutrient and sediment loading.

Alternative 1 (Proposed Action)
No additional impacts would be expected.

Alternative 2
No additional impacts would be expected.

Alternative 3
No additional impacts would be expected.

Alternative 4 (No Action Alternative)
No impacts to water resources would be expected if this alternative were selected.

4.10.2 Water Quality

Impacts Common to All Action Alternatives
There is a close correlation between the soil, vegetation, and water resources. Removal of vegetation generally increases the rate at which water flows off the land. Substantial disturbance to soil, including compaction of soil or changes in vegetative cover that result in decreased surface coverage, root depth, or root density, could increase water runoff, and accelerate erosion, sedimentation, and the addition of nutrients and sediment loads to stream channels.

It is likely that adverse impacts to water quality would be minor to negligible under all Alternatives. The proposed rates for herbicide application are on the low end of approved application rates, minimizing potential for leaching and surface runoff. Surface waters downhill from areas of proposed mechanical treatments may have a short-term increase in runoff due to the removal of surface vegetation. However, since untreated vegetation buffers exist between all live water and any proposed treatment, any potential impacts to surface water would be negligible.

Herbicides
The proposed rates for Glyphosate (Roundup®) and Tebuthiuron (Spike®) 20P are both on the low end of approved application rates, minimizing potential for leaching and surface runoff. Herbicide treatments would occur on up to 235 acres under this alternative, or 0.01% of the Upper Green River Watershed. Herbicide treatments would not occur in the New Fork River Watershed under any of the action alternatives. Control of non-native vegetation using herbicides can result in movement of herbicides into groundwater. However, the potential for an herbicide to reach groundwater before degrading is low, especially if applicators adhere to BMPs (see Appendix F for SOP's) during herbicide application. As nearly all drainages in the APP are intermittent, buffers will be implemented along any perennial water courses. Since untreated vegetation buffers exist between all live water and any proposed treatment, any potential impacts to surface water would be negligible.

Mechanical Treatments
Mechanical treatments would occur on 3,118 acres, or 0.1% of the Upper Green River Watershed. A total of up to 1,073 acres would also be treated on three different sites in the Mount Airy Allotment, or 0.08% of the New Fork River Watershed. Proposed treatments would be implemented in a mosaic fashion and all litter created by treatments would be left on site. Untreated vegetation buffers exist between all live water and any proposed treatment area. Any potential impacts to surface water would be negligible.

Seeding/Planting
Seeding and planting activities would have negligible impacts to water quality in the short-term. In the long-term direct and indirect, beneficial, minor effects would occur at treatment sites as a native

vegetation cover would be re-established, thus reducing erosion and sedimentation and improving water quality.

Exclosures/Fencing
Fencing of Onion Springs would benefit overall water quality by minimizing impacts to sensitive soils/habitats during key times and improving function.

Water Projects
Improvements to water wells, such as installing pipelines to run water to drinking locations or making non-functional wells functional, would impact groundwater quality. As the volume of water to be withdrawn is unknown at this time, it is difficult to evaluate the extent of possible effects on groundwater drawdown. However, given that there is only one proposed well rehabilitation (and it is not known if function could be restored to the well), it is likely that adverse impacts on groundwater would be negligible to minor. One pipeline is proposed for burial. Soil would be disturbed in a narrow, linear fashion. BMPs would be implemented and both sides of the soil disturbance would remain vegetated, thus any potential impacts to surface water would be negligible. Installation of check dams within drainages would have negligible to beneficial impacts to water quality in the short-term by reducing runoff speed and thereby reducing sediment loads. In the long-term, direct and indirect beneficial, minor effects would occur at treatment sites as native vegetation cover would be re-established, thus reducing erosion and sedimentation and improving water quality.

<u>Alternative 1 (Proposed Action)</u>
Proposed treatments that have the potential to affect water quality include the use of herbicides, prescribed burns, mechanical treatments, water projects, and fencing around Onion Springs. Due to limited surface water at project sites, impacts would not occur if BMPs are followed. Impacts to perennial waters are not expected due to proximity. A 500 foot buffer, where appropriate, will be maintained around perennial and intermittent/ephemeral drainages.

Prescribed Burns
Prescribed burn treatments would occur on no more than 49 acres, approximately 0.002% of the Upper Green River Watershed. No prescribed burn treatments would occur in the New Fork River Watershed under any of the action alternatives. Small fires and fires of low intensity would be expected to have very little effect on water quality. Loss of vegetation could lead to increased erosion and sediment loading into surface water and wetlands. However, these effects are considered normal and natural in fire-adapted ecosystems and would be within the normal range of variability. Since untreated vegetation buffers exist between all live water and any proposed treatment, any potential impacts to surface water would be negligible.

Summary of Effects
Since surface water is scarce at project sites, impacts would only occur when water is present in intermittent streams or there is precipitation shortly after treatment. Direct impacts to perennial waters would not occur as these rivers and streams are not near treatment sites. By following BMPs and BLM SOP's for herbicide application and complying with DEQ water quality rules and regulations, potential impacts to water quality would be negligible to minor in the short-term. In the long-term direct and indirect, beneficial, minor effects would occur at treatment sites as native vegetation cover would be established, thus reducing erosion and sedimentation and improving water quality. The treatment

projects are designed to increase ground cover and infiltration. Those projects sites that are drainage specific include small structures to aid in catching and holding sediment, and will be seeded with species to aid in assuring this. Overall, any potential impacts to surface or ground water would be negligible.

Alternative 2
Impacts would be similar to those described for Alternative 1, but would occur over a smaller area.

Alternative 3
Impacts would be similar to those described for Alternative 1, but would occur over a smaller area. There would be no impacts from prescribed burning.

Alternative 4 (No Action Alternative)
Under the No Action Alternative no herbicides would be used that may have a possibility of affecting current water resources. No increase in sedimentation would be expected save that naturally occurring due to plant succession and loss of diversity of ground cover. In the long-term direct and indirect, beneficial, minor effects would not occur at treatment sites as native vegetation cover would remain as is. The proposed treatments are designed to increase ground cover and would likely benefit infiltration; those projects sites that are drainage specific include small structures to aid in catching and holding sediment, and would be seeded with species to aid in assuring this. Under this alternative no such benefits would occur.

4.11 Wetlands and Riparian Zones

4.11.1 Wetland and Riparian Resources

Impacts Common to All Action Alternatives
Proposed treatments that have the potential to affect water resources include the use of herbicides, prescribed burns, mechanical treatments, seeding/planting, and exclosures/fencing.

Potential effects to wetlands and riparian areas could occur in the immediate vicinity of treatment activities or immediately downstream of those activities. Impacts from erosion and sedimentation caused by increased soil disturbance from mechanical treatments, application of herbicides, and would be direct, adverse and minor to negligible in the short-term. However, impacts should not increase if best management practices are in place and commitments made to enhance and restore Greater Sage-Grouse habitat could be met.

Lawson Aerator/Dixie Harrow
Mechanical treatment of soils could result in ground disturbance and movement of earth, increasing the likelihood of soil erosion and sediment delivery to stream channels and wetlands. The effects to local water quality and hydrology would be adverse and short-term if this occurs while water is present in intermittent streams, but may or may not be detectable. BMPs to control erosion, sediment release, and storm water surface runoff would be utilized during all mechanical treatments to minimize adverse impacts on streams and wetlands. Additionally, treatments conducted when intermittent streams are dry and there is no forecasted precipitation would completely avoid impacting surface water. All disturbed areas would be planted with native vegetation. Soils would be stabilized through seeding, reducing long-term effects such as erosion, sedimentation, and runoff, and improving water quality in the receiving

streams while vegetative productivity would be increased with all treatments, relative to longer term benefits.

Seeding/Planting
Seeding and planting activities would have negligible impacts in the short-term. All disturbed areas would be planted with native vegetation. Soils would be stabilized through seeding, reducing long-term effects such as erosion, sedimentation, and runoff, and improving water quality in receiving wetlands. Seeding and planting activities would benefit riparian areas by reducing runoff and sedimentation.

Exclosures/Fencing
Fencing around Onion Springs would protect riparian vegetation and the spring source from trampling. Fencing would aid in the reduction of use by ungulates and other treatments would not occur within wet areas.

<u>Alternative 1 (Proposed Action)</u>
Prescribed Burns
Small fires and fires of low intensity would be expected to have very little effect on wetlands and riparian areas. Fires that become large could have more substantial due to increased runoff, ash and woody debris deposited into wetlands and riparian areas. Short-term loss of vegetation could lead to increased erosion and sediment loading. These effects would be within the normal range of variability.

Prescribed fire would be managed to avoid or minimize the potential impacts. Existing canopy cover along all riparian areas within 300 feet of any intermittent or perennial surface water would be maintained when constructing fire lines. Any fire line that crosses riparian areas would have water bars installed within 300 feet of any intermittent or perennial body of water or wetland, and all fire lines located on steep slopes would have water bars installed at proper intervals. These actions would minimize or eliminate impacts to water quality from prescribed fire activities.

Summary of Effects
Short-term impacts to wetlands and riparian areas would be negligible to minor and adverse due to prescribed burning and mechanical and chemical treatments, which could increase soil erosion, sedimentation, and runoff. BMPs for mechanical treatments to control erosion, sediment release, and storm water surface runoff would be utilized during treatments to minimize impacts. By following label instructions and restrictions, establishing buffer zones between treatment areas and water bodies, and adhering to BMPs for pesticide application, applicators can reduce the potential for herbicides to reach aquatic systems. Prescribed fire would be managed to avoid or minimize potential impacts by maintaining, wherever possible, an unburned strip along the wetland or riparian area.

These treatments could enhance and restore Greater Sage-Grouse habitat.

Fencing of Onion Springs would protect this area and provide the potential for increases in forage and function. All disturbed areas would be planted with native vegetation. Soils would be stabilized through seeding, reducing long-term effects such as erosion, sedimentation, and runoff, and improving water quality in the receiving wetlands. These practices, in combination with other BMPs and a 500 foot buffer between treatments and wetlands/riparian zones would result in negligible impacts to Ryegrass Draw and Onion Springs.

Alternative 2
Impacts on wetlands and riparian areas would be similar to those described under Alternative 1 (Proposed Action), but lesser in extent due to the reduced acreage of mechanical treatments.

Alternative 3
Impacts on wetlands and riparian areas would be similar to those described under Alternative 1 (Proposed Action), but lesser in extent due to the reduced acreage of mechanical treatments. Prescribed burns would not occur, further reducing the acreage of disturbance.

Alternative 4 (No Action Alternative)
The spring at Onion Springs would see continuing adverse long term effects. No fencing to protect this resource would be installed, resulting in the spring continuing to degrade due primarily to wildlife and livestock use. Range health would continue to degrade with a major loss in diversity due to naturally occurring plant succession.

4.12 Wildland Fuels and Fire

Impacts Common to All Action Alternatives
Implementation of either alternative would decrease the likelihood of a catastrophic wildfire in the project area, thus conserving Greater Sage-Grouse habitat. The extensive alteration of hazardous fuel loads across the landscape would result in improving the fire resiliency of the plant community and return portions of this area to an early seral community with aspen and other first-generation successional species. The reduction of hazardous fuel loadings across this relatively large area would protect important wildlife habitat, infrastructure (i.e., roads and gas developments), and human health and safety from a potentially catastrophic wildfire. Recent wildfires in the region have burned in a mosaic pattern, and additional alterations to hazardous fuel loading would decrease future fire intensity and resistance to control.

Alternative 1 (Proposed Action)
Treatment acreage is the largest of all the alternatives, so hazardous fuel reductions would be the greatest, thereby reducing the potential for catastrophic wildfire. Alternative 1 provides the largest areas of reduced hazardous fuel loads and the largest surface area of reduced hazardous fuels.

Alternative 2
The reduction in hazardous fuel loads would reduce the risk of catastrophic wildfire, but not as significantly as Alternative 1 (Proposed Action).

Alternative 3
The reduction in hazardous fuel loads would be minor, and while likely beneficial, would not be as significant as Alternative 1 (Proposed Action).

Alternative 4 (No Action Alternative)
No treatments occur, so hazardous fuel loads would not be reduced. The potential for large catastrophic wildfire would likely increase.

4.13 Wildlife

4.13.1 Big Game Species (Mule Deer, Pronghorn, Moose, Elk)

Impacts Common to All Action Alternatives
With the exception of the No Action Alternative, the implementation of proposed habitat treatments could result in the long term enhancement of wildlife habitat within the treatment areas. Timing restrictions for all wildlife stipulations would be applied in accordance with the BLM's 2008 Resource Management Plan, as amended, reducing the impacts during critical life stages for raptors, big game and Greater Sage-Grouse. All actions would comply with and incorporate the appropriate disturbance and timing restrictions relating to SFAs, PHMAs, and GHMAs set forth in the ARMPA.

Mechanical Treatments
The proposed mechanical treatments could cause some localized disturbance to mule deer including dispersal and/or avoidance. In general, mule deer may be impacted by the removal or crushing (reduction in habitat quality) of sagebrush and mountain shrub habitats. Much of the area proposed for treatment is used during both winter and transitional times by mule deer moving to and from spring/summer habitat. The thinning of older, mature to decadent shrubs and sagebrush stands would create better overall mule deer habitat by creating a greater mixture of age classes and structural diversity within the shrub communities. In the long term, the overall habitat modified to a mixture of older and younger stands of shrubs would provide much higher nutritional value and become more palatable due to the presence of younger shrub stands and reproducing seedlings. By conducting treatments in transitional ranges, there is potential to improve the survival of mule deer and other big game species by improving animal health and increasing fat buildup before moving onto crucial winter range.

Herbicide Treatments
Tebuthiuron (Spike®
Alternative 1 (Proposed Action) includes treating shrub communities with aerial applications of Tebuthiuron (Spike®) in pellet form. For mule deer, the proposed aerial applications would cause some localized disturbance to wildlife in the area during the application including dispersal and/or avoidance. Any present big game species would be exposed to very low levels of Tebuthiuron (Spike®) following application. In mammals, Tebuthiuron (Spike®) is considered to have low acute dermal toxicity, but moderate toxicity when exposed for greater periods of time via diet or oral gavage (BLM 2007). Big game losses would not be anticipated with the proposed treatment.

Changes in vegetation composition would depend upon soil moisture conditions and could be seen over a period of 1-5 years depending on precipitation patterns. This gradual process allows wildlife to adjust to habitat changes over an extended period of time. Much of the area proposed for treatment is used during both winter and transitional times by mule deer moving to and from spring/summer habitat. The thinning of the older, mature to decadent shrubs and sagebrush stands would create better overall big game habitat by creating a greater mixture of age classes and structural diversity within the shrub communities.

Glyphosate (Roundup®)

Alternative 1 (Proposed Action) includes treating shrub communities with spray applications of Glyphosate (Roundup®). Acute risks to wildlife from Glyphosate (Roundup®) exposure are low and there are no chronic risks. Exposures with the greatest risk are direct spray and acute consumption of contaminated vegetation and insects. Smaller or spot applications would have lower risks than broadcast applications (BLM 2007). The proposed spray applications would cause some localized disturbance to big game in the area during the application including dispersal and/or avoidance. Any big game animals present would be exposed to very low levels of Glyphosate (Roundup®) following application; however losses would not be anticipated with the proposed treatment.

Mechanical and Herbicide:
Research has been published that calls into question the effectiveness of using mechanical and herbicide treatments on sagebrush to increase herbaceous vegetation production and cover (Beck *et.al* 2012, RMRS-GTR-144 2005, Jones *et.al* 2013, Davies et al 2012, Prevey *et.al*. 2009, Sowell *et.al* 2011, RMRS-GTR-040 2003). Several of these same sources also identify a greater risk for the establishment of invasive and exotic plant species following the removal of sagebrush. In order to reduce the chance of invasive species establishment within treatment sites post treatment monitoring would be conducted and standard weed prevention and control measures would apply. The proposed action was developed using the Wyoming Game and Fish Department's Recommendations for Managing Mule Deer Habitat In Wyoming (WGFD 2015). These recommendations identify mechanical and herbicide treatments as a management technique to maintain sagebrush vigor and increase the composition of preferred forage species. Periodic disturbance events can be used to maintain shrub vigor and age class diversification by setting back succession.

Seeding
Post-treatment seeding based on ecological site reference information and wildlife needs may increase the potential for germination of desirable forage and cover species and improve habitat quality for mule deer and the other big game species. The potential exists for the introduction of undesirable species such as cheatgrass through the seed mix which could reduce habitat quality. Drill seeding may result in temporary displacement of wildlife during the seeding operation and soil surface disturbance.

Fencing
Installation of permanent fencing has the potential to increase the probability of entanglements and associated mortalities or injuries to big game species. In order to minimize these impacts and protect the integrity of migration routes, new fence construction would adhere to BLM wildlife friendly specifications. Temporary electric fence line has been proposed to facilitate the necessary post treatment deferment for proposed habitat enhancement projects. These temporary fences would be consistent with BLM recommended wildlife friendly specifications. In addition, the temporary fence would only be present during the livestock grazing season during the associated period of deferment for each treatment area thereby reducing any potential long term impacts to big game species.

Water Projects
This proposed action outlines the installation of 3 miles of pipeline in order to facilitate water distribution for livestock, allow for the necessary deferment of proposed treatments and create more available water for wildlife. Installation of the pipeline would result in the removal or crushing of sagebrush habitat during construction. In addition, localized temporary disturbances could result in

localized disturbance including dispersal and/or avoidance by big game due to the presence of machinery and equipment during installation.

The installation of up to 4 water troughs associated with the pipeline would increase livestock utilization of the area immediately surrounding the water troughs, thereby reducing herbaceous cover. A decrease in the amount of shrub and herbaceous canopy could decrease the amount of forage available. In general, big game may be impacted by temporary removal or crushing (reduction in habitat quality) of sagebrush habitat during construction. Escape ramps in the troughs would minimize the potential for wildlife to drown.

Alternative 1 (Proposed Action)
Implementation of Alternative 1 (Proposed Action) would result in up to 3,415 acres of habitat treatments. The proposed treatments in the Aspen Ridge, Ryegrass and Mesa Treatment areas are located within crucial winter range for mule deer. Treatments proposed in the Soapholes treatment area are located within crucial winter range and spring, summer and fall range for mule deer. These treatments would be expected to increase age class diversity of the sagebrush community and increase species richness and cover of mixed mountain shrub communities, thus providing a long-term benefit to mule deer that use sagebrush ecosystems. Maintaining a balance and diversity of forage species on the landscape would benefit mule deer as they transition between summer and winter ranges during critical spring and fall seasons. Increased vegetation vigor and production could retain a greater proportion of digestible biomass for mule deer and other big game species to utilize. Timing restrictions for big game would be applied in accordance to the 2008 BLM Pinedale Resource Management Plan, as amended, for all alternatives.

Prescribed Fire
Impacts from prescribed burning could include the temporary removal of understory vegetation, loss of habitat quality and temporary avoidance of the area by big game animals during implementation. There is also potential for the burn to escape the targeted areas and impact adjacent habitats. The planting of bare root shrubs would reduce the effective response time of vegetation to the treatment and may increase the age class diversity of sagebrush, increase mountain shrub cover and increase leader growth of mountain shrubs.

Research has suggested that the presence of cheatgrass, global warming, and human started fires have resulted in a shorter fire interval compared to the historic regime (Baker 2011, Bukowski & Baker 2013). Sagebrush removal has also been associated with negative vegetation response and a greater risk of invasive plant increase (Beck et al 2012, RMRS-GTR-144 2005). The Proposed Action analyzes 49 acres of prescribed burning, this represents only 1.4% of the total proposed treatment acres. The proposed burning would occur within mixed mountain shrub communities consisting of mahogany, serviceberry, antelope bitterbrush, snowberry, and mountain big sage. This represents a more mesic vegetative community associated with areas of higher precipitation compared to the surrounding sagebrush dominated habitat. Containerized plantings will be planted to expedite recovery of mountain shrubs within the treated areas. The Wyoming Game and Fish Department's Recommendations for Managing Mule Deer Habitat In Wyoming (WGFD 2015) identifies prescribed burning as a management technique to maintain mountain shrub vigor and increase the composition of preferred forage species.

Alternative 2
Implementation of this alternative would result in treatments of up to 2,361 acres of habitat treatments. Impacts on big game species would be similar to those described in Alternative 1 (Proposed Action) but with less total acreage of habitat treatments. In the long term, it would be expected that the proposed treatments would increase age class diversity of the sagebrush community, increase species richness and increase cover of mixed mountain shrubs, thus providing a long term benefit to mule deer using the area.

Alternative 3
Impacts from implementation of this alternative on big game would be similar to Alternative 1 (Proposed Action), but with a smaller treatment acreage. The treated acreage would be approximately 1,010 acres of habitat treatments. Fire would not be used as a treatment in this alternative. It would be expected that treatments would increase age class diversity of the sagebrush community and increase species richness, thereby providing a long-term benefit to mule deer that use the project area.

Alternative 4 (No Action Alternative)
The No Action alternative would result in no changes to current vegetative conditions. This alternative would allow the vegetation community to continue to persist with an overabundance of decadent sagebrush and lack of grass and forb cover. With no change in the state of the current vegetation communities, any existing trends toward increasing or decreasing habitat quality would likely continue.

4.13.2 Federally Listed Threatened, Endangered, Proposed and Candidate Species

Colorado River Fish Critical Habitat
The installation of one range improvement outlined in the proposed actions would result in de minimus removal of water from the Upper Colorado River Basin. These troughs have a water surface area of approximately 113 sq. ft. each. They would contain water for approximately 60 days during the grazing season. With a maximum evaporation rate of 0.25”/day (0.0208 feet/day) during the summer, the cumulative total evaporation rate from the proposed troughs would equal 0.019 acre-feet per year. As of August 11, 2009, the USFWS, in accordance with the Upper Colorado River Endangered Fish Recovery Program, adopted a *de minimus* policy, which states that water-related activities in the Upper Colorado River basin that result in less than 0.1 acre-foot per year of depletions in flow have no effect on the Colorado River endangered fish species, and thus do not require consultation for potential effects on those species. The proposed project would therefore not impact the endangered Bonytail, Colorado Pikeminnow, Humpback Chub and Razorback Sucker.

4.13.3 BLM Sensitive Species, Raptors and Migratory Birds

Elements Common to All Action Alternatives
All proposed actions would comply with the BLM Special Status Species Management protocol. In compliance with existing laws, including the BLM multiple use mission as specified in the Federal Land Policy and Management Act, the BLM shall designate Bureau sensitive species and implement measures to conserve these species and their habitats, including proposed critical habitat, to promote their conservation and reduce the likelihood and need for such species to be listed pursuant to the Endangered Species Act. Site specific surveys for sensitive species would be conducted prior to initiation of proposed treatment activities for the presence of occupied habitat. If sensitive species are identified within the proposed treatment polygons efforts will be employed to limit disturbance including avoidance of identified habitats. Water troughs would have wildlife escape ramps installed to reduce the

potential for wildlife drowning in the troughs. Timing restrictions for all wildlife stipulations would be applied in accordance with the BLM 2008 Resource Management Plan, as amended.

Alternative 1 (Proposed Action)

Migratory Birds and Raptors

Implementation of Alternative 1 (Proposed Action) would result in 3,415 acres of habitat treatments. Impacts to migratory birds and raptors from the proposed actions would be similar to those described for Greater Sage-Grouse for all action alternatives. Proposed treatments may have short-term impacts on birds due to noise and physical presence of equipment. Birds may be impacted in the short-term by temporary removal or crushing (reduction in habitat quality) of sagebrush habitat during implementation of treatments and construction of water improvements and associated infrastructure. The long term shift in plant community dynamics that could be expected to occur with treatments may overall increase the amount of herbaceous cover and forage available for birds using the area. Stratifying age structure in shrub communities would alter the habitat from primarily older age class shrub stands to stands with younger shrub seedlings interspersed with older aged shrubs and vegetation. This increased edge effect, species diversity and variable age classes may be a long term benefit to birds.

Pygmy Rabbit

Mechanical

Direct impacts of this alternative action would be similar to those described for Greater Sage-Grouse including short-term impacts such as noise and longer term removal or crushing of habitat. The long term shift in plant community dynamics to increase grass and forb cover that would be expected to occur with treatments may result in an overall increase of the amount of forage available for pygmy rabbits using the area, particularly during the spring.

Herbicide

Tebuthiuron (Spike®)

Impacts of Alternative 1 (Proposed Action) would be similar to those described for big game and Greater Sage-Grouse. Impacts may include localized avoidance and disturbance and exposure to low levels of chemical following application. In mammals, Tebuthiuron (Spike®) is considered to have low acute dermal toxicity, but moderate toxicity when exposed for greater periods of time via diet or oral gavage (BLM 2007). Pygmy Rabbit losses would not be anticipated with the proposed treatment. Shifts in the vegetation community as a result of the application could be similar to those described for mule deer and Greater Sage-Grouse. The increasing grass and forb cover that would be expected to occur with treatment may result in an overall increase in the amount of forage available for pygmy rabbits using the area, particularly during the spring.

Glyphosate (Roundup®)

Alternative 1 (Proposed Action) includes treating shrub communities with spray applications of Glyphosate (Roundup®). Impacts to pygmy rabbits from application would be similar to those described for Tebuthiuron (Spike®). Acute risks to wildlife from Glyphosate (Roundup®) exposure are low and there are no chronic risks. Exposures with the greatest risk are direct spray and acute consumption of contaminated vegetation and insects. Smaller or spot applications would have lower risks than broadcast applications (BLM 2007).

Seeding

Impact to pygmy rabbits from proposed seeding actions would be similar to those described for mule deer.

Prescribed Fire
Impacts to pygmy rabbits from prescribed burning outlined in Alternative 1 (Proposed Action) would be similar to those outlined for mule deer. These impacts may include avoidance, temporary removal of understory vegetation, and temporary loss of habitat quality. Increased forb and grass cover may increase the amount of late summer forage available.

Fencing
Impacts to pygmy rabbits from the proposed fence line relocation and new construction are similar to those described for Greater Sage-Grouse. Proposed fence lines would be surveyed for the presence of occupied burrows. If occupied burrows are identified, efforts to avoid structural damage would be employed. All construction and other disturbance activities would adhere to seasonal timing restrictions and the amount of disturbed sagebrush habitat would be minimized as practicable.

Water Projects
The installation of water developments has potential to result in the degradation and/or destruction of suitable pygmy rabbit habitat in the immediate vicinity of the project location through increased levels of livestock utilization and trampling. Impacts would be similar to those outlined for mule deer. In order to reduce the potential impacts to habitat quality a project location would be identified that minimize sagebrush disturbance. In addition, occupancy surveys would be conducted within ¼ mile of potential locations. Utilization of solar panels instead of windmills would reduce perching opportunities for predators.

Amphibians
Riparian exclosures proposed in all action alternatives could provide protection and enable habitat to meet necessary requirements for amphibian species through improved water quality, system stability, and enhanced forage conditions. No habitat altering treatment projects will occur within suitable riparian habitat therefore no direct impacts would occur.

White-tailed Prairie Dog
No treatment projects will occur within identified white-tailed prairie dog towns therefore no direct impacts would occur.

<u>Alternative 2</u>
Impacts on sensitive species would be similar to those described in Alternative 1 (Proposed Action), but with a reduced total acreage of habitat treatments. This alternative would restrict the percent allowable for mechanical treatment within each mechanical treatment area to no more than 50% for a total of 2,361 acres of treatment. In the long term, it would be expected that the proposed treatments would increase age class diversity of the sagebrush community, increase species richness and increase cover of mixed mountain shrubs, thus providing a long-term benefit to wildlife using the area.

<u>Alternative 3</u>
Impacts on sensitive species would be similar to those described in Alternative 1 (Proposed Action), but with a reduced total acreage of habitat treatments. This alternative would restrict the percent allowable

for mechanical treatment within each mechanical treatment area to no more than 20% for a total of 1,010 acres of treatment. Prescribed fire would not be used as a treatment in this alternative therefore all impacts associated with that treatment type would no longer be applicable. It would be expected that treatments would increase age class diversity of the sagebrush community and increase species richness, thereby providing a long-term benefit to wildlife that use the project area.

Alternative 4 (No Action Alternative)
The No Action alternative would result in no changes to current vegetative conditions. This alternative would allow the vegetation community to continue to persist with an overabundance of decadent sagebrush and lack of grass and forb cover. With no change in the state of the current vegetation communities, any existing trends toward increasing or decreasing habitat quality would likely continue.

Greater Sage-Grouse
The proposed project has been reviewed and is in conformance with the Approved Resource Management Plan Amendment for Greater Sage-Grouse (ARMPA) and is consistent with guidelines provided in the Governor's Greater Sage-Grouse Implementation Team's Core Population Area strategy and the Governor's Executive Order 2015-4. The Density and Disturbance Calculation has been completed (based upon disturbance of 100% of the acreage involved) and sagebrush projects are within acceptable limits of the disturbance calculation (4.77%). The density calculation is also within the Executive Order 2015-4 guidelines of one acre of disturbance per 640 acres of land (0.7/640 acres). Timing restrictions for Greater Sage-Grouse would be applied in accordance to the ARMPA for all alternatives. With application of SOPs, applied mitigation, Required Design Features and Conditions of Approval identified for Greater Sage-Grouse under the proposed actions, impacts caused by surface-disturbing and disruptive activities would be minimized.

With the exception of the No Action Alternative, the implementation of proposed habitat treatments could result in the long term enhancement of habitat within the treatment area. This is likely to enhance quality of brood-rearing habitat. Short-term impacts include the potential for dispersal and/or avoidance during treatment, and a decrease in available sagebrush cover for nesting. All actions would comply with and incorporate the appropriate disturbance and timing restrictions relating to PHMA set forth in the ARMPA.

Alternative 1 (Proposed Action)
Implementation of Alternative 1 (Proposed Action) would result in 3,415 acres of habitat treatments. The Aspen Ridge, Ryegrass and Soapholes treatment areas are all located within designated SFA and PHMA. The Mesa treatment area is located outside of SFA and PHMA and Greater Sage-Grouse Core Areas. In the Aspen Ridge and Ryegrass treatment areas, some of the proposed treatments are located within 0.6 miles of active Greater Sage-Grouse leks. Treatment areas within 0.6 mile of an occupied lek will not result in a reduction of sagebrush canopy cover below 15% in accordance with Wyoming Game & Fish protocol for treating sagebrush consistent with SFA and PHMA protections mandated within the ARMPA.

Mechanical Treatments
Proposed treatments may have short-term impacts on Greater Sage-Grouse due to noise and physical presence of equipment. Greater Sage-Grouse may be impacted in the short-term by temporary removal or crushing (reduction in habitat quality) of sagebrush habitat during implementation of treatments and

construction of water improvements and associated infrastructure. The long term shift in plant community dynamics that could be expected to occur with treatments may overall increase the amount of herbaceous cover and forage available for Greater Sage-Grouse using the area, particularly for nesting and brood rearing habitats. An increase in forbs could benefit Greater Sage-Grouse as forbs are an important food source, especially for chicks that eat forbs until early fall (Connelly et al 2000). Crushing sagebrush vegetation may also result in an increase in insect abundance and could benefit Greater Sage-Grouse during early brood rearing (Aster Canyon Consulting 2006). Stratifying age structure in shrub communities would alter the habitat from primarily older aged class shrub stands to stands with younger shrub seedlings, interspersed with unaffected older aged shrubs and vegetation. This increased edge effect, species diversity and variable age classes may be a long term benefit to Greater Sage-Grouse.

Herbicide Treatments

Tebuthiuron (Spike®) 20P

Alternative 1 (Proposed Action) includes treating shrub communities with aerial applications of Tebuthiuron (Spike®) in pellet form. For Greater Sage-Grouse, the proposed aerial applications would cause some localized disturbance to Greater Sage Grouse in the area during the application including dispersal and/or avoidance. Greater Sage-Grouse would be exposed to very low levels of Tebuthiuron (Spike®) following application. Tebuthiuron (Spike®) is essentially non-toxic to birds (BLM 2007). Greater Sage-Grouse losses would not be anticipated with the proposed treatment.

Changes in vegetation composition as a result of the Tebuthiuron (Spike®) treatment would depend upon soil moisture conditions and could be seen over a period of 1-5 years depending on precipitation patterns. This gradual process allows wildlife to adjust to habitat changes over an extended period of time. Much of the area proposed for treatment is currently used as nesting, brood rearing and winter habitats by Greater Sage-Grouse. Over the long term, the expected changes that would occur as a result of thinning the older, mature decadent sagebrush stands would create better overall Greater Sage-Grouse habitat by increasing plant diversity and variable age classes in sagebrush communities.

Glyphosate (Roundup®)

Alternative 1 (Proposed Action) includes treating shrub communities with spray applications of Glyphosate (Roundup®). Acute risks to wildlife from Glyphosate (Roundup®) exposure are low and there are no chronic risks. Exposures with the greatest risk are direct spray and acute consumption of contaminated vegetation and insects. Smaller or spot applications would have lower risks than broadcast applications (BLM 2007). For Grater Greater Sage-Grouse, the proposed spray applications would cause some localized disturbance to Greater Sage Grouse in the area during the application including dispersal and/or avoidance. Greater Sage-Grouse would be exposed to very low levels of Glyphosate (Roundup®) following application; however losses would not be anticipated with the proposed treatment.

Seeding

Impacts to Greater Sage-Grouse from proposed seeding actions would be similar to those described for big game.

Prescribed Fire

Impacts to Greater Sage-Grouse from the prescribed burning outlined in Alternative 1 (Proposed Action) would be similar to those described for big game.

Fire was selected as a treatment method, as opposed to any alternative treatment techniques, in order to better prepare the treatment sites for planting of mountain shrubs. These shrubs are challenging to establish and burning the site will reduce competition with existing shrubs and grasses more effectively than mechanical treatments, and without the potential harm caused by herbicide residue. The Wyoming Game and Fish Department's Recommendations for Managing Mule Deer Habitat In Wyoming (WGFD 2015) recommends prescribed burning to stimulate growth of young plants when mountain shrubs have matured into tree like growth forms or become decadent. In addition, prescribed burning can enhance age class diversity of mountain shrubs (WGFD 2015).

The proposed treatments are in line with Approved Resource Management Plan Amendment (ARMPA) for Greater Sage-Grouse Objective 8 - Manage for vegetation composition and structure consistent with ecological site potential to achieve sage-grouse seasonal habitat objectives; and Objective 10 - Incorporate management practices that will provide for maintenance and/or enhancement of sage-grouse habitats, including specific attention to maintenance of desired understories of sagebrush plant communities. When developing objectives for residual cover and species diversity, identify the ecological site types within the planning area and refer to the appropriate ESDs. The proposed burning would occur within mixed mountain shrub communities consisting of mahogany, serviceberry, antelope bitterbrush, snowberry, and mountain big sage. This represents a more mesic vegetative community associated with areas of higher precipitation compared to the ecological site potential surrounding sagebrush dominated habitat. The surrounding sagebrush habitats would be maintained and not be impacted by the proposed burning. Potential threats to sage-grouse habitat from the use of fire, and methods to minimize these risks will be described in the Burn Plan. All best management practices within the Burn Plan will be implemented.

The following Objectives from the COT would be met:

1) Stop population declines and habitat loss by "eliminating activities known to negatively impact sage-grouse and their habitats" and by appropriately managing Priority Areas for Conservation (PACs) by "maintain, and improve degraded habitats to provide healthy intact sagebrush shrub and native perennial grass and forb communities, appropriate to the local ecological conditions, and to conserve all essential seasonal habitat components for sage-grouse." (Greater Sage-grouse Conservation Objectives: Final Report, 2013)

   In order to prevent population declines and habitat loss the proposed treatments have been reviewed for consistency with State sage-grouse regulations and in compliance with ARMPA. The project was determined to be in compliance with all density and disturbance restrictions using the Density Disturbance Calculation Tool (DDCT). All applicable wildlife seasonal restrictions from the ARMPA and recommendations outlined in the Wyoming Game and Fish Department Protocols for Treating Sagebrush in Greater Sage-Grouse Habitat will be followed.

2) Implement targeted habitat management and restoration.

   The objectives of the prescribed fire are to increase leader growth and cover of desirable mountain shrub communities. These treatments are designed to enhance habitat for wintering mule deer and are not targeted for the management and restoration of sage-grouse habitat. The

surrounding sagebrush habitats would be maintained and not be impacted by the proposed burning.

3) Develop and implement state and federal sage-grouse conservation strategies and associated incentive-based conservation actions and regulatory mechanisms.

   This objective is beyond the scope of this document and the proposed treatments.

4) Develop and implement proactive, voluntary conservation actions.

   This objective is beyond the scope of this document and the proposed treatments.

5) Develop and implement monitoring plans to track the success of state and federal conservation strategies and voluntary conservation actions.

   This objective is beyond the scope of this document and the proposed treatments.

6) Prioritize, fund, and implement research to address existing uncertainties.

   This objective is beyond the scope of this document and the proposed treatments.

Fencing
Impacts to Greater Sage-Grouse from fence line construction outlined in Alternative 1 (Proposed Action) would be similar to those described for big game. Installation of permanent fence may result in crushing of vegetation, temporary increase in human activity and associated noise, and potentially increase the probability of fence strikes. In order to minimize the risk of collision, all proposed fencing within 0.6 mile of occupied lek locations would be marked with strike diverters.

Water Projects
Impacts from proposed pipeline and trough installation would be similar to those described for big game. In addition, to address the increased risk Greater Sage-Grouse have of drowning in stock water troughs, escape ramps would be installed in all troughs.

<u>Alternative 2</u>
Implementation of this alternative would result in 2,361 acres of habitat treatments. Impacts to Greater Sage-Grouse would be similar to those described in Alternative 1 (Proposed Action) but with less total acreage of habitat treatments. In the long term, it would be expected that the proposed treatments would increase age class diversity of the sagebrush community, increase species richness and increase cover of mixed mountain shrubs, thus providing a long term benefit to Greater Sage-Grouse using the area.

<u>Alternative 3</u>
Impacts from implementation of this alternative on Greater Sage-Grouse would be similar to Alternative 1 (Proposed Action) but with a smaller treatment acreage. Implementation of this alternative would result in 1,010 acres of habitat treatments. Fire would not be used as a treatment in this alternative. It would be expected that treatments would increase age class diversity of the sagebrush community and

increase species richness, thereby providing a long term benefit to Greater Sage-Grouse that use the project area.

Alternative 4 (No Action Alternative)
The No Action alternative would result in no changes to current vegetative conditions. This alternative would allow the vegetation community to continue to persist with an overabundance of decadent sagebrush and lack of grass and forb cover. With no change in the state of the current vegetation communities, any existing trends toward increasing or decreasing habitat quality would likely continue.

4.14 Cumulative Effects

Introduction
Cumulative impacts are the effects on the environment that result from implementing any of the alternatives in combination with other actions outside the scope of this plan, either within the planning area or outside it. The CEQ regulations for implementing NEPA define cumulative impacts as—

> • *"The impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR §1508.7).*

According to the 1994 BLM publication "Guidelines for Assessing and Documenting Cumulative Impacts," the cumulative analysis can be focused on those issues and resource values identified by management, the public and others during scoping that are of major importance." Additionally, the guidance provided in the National BLM NEPA Handbook H-1790-1 (2008), for analyzing cumulative effects issues states, "determine which of the issues identified for analysis may involve a cumulative effect with other past, present, or reasonably foreseeable future actions.

The Proposed Alternative would authorize up to 3,415 acres of treatments to improve mule deer habitat for a period of up to five years. Therefore, the time-frame for analyzing the effects of any reasonable foreseeable future actions would be for a period of five years. The past and present actions listed below would continue throughout the time frame.

Past, Present and Reasonably Foreseeable Future Actions
Past actions in the area include grazing, recreation, hunting, fuels treatments, wildland fires, range improvement projects, habitat enhancement projects, energy development, and road development.

Various vegetation treatments have occurred. Tables 25 and 26 list past and reasonable foreseeable vegetation treatments to occur on public land in the APP. The results of these projects were to reduce sagebrush canopy and increase grass and forb production, or to reduce fuel loads. Numerous water projects have also occurred with the intention of increasing water availability for livestock and wildlife and to redistribute livestock grazing pressure.

Livestock grazing has a long history in the area dating back to the 1800's. There were numerous range improvement projects implemented throughout the APP to improve the quality of forage and these projects consisted of fences, reservoirs, spring developments, and drilling of water wells.

There have also been seasonal vehicle winter range closures in the Aspen Ridge, Ryegrass and Mesa segments of the APP to minimize stress to wintering wildlife.

Recreation activities that occur within the allotments include: hunting, antler hunting, wildlife viewing, camping, and OHV use.

Based on the 2008 Pinedale RMP the affected environment within Aspen Ridge, Ryegrass and Soapholes is unavailable to leasing for mineral development. However, there is a natural gas pipeline that goes through the Ryegrass region. The Mesa segment has undergone, and is continuing to undergo, energy development.

Current uses include wildfire management, energy development, grazing, hunting, and recreation. Reasonably foreseeable future actions include travel management planning, grazing plan revisions, and potentially other fuels and habitat treatments.

Table 25: Foreseeable projects within and near the APP

Project	Description	Approximate Location	Timeline
Basin Reservoir	Improve the well at this site	T31N, R109W, Sec 7	2016 or 2017
Sublette Mule Deer, Phase 2	Habitat improvements intended to benefit mule deer.	On the Mesa and within transitional habitats used by mule deer that winter on the Mesa	2017 or 2018
Mesa Weed Inventory and Treatment	Sublette County Weed and Pest will inventory and treat weeds on the Mesa flanks	PAPA flanks	2015
Pinedale Anticline Development	Oil and gas well pads, roads, pipelines, and human presence/traffic	Pinedale Anticline	Present - 2025

Foreseeable activities within and near the project area include livestock grazing, maintenance of county and other roads, seasonal vehicle closures for protection of wildlife occupying winter range, , and further/future vegetation treatment projects.

Table 26: Past habitat improvement treatments in the APP

Treatment Name	Treatment Type	Focus Area in the APP	Year
Brodie Draw Burn 1	Prescribed Fire	Aspen Ridge	1999
Brodie Draw Burn 2	Prescribed Fire	Aspen Ridge	1999
Green River Spray #9	Herbicide	Aspen Ridge	Before 1974

Treatment Name	Treatment Type	Focus Area in the APP	Year
Ryegrass Mowing	Mowing	Aspen Ridge	2007, 2008, 2009
James Spray	Herbicide	Aspen Ridge	Before 2002
Unnamed	Herbicide	Aspen Ridge	Before 1974
Onion Creek Spray	Herbicide	Ryegrass	Before 1974
Unnamed	Herbicide	Ryegrass	Before 1974
Round Valley Ryegrass/Fork Road Spray	Herbicide	Ryegrass	Before 1974
Unnamed	Herbicide	Ryegrass	1970
Unnamed	Herbicide	Soapholes	Before 1974
Unnamed	Herbicide	Soapholes	Before 1983
Mt. Airy Seeding	Seeding	Mesa	Before 1974
Green River Spray #7	Herbicide	Mesa	Before 1974
Unnamed	Herbicide	Mesa	Before 1983
Mesa Fertilization 40lb/ac	Fertilizer	Mesa	2010
Mesa Fertilization 80lb/ac	Fertilizer	Mesa	2010
Mesa Fuels Treatments	Mixed (Mechanical, Herbicide and Seeding)	Mesa	2006

4.14.1 Air Quality

The analysis area for cumulative impacts to air quality is the upper Green River basin. The scale of the proposed projects is minor. Non-measurable impacts are anticipated to air quality with the exception of during the prescribed burns, which would occur according to the High Desert District Fire Management Plan and would minimize any potential impacts. Impacts to air quality through the use of fossil fuels to complete treatments are expected to be unmeasurable and diffuse, and very short-term (limited to the time of the burn).

General conformity analysis conducted on the proposed action indicates that the emissions from the proposed action would be minor and fall well below the 10 tons per year. The timing and short-term nature of the treatments and very minor emissions produced during treatments would not result in increases to overall emissions in the Upper Green River Basin Non-attainment area. Long-term enhancement of habitat would in some cases improve the air quality in localized area by reducing fugitive emissions and stabilizing soil.

4.14.2 Cultural Resources

The proposed project has the potential to adversely impact NRHP eligible historic properties. The BLM and WYSHPO have chosen to develop a Programmatic Agreement pursuant to 36 CFR Part

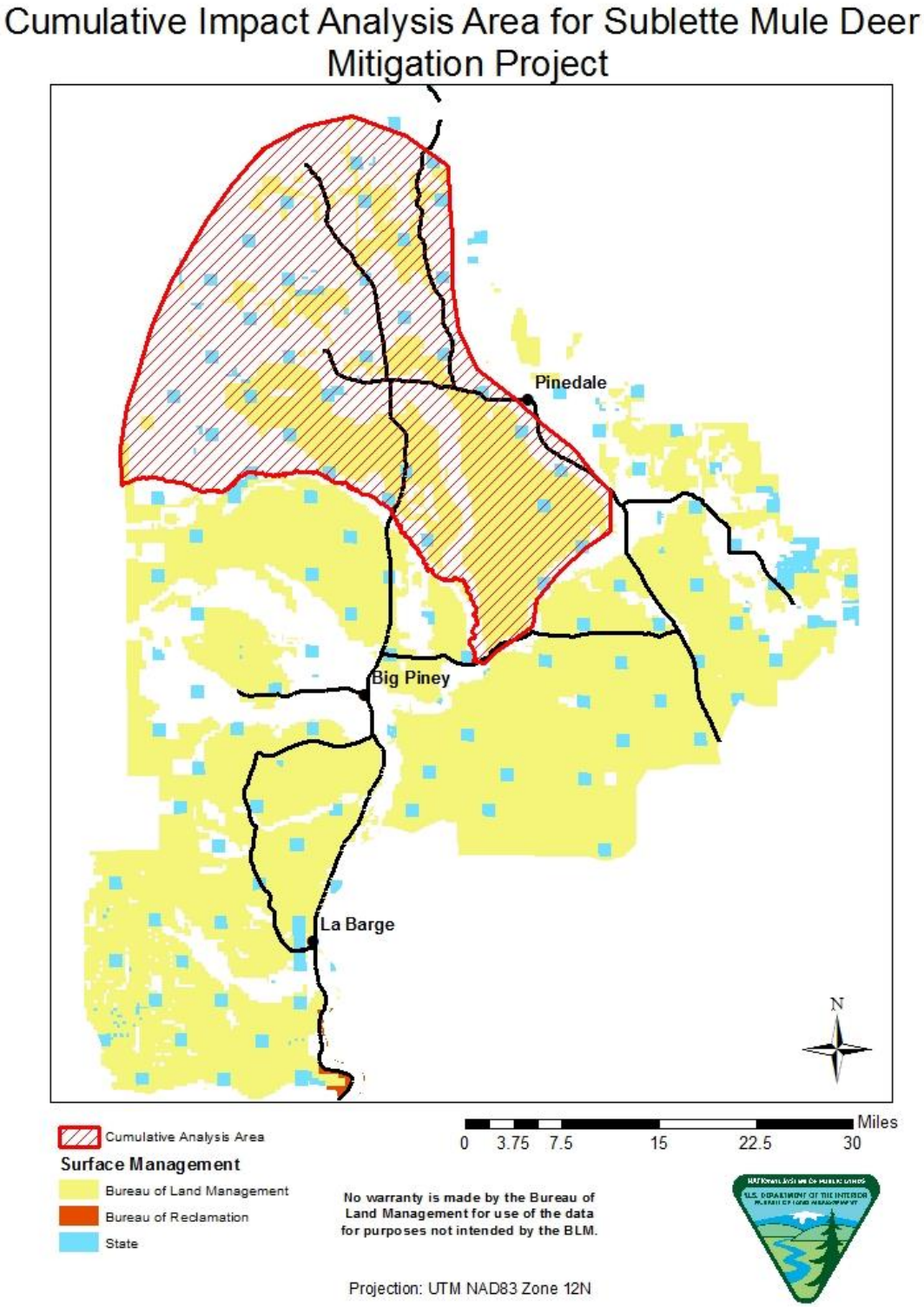
800.14(b)(ii) of the regulations implementing the National Historic Preservation Act to employ a phased approach to historic property identification as allowed under 36 CFR Part 800.4(b)(2)(BLM 2014). This Programmatic Agreement is incorporated into this document as Appendix C. The analysis area for cumulative impacts to cultural resources is the PA area.

The cumulative impacts to cultural resources of previous, present and future development, including the surrounding industrialization are discussed in the 2008 Pinedale Resource Management Plan Final EIS Section 4.19.4. The BLM, in coordination with consulting agencies, will continue to manage potential cumulative impacts to cultural resources in the CIAA through the implementation of federal regulatory laws, actions and guidelines designed to protect cultural resources.

4.14.3 Livestock Grazing

The analysis area for cumulative impacts to livestock grazing is the Ryegrass, Mesa, and Upper Green landscapes (Map 18). Impacts to grazing from this project would be in addition to impacts from energy development on the Mesa, and other activities that might necessitate deferment or rest of allotments, pastures, or treatment areas. Energy operators coordinate with livestock grazing permittees periodically to determine and solve problems. Reclamation areas in the gas fields are often fenced to facilitate success of planted vegetation. These areas are a small portion of the entire analysis area, making the additional impact of this project small. Impacts would be short term, as temporary fencing and deferment needs would be removed within 2 years after project implementation.

Map 18. Cumulative Impact Analysis Area.



4.14.4 Recreation

The analysis area for cumulative impacts to recreation is the Ryegrass, Mesa, and Upper Green landscapes (Map 18).Because impacts to recreation only occur during the actual time of implementation of the project, cumulative effects to recreation are anticipated to be low. The only other disturbances likely to occur at the same time as this project are potential road maintenance and potential new gas well drilling within the Pinedale Anticline gas field.

4.14.5 Soils

The analysis area for cumulative impacts to soils is soil types similar to those found in the project area, within the Ryegrass, Mesa, and Upper Green landscapes (Map 18). Project impacts to soils would be localized. The Pinedale Anticline Project Area would be within the cumulative impact analysis area for this project. Maintenance of county roads in the analysis area could cause some soil erosion. However, additional cumulative impacts to the soil from this project would not be expected, due to the types of treatment methods used. Some benefits to soils could occur, due to successful reclamation from energy development and enhanced vegetative cover from the mechanical treatments, protecting the soil from erosion.

4.14.6 Vegetation Resources

The analysis area for cumulative impacts to vegetation is the Ryegrass, Mesa, and Upper Green landscapes (Map 18).

Rangeland Vegetation
Vegetation is impacted by other disturbances including energy development, road construction and maintenance, livestock grazing, and other vegetation treatment projects. Some of these are long-term disturbances that remove vegetation for many years or permanently. Livestock grazing is managed to provide for continuation of vegetation communities. The impacts to vegetation from this project are localized and short term, with the exception of localized impacts around new water developments. This project would add a small impact (3415 acres) to vegetation resources in the analysis area (over 200,000 acres).

Thousands of acres of private lands are also located within the cumulative impact analysis area. Actions on those lands that could impact rangeland vegetation include subdivision, livestock grazing, other agricultural uses such as tilling, or industrial development.

Invasive, Non-native Species and Noxious Weeds
Other activities within the analysis area also have the potential to increase the presence or spread of weeds. Energy development activities are conducted according to weed management plans, with companies responsible for controlling weeds in areas where they are permitted to operate. Road maintenance results in disturbed areas that could become occupied by weeds. Livestock grazing is a potential way for weeds to spread. Ongoing monitoring of weed presence, and weed control activities, would minimize but would likely not eliminate the spread of weeds.

4.14.7 Visual Resource Management

The analysis area for cumulative impacts to visual resources is the Ryegrass, Mesa, and Upper Green landscapes (Map 18). The only long-term impacts to visual resources from this project are localized impacts from the Onion Creek exclosure and the Brodie Draw well and water troughs. A few other similar structures are located within the analysis area. Development of gas drilling and production facilities on the Mesa, as well as potential development of private lands within the analysis area, would cause some visual impacts. The Onion Creek exclosure and the Brodie Draw water development would not be visible from adjacent private lands or from gas fields on the Mesa.

4.14.8 Wildlife

The analysis area for cumulative impacts to wildlife is the Ryegrass, Mesa, and Upper Green landscapes (Map 18).

Maintenance of existing and installation of new range improvement projects and livestock grazing has been an ongoing action within the cumulative analysis area for many years and will likely continue. Livestock grazing may result in competition for forage and water and habitat alteration. Areas of concentrated livestock use may result in removal of vegetation and soil compaction such as stock driveways. Grazing may also enhance forage conditions for wildlife as regrowth in previously grazed areas may result in the increase in forage palatability (BLM 2008). Maintenance and installation activities may result in the temporary displacement of wildlife species due to the presence and noise associated with vehicles and tools. Additionally, the installation of new improvements may result in the removal of small areas of sagebrush habitat. These improvements can assist with grazing management and livestock distribution across the landscape. The proposed range improvements may alter livestock distribution and facilitate rest for treatment areas and may result in temporary displacement of wildlife during installation.

Habitat enhancement projects have resulted in a mosaic of sagebrush canopy cover and age classes within portions of the cumulative analysis area. The implementation of future habitat treatments could result in the long term enhancement of wildlife habitat within the cumulative analysis area. Impacts of these projects would likely be similar to those described for the Proposed Action.

Based on the 2008 Pinedale RMP the Ryegrass landscape is unavailable to leasing for mineral development. Therefore no cumulative impact to wildlife resources from mineral development is expected. There are no active oil and gas development operations currently within the Upper Green River landscape. Portions of this landscape are available for oil and gas leasing and development with stipulations. Development would likely result in the avoidance and removal of wildlife habitat. Active oil and gas development associated with the Pinedale Anticline is occurring within the Mesa landscape. Development has resulted in avoidance and removal of habitat for numerous wildlife species and will likely continue to reduce habitat quality on the Mesa. The proposed action is designed to enhance mule deer habitat in order to mitigate the impacts associated with development of the Pinedale Anticline.

Recreational activities including hunting, antler hunting, wildlife viewing, camping and OHV use may result in temporary disruption to and avoidance of habitat by wildlife populations within the cumulative analysis area. Unauthorized off-road use may also lead to habitat degradation. The proposed action is

designed to enhance mule deer habitats and may result in additional temporary and localized disruptions to wildlife populations and avoidance of habitats during project implementation.

Road maintenance has been ongoing and will likely continue along designated county roadways. Noise and disturbance associated with maintenance activities may result in temporary avoidance of suitable habitat by wildlife. All actions occur within established Rights-Of Way limiting any potential damage to adjacent habitat condition. The noise and disturbance associated with the proposed action may result in the temporary avoidance and displacement of wildlife during project implementation.

Seasonal motorized vehicle winter range closures have been implanted to protect big game winter range through limiting disturbance to wildlife during the critical winter season. The project is designed to enhance mule deer winter habitat and through adherence to seasonal winter range closures there will be no disturbance to big game associated with project implementation.

Inventory and treatment of weeds may result in the temporary displacement of wildlife due to noise and disturbance associated with human presence. The removal of noxious weed populations could allow native species to occupy additional acreage and potentially demonstrate increased vigor. This could result in improved habitat conditions for a variety of wildlife species. There is potential for the proposed action to result in the establishment of invasive species. In order to reduce the chance of invasive species establishment within treatment sites post treatment monitoring would be conducted and standard weed prevention and control measures would apply.

5.0 TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED

The BLM consulted the following individuals, Federal, State, and local agencies, and non-BLM persons during the development of this environmental assessment.

5.1 Federal, State, and Local Agencies

Wyoming State Historic Preservation Office, the Advisory Council on Historic Preservation, the Sublette County Historic Preservation Board, the Sublette County Certified Local Government, the Oregon-California Trails Association and the Alliance for Historic Wyoming.

5.2 Others

The Eastern Shoshone Tribe of the Wind River Reservation, The Northern Arapaho Tribe of the Wind River Reservation, The Shoshone-Bannock Tribe of the Fort Hall Reservation, The Northern Ute Tribe of the Ouray and Uintah Reservation.

6.0 List of Preparers

Table 27: BLM, WGFD and Wyoming Department of Agriculture (WDA) proponents

Name	Agency	Role in EA
Phil Damm/Dylan Bergman/Dan Stroud	WGFD	Project Proponent
Eric Decker	BLM	Project Coordinator
Caleb Hiner	BLM	Pinedale Field Manager
Janet Bellis	BLM	Air Quality

Name	Agency	Role in EA
Janet Bellis	BLM	Climate Change
Rob Schweitzer	BLM	Cultural
Joe Budd	WDA	Livestock Management
Justin Williams	WDA	Range/Livestock Management
Theresa Gulbrandson	BLM	Sensitive Species/ESA
Walter Loewen	BLM	NEPA
Travis Ames	BLM	Range Management, Vegetation Resources
Martin Hudson	BLM	Recreation
Kellie Roadifer	BLM	Riparian
Josh Hemenway	BLM	Sensitive Species/ESA
Brian Roberts	BLM	Soils
Martin Hudson	BLM	Visual Resources/Special Designation Management Areas
Janet Bellis	BLM	Water Quality/Wetlands
Therese Hartman	WGFD	Wildlife/Mitigation
Sam Drucker	BLM	Paleontology

7.0 REFERENCES CITED

Adamczewski, J.Z., P.J. Fargey, B. Laarveld, A. Gunn and P.F. Flood. 1998. The influence of fatness on the likelihood of early-winter pregnancy in muskoxen (*Ovibos moschatus). Theriogenology* 50(4):605-614.

Andréa MM, Peres TB, Luchini LC, Bazarin S, Papini S, Matallo MB, Savoy VLT (2003). "Influence of repeated applications of glyphosate on its persistence and soil bioactivity". *Pesquisa Agropecuária Brasileira* **38** (11): 1329–1335.

Aster Canyon Consulting, LLC. 2006 Annual Report. Wildlife Utilization Of Reclaimed Lands In The Jonah Infill Drilling Project Area.

Baker, W. L. 2011. Pre–Euro-American and recent fire in sagebrush ecosystems. Pp. 185–201 in S. T. Knick and J. W. Connelly (editors). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA.

Beck, J. L., Connelly, J.W., and Wambolt, C.L. 2012. Consequences of treating Wyoming Big Sagebrush to enhance wildlife habitats. Rangeland Ecology and Management, 65(5):444-455.

Bukowski, B.E., and Baker, W.L. 2013. Historical fire regimes, reconstructed from land-survey data, led to complexity and fluctuation in sagebrush landscapes. Ecological Applications, 23(3):546-564.

Bureau of Land Management. 2007. Final Programmatic Environmental Impact Statement (PEIS) – Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States. Washington Office. Washington D.C.

Bureau of Land Management. 2008. *Record of Decision: Final Supplemental Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project.* Accessed May 2013 at: http://www.blm.gov/wy/st/en/info/NEPA/documents/pfo/anticline/seis.html.

Bureau of Land Management. 2008. *Record of Decision and Approved Pinedale* RMP as amended. Accessed May 2013 at: http://www.blm.gov/wy/st/en/programs/Planning/rmps/pinedale/rod_armp.html.

Bureau of Land Management. 2012. *10-year Sublette Mule Deer Mitigation Plan.* Accessed May 2013 at: http://www.blm.gov/pgdata/etc/medialib/blm/wy/information/NEPA/pfodocs/sublette_mule_deer.Par.75290.File.dat/MDPlan.pdf.

Bureau of Land Management, 2012. *Seasonal Public Land Closures.* Accessed May 23, 2013 at: http://www.blm.gov/wy/st/en/field_offices/Pinedale/recreation/closures.html.

Bureau of Land Management. 2014. *A Class III Inventory for the Proposed Sublette Mule Deer Habitat Project. Sublette County, WY*. Report on file with the Bureau of Land Management Pinedale Field Office.

Bureau of Land Management. 2015. Approved Resource Management Plan Amendments for the Rocky Mountain Region, Including the Greater Sage-Grouse Sub-Regions of Lewistown, North Dakota, Northwest Colorado, and Wyoming/Record of Decision.

Braun, C.E. 2006. *A Blueprint for Sage-Grouse Conservation and Recovery*. Tuscon, AZ.

Cagney, J., E. Bainter, B. Budd, T. Christiansen, V. Herren, M. Holloran, B. Rashford, M. Smith, J. Williams. B-1203, March 2010. *Grazing Influence, Objective Development, and Management in Wyoming's Greater Sage-Grouse Habitat: With Emphasis on Nesting and Early Brood Rearing.* University of Wyoming, Laramie, WY.

Council on Environmental Quality. 2010. *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions.* Accessed May 2010 at http://www.whitehouse.gov/sites/default/files/microsites/ceq/20100218-nepa-consideration-effects-ghg-draft-guidance.pdf.

Connelly, J.W., M.A. Schroeder, A.R. Sands and C.E. Braun. 2000. Guidelines to Manage Greater Sage-Grouse Populations and Their Habitats. *Wildlife Society Bulletin* 28(4):967-985.

Cultural Resource Analysts Inc. Class III Cultural Resources Inventory of the Sublette Mule Deer Habitat Project, Sublette County, Wyoming. Report on file with the Wyoming State Historic Preservation Office, Report #30163.

Davies, K.W., et al. 2011. Saving the sagebrush sea: an ecosystem conservation plan for big sagebrush plant communities. Biol. Conservation. 144: 2573-2584.

Davies, K.W., Bates, J.D., and Nafus, A.M. 2012. Mowing Wyoming Big Sagebrush communities with degraded herbaceous understories: has a threshold been crossed? Rangeland Ecology and Management, 65(5):498-505.

Diamond J.M., Call C.A., and N. Devoe. 2009. Effects of targeted cattle grazing on fire behavior of cheatgrass-dominated rangeland in the northern Great Basin, USA. International Journal of Wildland Fire, 18, 944-950.

Environmental Systems Research Institute. 2010. *ESRI Data & Maps*. Redlands, CA.
Good Guide Scorecard, The Pollution Information Site. 2011. Clean Water Act Status: Sublette County, WY. Accessed April, 2013 at: http://scorecard.goodguide.com/env-releases/water/cwa-county.tcl?fips_county_code=56035#ranking.

Green, J.S., Flinders, J.T. 1980. Habitat and Dietary Relationships of the Pygmy Rabbit. Journal of Range Management 33(2):136-142.

Gustine, D.D., Barboza, P.S. and Lawler, J.P. 2010. Dynamics of body protein and the implications for reproduction in captive muskoxen (*Ovibos moschatus*) during winter. *Physiological and Biochemical Zoology* 83:687–697.

Hayden-Wing Associates, LLC. 2014. Pygmy rabbit monitoring in the Pinedale Anticline Project Area Sublette County, Wyoming. Prepared for: Wyoming Game and Fish Department, Pinedale Anticline Project Office and Bureau of Land Management.

Heidel, B. 2009. Status of Lesquerella macrocarpa (Large-fruited bladderpod) and Phlox pungens (Beaver Rim phlox) in the Upper Green River Basin. Prepared for the Bureau of Land Management. Wyoming Natural Diversity Database, Laramie, WY.

Heidel, B. 2013. Status of Antennaria arcuata (Meadow pussytoes) in Sublette County, Wyoming. Prepared for the USDI Bureau of Land Management - Pinedale and Rock Springs Field Offices by the Wyoming Natural Diversity Database - University of Wyoming, Laramie, WY.

IPCC, 2014: Summary for Policymakers. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1-32.

Jones, A.J., Catlin, J., and Vazquez, E. 2013. Mechanical treatment of pinyon-juniper and sagebrush systems in the intermountain west: a review of literature. Draft. Wild Utah Project, Salt Lake City, UT.

Keinath, D and M. McGee. 2005. Boreal Toad (*Bufo Boreas Boreas*) A Technical Conservation Assessment. Report for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project May 25, 2005. Wyoming Natural Diversity Database.

Launchbaugh K, Brammer B, Brooks M, Bunting S, Clark P, Davison J, Fleming M, Kay R, Pellant M, Pyke DA, Wylie B (2008) Interactions among livestock grazing, vegetation type, and fire behavior in the Murphy Wildland Fire Complex in Idaho and Nevada, July 2007. US Geological Survey Open-File Report 2008–1214. (Washington, DC)

Mule Deer Working Group. 2007. The Wyoming Mule Deer Initiative, Wyoming Game and Fish Department.

North Wind. 2009. Jonah Interagency Office Baseline Habitat Sampling 2009 – Brodie Draw, East Aspen Ridge and Jewett Ryegrass Allotments. Prepared for Jonah Interagency Mitigation and Reclamation Office. Prepared by North Wind, Inc., 119 S. Fremont Street, Pinedale, WY 82941.

NRCS Web Soil Survey, 2013http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Orabona, A., C. Rudd, M. Grenier, Z. Walker, S. Patla, and B. Oakleaf. 2012. Atlas of Birds, Mammals, Amphibians, and Reptiles in Wyoming. Wyoming Game and Fish Department Nongame Program, Lander, WY, USA. 232pp.

Pinedale Anticline Project Office. 2012. 10 Year Sublette Mule Deer Mitigation Plan. Pinedale, Wyoming.

Patla, D.A., D.A. Keinath. 2005. SPECIES ASSESSMENT FOR COLUMBIA SPOTTED FROG (*RANA LUTEIVENTRIS*) IN WYOMING. Report for United Sates Dept. of Interior Wyoming State Office March 2004. Wyoming Natural Diversity Database.

Prevey, J.S., Germino, M.J., and Huntly, N.J. 2010. Loss of foundation species increases population growth of exotic forbs in sagebrush steppe. Ecological Applications, 20(7):1890-1902.

Sawyer, H. and M. Kauffman, 2009. *Identifying mule deer migration routes to and from the Pinedale Anticline Project Area.* Prepared by: Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, 1000E. University Ave, Laramie, WY 82071. Prepared for University of Wyoming, Laramie WY.

Sawyer H. and R. Nielson, 2011. *Mule deer migration routes to and from the Mesa and Ryegrass winter ranges:2010*. Prepared by: Western Ecosystem Technology, Inc, 200 South 2nd St, Suite B, Laramie, WY 82070. Prepared for Pinedale Anticline Project Office, Pinedale WY.

Sawyer H. and R. Nielson, 2012. *Mule Deer and Pronghorn Monitoring in the Pinedale Anticline Project Area: 2012 Mule Deer and Pronghorn Mitigation Update*. Prepared by: Western Ecosystem Technology, Inc, 200 South 2nd St, Suite B, Laramie, WY 82070.

Sawyer H. and R. Nielson, 2011. *Mule Deer Migration Supplement*. Prepared by: Western Ecosystem Technology, Inc, 200 South 2nd St, Suite B, Laramie, WY 82070.

Sowell, B.F., Wambolt, C.L., Woodward, J.K., and Lane, V.R. 2011. Relationship of Wyoming Big Sagebrush cover to herbaceous vegetation. Natural Resources and Environmental Issues, 16: 1-3.

Sublette County Conservation District, 2016, Surface Water Biological Monitoring of The New Fork River Near the PAPA; A Summary of Preliminary Results and Needs, http://www.blm.gov/wy/st/en/field_offices/Pinedale/anticline/planning.html

Sublette County Conservation District. 2016. Pinedale Anticline Ground Water Data Summary (January 1, 2015 through December 31, 2015. Annual Report to Pinedale Anticline Working Group / Bureau of Land Management, Pinedale Field Office. http://www.sublettecd.com/pid/58/water-quality_quantity.aspx.

Smith, B.E. and D. Keinath. 2004. SPECIES ASSESSMENT FOR NORTHERN LEOPARD FROG (*RANA PIPIENS*) IN WYOMING. Report for United Sates Dept. of Interior Wyoming State Office March 2004. Wyoming Natural Diversity Database.

State of Wyoming Executive Order. 2015. Greater Sage-Grouse Core Area Protection; Order 2015-4. Cheyenne, Wyoming.

Sublette County Socioeconomic Impact Study: Phase 1 Final Report. 2008. Prepared by: Ecosystem Research Group. Prepared for:Sublette County Commissioners. Last accessed June 2015. http://www.sublettewyo.com/DocumentCenter/Home/View/355

The Economist, Inc. 2007. *Natural Gas in Wyoming – Boom and Doom.* Accessed May 2013 at: http://www.economist.com/node/9261736.

Tollefson, T.N., L.S. Shipley, W.L. Meyers, D.H. Keisler and n. Dasgupta. Influence of Summer and Autumn Nutrition on Body Condition and Reproduction in Lactating Mule Deer. *Journal of Wildlife Management* 74(5):974-986.

United States Census Bureau. 2000. *Profile of General Demographic Characteristics: 2000 (SF4).* Accessed May 2013 at: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_00_SF4_DP1&prodType=table.

United States Census Bureau. 2010. *Profile of General Population and Housing Characteristics: 2010 Demographic Characteristics: 2010.* Accessed May 2013 at: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_DP_DPDP1&prodType=table.

United States Census Bureau. 2010. *Profile of General Population and Housing Characteristics: 2010 Demographic Characteristics: 2010.* Accessed May 2013 at: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_DP_DPDP1&prodType=table.

United States Census Bureau. 2011. *State & County Quickfacts: Wyoming.* Accessed May 2013 at: http://quickfacts.census.gov/qfd/states/53/53071.html.

United States Department of Agriculture, Natural Resources Conservation Service. 2012. *Soil Survey Geographic (SSURGO) Database for Sublette County, Wyoming*. Accessed May 2013 at: http://soildatamart.nrcs.usda.gov/.

United States Department of Agriculture, Nationa Agriculture Statisitics Service. Last accessed: June 2015. http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_State_Level/Wyoming/st56_1_012_013.pdf

United States Environmental Protection Agency. 2012. *Six Common Air Pollutants*. Accessed May 2013 at: http://www.epa.gov/oar/oaqps/urbanair/.

United States Environmental Protection Agency. 2012. *Currently Designated Nonattainment Areas for All Criteria Pollutants*. Accessed May 2013 at: http://www.epa.gov/oaqps001/greenbk/ancl.html#WYOMING.

United States Fish and Wildlife Service. *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.* Accessed May 2013 at: http://digitalmedia.fws.gov/cdm/ref/collection/document/id/858.

United States Fish and Wildlife Service. 2013. Greater Sage-grouse (Centrocercus urophasianus) conservation objectives: final report. Denver, CO.

Welch, B.L. 2005. Big sagebrush: a sea fragmented into lakes, ponds, and puddles. Gen. Tech. Rep. RMRS-GTR-144. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Welch, B.L. and Criddle, C. 2003. Countering misinformation concerning big sagebrush. Research paper RMRS-RP-40. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Wyoming Game and Fish Department. 2012. *Annual Report of Small Game, Upland Game, Waterfowl, Furbearer, Wild Turkey, & Falconry Harvest 2011.* Accessed May 2013 at: http://wgfd.wyo.gov/web2011/Departments/Hunting/pdfs/HR2011_SMALLUPLANDGAME0002625.pdf.

Wyoming Game and Fish Department. 2014. *WGFC Regulations*. Accessed December 2014 at: http://wgfd.wyo.gov/web2011/HUNTING-1000179.aspx

Wyoming Game and Fish Department. 2015. Recommendations for managing mule deer habitat in Wyoming. Mule Deer Working Group. Cheyenne, WY.

Wyoming Game and Fish Department. 2015. *Wyoming Game and Fish Department protocols for treating sagebrush to be consistent with Executive Order 2015-4; Greater Sage-Grouse Core Area Protection.* Accessed October 2014 at: gf.state.wy.us/web2011/Departments/Wildlife/pdfs/SG_TREATINGSAGEBRUSHPROTOCOL0000668.pdf.

Wyoming Natural Diversity Database. 2014. *Species of Concern List.* Accessed May 2015 at: http://www.uwyo.edu/wyndd/species-of-concern/index.html

Appendix A

SCOPING COMMENTS

Sublette Mule Deer Project
Comment Categories, Codes, and Summaries

prepared by Mangi Environmental, LLC

22 January 2013

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Mule Deer Comment
Categories, Codes, and Summaries

Introduction

Forty scoping comment documents on the Sublette Mule Deer 10-year Mitigation Plan were reviewed. Six-hundred four individual comments were identified and similar comments were placed in 29 general comment categories, then grouped into more specific categories. The general and specific categories are listed and summarized in this document. The number of individual comments that fell into each specific comment category was tabulated and that number is listed here as well. The coded individual comments and their associated comment document are compiled in the accompanying excel spreadsheet document.

Proposal Effects on Allotments

Allotment01 – Request that all projects within a single allotment be conducted at the same time.

Summary: Commenter requested that all treatments in one allotment be implemented at the same time.

Number of comments: 1

Allotment02 – Concerned with unduly effect on a single operator having multiple treatments across several allotments.

Summary: Comment is concerned that the proposed project would unfairly affect a single operator due to their allotments having multiple treatments across them.

Number of comments: 2

Climate

Climate01 – Drought/dry conditions are the main cause of vegetation decline and should be addressed in this mitigation plan.

Summary: A few commenters believe climate change especially the recent dry conditions are the main cause of mule deer habitat degradation.

Number of comments: 5

Climate02 – Treatments will not be effective because of the climate and drought conditions.

Summary: Comments concerned that the proposed treatments will not be effective because of the drought conditions of the area.

Number of comments: 4

Summary: Commenter wants the EA to consider the project's potential to contribute to greenhouse gases. They also want the EA to address how greenhouse gases can be reduced or eliminated as a result of this project.

Climate03 – EA should consider potential to cause or contribute to greenhouse gasses; and how to mitigate or eliminate them.

Number of comments: 1

Cultural Resources

CulturalResources01 – Request that agencies involve the Tribes in the planning process.

Summary: Comment suggests involving Tribes and considering project that Tribes would be receptive to, even in areas of high importance relative to cultural resources.

Number of comments: 1

CulturalResources02 – Clarify status of cultural surveys, including on-the-ground inventory, Tribal consultation and landscape efforts for the work proposed for 2013 and 2014.

Summary: Cultural surveys including the on-the-ground inventory, trial consultation, and landscape efforts should be completed before the proposed plan is implemented.

Number of comments: 3

CulturalResources03 – Area 1 contains a recognized Traditional Cultural Property) and a National Register Eligible historic property (48SU285) and therefore should be addressed as a Cultural Landscape under Section 110 of NHPA.

Summary: Comment stated that Area 1 includes a Traditional Cultural Property and a National Register Eligible historic property. These issues should be addressed as a Cultural Landscape under Section 110 of NHPA.

Number of comments: 1

CulturalResources04 – A 1260-acre direct treatment area on the Mesa west of the Pinedale Airport includes 48SU2019 region, an area recognized Traditional Cultural Property and National Register Eligible historic property and therefore should be addressed as a Cultural Landscape under Section 106 of NHPA.

Summary: Comment addressed specific Traditional Cultural Property and National Register eligible historic property, 48SU2019. This area should be addressed as a Cultural Landscape under Section 106 of NHPA.

Number of comments: 1

Cumulative Effects

Cumulative01 – Recommend requiring all drilling rig operators to redirect light downward toward the drilling platform or well pad and away from sensitive species.

Summary: Commenter recommends requiring all drilling rig operators redirect light downward toward the drilling platform or well pad and away from sensitive species.

Number of comments: 1

Cumulative02– Mitigation needs to address habitat changes due to the oil and gas industry.

Summary: Livestock grazing is not the only operation that adversely affects mule deer habitat. Impacts from the oil and gas industry should also be addressed in this plan.

Number of comments: 12

Data Accuracy, Requirements, and Sources

Data01 – The 15% threshold which triggered mitigation efforts in 2008 is inaccurate.

Summary: A few comments stated the 15 percent threshold which triggered mitigation efforts in 2008 is inaccurate.

Number of comments: 2

Data02 – Utilize existing annual monitoring reports, recent assessments, and scientific publications.

Summary: Many commenters want existing annual monitoring reports, recent assessments, and scientific publications added to the management plan and treatment process. Several commenters want specific reports included.

Number of comments: 48

Data03 – Information regarding areas to be treated is inadequate (Size or area, # and periods of use of Greater Sage-Grouse, etc.).

Summary: A few commenters are stated the information regarding treatment areas is inadequate including the size of the area, number and periods of use of Greater Sage-Grouse.

Number of comments: 2

Data04 – Provide important vegetation data and calculations for the project area.

Summary: Provide important vegetation data and calculations for the project area. Number

of comments: 2

Data05 – Revise 10-year Sublette Mule Deer Mitigation Plan – especially appendices, tables, and maps – for consistency, accuracy, and clarity.

Summary: Several commenters stated that the document needs to be revised – especially appendices, tables, and maps – for consistency, accuracy, and clarity. Several comments stated that the numbers and proposed mitigation locations are not accurate.

Number of comments: 7

Data06 – Provide a timeline for treatment implementation.

Summary: Several comments requested a timeline for treatments. Some comments wanted to know when treatments would end.

Number of comments: 9

Data07 – Commenters provided data/information on current conditions and current operations on allotments for the agencies to consider in the management plan.

Summary: Several permittees have provided information on current conditions and operations on the allotments that agencies should consider when developing treatment areas and management goals and objectives.

Number of comments: 33

Economics

Economic01 – Overall economic impacts to ranchers should be considered and analyzed before developing and implementing a management plan. Especially need to address loss to permittees associated with resting the treatment area.

Summary: Many commenters are concerned about the economic impact to the permittees from implementing the proposed plan, especially from resting allotments. Economic impacts to permittees should have been considered when developing the plan and should be considered in the future. Permittees will have to graze on private lands and/or supplement livestock feeding with hay. Project could put ranchers out of business.

Number of comments: 36

Economic02 – Permittees should not have to pay for any aspect of the project including the construction and maintenance of fencing treatment areas.

Summary: Several commenters state that the agencies should pay for any fencing as well as any fence maintenance within treatment areas. Commenters do not believe the permittee should be responsible for the cost associated with fencing or the labor needed to build the fence.

Number of comments: 11

Economic03 – Agencies should compensate permittees for any costs associated with implementing the proposed project.

Summary: Several comments are concerned that permittees should be compensated for any cattle reduction or if they have to move their cattle to other fields.

Number of comments: 6

Economic04 – The agencies should bear the cost of the project.

Summary: Several commenters want the agencies to cover the cost of the projects because they are the ones proposing and implementing the management plan.

Number of comments: 11

Economic05 – Concern BLM funding will be inadequate to properly perform NEPA and monitor effectiveness of proposed project.

Summary: Commenter is concerned BLM funding will be inadequate to properly perform NEPA and monitor effectiveness of proposed projects.

Number of comments: 1

Economic06 – Fully disclose estimated costs for all phases, what funding is or is not secured, and which agency will be responsible for future implementation of which parts.

Summary: A few commenters requested that the agencies fully disclose estimated costs for all phases, what funding is or is not secured, and which agency will be responsible for future implementation of which parts.

Number of comments: 2

Economic07 – Loss of revenue to permittees will result in loss of employment.

Summary: Commenter is concerned that if permittees lose revenue from resting/losing allotments, they will be forced to liquidate their assets and will lay-off employees.

Number of comments: 1

Economic08 – Less money will be spent within the community because of any associated cost to permittees.

Summary: Commenter's concerned that cattle ranchers will have less money to spend within the local communities.

Number of comments: 1

Fencing

Fencing01 – Oppose to fencing livestock drinking source(s) (water resources) in an allotment.

Summary: Several commenters are concerned that fencing treatment areas would harm their cattle business, especially if fences kept cattle away from their primary drinking sources. Fences should only be placed around drinking sources if temporary water supplies are provided by the agencies.

Number of comments: 9

Fencing02 – Support fencing treatment areas.

Summary: Commenters support fencing the treatment areas.

Number of comments: 5

Fencing03 – Electric fencing does not effectively keep wildlife out and should not be used for this project.

Summary: A few commenters stated that electric fencing is not effective at keeping wildlife out of an area and would require maintenance. Commenter's feel electric fencing should not be used for this project.

Number of comments: 5

Fencing04 – Supports the use of electric fencing.

Summary: Commenters support using electric fencing around treatment areas in allotments.

Number of comments: 2

Fencing05 –Suggest fencing specific locations in treatment areas.

Summary: Several commenters with knowledge of the area (permittees) suggested specific locations that fencing may be effective at enhancing habitat conditions.

Number of comments: 5

Fencing06 – Request that if fencing is used, it is temporary and removed as soon as the project is completed.

Summary: Several commenters are concerned that fencing will be permanent. Fencing should to be temporary and removed as soon as the project is completed.

Number of comments: 5

Fencing07 – If fences are used or proposed they should be wildlife friendly for big game and Greater Sage-Grouse.

Summary: If fences are used or proposed they should be wildlife friendly for big game and Greater Sage- Grouse.

Number of comments: 1

Fencing08 – Agencies should be responsible for fencing any treatment areas.

Summary: Several commenters believe the agencies should be responsible for fencing and maintaining fences within the allotments. Permittees do not want to be responsible for fencing treatment areas within their allotments.

Number of comments: 13

Fencing09 – Oppose fencing treatment areas.

Summary: Several commenters oppose using fencing around specific treatment areas.

Number of comments: 7

Higher Country

HigherCountry01 – Comments concerned about what is being done on the higher country.

Summary: Comment concerned about what the agencies are doing on the higher country.

Number of comments: 1

Hunting

Hunting01 – WY Fish and Game Department should address hunting to address declining mule deer populations.

Summary: Several commenters are concerned that the permittees and oil and gas industry are being forced to manage mule deer and Greater Sage-Grouse populations, but the WY Department of Fish and Game is not addressing the amount of deer harvested each year from hunting.

Number of comments: 3

Public Involvement

Involvement01 – Agencies should restart planning process and involve the permittees from the beginning and throughout the entire planning process.

Summary: Several commenters are concerned that permittees were not involved in the planning process from the start, especially for treatment locations, sizes, and schedules. Permittees are out in the field every day and have a good understanding of what treatments would and would not work. They will also be adversely affected by this project and would like to work with the agencies to develop objectives and treatments that will protect wildlife while limiting the adverse impacts to ranchers.

Number of comments: 36

Involvement02 – Better explain to the public all efforts undertaken by the agencies to prevent mule deer population declines and why some, if any, have been considered successful and some not, and what the criteria for success are.

Summary: Commenter requests that the agencies better explain to the public all efforts undertaken by the agencies to prevent mule deer population declines and why some, if any, have been considered successful and some not, and what the criteria for success are.

Number of comments: 1

Involvement03 – Make most current wildlife population data available to public and extend deadline so stakeholders can properly assess and recommend management strategies.

Summary: Commenter requested that the agencies make most current wildlife population data available to the public.

Number of comments: 1

Involvement04 –Request to also be involved in annual meetings and coordination with PAPO, WGFD, BLM, and permittees.

Summary: Commenter requests to be involved in annual meetings and coordination with PAPO, WGFD, BLM, and permittees.

Number of comments: 1

Involvement05 – Request that comment be formally recognized.

Summary: Commenter requests to be recognized as having status in the NEPA and Section 106 processes for the project.

Number of comments: 1

Livestock

Livestock01 – Recommend using livestock within treatment areas during mitigation process.

Summary: A few commenters feel livestock could help cultivate and fertilize treatment areas during reseeding procedures.

Number of comments: 4

Livestock02 – Quantify variables of livestock grazing that influence the soils, water, plants, and wildlife within the treatment areas.

Summary: Commenter requests that the agencies quantify variables of livestock grazing that influence soils, water, plants, and wildlife within the treatment area.

Number of comments: 1

Livestock03 – Suggest keeping cattle off allotments during growing season and fall grazing to prevent them from taking crucial forage for wintering deer; and to allow seedlings to establish during spring months. Grazing should not be permanently eliminated during the spring but deferred every other year.

Summary: Commenter suggests using the funds to purchase grazing privileges for three growing seasons and during fall grazing, enhancing forbs and grasses and preventing livestock from taking crucial forage for wintering deer during fall grazing and allow seedlings to establish during the spring months.

Number of comments: 1

Livestock04 – Suggest moving livestock via water control.

Summary: Commenter proposed moving livestock via water control (fencing reservoirs and pumping water off site).

Number of comments: 2

Mitigation

Mitigation01 –Fear that mitigation efforts on transition range would not be effective.

Summary: Several commenters do not believe mitigation efforts will be effective at addressing the decline in mule deer population because the habitat problem is within the deer's winter range and not their transition range.

Number of comments: 6

Mitigation02 – Recommend mitigation strategies that avoid the fragmentation of ecosystems and associated impacts to native wildlife species in Pinedale Anticline.

Summary: Several commenters recommend addressing habitat encroachment from and fragmentation in the Pinedale Anticline where oil and gas activities occur.

Number of comments: 5

Mitigation03 – Recommend reseeding sage and other palatable shrubs and forbs on all disturbed areas not containing at least 15% sagebrush on the Pinedale Anticline.

Summary: Commenter recommend reseeding sage and other palatable shrubs and forbs on all disturbed areas not containing at least 15% sagebrush on the Pinedale Anticline.

Number of comments: 1

Mitigation04 – Require use of newest drilling technologies and restrict new surface disturbance in mule deer and pronghorn crucial winter range, migration corridors, and Greater Sage-Grouse core areas.

Summary: Require use of newest drilling technologies and restrict new surface disturbance in mule deer and pronghorn crucial winter range, migration corridors, and Greater Sage-Grouse core areas.

Number of comments: 1

Monitoring

Monitoring01- Projects need to be monitored to determine benefits and the next steps/treatments. These should be made available to permittees.

Summary: Several commenters requested that the proposed project include a monitoring plan to determine which management techniques are effective. Permittees should be involved in this process.

Number of comments: 9

Monitoring02 – Expand and standardize noise monitoring as related to natural gas development.

Summary: Commenter requested that the plan expand and standardize noise monitoring as related to natural gas development.

Number of comments: 1

Mule Deer Population

MuleDeerPopulation01 – Provide forecast of mule deer populations with and without proposed enhancement projects.

Summary: Comments requested that the agencies provide forecast of mule deer populations with and without proposed enhancement projects.

Number of comments: 3

Noise

Noise01 – Redefine ambient noise for wildlife (and not just humans), referencing measured background and not the 39dBA used in the PAPA ROD.

Summary: Commenter requests that the plan redefines ambient noise for wildlife (and not just humans), referencing measured background and not the 39dBA used in the PAPA ROD.

Number of comments: 1

Noise 02 – Reduce noise from all anthropogenic sources on the Anticline, especially in sensitive habitats.

Summary: Commenter requests that the plan includes reducing noise from all anthropogenic sources on the anticline, especially in sensitive habitats.

Number of comments: 2

O&M Effects

Operation and Maintenance01 - Consider existing operations and impending developmental impacts from the ongoing drilling and production, grazing or other existing land management.

Summary: Several comments requested that the plan consider existing operations and impending developmental impacts from the ongoing drilling and production, grazing or other existing land management.

Number of comments: 2

Predator Control

Predators01 – Predator management should be addressed in addition to the proposed plan.

Summary: Commenters are concerned predators are contributing to the decline of mule deer populations and that they need to be addressed in addition to the proposed project.

Number of comments: 11

Predators02 – Recommend redesigning all gas field infrastructures (power poles, exclusion devices, tank batteries, etc.) to reduce predator perches.

Summary: Comment suggested that all gas field infrastructures (power poles, "exclusion devices, tank batteries, etc.) to reduce predator perches.

Number of comments: 1

Proposal Specifics

Proposal01 – Proposed project is too vague and because of this the objectives of the management plan will not be met. Permittees need to know how long they will be held off treatment areas, how large the treatment areas are, what the vegetation objective are, and who is in charge.

Summary: Several commenters are concerned that the proposed management plan does not address the real reasons for mule deer decline; and the agencies need to understand why mule deer populations are declining before actually implementing the management plan.

Number of comments: 26

Proposal02 – Concern that the proposed plan as it stands would not properly address management of mule deer.

Summary: Several commenters are concerned that the proposed plan needs to take a larger view and all the reasons for mule deer decline. As the proposal stands now, it generally lacks the necessary implementation measures to achieve the objectives.

Number of comments: 14

Proposal03 – Agencies must fully comply with all relevant sections of NEPA and implement regulations, including consideration of the full range of alternatives and potential direct, indirect, and cumulative impacts.

Summary: Agencies must fully comply with all relevant sections of NEPA and implement regulations, including consideration of the full range of alternatives and potential direct, indirect, and cumulative impacts. Plan needs to address oil and gas impacts as well as livestock impacts.

Number of comments: 6

Proposal04 – Confusion with regards to use of terms such as goals, objectives, methods, tools; also recommend clearly defining expected outcomes. Request these be clearly defined or clarified.

Summary: Several commenters request that the goals, objectives, methods, and tools are clearly defined or clarified.

Number of comments: 5

Proposal05 – Comments expressing support for mitigation plan.

Summary: Comments supporting the mitigation plan.

Number of comments: 8

Proposal06 – Allow for future treatments, improvements, and developments to occur as treatment planning and analysis progresses.

Summary: Several commenters request that an adaptive management approach be taken so that future treatments, improvements, and developments are developed as more information is gathered.

Number of comments: 2

Proposal07 – Support habitat improvement on BLM land, but not the current mitigation plan.

Summary: Several commenters support improving habitat on BLM land for general wildlife, mule deer, and livestock but they do not agree with the proposed management plan.

Number of comments: 6

Proposal08-Research and clarify how the new highway fences and privets affect deer migration and winter/transitional habitat preferences before predicting where to increase forage.

Summary: Several commenters stated that the agencies need to understand the impacts highway fences have on mule deer migration before developing treatments.

Number of comments: 3

Proposal9 – Permittees should not be held liable or be penalized if their cattle get into treatment areas.

Summary: Comments concerned that permittees will be held liable or penalized if their cattle get into treatment areas.

Number of comments: 2

Proposal10 – Spread treatments over several years.

Summary: Commenter would like treatments spread over several years instead of implementing them all at once.

Number of comments: 1

Proposal11 – Look at Mesa for projects.

Summary: Commenter feels the agencies should look at improving vegetation on the Mesa.

Number of comments: 1

Proposal12 – Consider and evaluate effects of Chronic Wasting Disease on deer populations.

Summary: Comment requesting that the proposed plan considers and evaluate effects of Chronic Wasting Disease on deer populations.

Number of comments: 1

Requests

Request01 – Request a longer comment period. *Summary:*

Commenter requests a longer comment period Number of

comments: 1

Request02 – Request for additional data or reports.

Summary: Comments request additional data or reports.

Number of comments: 2

Grazing Rest Requirements

Resting01: Support limited resting

Summary: Several commenters were concerned about the length of time proposed for resting allotments and are in favor of limiting the amount of time allotments/treatments are in rest. One commenter recommends the use of grazing deferment and not a blanket "2-year rest" statement.

Number of comments: 7

Resting02 – Prescription of rest should be ecologically consistent with plant community objective.

Summary: Commenter requests that prescription of rest be ecologically consistent with plant community objective.

Number of comments: 1

Resting03 – Could rest entire area if agencies provide/fund alternative pasture in places where large treatments or multiple small treatments are proposed.

Summary: Some permittees could rest entire area if agencies provide/fund alternative pasture in places where large treatments or multiple small treatments are proposed.

Number of comments: 5

Resting04 – Request that treatments be conducted on an allotment by allotment basis so that only one allotment is at rest at a time per permittee.

Summary: Several permittees are concerned about resting all of their allotments at once and believe this mitigation plan should be conducted on an allotment by allotment basis. An alternative based on implementing treatments on an allotment by allotment basis would be best for the permittees.

Number of comments: 10

Resting05 – Request that the agencies allow livestock grazing on allotments during any projects/restoration/reseeding.

Summary: A few comments requested that the agencies allow permittees to continue grazing on their allotments while treatments are conducted. Commenters do not want to stop using their allotments because they are essential pasture areas for their operations.

Number of comments: 2

Resting06 – Agencies should not put allotments in permanent rest and allotments should be given back to permittees.

Summary: A few commenter's are concerned that the agencies will put the allotments into permanent rest and that the permittees will lose their allotments.

Number of comments: 2

Ryegrass

Ryegrass01- Ryegrass is not wintering range for mule deer.

Summary: Comment state that the ryegrass area is not the wintering range of the mule deer.

Number of comments: 1

Ryegrass02 – Identify why ryegrass vegetation is declining.

Summary: Several comments requested that the agencies identify why vegetation conditions in the ryegrass areas are declining.

Number of comments: 1

Ryegrass03 - Recommend Italian Ryegrass for planting wildlife forage on private lands.

Summary: Commenter recommends Italian ryegrass because it has historically been good vegetation for wildlife forage.

Number of comments: 2

Greater Sage-Grouse

Greater Sage-Grouse01 – Replacing existing vegetation with Greater Sage-Grouse could add more restrictions to grazers.

Summary: Commenters are concerned that if this area becomes Greater Sage-Grouse they will be further restricted because of the 5% disturbance cap associated with Greater Sage-Grouse.

Number of comments: 1

Greater Sage-Grouse02 – Projects should be delayed until Landscape Analysis and Greater Sage-Grouse
RMP amendments are considered.

Summary: Commenters request that the project should be delayed until Landscape Analysis and Greater Sage-Grouse RMP amendments are considered.

Number of comments: 2

Greater Sage-Grouse03 – Concern the Mitigation Plan and Treatments could compromise ongoing efforts to prevent further decline of Greater Sage-Grouse population in the Pinedale Anticline Area.

Summary: A few commenters are concerned that the mitigation plan and proposed treatments could compromise efforts to prevent decline of Greater Sage-Grouse populations in the Pinedale Anticline.

Number of comments: 4

Greater Sage-Grouse04 – Concerned cumulative impacts of all existing treatments since at least 1993 on distribution and population size of Greater Sage-Grouse in the Pinedale Anticline Area has not been considered.

Summary: Commenter is concerned that cumulative impacts of all existing treatments since at least 1993 on distribution and population size of Greater Sage-Grouse in the Pinedale Anticline Area has not been considered.

Number of comments: 1

Greater Sage-Grouse05 – Consider whether 10 dB above ambient noise is too high for Greater Sage-Grouse and other wildlife species.

Summary: Commenter requests that the agencies consider whether 10 dB above ambient noise is too high for Greater Sage-Grouse and other wildlife species.

Number of comments: 1

Greater Sage-Grouse06 – Proposed plan could benefit Greater Sage-Grouse

Summary: Commenter believes the proposed plan will benefit Greater Sage-Grouse.

Number of comments: 1

Soil Survey

Soil01 – Need to conduct a soil survey on allotments to determine if treatments are practical.

Summary: Commenter wants soil surveys completed to help determine best treatment methods.

Number of comments: 1

Cattle Trails

Trailing01 – Trailing of livestock is invaluable and permittees need to use allotments to trail their livestock.

Summary: Several commenters are concerned that treatment areas would be closed to cattle trails, which would make operations impossible.

Number of comments: 11

Treatment Specifics

Treatment01 –Propose treatments of resting allotments one year and then grazing lightly late in the second year to facilitate seeding.

Summary: Proposed treatments of resting allotments one year and then grazing lightly late in the second year to facilitate seeding.

Number of comments: 1

Treatment02 – Request smaller/test treatment sizes

Summary: Several commenters requested that the proposed project should include smaller treatment areas.

Number of comments: 17

Treatment03 – Carefully consider treatment on or around wet meadows, seeps, and mixed shrubs communities which are valuable for mule deer, Greater Sage-Grouse, and other wildlife species.

Summary: Carefully consider treatment on or around wet meadows, seeps, and mixed shrubs communities which are valuable for mule deer, Greater Sage-Grouse, and other wildlife species.

Number of comments: 1

Treatment04 – Suggest alternative treatment options such as cattle in combination with broadcast seeding to increase diversity.

Summary: Commenter suggests treatment of using cattle in combination with broadcast seeding to increase diversity.

Number of comments: 3

Treatment05 – Recommend that nitrogen fertilization project not only consider application rates but also the type of sagebrush and associated Ecological Site Description.

Summary: Commenter suggests that nitrogen fertilization project not only consider application rates but also the type of sagebrush and associated Ecological Site Description.

Number of comments: 1

Treatment06 – Recommend re-evaluating inter-seeding projects. *Summary:*

Commenter recommends re-evaluating inter-seeding projects. Number of

comments: 1

Treatment07 – Recommend re-evaluating treatments that reduce sagebrush.

Summary: Commenter recommends re-evaluating treatments that reduce sagebrush.

Treatment08 – Support aggressive and effective reclamation in disturbed areas to reduce sagebrush densities.

Summary: Commenters support aggressive and effective reclamation in disturbed areas to reduce sagebrush densities.

Number of comments: 2

Treatment09 – Supports any treatment where livestock stay in pastures longer and use some of the areas currently not being used.

Summary: Commenter wants to keep livestock in pastures longer and use areas not currently being used.

Number of comments: 1

Treatment10 – Oppose prescribed burns

Summary: Commenters oppose using prescribed burns as a treatment option because low-dry communities in the area do not need to be regularly burned.

Number of comments: 4

Treatment11 – Support prescribed burns in certain treatment areas

Summary: Commenter supports using prescribed burns in specific areas within the Grindstone – Soaphole Allotment.

Number of comments: 1

Treatment12 – Mowing has had positive habitat enhancement results in the past and should be used for this project.

Summary: Several commenters stated that mowing has had positive results in the past and should/could be used for treatments for this project. Several commenters feel mowing is the best treatment option.
Number of comments: 10

Treatment10 – Oppose prescribed burns

Summary: Commenters oppose using prescribed burns as a treatment option because low-dry communities in the area do not need to be regularly burned.

Number of comments: 4

Treatment11 – Support prescribed burns in certain treatment areas

Summary: Commenter supports using prescribed burns in specific areas within the Grindstone – Soaphole Allotment.

Number of comments: 1

Treatment12 – Mowing has had positive habitat enhancement results in the past and should be used for this project.

Summary: Several commenters stated that mowing has had positive results in the past and should/could be used for treatments for this project. Several commenters feel mowing is the best treatment option.

Number of comments: 10

Treatment13: Solar powered wells have had positive habitat enhancement results in the past and could be used for this project.

Summary: Comments stated that solar powered wells have worked well in the past and could be used as a treatment for this plan.

Number of comments: 3

Treatment14: Suggestions on polygon/treatment areas that should/should not be part of this management plan.

Summary: Comments described specific polygons that should be removed or added to the proposed treatment areas.

Number of comments: 2

Treatment15 – Interested in seed blocks *Summary:*

Commenter is interested in seed blocks. Number of

comments: 1

Treatment16 – Areas identified for 2-4 passes with aerator and seeding

Summary: Areas identified on permittee allotment maps for 2-4 passes with aerator and seeding.

Number of comments: 3

Treatment17 – Areas identified for sagebrush treatment

Summary: Areas identified on permittee allotment maps for sagebrush treatment.

Number of comments: 1

Treatment18 – Recommend mechanical treatment.

Summary: Study recommends mechanical treatments within this area.

Number of comments: 1

Treatment19 – Recommend chemical treatment.

Summary: Study recommends chemical treatments within this area.

Number of comments: 1

Treatment20 – Fertilization treatments are not recommended in this area.

Summary: Study does not recommend fertilization treatments in this area. Number of

comments: 1

Vegetation

Vegetation01 – Plowing around aspen stands would not be effective.

Summary: A few commenters were concerned that plowing around aspen stands is a waste of time and money. Aspen treatments could impact the snow catch for the reservoir.

Number of comments: 5

Vegetation02 –Research is needed to determine the historical extent of the aspen stand.

Summary: Commenters are concerned that BLM's passed activities have degraded the aspen stands and that research is needed to determine the historical extent of aspens in this area.

Number of comments: 2

Vegetation03 – Suggest using yellow clover for treatment areas.

Summary: Commenter suggests using yellow clover for treatment areas because it grows well in this area.

Number of comments: 1

Vegetation04 – Management plan should address cheatgrass.

Summary: Commenters are concerned about cheatgrass within the project area and requests that the plan addresses cheatgrass.

Number of comments: 2

Vegetation05 – Suggest using falcate alfalfa for treatment areas.

Summary: Commenters suggest using falcate alfalfa.

Number of comments: 2

Vegetation06 – Comments requesting specific vegetation projects.

Summary: Comment suggested specific areas for specific vegetation projects to enhance mule deer habitat.

Number of comments: 1

Vegetation07 - Concerned about doing any large scale sagebrush manipulation in these low-dry wyomingensis communities (Wyoming big sage).

Summary: Commenter is concerned about any large-scale sagebrush manipulation.

Number of comments: 1

Vegetation08 – Take a close look at the 5% canopy disturbance for sagebrush.

Summary: Commenter wants the 5% canopy disturbance for sagebrush addressed.

Number of comments: 1

Water Resources

WaterResources01 – Specific water resource projects can improve habitat.

Summary: Comments suggesting/request/recommend specific water resource projects within allotments to improve habitat.

Number of comments: 20

WaterResources02 – Water Resources are the limiting factor for mule deer populations and habitat conditions.

Summary: Commenters believe the lack of water is the limiting factor impacting mule deer populations and habitat conditions.

Number of comments: 4

WaterResources03 – Design water developments to benefit both wildlife and the domestic livestock on allotments.

Summary: Commenters want water development projects that benefit both wildlife and domestic livestock on allotments.

Number of comments: 4

WaterResources04 – Address impacts downstream from the proposed project

Summary: Comment is concerned about impacts downstream due to the proposed treatments.

Number of comments: 1

WaterResources05- Suggests reservoirs for bentonite treatment.

Summary: Commenters brought up specific reservoirs in allotments that they feel could use bentonite.

Number of comments: 9

Wildlife Resources

WildlifeResources01 – Support project because it will benefit wildlife habitat and wildlife species besides mule deer populations.

Summary: Commenter believes the proposed project will enhance habitat for wildlife species.

Number of comments: 6

WildlifeResources02 – Consider effects to pygmy rabbit, which according to the USFWS may occur in the proposed project area. The pygmy rabbit is considered a Species of Greatest Conservation by the WGFD and by the BLM as a sensitive species.

Summary: Consider effects to pygmy rabbit, which according to the USFWS may occur in the proposed project area. The pygmy rabbit is considered a Species of Greatest Conservation by the WGFD and by the BLM as a sensitive species.

Number of comments: 1

WildlifeResources03 – Forcing permittees to use private lands to graze livestock will harm wildlife species that are dependent on these areas.

Summary: Commenter feels that the proposed project will force permittees to graze on private land which will degrade wildlife habitat and harm wildlife species that use these areas.

Number of comments: 1

Winter Range

WinterRange01 – What is being done on winter range of mule deer?

Summary: Commenters would like to know what is being done on the winter range of mule deer.

Number of comments: 3

WinterRange02 – Withdraw winter drilling allowances and restore crucial winter range drilling restrictions on winter range of mule deer.

Summary: Comments request that the agencies withdraw winter drilling allowances and restore crucial winter range drilling restrictions on winter range of mule deer.

Number of comments: 2

Appendix B

WGFD HABITAT DESIGNATION DEFINITIONS

STANDARDIZED DEFINITIONS
For
SEASONAL WILDLIFE RANGES
Wyoming Game & Fish Dept.

Symbol	Term	Definition
CRU	Crucial (would replace WGFD's term "Critical"	Crucial range can describe any particular range or habitat component (often winter or winter/year long range in Wyoming, but describes that component which is the determining factor in a population's ability to maintain and reproduce itself at a certain level (theoretically at or above the WGFD pop8ulation objective) over the long term.
CRT	Critical Habitat*	Those areas designated as critical by the Secretary of the Interior or Commerce, for the survival and recovery of listed Threatened and Endangered Species (50CFR), Parts 17 and 226). Because use of the term has legal implications, its use of the term has legal implications, its use is limited to only those habitats officially determined as critical by the Secretary
ESS	Essential Habitat*	Those areas designated as possessing the same characteristics as critical habitat for Threatened and Endangered Species without having been declared as critical habitat by the Secretary of the Interior or Commerce.
PAR	Parturition Areas (calving areas, fawning areas, lambing grounds.)	Birthing areas commonly used by more than a few female members of a population.
SUM	Summer	The area where young are raised by elk, bighorn sheep, usually smaller than SSF, more important. Used from 5/1 to 10/1.
SSF	Spring-Summer–Fall	A population or portion of a population of animals use the available habitat sites within this range annually only during the period after the demise of, and before the onset of persistent winter conditions (variable, but commonly this period is between 5/1 and 11/30 or shorter in Wyoming).

Symbol	Term	Definition
SWR	Severe Winter Relief	A survival range, not considered a crucial range area as defined. It is used to a great extent, only on occasionally extremely severe winters (e.g. 2 years out of 10). It may lack habitat characteristics which would make it attractive or capable of supporting major portions of the population during normal years but is used by and allows at least a significant portion of the population to survive the occasionally extremely severe winter.
WIN	Winter	A population or portions of a population of animals use the suitable habitat sites within this range annually, in substantial numbers only during the winter period (variable, but commonly between 12/1 and 4/30).
WYL	Winter/Yearlong	Portions of a population of animals make general use of the suitable habitat sites within this range on a year-round basis. But during the winter months (commonly between 12/1 and 4/30, there is a significant influx of additional animals into the area from other seasonal ranges.
YRL	Yearlong	A population or substantial proportion of a population of animals makes general use of the suitable habitat sites within the range on a year-round basis. Exception – occasionally, under severe conditions (extremely severe winters, drought) animals may leave the area.

*Pertains to threatened and endangered species only.

Appendix C

PROGRAMMATIC AGREEMENT BETWEEN THE BUREAU OF LAND MANAGEMENT AND THE WYOMING STATE HISTORIC PRESERVATION OFFICER REGARDING THE SUBLETTE MULE DEER HABITAT IMPROVEMENT PROJECTS IN SUBLETTE COUNTY, WYOMING

WHEREAS, The Pinedale Field Office of the Bureau of Land Management (BLM) is preparing a plan to conduct multiple vegetation treatments within +/- 500,000 acres of public land in Sublette County; and

WHEREAS, the BLM has determined that this project is an undertaking as defined under 36 CFR § 800.16(y) that has the potential to affect historic properties; and

WHEREAS, the BLM is responsible for ensuring that it is in compliance with Section I 06 of the National Historic Preservation Act of 1966, as amended (NHPA), 16 U.S.C.470f, and its implementing regulations, 36 C.F.R. Part 800 for this undertaking;

WHEREAS, the BLM proposes to implement the undertaking to comply with all relevant Federal regulations, policies, and laws; including implementing these policies subject to the requirements of the National Environmental Policy Act of 1969 (NEPA); and

WHEREAS, the BLM has decided to employ a phased approach as allowed under 36 CFR § 800.4(b)(2) and because the BLM cannot fully determine effects to historic properties prior to approval of the undertaking it has chosen to develop a Programmatic Agreement (PA) pursuant to 36 CFR § 800.14(b)(ii) of the regulations implementing Section 106 of the National Historic Preservation Act (NHPA), as amended, [16 U.S.C. Section 470(f)] as incorporated by reference herein; and

WHEREAS the undertaking would be implemented over the course of the next 10 years; and

WHEREAS, the 1) regulations at 36 CFR § 800.6(c)(1-3) recognizes three types of signatories to this agreement: Signatories, Invited Signatories and Concurring Parties, which are referred to collectively as the Parties. Signatories and Invited Signatories may include any party who assumes responsibilities under this agreement. Concurring Parties have a demonstrated interest in the undertaking or its effects on historic properties, but do not assume responsibilities under the agreement. Concurring Parties may participate in development of the document and may concur with this agreement. The refusal of any Invited Signatory or Concurring Party to sign does not invalidate the PA. Concurring Parties cannot amend or terminate this agreement; and

WHEREAS, the BLM has consulted with the Wyoming State Preservation Officer (SHPO) pursuant to 36 CFR § 800.14(b) and has invited SHPO to be a Signatory to this agreement; and

WHEREAS, the BLM notified the Advisory Council on Historic Preservation (ACHP) and the

ACHP has declined to participate in the development of this PA; and

WHEREAS, the BLM has invited the Alliance for Historic Wyoming to participate in the development of this PA and they are Concurring Parties,

WHEREAS, the BLM is responsible for government-to-government consultation and coordination with Federally recognized Indian Tribes for this undertaking and has formally invited the Indian Tribes listed as consulting parties to participate in consultation, and continue to be consulted regarding the potential effects of the undertaking on historic properties to which they ascribe traditional religious and cultural significance (see Appendix C-Tribal Consultation Summary); and

WHEREAS, the Eastern Shoshone Tribe of the Wind River Reservation, the Northern Arapaho Tribe of the Wind River Reservation, the Ute Tribe of the Uintah and Ouray Reservation and the Shoshone-Bannock Tribe of the Fort Hall Reservation were invited to participate in consultation, and no Tribes have elected to directly participate in the development of this PA; and

WHEREAS, this PA covers all aspects of the planning, development, and implementation of the undertaking including but not limited to prescribed fire, tree cutting and removal, chaining, herbicide treatments, weed prevention and treatment, and seeding.

NOW, THEREFORE, the BLM and the WYSHPO agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effects of the undertaking on historic properties.

STIPULATIONS

The BLM shall ensure that the following stipulations are carried out.

I. ROLES AND RESPONSIBILITIES

The BLM is responsible for administering this PA. This includes but is not limited to: ensuring that Signatories carry out their responsibilities; overseeing or conducting cultural resource work; assembling submissions to the SHPO including reports, determinations of eligibility and effect; and for seeking SHPO concurrence with agency compliance decisions.

II. AREA OF POTENTIAL EFFECT

The Area of Potential Effect (APE) for cultural resources is defined as the boundaries of the +/- 500,000 acres considered for vegetation management in the Sublette Mule Deer Habitat Improvement Project NEPA documents. The overall APE and is shown in Appendix A.

The APE has been defined to include potential direct and indirect effects to cultural resources

and properties of traditional religious and cultural importance from any activities associated with the undertaking without regard for land ownership. The nature of the undertaking will not result in any permanent change to aspects of integrity of setting that will not adversely affect the integrity of setting of historic properties. Naturally occurring processes such as vegetative community progression, drought and fire have occurred and will continue to occur throughout the project area.

The BLM may amend the APE as needed or as requested by the SHPO or the Tribes without amending the entirety of the PA.

III. INVENTORY

1. The BLM, in consultation with the SHPO, shall ensure that appropriate cultural resource identification activities, including records research; ethnographic work and informant interviews; context development; and archaeological or historic inventory for the APE are conducted in a manner consistent with the36 CFR§ 800.4.

2. Required identification activities shall be completed for the APE regardless of the ownership (public or private) of the lands involved and BLM shall be responsible for gaining access to privately held lands.

3. The BLM shall make a reasonable and good faith effort to consult with the Tribes and affected Tribal members to identify historic properties of traditional religious or cultural importance.

IV. TREATMENT

A. General Procedures

1. To the extent practicable, the BLM shall ensure that project activities avoid or minimize adverse effects to all historic properties through project design, or redesign, relocation of activities, or by other means in a manner consistent with 36 CFR § 800.5.

2. In avoiding or mitigating effects, the BLM, in consultation with the SHPO, shall determine the precise nature of effects to historic properties identified in the APE, using 36 CFR § 800.6.

3. The BLM shall consult with the Tribes, or identified affected Tribal members, to evaluate effects to historic properties of traditional religious and cultural importance. Based on information shared with the BLM, the BLM would determine the appropriate treatment to avoid or to minimize to the extent practicable adverse effects, and consult on these determinations with SHPO and the Tribes.

B. Protocol for conducting vegetative treatment activities at less than Class III inventory. There shall be no surface disturbing activities associated with these activities.

l. Mowing treatment areas in which a rubber-tired tractor is used in conjunction with a blade height of at minimum 6 inches about the ground surface will require a Class II reconnaissance to assess potential effects to cultural resources in those areas. Mowing will be done while the ground surface is dry to avoid rutting of the ground.

2. Slopes greater than 30 degrees that are not likely to contain rock shelters or caves due to geologic context will not be inventoried for cultural resources.

3. The use of bentonite to seal existing reservoirs within their existing disturbance footprint will not require Class III inventory and can move forward as 'notify and proceed' undertakings reported through the CRMTracker system.

4. Exclosure fencing for riparian areas and spring developments that do have the potential to adversely affect known Criteria A, B and/or C NRHP eligible sites in which setting is an aspect of integrity will be exempted from Class III inventory.

5. Aerial application of herbicides or fertilizers that will not impact rock art or Native American plant gathering areas. Decisions will be consistent with and informed by the 2007 Vegetative Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic Environmental Impact Statement.

6. Prescribed burns that require no surface disturbance (i.e. hand thinning, hand piling, or chemical treatment) require only a Class II reconnaissance survey to determine if rock art, rock shelters or other types of fire sensitive or chemical-sensitive historic properties exist. If the BLM cultural resource specialist determines that fire sensitive properties do not exist within the proposed area of the prescribed burn, BLM may proceed with processing the undertaking through the CRMTracker system.

V. UNANTICIPATED DISCOVERIES

Stipulations of this PA and 36 CFR § 800.13(a)(l) are intended to identify and treat cultural resources that are eligible for inclusion in the NRHP. A program of post project monitoring will be conducted by the BLM PFO cultural resource staff in all project areas in which the activity engaged in may have exposed unknown archaeological deposits. The specific monitoring plan is located in Appendix B. The monitoring program consists of both Class II and Class III inventory in areas identified in the field as having a high probability of containing exposed archaeological material. The monitoring will be conducted within 12 months of the action that may have exposed material. Any associated monitoring reports will be submitted to the WYSHPO through the CRMTracker system.

Unplanned discoveries of buried cultural resources are not anticipated. In the case of an unplanned discovery, the BLM will ensure that provisions) in Appendix B of this PA are met.

Prior to initiating any ground disturbing activities within the APE, all BLM employees, contractors, and subcontractors empowered to halt activities in a discovery situation shall be informed about who to contact and under what time frame.

Activities in the area of the discovery will be halted until the BLM Authorized Officer provides written authorization that any required mitigation is complete activities can resume.

VI. NOTICES TO PROCEED

When appropriate, in consultation with the SHPO and in compliance with the PA stipulations, the BLM may issue Notices to Proceed (NTP) for individual project actions through the CRMTracker system, under the following conditions:

A. The BLM, in consultation with the SHPO, has determined that:

1. either there are no historic properties within the proposed APE, or through project design all historic properties will be avoided for the current phase of the undertaking; and

2. in consultation with the Tribes, no historic properties of traditional religious or cultural importance were identified within the APE for the current phase of the undertaking; or

VII. MONITORING AND REPORTING

A. Monitoring: Any Signatory may monitor actions carried out pursuant to this PA. To the extent practicable, monitoring activities should minimize the number of monitors involved in the undertaking.

B. Reporting: All reporting will be done in accordance with SHPO reporting standards. Agency review timeframes are outlined in Appendix D. Reporting will be conducted in accordance with the post project implementation plan in Appendix B.

1. A draft report of the identification, recordation, evaluation, treatment or other mitigation activities will be due to the BLM from any contractor within two (2) months after the completion of the fieldwork associated with the activity, unless otherwise negotiated.

VIII. OTHER CONSIDERATIONS

1. The BLM shall ensure that all its personnel and all the personnel of its contractors and subcontractors are directed not to engage in the illegal collection of historic and prehistoric materials. All parties shall cooperate with the BLM to ensure compliance with the Archaeological Resources Protection Act of 1979 (16 U.S.C.470), as amended, on public lands and with Wyoming Statute (W.S.) 6-4-503 for private lands.

2. The BLM shall ensure that any human remains, grave goods, items of cultural patrimony, and sacred objects encountered during the undertaking are treated with respect. In coordination with this PA, human remains and associated funerary objects found on public land will be handled according to the provisions of the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3001 et seq. and its implementing regulations (43 CFR § 10). Human remains and associated funerary objects on private land will be handled according to the provisions of W.S. 6-4-503.

3. The BLM shall bear the expense of the identification, evaluation, and any treatment of historic properties directly or indirectly affected by project-related activity. Such costs may include, but not be limited to, pre-field planning, fieldwork, post-fieldwork analysis, research and report preparation, interim and summary report preparation, publications for the general public, and the cost of curating project documentation and artifact collections.

4. Information on the location and nature of cultural resources, and information provided by and considered proprietary by the Tribes, will be held confidential to the extent provided by Federal and state law. Consistent with applicable law, confidential and/or proprietary information will not be released (see 36 CFR § 800.ll(c) and Section 106 of the NHPA).

IX. DISPUTE RESOLUTION

1. If there is an objection by any Signatory to the manner in which the terms of this PA are implemented, the objecting Signatory will notify the BLM in writing of the objection. The BLM will notify all other Signatories of the objection. All Signatories will consult to resolve the objection.

2. Resolution of the objection will be documented in a written amendment to this PA to be signed by all Signatories. If a Signatory fails to respond within 30 days of receipt of the written amendment, concurrence with the amendment will be assumed by other Signatories and the amendment will go into effect. If resolution of the objection does

not require amendment to the PA, this decision will be documented in writing and provided to all Signatories.

3. If the objection cannot be resolved among the Signatories, the matter shall be referred to the High Desert District Manager that may consult with the BLM Preservation Board on the matter. The High Desert District Manager will notify all Parties of the recommendations of the BLM Preservation Board. Within 15 days of notification, any Signatory may request consultation among all Signatories regarding the recommendations of the BLM Preservation Board. The final decision for resolution of objections shall be made by the High Desert District Manager.

4. The BLM shall consider non-Signatory objections to the manner in which the terms of the PA are implemented. If the objection cannot be resolved to the satisfaction of the BLM and the objecting party, the BLM shall request the Signatories to provide their opinion on the matter. Prior to making a final decision on the matter, the BLM shall take into account all the Signatory opinions received within 15 days of the request.

5. Nothing in this Section shall be construed or interpreted as a waiver of any judicial remedy that would be available to any Signatory to this PA.

X. AMENDMENT

Any Signatory to this agreement may request that the other Signatories consider amending it if circumstances change over time and warrant revision of the stipulations. Except in the case of amendments addressing resolution of disputes pursuant to Section V of this PA, amendments shall be executed in writing and shall be signed by all Signatories in the same manner as the original PA.

XI. TERMINATION

Any Signatory to this PA may initiate termination by providing written notice to the other Signatories of their intent. After notification by the initiating Signatory, the remaining Signatories shall have 90 business days to consult to seek agreement on amendments or any other actions that would address the issues and avoid termination. In the event of termination, the BLM shall refer to 36 CFR Part 800 to address any remaining adverse effects to the Trails or sites.

XII. SUNSET TERMS

This PA shall remain in effect for 10 years after the date of execution hereof. The BLM and WYSHPO shall re-evaluate the PA every 1 0 years. The BLM shall ensure the PA will be re- evaluated and amended, to accommodate any changes to the terms. All Signatories will be consulted during the amendment process (See Section X).

General Provisions

a. **Entirety of Agreement.** This PA, consisting of number (11) pages and four appendices, represents the entire and integrated agreement between the parties and supersedes all prior negotiations, representations and agreements, whether written or oral, regarding compliance with Section 106 of the National Historic Preservation Act.

b. **Prior Approval.** This PA shall not be binding upon any party unless this PA has been reduced to writing before performance begins as described under the terms of this PA, and unless the PA is approved as to form by the Attorney General or his representative.

c. **Severability.** Should any portion of this PA be judicially determined to be illegal or unenforceable, the remainder of the PA shall continue in full force and effect, and any party may renegotiate the terms affected by the severance.

d. **Sovereign Immunity.** The State of Wyoming and the WYSHPO do not waive their sovereign or governmental immunity by entering into this PA and each fully retains all immunities and defenses provided by law with respect to any action based on or occurring as a result of the PA.

e. **INDEMNIFICATION**. Each signatory to this PA shall assume the risk of any liability arising from its own conduct. Each Signatory agrees they are not obligated to insure, defend, or indemnify the other Signatories to this PA.

Execution of this PA and implementation of its terms evidence that the BLM has taken into account the effects of the undertaking on historic properties.

Signatures. In witness whereof, the parties to this PA through their duly authorized representatives have executed this PA on the dates set out below, and certify that they have read, understood, and agreed to the terms and conditions of this PA as set forth herein.

The effective date of this PA is the date of the last Signatory signature affixed to these pages.

Signatories:

Bureau of Land Management

7-23-14

Shane DeForest, Pinedale Field Manager — Date

Bureau of Land Management

8-4-14

Buddy Green, Deputy State Director — Date
Resources Policy and Management

Wyoming State Historic Preservation Officer

Mary Hopkins 8/12/14

Mary Hopkins, SHPO — Date

Other signature lines as needed (Concurring parties, etc.)

Carly-Ann Marie Anderson July 31, 2014

Carly-Ann Anderson, Executive Director — Date
Alliance for Historic Wyoming

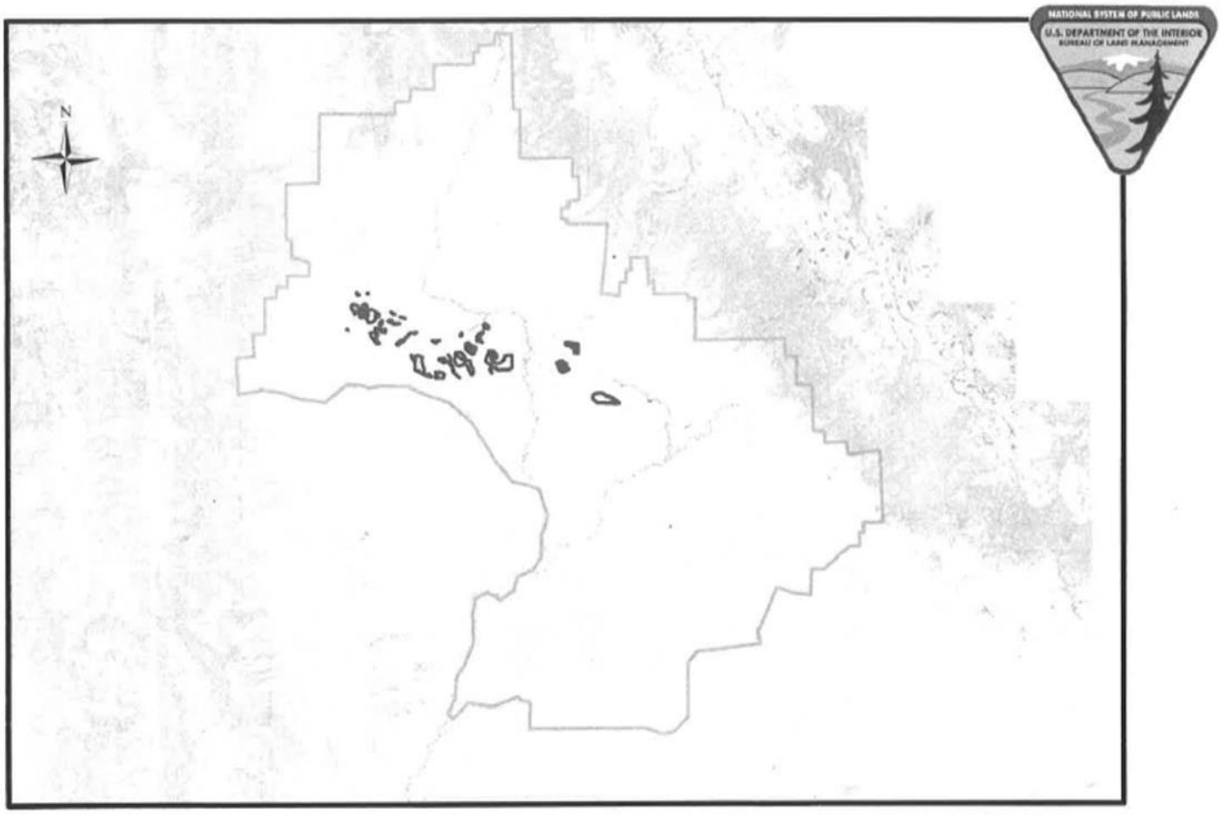
Approval as to Form:
Wyoming Attorney General's Office

S. Jane Caton # 117075 8-7-14

S. Jane Caton, — Date
Senior Assistant Attorney General

APPENDIX A OF THE PROGRAMMATIC AGREEMENT BETWEEN THE PINEDALE FIELD OFFICE OF THE BUREAU OF LAND MANAGEMENT AND THE WYOMING STATE HISTORIC PRESERVATION OFFICER REGARDING THE SUBLETTE MULE DEER HABITAT IMPROVEMENT PROJECTS IN SUBLETTE COUNTY, WYOMING

PROJECT AREA OF POTENTIAL EFFECT



Appendix A-Sublette Mule Deer Habitat Treament Project
Proposed Project Area of Potential Effect-Phase I

Overall Area of Potential Effect under the Sublette Mule Deer Improvement Project Programmatic Agreement
*excludes WY State Land

Kilometers
0 5 10 20 30 40
1:715,000

* No warranty is made by the Bureau of Land Management for use of map data for purposes otherwise intended by the BLM.

APPENDIX B OF THE PROGRAMMATIC AGREEMENT BETWEEN THE PINEDALE FIELD OFFICE OF THE BUREAU OF LAND MANAGEMENT AND THE WYOMING STATE HISTORIC PRESERVATION OFFICER REGARDING THE SUBLETTE MULE DEER HABITAT IMPROVEMENT PROJECTS IN SUBLETTE COUNTY, WYOMING

Discovery and Unanticipated Impacts Procedures

In the event that previously unknown cultural resources are discovered within the APE of the undertaking, or should known resources be directly or indirectly impacted in an unanticipated manner, the following actions, at a minimum, would be initiated by the BLM in consultation with the signatories:

1. All activities will halt in the immediate vicinity of the discovery and all actions will be directed away from an area at least 100 meters in all directions from the point of discovery.

   a. A BLM cultural resources specialist (CRS) will be notified immediately by the contractors or BLM staff working on the project. The BLM will ensure that a CRS, with the proper expertise for the suspected resource type, is on-site as soon as possible.

   b. The BLM will initiate consultation with the appropriate parties, including the SHPO, the Tribes, and consulting parties as appropriate.

   c. In the event that a CRS or other necessary persons are not immediately available, BLM may be required to cover and/or otherwise protect the resource until such time that the appropriate parties can be present for inspection and/or evaluation.

2. Upon arriving at the site of the discovery, the CRS will assess the resource. At a minimum, the assessment will include:

   a. The nature of the resource (e.g., number and kinds of artifacts, presence/absence of features). This may require screening of already disturbed deposits, photographs of the discovery, and / or other necessary documentation.

   b. The spatial extent of the resource. This may require additional subsurface testing, mapping or inspection, as is appropriate to the resource.

   c. The nature of deposition exposure. This may require interviews with construction personnel, other persons having knowledge concerning the resource or, in rare instances, the expansion of existing disturbances to establish the characteristics of the deposits.

3. Discoveries and unanticipated impacts to known resources will be managed according to the provisions of this PA and the Protocol. After consultation with the appropriate parties, BLM shall then make a determination of eligibility, treatment and effect. If necessary, BLM, in consultation with the

SHPO, the Tribes and appropriate parties, shall ensure that a treatment plan is prepared following the guidance provided in this PA.

4. Any items covered by NAGPRA encountered in a discovery or unanticipated impact situation, will be handled according to 43 C.F.R. Part 10 or Wyoming state laws, as appropriate.

5. All implementation activities in the area of the discovery will be halted until the BLM documents in writing that identification and treatment is complete and activities can resume.

Post Project Implementation Monitoring Plan and Reporting

The purpose of this plan is to provide a means to assess project effects to cultural resources after treatment action implementation. Types of treatments that may require post implementation monitoring include prescribed bums, harrowing or disking or other activities that removes vegetation in its entirety or disturbs the ground surface. Post implementation assessments and reporting will be conducted in those aforementioned treatment area types in which the slope is less than 5 percent. Addition elements such as a project area's proximity to a permanent water source or other geographical considerations such as naturally sheltered areas and riparian areas would also prompt post implementation examination of an area. This assessment should also target any areas in which unforeseen erosional processes begin to occur to investigate the potential for newly exposed subsurface cultural materials.

A post implementation assessment report will be prepared by the BLM and submitted to the WYSHPO after the treatment actions are completed. This report will consist of a description of the action being assessed, a discussion of treatment effects to any known cultural resource in the project area, map and photographs of the post-treatment area and a summary of any recommendations for further work. The post-implementation assessment and reporting will be completed and submitted to SHPO through the CRMTracker system within 12 months of the completion of the action. The BLM will consult SHPO based on the results of the project assessment reporting following Protocol guidelines and timeframes.

APPENDIX C OF THE PROGRAMMATIC AGREEMENT BETWEEN THE BUREAU OF LAND MANAGEMENT AND THE WYOMING STATE HISTORIC PRESERVATION OFFICER REGARDING THE SUBLETTE MULE DEER HABITAT IMPROVEMENT PROJECTS IN SUBLETTE COUNTY, WYOMING

TRIBAL CONSULTATION SUMMARY

Eastern Shoshone Tribe of the Wind River Reservation:
Project NEPA scoping notice- 10/13/2013
Cultural PA invitation Letter-5/21/2013
Cultural PA kick-off meeting e-mail-7/22/2013
Cultural PA meeting outreach phone call-7/22/2013
Cultural PA meeting reminder e-mail-7/30/2013
Cultural PA meeting draft minutes e-mail-8/112013
Cultural PA development progress update e-mail-8116/2013
Cultural PA development progress update e-mail-8/23/2013
Cultural PA development progress update e-mail-9/13/2013
Face to face discussion of project with Wilfred Ferris-9/26/2013
Cultural PA development progress update e-mail-10/22/2013
Cultural PA 2nd meeting information and draft agenda-11/12/2013
Cultural PA development progress update e-mail-1/22/2014
Cultural PA development progress update e-mail-2/28/2014
Cultural PA draft review and progress update e-mail-4/3/2014
Cultural PA draft review and progress update e-mail-5/15/2014
Cultural PA draft review and scheduling e-mail-5/16/2014

Northern Arapaho Tribe of the Wind River Reservation:
Project NEPA scoping notice- 10/13/2013
Cultural PA invitation Letter-5/21/2013
Cultural PA kick-off meeting e-mail-7/22/2013
Cultural PA meeting outreach phone call-7/22/2013
Cultural PA meeting reminder e-mail-7/30/2013
Cultural PA meeting draft minutes e-mail-8/1/2013
Cultural PA development progress update e-mail-8/16/2013
Cultural PA development progress update e-mail-8/23/2013
Cultural PA development progress update e-mail-9/13/2013
Cultural PA development progress update e-mail-10/22/2013
Cultural PA 2nd meeting information and draft agenda-11112/2013
Cultural PA development progress update e-mail-1122/2014

Cultural PA development progress update e-mail-2/28/2014
Cultural PA draft review and progress update e-mail-4/3/2014
Follow-up phone call to discuss project-5/14/2014
Follow-up e-mail to discuss project-5114/2014
Cultural PA draft review and progress update e-mail-5115/2014
Cultural PA draft review and scheduling e-mail-5/16/2014

Shoshone Bannock Tribe of the Fort Hall Reservation:
Project NEPA scoping notice- 10/13/2013
Cultural PA invitation Letter-5/21/2013
Cultural PA kick-off meeting e-mail-7/22/2013
Cultural PA meeting outreach phone call-7/22/2013
Cultural PA meeting reminder e-mail-7/30/2013
Cultural PA meeting draft minutes e-mail-8/1/2013
Cultural PA development progress update e-mail-8/16/2013
Cultural PA development progress update e-mail-8/23/2013
Cultural PA development progress update e-mail-9/13/2013
Cultural PA development progress update e-mail-1 0/22/2013
Cultural PA 2nd meeting information and draft agenda-11/12/2013
Cultural PA development progress update e-mail-1/22/2014
Cultural PA development progress update e-mail-2/28/2014
Cultural PA draft review and progress update e-mail-4/3/2014
Cultural PA draft review and progress update e-mail-5115/2014
Cultural PA draft review and scheduling e-mail-5/16/2014
Follow-up phone conversation to discuss PA and EA development-5/22/2014

The Northern Ute Tribe of the Uintah and Ouray Reservation:

Project NEPA scoping notice- 10/13/2013
Cultural PA invitation Letter-5/21/2013
Cultural PA kick-off meeting e-mail-7/22/2013
Cultural PA meeting outreach phone call-7/22/2013
Cultural PA meeting reminder e-mai1-7/30/201
Cultural PA meeting draft minutes e-mail-8/1/2013
Cultural PA development progress update e-mail-8/16/2013
Cultural PA development progress update e-mail-8/23/2013
Cultural PA development progress update e-mail-9/13/2013
Cultural PA development progress update e-mail-1 0/22/2013
Cultural PA 2nd meeting information and draft agenda-11/12/2013

Cultural PA development progress update e-mail-1122/2014
Cultural PA development progress update e-mail-2/28/2014
Cultural PA draft review and progress update e-mail-4/3/2014
Cultural PA draft review and progress update e-mail-5/15/2014
Cultural PA draft review and scheduling e-mail-5/16/2014

Appendix D

3.2.1 Air Resources

Air quality, climate, and visibility are the components of air resources which include applications, activities, and management of the air resource. The BLM must consider and analyze the potential effects of authorized activities on air resources as part of the planning and decision making process.

3.2.1.1 Air Quality

Regional air quality is influenced by the interaction of meteorology, climate, the magnitude and spatial distribution of local and regional air pollutant sources (including natural sources), and chemical properties of emitted air pollutants. The following sections summarize the existing climate and air quality within the area potentially affected by the proposed action.

Monitoring and enforcement of air quality standards are administered by the Wyoming Department of Environmental Quality-Air Quality Division (WDEQ-AQD). Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS) identify maximum limits for concentrations of criteria air pollutants at all locations to which the public has access. The WAAQS and NAAQS are legally enforceable standards. Concentrations above the WAAQS and NAAQS represent a risk to human health that, by law, require public safeguards be implemented. State standards must be at least as protective of human health as federal standards, and may be more restrictive than federal standards, as allowed by the Clean Air Act (CAA). Currently, the WDEQ-AQD does not have regulations regarding greenhouse gas emissions, although these emissions are regulated indirectly by various other regulations.

Pollutant concentration can be defined as the mass of pollutant present in a volume of air and is reported in units of micrograms per cubic meter (µg/m3), parts per million (ppm), or parts per billion (ppb). The Wyoming Department of Environmental Quality operates an extensive monitoring network within Sublette County. Criteria air pollutants are those for which national concentration standards have been established. Table 3-2 shows both the National and Wyoming Ambient Air Quality Standards (NAAQS/WAAQS).

Table 3-2. Criteria Pollutant Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS[1]	WAAQS[2]	Units	Form of the Standards
O_3	8-hour	0.070	0.075	Parts per million (ppm)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
CO	1-hour	40,000	40,000	µg/m^3	Not to be exceeded more than once per year
	8-hour	10,000	10,000	µg/m^3	
NO_2	1-hour	188	189	µg/m^3	98th percentile, averaged over 3 years
	Annual	100	100	µg/m^3	Annual mean

PM_{10}	24-hour	150	150	µg/m^3	Not to be exceeded more than once per year on average over 3 consecutive years
	Annual	NA[3]	50	µg/m^3	Annual mean
$PM_{2.5}$	24-hour	35	35	µg/m^3	98th percentile, averaged over 3 consecutive years
	Annual	12	12	µg/m^3	Annual mean, averaged over 3 consecutive years
SO_2	1-hour	196.5	196.5	µg/m^3	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years

[1]Source: USEPA National Ambient Air Quality Standards (USEPA 2015b).

[2]Source: WDEQ- Standards and Regulations (WDEQ 2015b).

3.2.1.2 Ozone

Ozone is formed in the lower atmosphere by a series of reactions involving sunlight and precursor emissions of NO_X and VOCs. Ozone and its precursors can be transported both into and out of the region.

Compliance with the 8-hour ozone NAAQS is based on the ozone "design value," which is defined as the 3-year average of the annual fourth-highest observed 8-hour average ozone concentration. An ozone design value is first calculated for each monitoring site within a given area. The area-wide ozone design value is then defined as the maximum over all sites within the area. If the design value exceeds the 8-hour ozone NAAQS of 70 parts per billion (ppb), the area is designated nonattainment.

Ozone is currently measured at 5 monitoring sites within Sublette County. All of the sites have sufficient data to calculate one or more 3-year design values. Ozone design values for each of these sites, for three recent 3-year design value periods (2010–2012, 2011–2013, and 2012–2014), are listed in Table 3-3.

Table 3-3. Ozone Design Values for 2010–2012 through 2012–2014 for Ozone Monitoring Sites in Sublette County Compared with the NAAQS

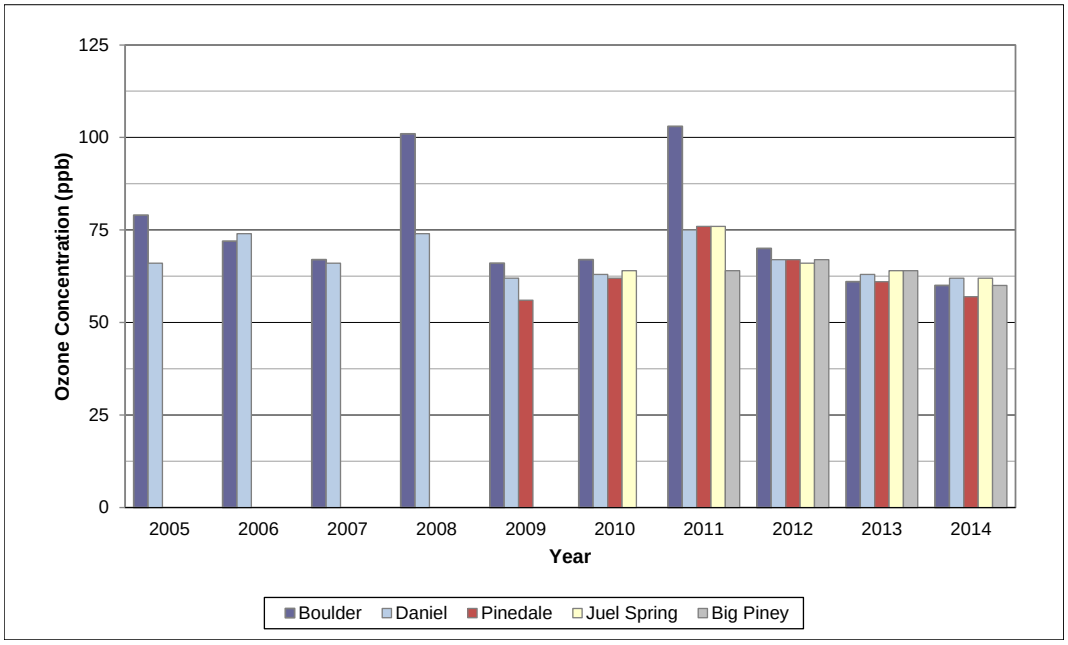
Site Name	ID	County	Ozone Design Value (ppb)			NAAQS (ppb)
			2010–2012	*2011–2013*	*2012–2014*	
Big Piney	56-035-0700	Sublette	--	65	63	70
Boulder	56-035-0099	Sublette	80	78	63	70
Daniel South	56-035-0100	Sublette	68	68	64	70
Juel Spring	56-035-0700	Sublette	68	68	64	70
Pinedale	56-035-0101	Sublette	68	68	61	70

Source: REF 1018
NAAQS National Ambient Air Quality Standards
ppb parts per billion

The design values for the Boulder monitoring site for the 2010-2012 and 2011-2013 design value periods are greater than the 2015 NAAQS. For the 2012-2014 period, the values are much lower and are below the NAAQS for all sites. Figure 3-1 displays the fourth-highest 8-hour average ozone

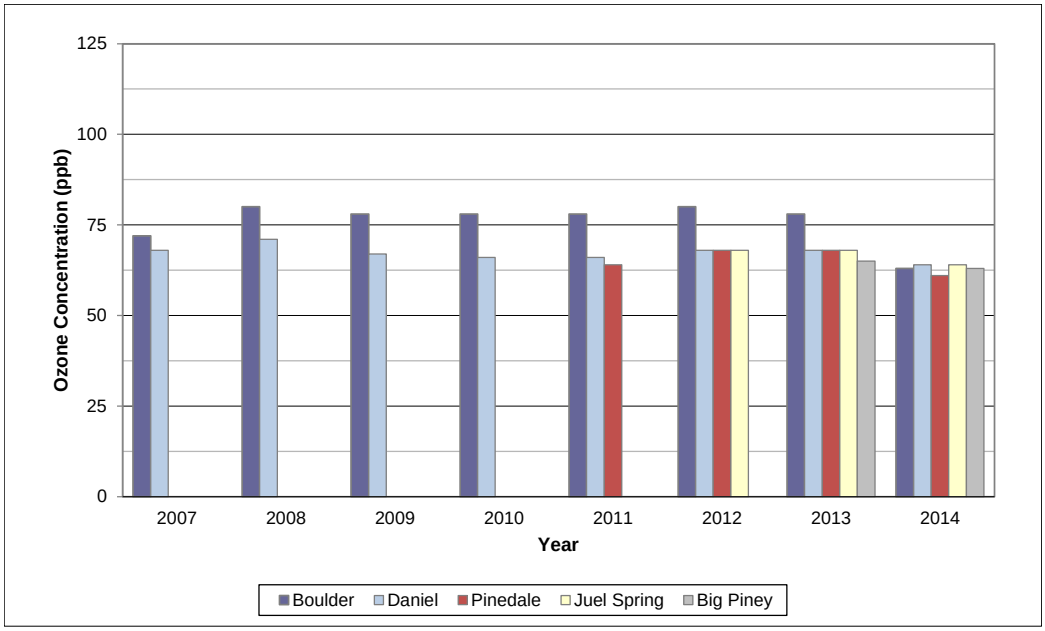
concentrations and Figure 3-2 displays the 8-hour ozone design values for the monitoring sites for all years with available data. As noted earlier, the fourth-highest 8-hour average ozone concentration for each year is used to calculate the design value and assess compliance with the ozone NAAQS.

Figure 3-1. Fourth Highest 8-Hour Average Ozone Concentration (parts per billion) for Monitoring Sites in Sublette County



Data Source: REF 1018
Note: The NAAQS for 8-hour average ozone concentration is 70 ppb.
NAAQS National Ambient Air Quality Standards
ppb parts per billion

Figure 3-2. 8-Hour Ozone Design Values (parts per billion) for Monitoring Sites in Sublette County



3.2.1.3 *General Conformity*

On April 30, 2012, the EPA formally designated the UGRB as a 'Marginal' ozone nonattainment area, effective July 20, 2012. As a result of the nonattainment designation, the BLM must comply with General Conformity regulations in 40 CFR 93 subpart B and Chapter 8, Section 3 of the Wyoming Air Quality Standards and Regulations (WAQSR) for any federal action within the designated nonattainment area.

The BLM is required to conduct a General Conformity analysis and cannot approve any action that would cause or contribute to a new violation of the NAAQS or increase the frequency or severity of any existing violation. A formal General Conformity determination must be conducted for any action where the total of direct and indirect emissions for the proposed action exceeds the de minimis levels specified in 40 CFR 93.153(b) and WAQSR Chapter 8, Section 3. For projects located in a marginal ozone nonattainment area, this de minimis level is 100 tons per year (tpy) of VOC or NOx. For projects that are below the de minimis threshold level of 100 tpy for NOx or VOC, the BLM must complete a conformity analysis and demonstrate that the proposed project will not exceed the de minimis threshold level and is therefore exempt from requiring a conformity determination.

3.2.1.4 Nitrogen Dioxide

NO_2 is currently measured at five monitoring within Sublette County. Relevant NAAQS for NO_2 include (1) the 1-hour NO_2 NAAQS, which requires the 3-year average of the 98th percentile daily maximum 1-hour NO_2 concentration to be less than 100 ppb; and (2) the annual NO_2 NAAQS, which requires the annual average NO_2 concentration to be less than 53 ppb. All nine sites have sufficient data

to calculate one or more 3-year average 1-hour NO_2 values. One-hour NO_2 design values for each of these sites, for 2010–2012, 2011–2013, and 2012–2014, are listed in Table 3-4.

Table 3-4. Design Values for 2010–2012 through 2012–2014 for NO_2 Monitoring Sites in Sublette County Compared with the NAAQS

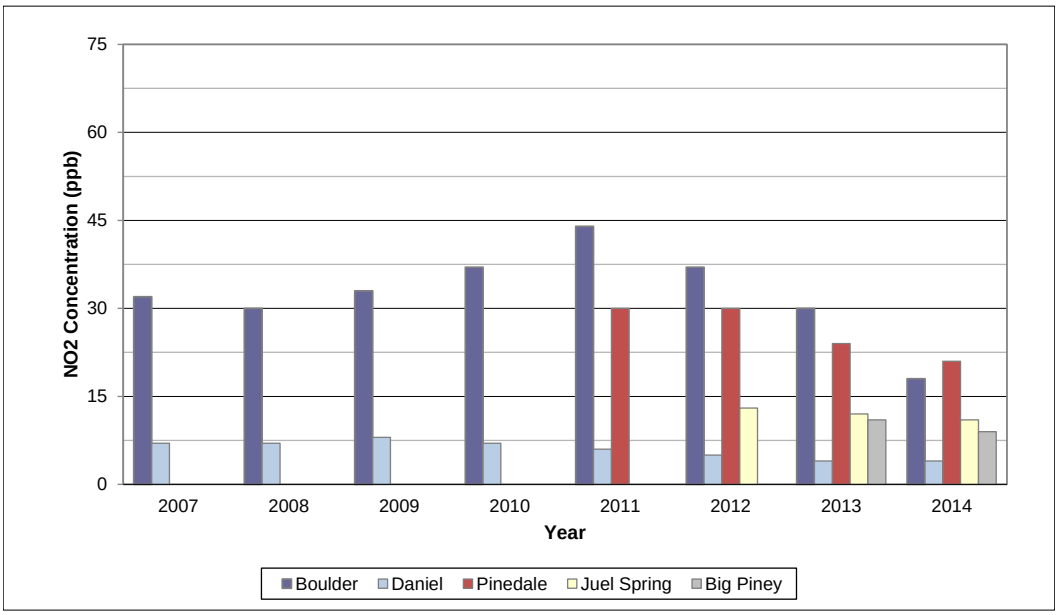
Site Name	ID	County	3-Year Average 98th Percentile 1-Hour NO_2 (ppb)			NAAQS (ppb)
			2010–2012	*2011–2013*	*2012–2014*	
Big Piney	56-035-0700	Sublette	--	10	9	100
Boulder	56-035-0099	Sublette	37	30	18	100
Daniel South	56-035-0100	Sublette	5	4	4	100
Juel Spring	56-035-0700	Sublette	13	12	11	100
Pinedale	56-035-0101	Sublette	30	24	21	100

Source: REF 1018
NAAQS National Ambient Air Quality Standards
NO_2 nitrogen dioxide
ppb parts per billion

The highest design values occur at the Boulder and Pinedale monitoring sites. The design values are consistent across the three multi-year periods, and none of the design values exceed the 1-hour NO_2 NAAQS. The data also indicate compliance with the annual NO_2 NAAQS. Figure 3-5 displays the 1-hour NO_2 design values for the ozone monitoring sites for all years with available data. As noted earlier, the 98th percentile (or eighth-highest) daily maximum 1-hour NO_2 concentration for each year is used to calculate the design value for each site and assess compliance with the NAAQS.

Figure 3-3. 1-Hour NO_2 Design Values (parts per billion) for Monitoring Sites in Southwestern Wyoming

a) Sublette County Monitoring Sites



3.2.1.5 Sulfur Dioxide

The closest SO_2 monitoring site is located at the Moxa monitoring site (in Sweetwater County). This site was established in 2010. The 99th percentile daily maximum 1-hour SO_2 values are 21, 17, 16, 20 and 16 ppb for 2010 through 2014. The corresponding SO_2 design values are 18, 17 and 17 ppb for 2010–2012, 2011–2013 and 2012-2014, respectively, as listed in Table 3-5. The 1-hour SO_2 NAAQS sets a limit of 75 ppb for the 3-year average of the 99th percentile daily maximum 1-hour value. Therefore, the SO_2 design values are well below the NAAQS and SO_2 is not a pollutant of concern for the region. Note, however, that SO_2 monitoring is limited to one site.

Table 3-5. Three-Year Average 99th Percentile Daily Maximum 1-Hour SO_2 Values for 2010–2012 through 2012-2014 for Monitoring Sites in Southwestern Wyoming Compared with the NAAQS

Site Name	ID	County	3-Year Average 99th Percentile 1-Hour SO_2 (ppb)			NAAQS (ppb)
			2010–2012	*2011–2013*	*2012–2014*	
Moxa	56-037-0300	Sweetwater	18	17	17	75

Source: REF 1018
NAAQS National Ambient Air Quality Standards
ppb parts per billion
SO_2 sulfur dioxide

3.2.1.6 Carbon Monoxide

CO is not routinely monitored within the region. CO was measured at the Murphy Ridge site (in Uinta County) during 2008. Based on these measurements, the daily maximum 1-hour CO value was 870 ppb (0.87 parts per million [ppm]) and the daily maximum 8-hour average CO value was 690 ppb (0.69 ppm). These values are well below the NAAQS limits of 35,000 and 9,000 ppb (35 and 9 ppm), respectively. Therefore, CO does not appear to be a pollutant of concern for the region. Note, however, that CO monitoring is limited to one site.

The 2011 National Emission Inventory indicates that CO emissions in the region are primarily from area (mostly oil and gas–related) and on-road mobile sources. CO concentrations are expected to be greatest near human-made CO sources such as oil and gas development areas, population centers, and roadways, but CO is not a primary air quality concern for the region.

3.2.1.7 Lead

Lead is not routinely monitored and is not a primary air quality concern for the region.

3.2.1.8 Particulate Matter

PM_{10} and $PM_{2.5}$ are pollutants of concern within the region. At the regional scale, it is expected that fugitive dust sources are the dominant contributors to PM_{10} and $PM_{2.5}$ concentrations. Fugitive dust is likely to occur naturally across the region, especially during high-wind events. Post-burn vegetative conditions associated with wildfires are also sources of fugitive dust. At the local level, concentrations are expected to be highest near towns, unpaved roads that experience high volumes of traffic, areas with depleted vegetative cover, and areas downwind of human-made sources of precursor emissions such as SO_2 and NO_2 that may react to form secondary $PM_{2.5}$.

Recent PM_{10} data are available for three monitoring sites within the region. Under the PM_{10} NAAQS, the maximum 24-hour average PM_{10} concentration cannot exceed 150 micrograms per cubic meter ($\mu g/m^3$) more than once per year on average over 3 years. Wyoming DEQ also requires the annual PM_{10} concentration to be less than 50 $\mu g/m^3$. Maximum 24-hour PM_{10} concentrations for monitoring sites within the area are listed in Table 3-6.

Table 3-6. Maximum 24-Hour PM_{10} Concentrations for Monitoring Sites in Sublette County Compared with the NAAQS

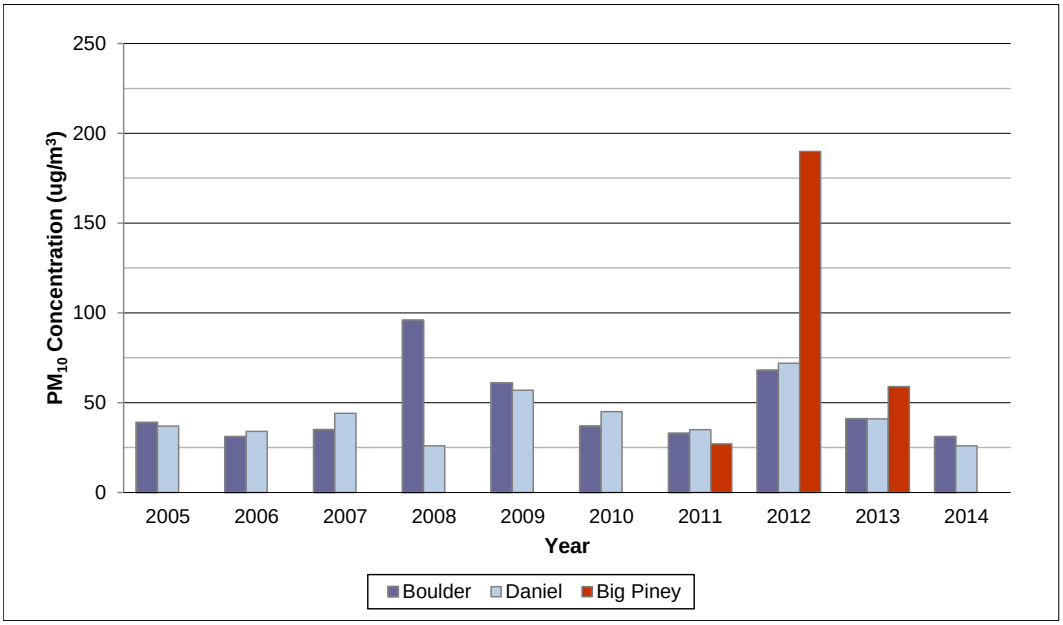
Site Name	ID	County	Maximum 24-Hour Average PM_{10} ($\mu g/m^3$)			NAAQS ($\mu g/m^3$)
			2012	*2013*	*2014*	
Big Piney	56-035-0700	Sublette	190	59	--	150
Boulder	56-035-0099	Sublette	68	41	31	150
Daniel	56-035-0100	Sublette	72	41	26	150

Source: REF 1018
NAAQS National Ambient Air Quality Standards
PM_{10} particulate matter less than 10 microns in diameter
$\mu g/m^3$ micrograms per cubic meter

PM_{10} concentrations exceeded 150 µg/m^3 for 1 of the 3 periods at the Big Piney site. Therefore, while there are no violations of the PM_{10} NAAQS, PM_{10} is an air quality concern for the region. Figure 3-4 displays the maximum 24-hour PM_{10} concentration for these sites for all years with available data.

Figure 3-4. Maximum 24-Hour PM_{10} Design Values (micrograms per cubic meter) for Monitoring Sites in Sublette County

a) Sublette County Monitoring Sites



Recent $PM_{2.5}$ data are available for two monitoring sites within the region. The NAAQS for $PM_{2.5}$ include (1) the 24-hour $PM_{2.5}$ NAAQS, which requires the 3-year average of the 98th percentile 24-hour average $PM_{2.5}$ concentration to be less than 35 µg/m^3; and (2) the annual $PM_{2.5}$ NAAQS, which requires the 3-year average of the annual average $PM_{2.5}$ concentration to be less than 12 µg/m^3. The 24-hour $PM_{2.5}$ design values are listed in Table 3-7 and the annual $PM_{2.5}$ design values are listed in Table 3-8. The 24-hour $PM_{2.5}$ design values are below the NAAQS for both sites.

Table 3-7. 24-Hour $PM_{2.5}$ Design Values for 2010–2012 through 2012–2014 for Monitoring Sites in Sublette County Compared with the NAAQS

Site Name	ID	County	3-Year Average 98th Percentile 24-Hour $PM_{2.5}$ (µg/m^3)			NAAQS (µg/m^3)
			2010–2012	*2011–2013*	*2012–2014*	
Big Piney	56-035-0700	Sublette	--	23.3	--	35
Pinedale	56-035-0101	Sublette	16.0	17.0	17.3	35

Source: REF 1018
NAAQS National Ambient Air Quality Standards
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
µg/m^3 micrograms per cubic meter

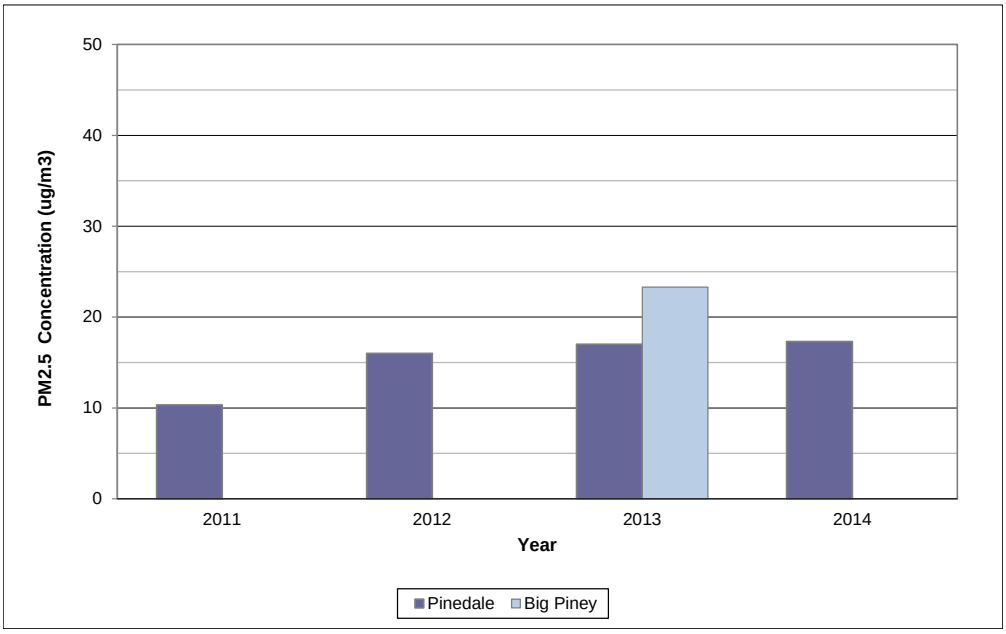
Table 3-8. Annual $PM_{2.5}$ Design Values for 2010–2012 through 2012–2014 for Monitoring Sites in Sublette County Compared with the NAAQS

Site Name	ID	County	3-Year Average 98th Percentile 24-Hour $PM_{2.5}$ (µg/m^3)			NAAQS (µg/m^3)
			2010–2012	*2011–2013*	*2012–2014*	
Big Piney	56-035-0700	Sublette	--	4.3	--	12
Pinedale	56-035-0101	Sublette	5.1	5.6	5.8	12

Source: REF 1018
NAAQS National Ambient Air Quality Standards
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
µg/m^3 micrograms per cubic meter

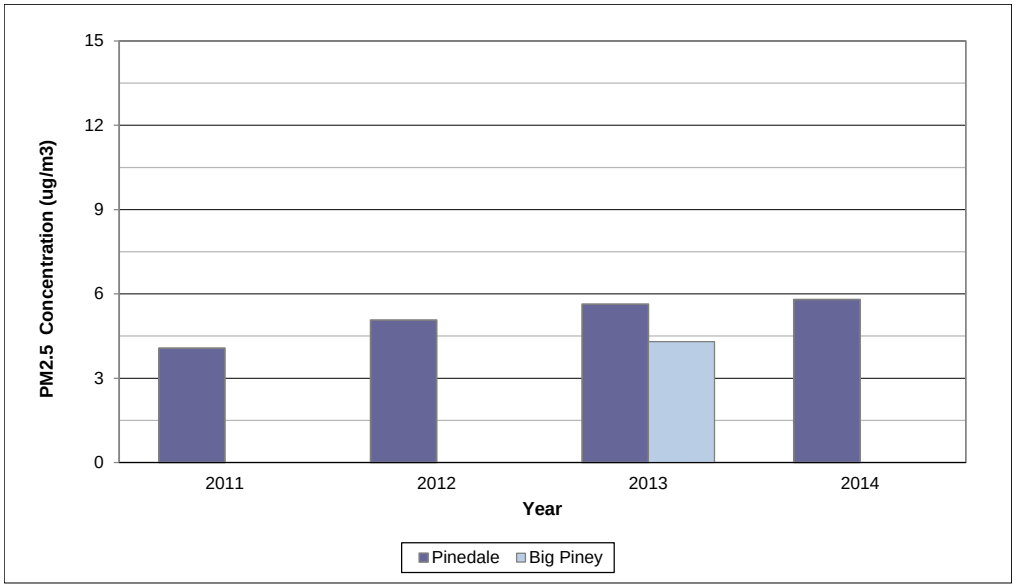
The annual $PM_{2.5}$ design values are also below the NAAQS for both sites. Figure 3-5 displays the 24-hour $PM_{2.5}$ design value and Figure 3-6 displays the annual average concentration for each 3-year period with available data. The design values are based on 3 years of data.

Figure 3-5. 24-Hour $PM_{2.5}$ Design Values (micrograms per cubic meter) for Monitoring Sites in Sublette County



Source: REF 1018
Note: The NAAQS for 24-hour $PM_{2.5}$ is 35 µg/m^3.
µg/m^3 micrograms per cubic meter
NAAQS National Ambient Air Quality Standards
$PM_{2.5}$ particulate matter 2.5 microns or less in diameter

Figure 3-6. Annual Average $PM_{2.5}$ Design Values (micrograms per cubic meter) for Monitoring Sites in Sublette County



Source: REF 1018
Note: The NAAQS for annual average $PM_{2.5}$ is 12 µg/m^3.
µg/m^3 micrograms per cubic meter
NAAQS National Ambient Air Quality Standards
$PM_{2.5}$ particulate matter 2.5 microns or less in diameter

For both the 24-hour and annual metrics, the data indicate a slight upward trend in $PM_{2.5}$ for the Pinedale site.

3.2.1.9 Visibility

The regional haze rule promulgated by EPA in 1999 requires states to establish Reasonable Progress Goals for improving visibility with the overall goal of attaining natural visibility conditions for Class I areas by 2064. Table 3-9 compares visibility in deciviews for the two IMPROVE monitoring sites in Sublette County for 2014 with the natural visibility conditions established by EPA for the Bridger Wilderness Area. The 2014 data indicate that natural background goals are achieved for the 20 percent best days for both sites. However, the deciview values for the 20 percent worst days and for all days are greater than natural background.

Table 3-9. Summary of Visibility Conditions (deciviews) for 2014 for IMPROVE Sites in Southwestern Wyoming Compared with Natural Visibility Conditions

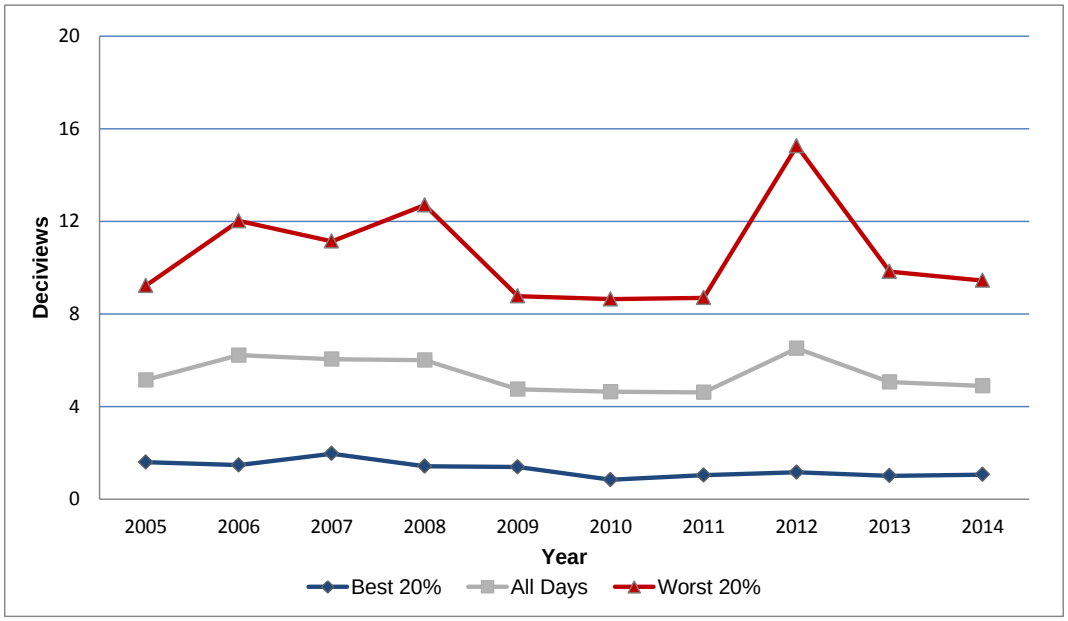
Site	20% Best Days (dv)		20% Worst Days (dv)		All Days (dv)	
	IMPROVE	*Natural*	*IMPROVE*	*Natural*	*IMPROVE*	*Natural*
Bridger Wilderness (BRID1)	1.1	2.0	9.4	7.1	4.9	4.5
Boulder Lake (BOLA1)	1.4	2.0	9.1	7.1	4.9	4.5

Sources: REF 1014; REF 1019

% percent
dv deciviews
IMPROVE Interagency Monitoring of Protected Visual Environments

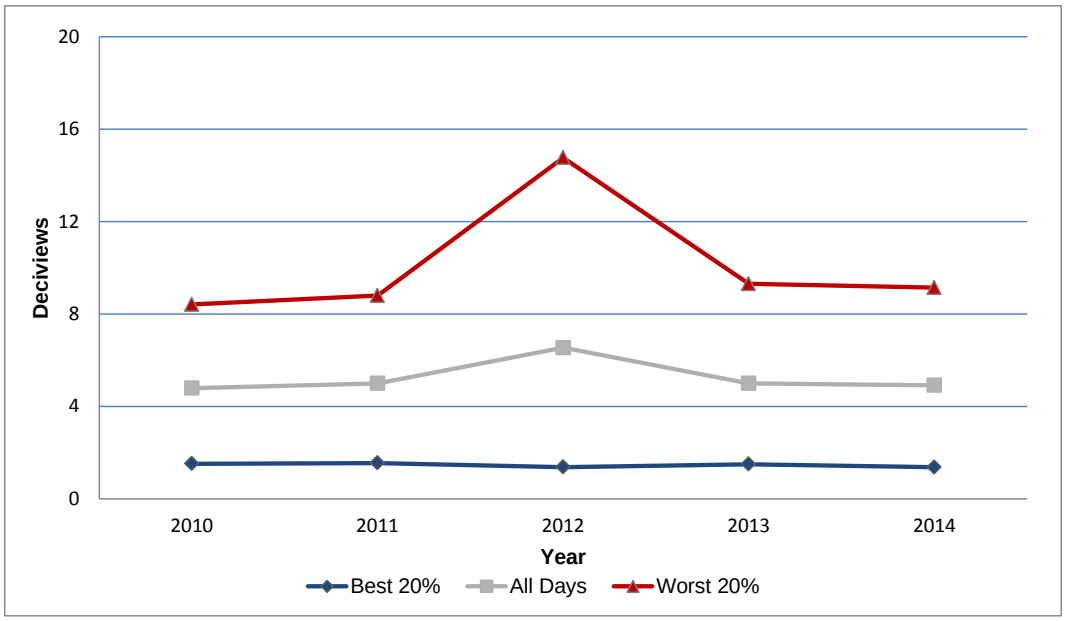
Figure 3-7 and Figure 3-8 display annual average visibility in deciviews for the 20 percent best days, 20 percent worst days, and all days for each year during the period from 2005 to 2014 for the Bridger Wilderness Area IMPROVE site and for 2010 to 2014 for the Boulder Lake IMPROVE site.

Figure 3-7. Annual Average Visibility (deciviews) for the Bridger Wilderness IMPROVE Site



Source: REF 1014
% percent
IMPROVE Interagency Monitoring of Protected Visual Environments

Figure 3-8. Annual Average Visibility (deciviews) for the Boulder Lake IMPROVE Site



Source: REF 1014
% percent
IMPROVE Interagency Monitoring of Protected Visual Environments

The data for Bridger Wilderness indicate a slight downward trend (improved visibility) for the 20 percent best days during the 2002–2014 period. Only the trend for the 20 percent best days is statistically significant. For the other two categories of days, the data are quite variable and it is difficult to distinguish a trend. Visibility for 2012 is especially poor, compared with that of most other years, likely because of wildfires that occurred in several surrounding states in 2012.

Data collection for Boulder Lake began in mid-2009. The data for 2010 through 2014 show no apparent trend in visibility for any of the categories of days. There is an increase in deciviews (poorer visibility) for 2012, compared with that for the other years.

3.2.1.10 Hazardous Air Pollutants

Many VOCs are HAPs and are associated with human-made sources. The 2011 National Emission Inventory and 2008 and later Wyoming DEQ emissions inventories indicate that VOC emissions within the region are primarily from area sources associated with oil and gas development activities. Therefore, HAP concentrations are expected to be greatest near oil and gas development sources and are a potential air quality concern for the region.
HAPs are not routinely monitored within the region. However, Wyoming DEQ conducted HAP monitoring for several sites from February 2009 until March 2010. Table 3-10 summarizes observed HAP concentrations for the Boulder, Daniel South, and Pinedale monitoring sites. Measurements were taken every six days and the values represent averages for the entire monitoring period.

Table 3-10. Example HAP Concentrations (micrograms per cubic meter) for Sublette County, Wyoming

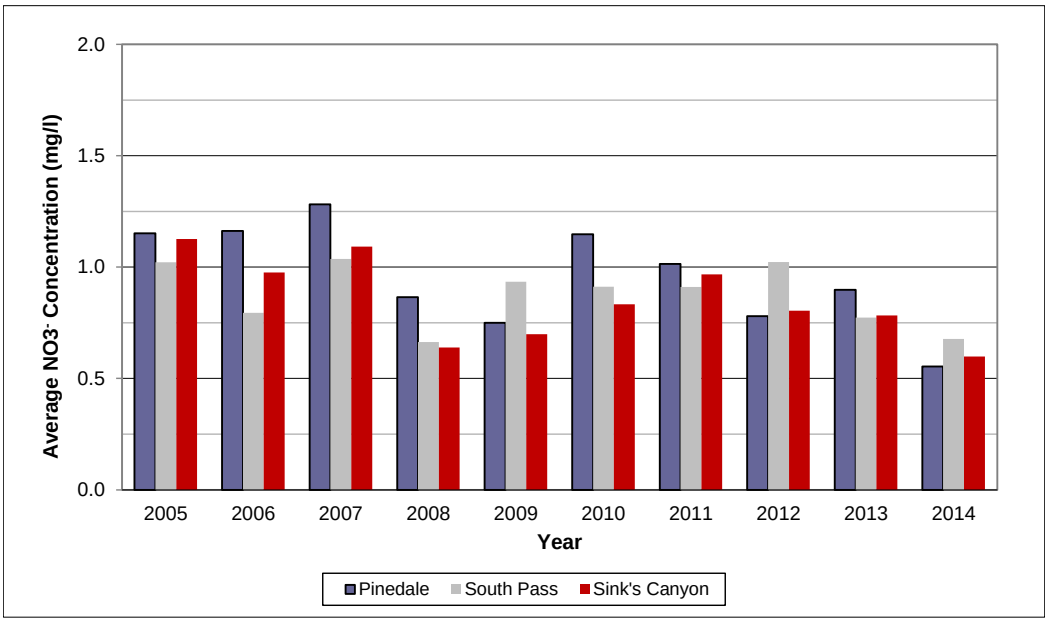
Site Name	Annual Average HAP Concentration (µg/m^3)					
	Benzene	***Ethyl-benzene***	***Formalde-hyde***	***Hexane***	***Toluene***	***Xylene***
Boulder	2.12	0.77	0.99	1.29	6.42	4.46
Daniel South	1.25	0.52	1.37	0.81	4.30	2.76
Pinedale	2.13	1.00	1.59	1.47	6.50	6.38

Source: REF 1020
µg/m^3 micrograms per cubic meter

3.2.1.11 Deposition and Lake Chemistry

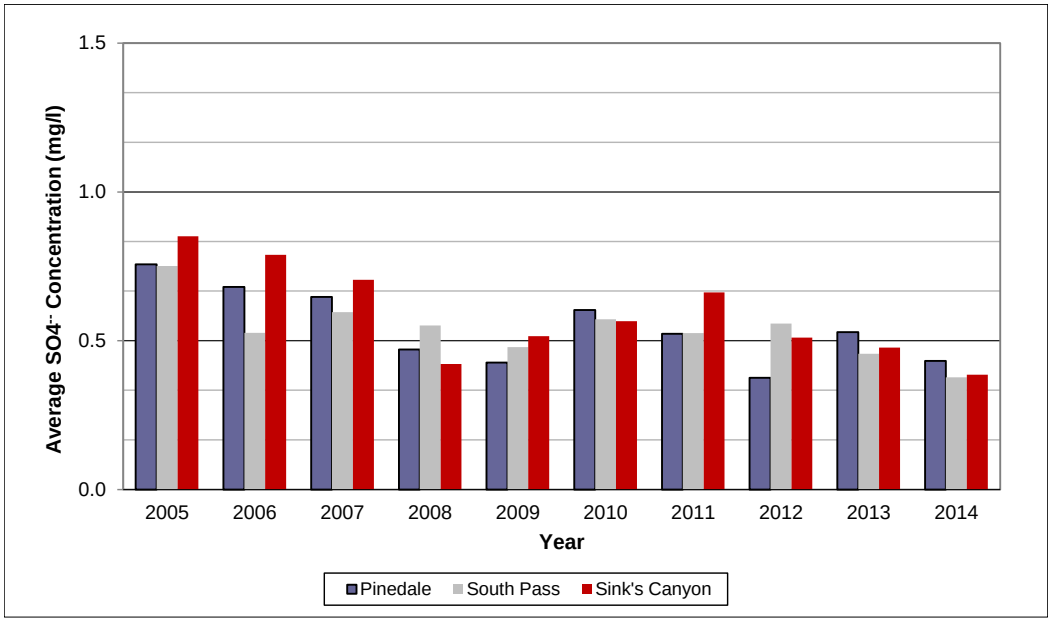
Atmospheric deposition of air pollutants can increase the acidity of soils and water resources. Atmospheric deposition is measured at one NADP site (wet deposition) and one CASTNet site (dry deposition) in Pinedale (Sublette County) and two NADP sites in Fremont County. Wet deposition is characterized by the concentration of nitrate ion (NO_3^-), sulfate ion (SO_4^-), and ammonium ion in precipitation samples. Figure 3-9 through Figure 3-1 display annual average concentration data for nitrate, sulfate, and ammonium ions from precipitation samples for each year during the period from 2005 to 2014 for the NADP sites. For each year, the data represent the average concentration based on all sampling periods. Units are milligrams per liter (mg/L).

Figure 3-9. Annual Average Concentration in Wet Deposition (milligrams per liter) for NADP Monitoring Sites at Pinedale, South Pass, and Sink's Canyon: Nitrate Ion Concentration



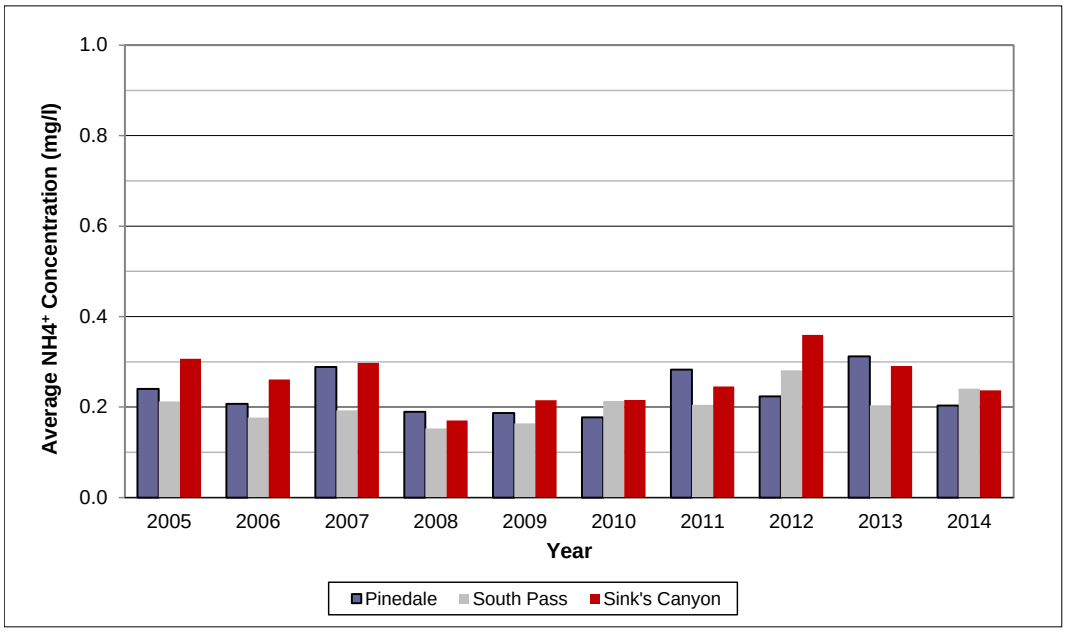
Source: REF 1014
mg/L milligrams per liter
NADP National Atmospheric Deposition Program
NO_3^- nitrate ion

Figure 3-10. Annual Average Concentration in Wet Deposition (milligrams per liter) for NADP Monitoring Sites at Pinedale, South Pass, and Sink's Canyon: Sulfate Ion Concentration



Source: REF 1014
mg/L milligrams per liter
NADP National Atmospheric Deposition Program
SO_4^- sulfate ion

Figure 3-11. Annual Average Concentration in Wet Deposition (milligrams per liter) for NADP Monitoring Sites at Pinedale, South Pass, and Sink's Canyon: Ammonium Ion Concentration

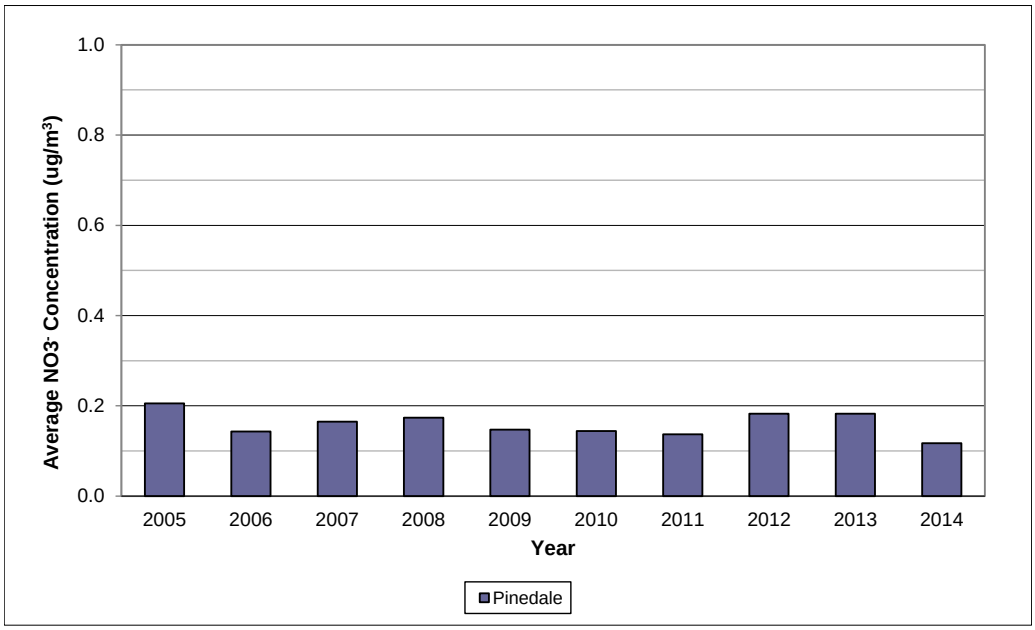


Source: REF 1014
mg/L milligrams per liter
NADP National Atmospheric Deposition Program
NH_4^+ ammonium ion

The data indicate a decrease over time for nitrate and sulfate ions for all three sites in precipitation samples during this period. There is no discernible trend in ammonium ions. For Pinedale and Sink's Canyon, the downward trends are statistically significant for nitrate and sulfate. For South Pass, the downward trend is statistically significant for sulfate.

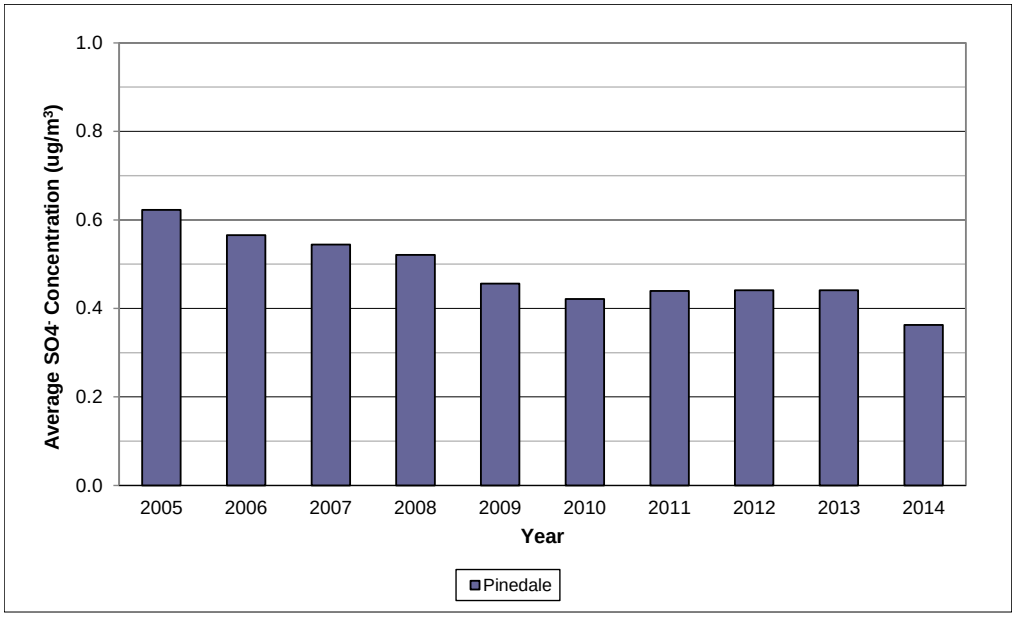
Figure 3-2 through Figure 3-4 display annual average concentration data for nitrate, sulfate, and ammonium ions for each year during the period from 2005 to 2014 for the Pinedale CASTNet site. The concentration measurements are used to estimate dry deposition. For each year, the data represent the average concentration based on all sampling periods. Units are $\mu g/m^3$.

Figure 3-12. Annual Average Concentration (micrograms per cubic meter) for the CASTNet Monitoring Site at Pinedale: Nitrate Ion Concentration



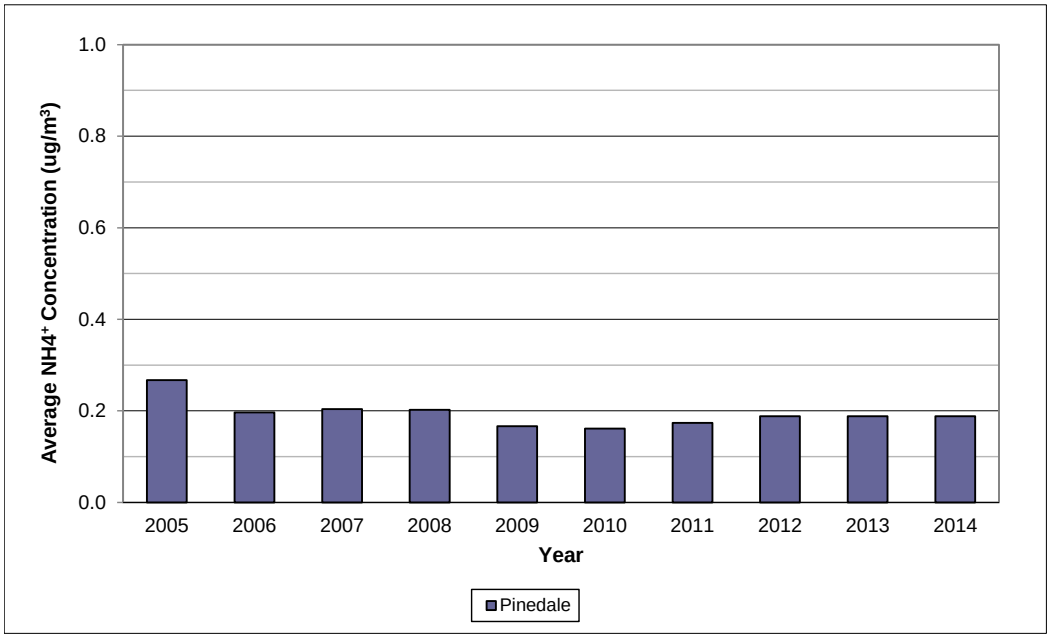
Source: REF 1014
$\mu g/m^3$ micrograms per cubic meter
CASTNet Clean Air Status and Trends Network
NO_3^- nitrate ion

Figure 3-13. Annual Average Concentration (micrograms per cubic meter) for the CASTNet Monitoring Site at Pinedale: Sulfate Ion Concentration



Source: REF 1014
µg/m^3 micrograms per cubic meter
CASTNet Clean Air Status and Trends Network
SO_4^- sulfate ion

Figure 3-14. Annual Average Concentration (micrograms per cubic meter) for the CASTNet Monitoring Site at Pinedale: Ammonium Ion Concentration



Source: REF 1014
µg/m^3 micrograms per cubic meter
CASTNet Clean Air Status and Trends Network
NH_4^+ ammonium ion

The concentration data that are used to estimate dry deposition indicate a decrease over time for all three pollutant species in air samples taken during this period. The downward trend is slight for NO_3^- and ammonium ions and is more pronounced (and statistically significant) for the SO_4^- concentrations.

Seven lakes have been identified as being acid sensitive. Applicable thresholds for the assessment of changes in acid neutralizing capacity (ANC) of sensitive lakes include: 10 percent change in ANC for lakes with background ANC values greater than 25 micro equivalents per liter [µeq/L], and less than a 1 µeq/L change in ANC for lakes with background ANC values equal to or less than 25 µeq/L.

Available ANC values for each of the nearest sensitive lakes are provided in Table 3-10, along with the number of samples used in the calculation of the 10th percentile lowest ANC values. Of the seven lakes listed in Table 3-11, only Upper Frozen Lake is considered to be extremely sensitive to atmospheric deposition by the USFS since the background ANC is less than 25 µeq/L.

Table 3-11. Background ANC Values for Acid Sensitive Lakes

Wilderness Area	Lake	Latitude (Deg, Min, Sec)	Longitude (Deg, Min, Sec)	10th Percentile Lowest ANC Value (µeq/l)	Number of Samples
Bridger	Deep	42°43’10”	109°10’15”	61.1	62
Bridger	Black Joe	42°44’22”	109°10’16”	70.6	72
Bridger	Lazy Boy	43°19’57”	109°43’47”	27.8	1
Bridger	Upper Frozen	42°41’13”	109°09’39”	13.2	3
Bridger	Hobbs	43°02’08”	109°40’20”	69.8	76
Fitzpatrick	Ross	43°22’41”	109°39’30”	54.0	55
Popo Agie	Lower Saddlebag	42°37’24	108°59’38”	55.5	54

Source: USFS (2011)
ANC Acid Neutralizing Capacity
Deg Degree
Min Minute
Sec Second
µeq/l Microequivalent per liter

3.2.2 Climate Change

3.2.2.1 Overview

Throughout southwestern Wyoming, a number of resources could be affected by alterations in future weather and land-use conditions resulting from possible changes in the overall climate of the region. Meteorological data collected throughout the world during the last 50 years show strong indications of a warming planet. Other environmental data collected from oceans, wetlands, forests, and the polar regions (associated with ice pack extent, thickness, and melting) corroborate the global warming trend. It is well known that certain gases in the atmosphere allow short-wave radiation from sunlight (visible light, ultraviolet, near infrared) through the atmosphere. These gases include CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulfur hexafluoride (SF_6), VOCs, water vapor, and other trace gases. When the sun's radiation strikes Earth's surface, heat is generated in the form of infrared radiation. These same gases act to absorb longer wave infrared radiation, resulting in a warming of the atmosphere. This phenomenon is known as the "greenhouse effect," because these gases, referred to as greenhouse gases (GHGs), act to trap heat in the atmosphere in a similar manner as a greenhouse.

Throughout Earth's history, the proportions of the major constituents of the atmosphere (oxygen and nitrogen, which make up 99 percent of the atmosphere) have changed somewhat due to natural and geogenic processes. The concentrations of minor constituents such as CO_2, CH_4, N_2O, and water vapor have also varied somewhat throughout history. Since the advent of the Industrial Revolution in the 1700s, fossil fuels (coal, oil, and natural gas) have been used for heat and power generation throughout the world. This has resulted in increases in the concentrations of GHGs, compared to pre-industrial concentrations, as estimated using long-term historical records of ice-core samples. During the last 50 years, the rate of this increase in GHG concentrations, especially CO_2, has shown a dramatic upward trend, likely due to the increased burning of fossil fuels brought on by larger populations demanding more energy throughout the world, especially in Asia and other newly developing countries. The increases in CO_2 are due to the use of fossil fuels and certain changes in land use. The major human activities that cause increases in CH_4 are coal mining and releases of natural gas from oil and gas operations, and the major human activities that cause increases in both CH_4 and N_2O include animal manure management, agricultural soil management, sewage treatment, and combustion of fossil fuels in stationary and mobile sources (IPCC, 2014).

3.2.2.2 Indicators

In the region, most GHG emissions, primarily in the form of CO_2, result from the combustion of fossil fuels for oil and gas drilling and production operations and transportation. Energy demand, which is the main driver for natural gas development, is influenced by regional and national population growth, economic development, and seasonal weather conditions. CH_4 emissions also result from the development of fossil fuel resources, landfills, and agricultural and livestock activities.

3.2.2.3 Current Conditions

Throughout the Mountain West, including southwestern Wyoming, numerous types of activities and actions result in GHG emissions, with the largest contributor being the combustion of fossil fuels in power plants; on-road and off-road vehicles; drilling engines, pumps, and compressors used in oil and natural development; and construction equipment. In addition to direct GHG emissions from these activities, indirect GHG emissions and other factors potentially contributing to climate change include electricity generated outside the analysis area, land-use changes (e.g., converting forested areas to agricultural use), and soil erosion.

3.2.2.4 Trends

According to climate change researchers, the effects of climate change are expected to vary by region, season, and time of day. Computer model forecasts indicate that increases in temperature will not be evenly or equally distributed, but are likely to be accentuated at higher latitudes. Warming during winter is expected to be greater than during the summer, and increases in daily minimum temperatures are more likely than increases in daily maximum temperatures. Within a given region, increasing temperatures also could affect the amount of water vapor in the atmosphere, the timing and amount of precipitation, the intensity of storm systems, snow melt, and soil moisture. All of these factors can affect climate, day-to-day weather conditions, plant physiology, and air quality.

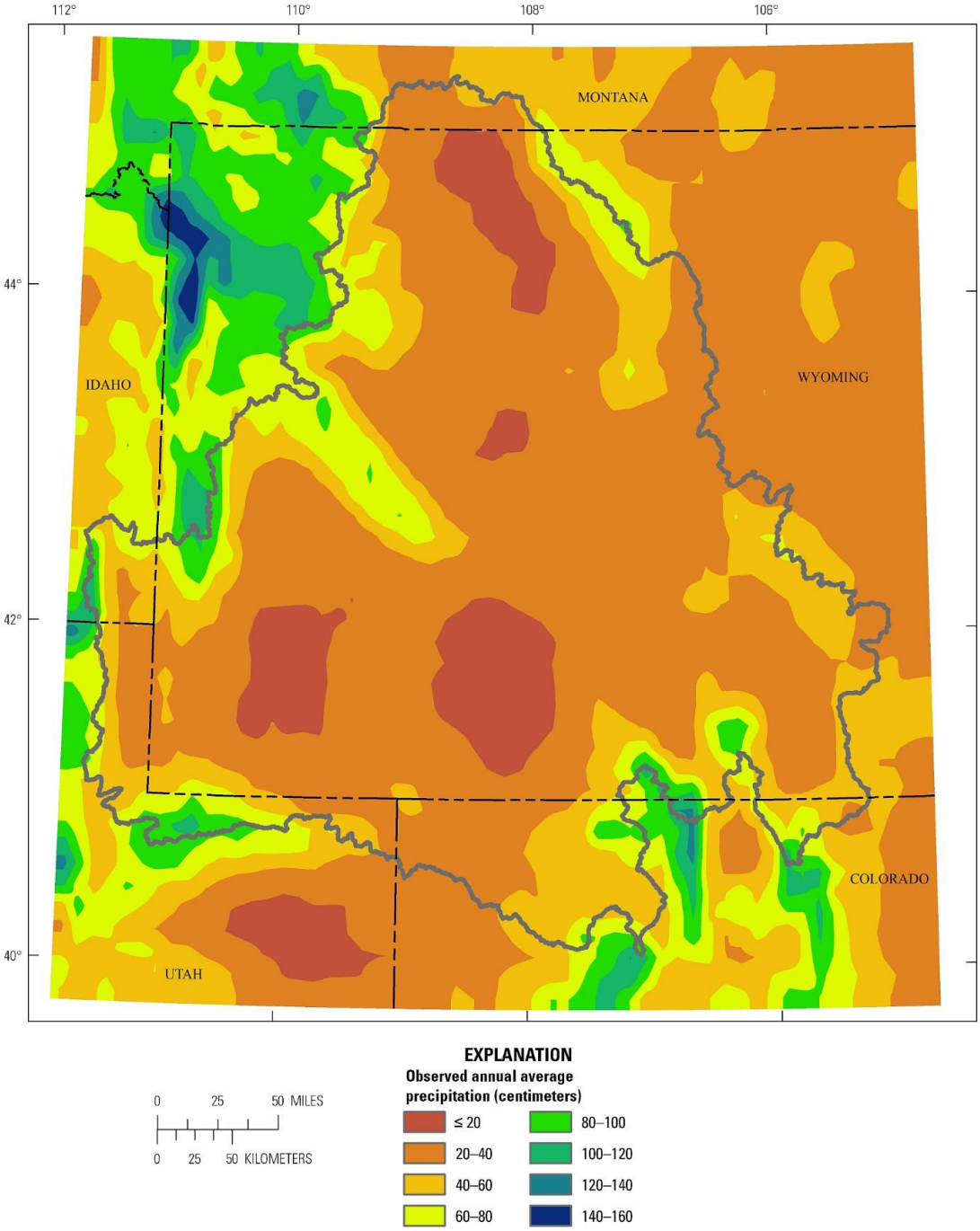
Based on research compiled for the International Panel on Climate Change Fifth Assessment Report, (IPCC, 2014) potential effects of climate change on resources in the affected environment are likely to be varied. Within North America, the report specifically forecasts that: warming in western mountains is projected to cause decreased snowpack, more winter flooding and reduced summer flows, exacerbating competition for over-allocated water resources; in the early decades of the century, moderate climate change is projected to increase aggregate yields of rain-fed agriculture by 5 to 20 percent, but with important variability among regions; major challenges are projected for crops that are near the warm end of their suitable range or which depend on highly utilized water resources; cities that currently experience heat waves are expected to be further challenged by an increased number, intensity and duration of heat waves during the course of the century, with potential for adverse health impacts; and coastal communities and habitats will be increasingly stressed by climate change impacts interacting with development and pollution.

Specific modeling and/or assessments of the potential effects for the State of Wyoming currently do not exist; however, there are downscaled models that have been applied for the area such as a Rapid Ecoregional Assessment (REA) and the 2014 National Climate Assessment (GCRP, 2014).

Recently, the USGS completed the Wyoming Basin Rapid Ecoregional Assessment (USGS, 2015) and presented the results of the climate change analysis for this ecoregion. The analysis provided estimates of expected changes in environmental factors (e.g., precipitation, temperature, etc.) based on information derived from multiple global change models (GCM). The analysis used data for a current or baseline period (1961 to 1990) and provided a series of expected patterns for specific future time periods (e.g., 2046 – 2060).

The general precipitation pattern is presented on Figure 3-15. The general annual average precipitation pattern for the Wyoming Basin ecoregion shows increasing precipitation from the northwest to the southeast, with the Grand Teton and Yellowstone areas receiving the most rainfall and the mid-basin areas (including the Bighorn Basin and parts of Southeast Wyoming) receiving the least.

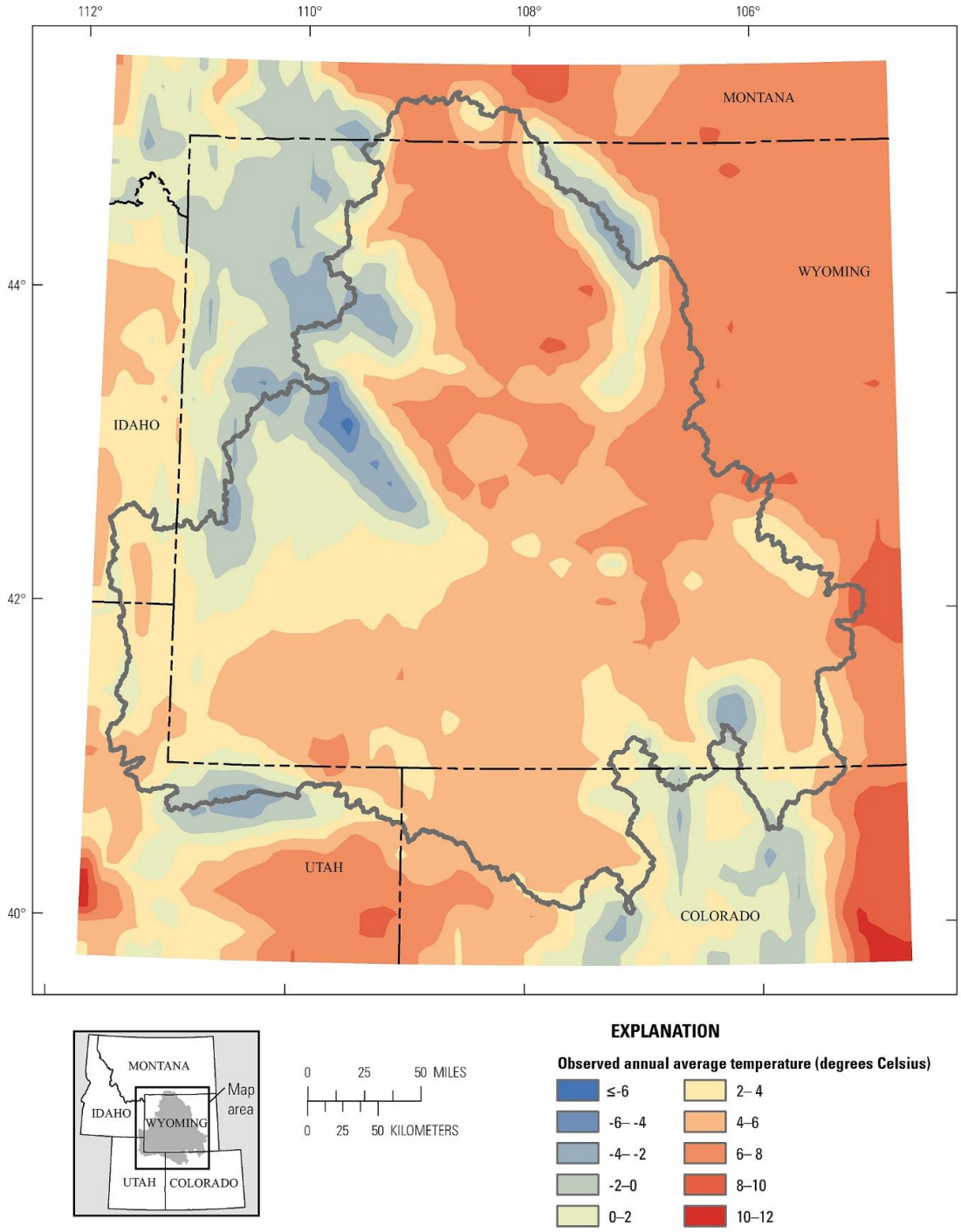
Figure 3-15. Current (1961-1990) Total Annual Precipitation (millimeters)



Source: USGS, 2015

The mean annual temperature for existing climate pattern in the Wyoming Basin is presented on Figure 3-16. The historical data indicate that the Bighorn Basin area of the Wyoming Basin is generally warmer than the rest of the ecoregion.

Figure 3-16. Current (1961-1990) Mean Annual Temperature (°C)



Source: USGS, 2015

The REA for the Wyoming Basin shows that all GCMs expect increased warming by 2030 and further warming by 2060. There was disagreement on the expected changes in precipitation amongst the models but the analysis did indicate an overall expectation for the future of wetter winters and drier summers.

All of North America is likely to experience an increase in average temperature during the next 100 years, and annual mean warming is likely to exceed global mean warming in most areas (IPCC, 2014). Temperatures are projected to increase substantially by the end of this century (GCRP, 2009). Summer temperatures are expected to increase between approximately 7°F and 10+°F by 2080 to 2099. Overall, temperature in the region is projected to increase between 2.5°F to more than 13°F compared to the 1960 to 1979 baseline, depending on future GHG emissions (GCRP, 2009). This range of temperature increase reflects the current uncertainty in climate change modeling and represents the likely range of model projections, although lower or higher outcomes are possible.

Increasing temperatures are likely to contribute to increased evaporation, drought frequencies, and declining water quantity. The warming of lakes and rivers will adversely affect the thermal structure and water quality of hydrological systems, which will add additional stress to water resources in the region (IPCC, 2014). The area depends on temperature-sensitive springtime snowpack to meet demand for water from municipal, industrial, agricultural, recreational uses and BLM-authorized activities. The U.S. Geological Survey (USGS) notes that mountain ecosystems in the western U.S. are particularly sensitive to climate change, especially in the higher elevations, where much of the snowpack occurs, which have experienced three times the global average temperature increase over the past century. Higher temperatures are causing more winter precipitation to fall as rain rather than snow, which contributes to earlier snowmelt. Additional declines in snowmelt associated with climate change are projected, which would reduce the amount of water available during summer (GCRP, 2009). Rapid spring snowmelt due to sudden and unseasonal temperature increases can also lead to greater erosive events and unstable soil conditions.

Increases in average summer temperatures and earlier spring snowmelt are expected to increase the risk of wildfires by increasing summer moisture deficits (GCRP, 2009). Studies have shown that earlier snowmelts can lead to a longer dry season, which increases the incidence of catastrophic fire (Westerling et al., 2006). Together with historic changes in land use, climate change is anticipated to increase the occurrence of wildfire throughout the western U.S. The latest GCRP assessment (GCRP, 2014) predicts that temperatures and precipitation over the region will continue to increase, especially if GHG emissions remain high. In addition, the assessment predicts that the frequency of extreme weather events such as heat waves, droughts, and heavy rainfall will also increase and may affect water resources, forests and wilderness areas, agricultural and ranching activities, and human health.

There is evidence that recent warming is impacting terrestrial and aquatic biological systems, with higher temperatures leading to earlier timing of spring events such as leaf-unfolding, bird migration, and egg-laying (IPCC, 2014). The range of many plant and animal species has shifted poleward and to higher elevation, as the climate of these species' traditional habitat changes. As future changes in climate are projected to be even greater than those in the recent past, there will likely be even larger range shifts in the coming decades (Lawler et al., 2009). Warming temperatures are also linked to earlier "greening" of vegetation in the spring and longer thermal growing seasons (IPCC, 2014). In aquatic habitats, increases in algal abundance in high-altitude lakes have been linked to warmer temperatures, while range changes and earlier fish migrations in rivers have also been observed. Climate change is likely to combine with other human-induced stress to further increase the vulnerability of ecosystems to other pests, invasive species, and loss of native species. Climate change

is likely to affect breeding patterns, water and food supply, and habitat availability to some degree. Sensitive species, such as the Greater Sage-Grouse, which are already stressed by declining habitat, increased development and other factors, could experience additional pressures as a result of climate change.

More frequent flooding events, erosion, wildfires and hotter temperatures all pose increased threats to cultural and paleontological sites and artifacts. Heat from wildfires, suppression activities and equipment, as well as greater ambient daytime heat can damage sensitive cultural resources. Similarly, flooding and erosion can wash away artifacts and damage cultural and paleontological sites. However, these same events may also uncover and lead to discoveries of new cultural and paleontological localities.

Climate change also poses challenges for many resource uses on BLM-administered land. Increased temperatures, drought and evaporation may reduce seasonal water supplies for livestock and could impact forage availability. However, in non-drought years, longer growing seasons resulting from thermal increases may increase forage availability throughout the year. Shifts in wildlife habitat due to climate change may influence hunting and fishing activities, and early snowmelt may impact winter and water-based recreational activities. Drought and resulting stress on vegetation is likely to increase the frequency and intensity of mountain bark beetle and other insect infestations, which further increases the risk of fire and reduces the potential for sale of forest products on BLM-administered lands.

A variety of activities currently generate GHGs. Fuels combustion, industrial processes and any number of other activities on public lands result in direct emissions of GHGs. Direct emissions in the include those related to current and ongoing oil and gas and other minerals development, fire events, motorized vehicle use (e.g., off-highway vehicles), livestock grazing, facilities development, and other fugitive emissions. Indirect GHG emissions include the demand for electricity generated outside the area. Contributions to climate change also result from land use changes (conversion of land to less reflective surfaces that absorb heat, such as concrete or pavement), and soil erosion (which can reduce snow's solar reflectivity and contribute to faster snowmelt).

Several federal initiatives have been launched to improve the ability to understand, predict, and adapt to the challenges of climate change. The Secretary of the Interior signed Secretarial Order 3289 on February 22, 2010, establishing a Department-wide, scientific-based approach to increase understanding of climate change and to coordinate an effective response to impacts on managed resources. The order reiterated the importance of analyzing potential climate change impacts when undertaking long-range planning issues, and also established several initiatives including the development of eight Regional Climate Science Centers (DOI, 2010). Regional Climate Science Centers would provide scientific information and tools that land and resource managers can apply to monitor and adapt to climate changes at regional and local scales. The North Central Climate Science Center was established in 2011.

Given the broad spatial influence of climate change which requires response at the landscape-level, the U.S. Department of the Interior (DOI) also established Landscape Conservation Cooperatives which are management-science partnerships that help to inform management actions addressing climate change across landscapes. These Cooperatives are formed and directed by land, water, wildlife and cultural resource managers and interested public and private organizations, designed to increase the scope of climate change response beyond federal lands.

Other federal initiatives are being implemented to mitigate climate change. The Carbon Storage Project was implemented to develop carbon sequestration methodologies for geological (i.e., underground) and biological (e.g., forests and rangelands) carbon storage. The project is a collaboration of federal agency and external stakeholders to enhance carbon storage in geologic formations and in plants and soils in an environmentally responsible manner. The Carbon Footprint Project is a project to develop a unified GHG emission reduction program for the DOI, including setting a baseline and reduction goal for the Department's GHG emissions and energy use. More information about DOI's efforts to respond to climate change is available at: www.doi.gov/whatwedo/climate/index.cfm.

In addition to DOI's efforts to address this issue, the EPA has undertaken a number of regulatory initiatives in recent years to reduce GHG emissions. For over 20 years, the EPA has developed approaches and strategies for reducing GHG emissions from natural gas operations through its Natural Gas Star Program (EPA, 2014). This program has provided recommendations for capturing or reducing fugitive emissions of VOCs, including hazardous air pollutants (HAP), as well as GHG's such as methane. In 2009, a finding was made under the Clean Air Act identifying the key constituent gases that threaten public health and welfare and contribute to climate change. An initiative was developed for mobile sources by setting engine and fuel standards to cut GHGs and fuel use for new motor vehicles, and the implementation of a renewable fuel standard aimed at decreasing oil imports and reducing GHGs. Another initiative addresses stationary sources to limit GHGs for power plants and other large industrial facilities. The EPA also initiated a national GHG emissions reporting program for large emitters. In 2012, EPA finalized regulations to reduce pollution from the oil and natural gas industry which is expected to result in substantial reductions in VOC emissions, air toxics, and CH_4, an important GHG (EPA, 2012). Most recently, EPA extended the rule to mandate control requirements for hydraulically fractured oil wells (EPA, 2015). In addition to requiring reduced emission completions (or "green completions") of oil wells, the rules also mandate that developers find and repair leaks, limit emissions from new and modified pneumatic pumps, and limit emissions from several types of equipment used at natural gas transmission compressor stations and at gas storage facilities, including compressors and pneumatic controllers. These actions, initiatives, and regulations will impact activities, especially those related to oil and natural gas development, in an overall effort to balance growth in resource development with continued reductions in key GHG emissions.

Appendix E

ADDITIONAL REFERENCES PROVIDED BY COMMENTORS

Additional Literature Received and Reviewed

BLM 2008 Pinedale Resource Management Plan
Greater Sage-Grouse Comprehensive Conservation Strategy
http://gf.state.wy.us/downloads/pdf/WAFWA%20Greater%20Greater Sage-Grouse%20Conservation%20Strategy%202006.pdf

Sawyer, H and R Nielson 2011. "Mule Deer Monitoring in the Pinedale Anticline Project Area 2011 Annual Report" September 21, 2011

Sawyer, H and R Nielson 2010. "Mule Deer Monitoring in the Pinedale Anticline Project Area 2010 Annual Report" September 14, 2010

USFS. "North schell escaped prescribed fire facilitated learning analysis"; June 2012

Beck et al. (2009) - Restoration Ecology

Davies et al. (2011)—Biol Cons

Energy Development Guidelines for Mule Deer (2011) Western Association of Fish and Wildlife Agencies

Hebblewhite (2009) Energy and Ungulates Literature Review (TRCP)

Hess and Beck (2012); WSB

MechTrt Literature Review Draft (December 2012)

Oil and Gas Technical Review 2012 TRCP

Restoration Framework Hobs (June 1996); Restoration Ecology Vol. 4 No. 2, pp 93-110

BLM's management considerations for sagebrush

Cattle and Elk Seed Dispersal

cheatgrass and grazing rangelands

Cheatgrass and Native systems rmrs_2008_mazzola_m002

Germination and seed water status of four grasses on moss-dominated biologicals

Invasional meltdown

Montana Sage Brush Review

Parker et al SCIENCE 2006 - Supporting Online Material

Parker_et_al_SCIENCE_2006

Prevey et al EcoApps Galleys

Prevey et al Pl Ecol 2010 v207p39-49

Relationship of Sagebrush Cover to Herbaceous Vegetatation

Sage Removal Causes Increased Invasives - 09Prevey

Sage_SuccessionSM

Sagebrush and loss of foundation species

Sagebrush burning and Greater Sage-Grouse pdf

sagebrush fire slow Sage_Succ_Veg-1

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Greater Sage-Grouse Comprehensive Conservation Strategy http://gf.state.wy.us/downloads/pdf/WAFWA%20Greater%20Greater Sage-Grouse%20Conservation%20Strategy%202006.pdf

Sawyer, H and R Nielson 2011. "Mule Deer Monitoring in the Pinedale Anticline Project Area 2011 Annual Report" September 21, 2011

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Sage_SuccessionSM

Sagebrush and loss of foundation species

Sagebrush burning and Greater Sage-Grouse pdf sagebrush fire slow Sage_Succ_Veg-1

Appendix F

BLM INVASIVE SPECIES AND HERBICIDE SOP

BLM Activity	Preventative Measures
Project Planning	
	• Incorporate prevention measures into project layout and design, alternative evaluation, and project decisions to prevent the introduction or spread of weeds.
	• Determine prevention and maintenance needs, including the use of herbicides, at the onset of project planning.
	• Before ground-disturbing activities begin, inventory weed infestations and prioritize areas for treatment in project operating areas and along access routes.
	• Remove sources of weed seed and propagates to prevent the spread of existing weeds and new weed infestations.
	• Pre-treat high-risk sites for weed establishment and spread before implementing projects.
	• Post weed awareness messages and prevention practices at strategic locations such as trailheads, roads, boat launches, and public land kiosks.
	• Coordinate project activities with nearby herbicide applications to maximize the cost effectiveness of weed treatments.
	• Determine prevention and maintenance needs, including the use of herbicides, at the onset of project planning.
	• Minimize soil disturbance to the extent practical, consistent with project objectives.
Project Development	
	• Avoid creating soil conditions that promote weed germination and establishment.
	• To prevent weed germination and establishment, retain native vegetation in and around project activity areas and keep soil disturbance to a minimum, consistent with project objectives.
	• Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas, or restrict travel to periods when the spread of seeds or propagates is least likely.
	• Prevent the introduction and spread of weeds caused by moving weed-infested sand, gravel, borrow, and fill material.
	• Inspect material sources on site, and ensure that they are weed-free before use and transport. Treat weed-infested sources to eradicate weed seed and plant parts, and strip and stockpile contaminated material before any use of pit material.
	• Survey the area where material from treated weed- infested sources is used for at least 3 years after project completion to ensure that any weeds transported to the site are promptly detected and controlled.
	• Prevent weed establishment by not driving through weed- infested areas.
	• Inspect and document weed establishment at access roads, cleaning sites, and all disturbed areas; control infestations to prevent weed spread within the project area.
	• Avoid acquiring water for dust abatement where access to the water is through weed-infested sites.

	• Identify sites where equipment can be cleaned. Clean equipment before entering public lands.
	• Clean all equipment before leaving the project site if operating in areas infested with weeds.
	• Inspect and treat weeds that establish at equipment cleaning sites.
	• Ensure that rental equipment is free of weed seed.
	• Inspect, remove, and properly dispose of weed seed and plant parts found on workers' clothing and equipment. Proper disposal entails bagging the seeds and plant parts and incinerating them.
Revegetation	
	• Include weed prevention measures, including project inspection and documentation, in operation and reclamation plans.
	• Retain bonds until reclamation requirements, including weed treatments, are completed, base on inspection and documentation.
	• To prevent conditions favoring weed establishment, reestablish vegetation on bare ground caused by project disturbance as soon as possible using either natural recovery or artificial techniques.
	• Maintain stockpiled, un-infested material in a weed-free condition.
	• Re-vegetate disturbed soil (except travel ways on surfaced projects) in a manner that optimizes plant establishment for each specific project site. For each project, define what constitutes disturbed soil and objectives for plant cover re- vegetation. Re-vegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching, as necessary.
	• Inspect seed and straw mulch to be used for site rehabilitation (for wattles, straw bales, dams, landings) etc.) Certify that they are free of weed seed and propagules.
	• Inspect and document all limited term ground-disturbing operations in noxious weed infested areas for at least 3 growing seasons following completion of the project.
	• Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available.
Standard Operating Procedures for Applying Herbicides	
Resource Element	**Standard Operating Procedure**
Guidance Documents	BLM Handbook H-9011-1 (Chemical Pest Control); and manuals 1112 (Safety), 9011 (Chemical Pest Control), 9012 (Expenditure of Rangeland Insect Pest Control Funds), 9015 (Integrated Weed Management), and 9220 (Integrated Pest Management)
General	
	• Prepare operational and spill contingency plan in advance of treatment.
	• Conduct a pretreatment survey before applying herbicides.
	• Select herbicide that is least damaging to the environment while providing the desired results.
	• Select herbicide products carefully to minimize additional impacts from degradates, adjuvants, inert ingredients, and tank mixtures.
	• Apply the least amount of herbicide needed to achieve the desired result.
	• Follow herbicide product label for use and storage.
	• Have licensed applicators apply herbicides.

	• Use only USEPA-approved herbicides and follow product label directions and “advisory” statements.
	• Review, understand, and conform to the “Environmental Hazards” section on the herbicide product label. This section warns of known pesticide risks to the environment and provides practical ways to avoid harm to organisms or to the environment.
	• Consider surrounding land use before assigning aerial spraying as a treatment method and avoid aerial spraying near agricultural or densely populated areas.
	• Minimize the size of application area, when feasible.
	• Comply with herbicide-free buffer zones to ensure that drift will not affect crops or nearby residents/landowners.
	• Post treated areas and specify reentry or rest times, if appropriate.
	• Notify adjacent landowners prior to treatment.
	• Keep a copy of Material Safety Data Sheets (MSDSs) at work sites. MSDSs are available for review at ttp://www.cdms.net/.
	• Keep records of each application, including the active ingredient, formulation, application rate, date, time, and location.
	• Avoid accidental direct spray and spill conditions to minimize risks to resources.
	• Consider surrounding land uses before aerial spraying.
	• Avoid aerial spraying during periods of adverse weather conditions (snow or rain imminent, fog, or air turbulence).
	• Make helicopter applications at target airspeeds of 40 to
	50 miles per hour (mph), and at about 30 to 45 feet above ground.
	• Take precautions to minimize drift by not applying herbicides when winds exceed >10 mph (>6 mph for aerial applications), or a serious rainfall event is imminent.
	• Use drift control agents and low volatile formulations.
	• Conduct pre-treatment surveys for sensitive habitat and special status species within or adjacent to proposed treatment areas.
	• Consider site characteristics, environmental conditions, and application equipment in order to minimize damage to non-target vegetation.
	• Turn off applied treatments at the completion of spray runs and during turns to start another spray run.
	• Refer to the herbicide product label when planning re- vegetation to ensure that subsequent vegetation would not be injured following application of the herbicide.
	• Clean OHVs to remove seeds.
Air Quality--See Manual 7000 (Soil, Water, and Air Management)	
	• Consider the effects of wind, humidity, temperature inversions, and heavy rainfall on herbicide effectiveness and risks.
	• Apply herbicides in favorable weather conditions to minimize drift. For example, do not treat when winds exceed 10 mph (>6 mph for aerial applications) or rainfall is imminent.
	• Use drift reduction agents, as appropriate, to reduce the drift hazard.
	• Select proper application equipment (e.g., spray equipment that produces 200- to 800-micron diameter droplets [spray droplets of 100 microns and less are most prone to drift]).

	• Select proper application methods (e.g., set maximum spray heights, use appropriate buffer distances between spray sites and non-target resources).
Soil--See Manual 7000 (Soil, Water, and Air Management	
	• Minimize treatments in areas where herbicide runoff is likely, such as steep slopes when heavy rainfall is expected.
	• Minimize use of herbicides that have high soil mobility, particularly in areas where soil properties increase the potential for mobility.
	• Do not apply granular herbicides on slopes of more than
Water Resources--See Manual 7000 (Soil, Water, and Air Management)	
	• Consider climate, soil type, slope, and vegetation type when developing herbicide treatment programs.
	• Select herbicide products to minimize impacts to water. This is especially important for application scenarios that involve risk from active ingredients in a particular herbicide, as predicted by risk assessments.
	• Use local historical weather data to choose the month of treatment. Considering the phonological stage of the target species, schedule treatments based on the condition of the water body and existing water quality conditions.
	• Plan to treat between weather fronts (calms) and at appropriate time of day to avoid high winds that increase water movements, and to avoid potential storm water runoff and water turbidity.
	• Review hydro geologic maps of proposed treatment areas. Note depths to groundwater and areas of shallow groundwater and areas of surface water and groundwater interaction. Minimize treating areas with high risk for groundwater contamination.
	• Conduct mixing and loading operations in an area where an accidental spill would not contaminate an aquatic body.
	• Do not rinse spray tanks in or near water bodies. Do not broadcast pellets where there is danger of contaminating water supplies.
	• Maintain buffers between treatment areas and water bodies. Buffer widths should be developed based on herbicide- and site-specific criteria to minimize impacts to water bodies.
Wetlands and Riparian Areas	
	• Use a selective herbicide and a wick or backpack sprayer.
	• Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications

Vegetation--See Handbook H-4410-1 (National Range Handbook), and manuals 5000 (Forest Management) and 9015 (Integrated Weed Management)	
	• Refer to the herbicide label when planning re-vegetation to ensure that subsequent vegetation would not be injured following application of the herbicide.
	• Use native or sterile species for re-vegetation and restoration projects to compete with invasive species until desired vegetation establishes.
	• Use weed-free feed for horses and pack animals. Use weed-free straw and mulch for re-vegetation and other activities.
	• Identify and implement any temporary domestic livestock grazing and/or supplemental feeding restrictions needed to enhance desirable vegetation recovery following treatment. Consider adjustments in the existing grazing permit, to maintain desirable vegetation on the treatment
Pollinators	
	• Complete vegetation treatments seasonally before pollinator foraging plants bloom.
	• Time vegetation treatments to take place when foraging pollinators are least active both seasonally and daily.
	• Design vegetation treatment projects so that nectar and pollen sources for important pollinators and resources are treated in patches rather than in one single treatment.
	• Minimize herbicide application rates. Use typical rather than maximum rates where there are important pollinator resources.
	• Maintain herbicide free buffer zones around patches of important pollinator nectar and pollen sources.
	• Maintain herbicide free buffer zones around patches of important pollinator nesting habitat and hibernacula.
	• Make special note of pollinators that have single host plant species, and minimize herbicide spraying on those plants (if invasive species) and in their habitats.
Fish and Other Aquatic Organisms--See manuals 6500 (Wildlife and Fisheries Management) and 6780 (Habitat Management Plans)	
	• Use appropriate buffer zones based on label and risk assessment guidance.
	• Minimize treatments near fish-bearing water bodies during periods when fish are in life stages most sensitive to the herbicide(s) used, and use spot rather than broadcast or aerial treatments.
	• Use appropriate application equipment/method near water bodies if the potential for off-site drift exists.

	• For treatment of aquatic vegetation, 1) treat only that portion of the aquatic system necessary to achieve acceptable vegetation management, 2) use the appropriate application method to minimize the potential for injury to desirable vegetation and aquatic organisms, and 3) follow water use restrictions presented on the herbicide label.
Wildlife See manuals 6500 (Wildlife and Fisheries Management) and 6780 (Habitat Management Plans)	
	• Use herbicides of low toxicity to wildlife, where feasible.
	• Use spot applications or low-boom broadcast operations where possible to limit the probability of contaminating non-target food and water sources, especially non-target vegetation over areas larger than the treatment area.
	• Use timing restrictions (e.g., do not treat during critical wildlife breeding or staging periods) to minimize impacts to wildlife.
Threatened, Endangered, and Sensitive Species See Manual 6840 (Special Status Species)	
	• Survey for special status species before treating an area. Consider effects to special status species when designing herbicide treatment programs.
	• Use a selective herbicide and a wick or backpack sprayer to minimize risks to special status plants.
	• Avoid treating vegetation during time-sensitive periods (e.g., nesting and migration, sensitive life stages) for special status species in area to be treated.
Livestock See Handbook H-4120-1 (Grazing Management)	
	• Whenever possible and whenever needed, schedule treatments when livestock are not present in the treatment area. Design treatments to take advantage of normal livestock grazing rest periods, when possible.
	• As directed by the herbicide product label, remove livestock from treatment sites prior to herbicide application, where applicable.
	• Use herbicides of low toxicity to livestock, where feasible.
	• Take into account the different types of application equipment and methods, where possible, to reduce the probability of contamination of non-target food and water sources.
	• Avoid use of diquat in riparian pasture while pasture is being used by livestock.
	• Notify permittees of the herbicide treatment project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.
	• Notify permittees of livestock grazing, feeding, or slaughter restrictions, if necessary.

	• Provide alternative forage sites for livestock, if possible.
Wild Horses and Burros	
	• Minimize using herbicides in areas grazed by wild horses and burros.
	• Use herbicides of low toxicity to wild horses and burros, where feasible.
	• Remove wild horses and burros from identified treatment areas prior to herbicide application, in accordance with herbicide product label directions for livestock.
	• Take into account the different types of application equipment and methods, where possible, to reduce the probability of contaminating non-target food and water sources.
Cultural Resources and Paleontological Resources See handbooks H-8120-1 (Guidelines for Conducting Tribal Consultation) and H- 8270-1 (General Procedural Guidance for Paleontological Resource Management), and manuals 8100 (The Foundations for Managing Cultural Resources), 8120 (Tribal Consultation Under Cultural Resource Authorities), and 8270 (Paleontological Resource Management) See also: Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation	
	• Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act and state protocols or 36 Code of Federal Regulations Part 800, including necessary consultations with State Historic Preservation Officers and interested Tribes.
	• Follow BLM Handbook H-8270-1 (General Procedural Guidance for Paleontological Resource Management) to determine known Condition I and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or mitigate adverse impacts.
	• Consult with Tribes to locate any areas of vegetation that are of significance to the Tribe and that might be affected by herbicide treatments.
	• Work with Tribes to minimize impacts to these resources.
	• Follow guidance under Human Health and Safety in the PEIS in areas that may be visited by Native peoples after treatments.
Visual Resources See handbooks H-8410-1 (Visual Resource Inventory) and H-8431-1 (Visual Resource Contrast Rating), and manual 8400 (Visual Resource Management)	
	• Minimize the use of broadcast foliar applications in sensitive watersheds to avoid creating large areas of browned vegetation.
	• Consider the surrounding land use before assigning aerial spraying as an application method.
	• Minimize off-site drift and mobility of herbicides (e.g., do not treat when winds exceed 10 mph; minimize treatment in areas where herbicide runoff is likely; establish appropriate buffer widths between treatment areas and residences) to contain visual changes to the intended treatment area.

	• If the area is a Class I or II visual resource, ensure that the change to the characteristic landscape is low and does not attract attention (Class I), or if seen, does not attract the attention of the casual viewer (Class II).
Wilderness and Other Special Areas See handbooks H-8550-1 (Management of Wilderness Study Areas (WSAs)), and H- 8560-1 (Management of Designated Wilderness Study Areas), and Manual 8351 (Wild and Scenic Rivers)	
	• Encourage backcountry pack and saddle stock users to feed their livestock only weed-free feed for several days before entering a wilderness area.
	• Encourage stock users to tie and/or hold stock in such a way as to minimize soil disturbance and loss of native vegetation.
	• Re-vegetate disturbed sites with native species if there is no reasonable expectation of natural regeneration.
	• Provide educational materials at trailheads and other wilderness entry points to educate the public on the need to prevent the spread of weeds.
	• Use the “minimum tool” to treat noxious and invasive vegetation, relying primarily on the use of ground-based tools, including backpack pumps, hand sprayers, and pumps mounted on pack and saddle stock.
	• Use chemicals only when they are the minimum method necessary to control weeds that are spreading within the wilderness or threaten lands outside the wilderness.
	• Give preference to herbicides that have the least impact on non-target species and the wilderness environment.
	• Implement herbicide treatments during periods of low human use, where feasible.
	• Address wilderness and special areas in management plans.
	• Maintain adequate buffers for Wild and Scenic Rivers (¼ mile on either side of river, ½ mile in Alaska).
Recreation See Handbook H-1601-1 (Land Use Planning Handbook, Appendix C)	
	• Schedule treatments to avoid peak recreational use times, while taking into account the optimum management period for the targeted species.
	• Notify the public of treatment methods, hazards, times, and nearby alternative recreation areas.
	• Adhere to entry restrictions identified on the herbicide product label for public and worker access.
	• Post signs noting exclusion areas and the duration of exclusion, if necessary.
Social and Economic Values	
	• Consider surrounding land use before selecting aerial spraying as a method, and avoid aerial spraying near agricultural or densely-populated areas.
	• Post treated areas and specify reentry or rest times, if appropriate.
	• Notify grazing permittees of livestock feeding restrictions in treated areas, if necessary, as per herbicide product label instructions.

	• Notify the public of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.
	• Control public access until potential treatment hazards no longer exist, per herbicide product label instructions.
	• Observe restricted entry intervals specified by the herbicide product label.
	• Notify local emergency personnel of proposed treatments.
	• Use spot applications or low-boom broadcast applications where possible to limit the probability of contaminating non-target food and water sources, especially vegetation over areas larger than the treatment area.
	• Consult with Native American Tribes and Alaska Native groups to locate any areas of vegetation that are of significance to the Tribes and Native groups and that might be affected by herbicide treatments.
	• To the degree possible within the law, hire local
Rights-of-way	
	• Coordinate vegetation management activities where joint or multiple use of a ROW exists.
	• Notify other public land users within or adjacent to the
	ROW proposed for treatment.
Human Health and Safety	
	• Establish a buffer between treatment areas and human residences based on guidance given in the HHRA, with a minimum buffer of ¼ mile for aerial applications and 100 feet for ground applications, unless a written waiver is granted.
	• Use protective equipment as directed by the herbicide product label.
	• Post treated areas with appropriate signs at common public access areas.
	• Observe restricted entry intervals specified by the herbicide product label.
	• Provide public notification in newspapers or other media where the potential exists for public exposure.
	• Have a copy of MSDSs at work site.
	• Notify local emergency personnel of proposed treatments.
	• Contain and clean up spills and request help as needed.
	• Secure containers during transport.
	• Follow label directions for use and storage.
	• Dispose of unwanted herbicides promptly and correctly.

Appendix G

Mechanical Treatment

Brush mowing can be accomplished with a large deck mower pulled behind a tractor or larger implement. The device is a rotary mower designed to mow large shrubs. Mowers can mow swaths from six to twenty feet wide and can leave stubble heights from six inches to approximately one foot. Mowing can produce significant levels of debris from the process that can reduce potential erosion and provide vegetation cover and debris to catch snow.

Another brush reduction technique utilizes the Lawson aerator (left). The Lawson aerator uses a single or multiple drum system fitted with numerous blades that will break or crush sagebrush and will aerate the soil, ideally increasing infiltration and soil moisture levels. The drum(s) are pulled behind a tractor. This method will leave a similar amount of stubble as mowing but without the shredding action. Instead, the sagebrush shows more of a crushed and chopped appearance. This method can be combined with seeding.

The Dixie harrow (right) is a set of steel pipes, each of which have several sets of protruding steel fins, that are pulled behind a tractor. This technique breaks or mangles sagebrush stems, generally tearing much of the plant from the base of the stem, and creates some soil disturbance that can reduce the cover of matting forbs. Whole, or nearly whole shrubs are left on the soil surface to capture snow and sediment in places, but in other locations the soil surface can be left exposed. This method can be combined with seeding.

Herbicide

Tebuthiuron (Spike®) 20P is a nonselective broad-spectrum herbicide with a long history of successful use on rangelands. This herbicide is soil active and has been used to control broadleaves and woody plants. It can be spot applied, broadcast applied aerially or by boom sprayer, and is often used to treat stumps of sprouting trees or shrubs. Rates proposed in this document range from 1.0 to 2.5 pounds per acre for a 50 percent mortality rate. Tebuthiuron (Spike®) has high soil persistence, high probability of groundwater leaching at high application rates, and low potential for surface runoff (BLM 2007). Chemical techniques do not increase erosion potential as much as some mechanical treatments, as they leave the plant intact and standing. However, standing shrub skeletons can be problematic for follow-up treatments such as seeding, and animal movement.

Glyphosate (Roundup®) is a nonselective broad-spectrum herbicide effective at controlling broadleaves, grasses and shrubs. It can be spot applied, or applied aerially or by boom sprayer. The chemical binds to soil where it generally becomes immobile and degrades quickly due to its short half-life of less than half of a year, dependent on soil conditions (Andrea et al. 2003). As with other herbicides, Glyphosate (Roundup®) will leave shrub skeletons intact.

Prescribed Fire

Prescribed fire, or a controlled burn, refers to the application of fire by a team of experts under specific weather conditions. Prescribed fires can reduce excessive amounts of litter (brush, shrubs and trees on the ground), promote growth of fire-adapted species, and help reduce the risk of catastrophic fire.

Appendix H – Ecological Sites

Below are tables describing Ecological Sites for all allotments within the APP.

Table 29: West Aspen Ridge Individual Allotment Ecological Sites (Aspen Ridge Focus Area)

Ecological Site	BLM Acres	Percent of Allotment
Loamy 15-19” Foothills and Mountains West R043BY222WY	1344	38
Coarse Upland 15-19” Foothills and Mountains West R043BY208WY	673	19
Shallow Clayey 10-14” Foothills and Basins West R034AY258WY	573	16
Gravelly 15-19” Foothills and Mountains West R043BY212WY	165	5
Dense Clay 15-19” Foothills and Mountains West R043BY210WY	12	.33
Shallow Loamy 15-19”Foothills and Mountains West R043BY262WY	4	.11
Clayey 15-19” Foothills and Mountains West R043BY204WY	122	3
Sandy 10-14” Foothills and Basins West R034AY250WY	87	2
Minor Components	547	15
Total	**3531**	**98**

Table 30: Brodie Draw Individual Allotment Ecological Sites (Aspen Ridge Focus Area)

Ecological Site	BLM Acres	Percent of Allotment
Loamy 10-14” Foothills and Basins West R034AY222WY	852	37
Gravelly 10-14” Foothills and Basins West R034AY212WY	19	1
Clayey 10-14” Foothills and Basins West R034AY204WY	3	0.1
Shallow Clayey 10-14” Foothills and Basins West R034AY258WY	69	21
Coarse Upland 10-14” Foothills and Basins West R034AY208WY	422	19
Minor Components	513	22
Total:	**2278**	**100**

Table 31: East Aspen Ridge Individual Ecological Sites (Aspen Ridge Focus Area)

Ecological Site	BLM Acres	Percent of Allotment
Loamy 10-14” Foothills and Basins West R034AY222WY	1695	40
Shallow Clayey 10-14” Foothills and Basins West R034AY258WY	743	18

Ecological Site	BLM Acres	Percent of Allotment
Coarse Upland 10-14” Foothills and Basins West R034AY208WY	520	12
Wetland 10-14” Foothills and Basins West R034AY278WY	147	3
Gravelly 10-14” Foothills and Basins West R034AY212WY	42	1
Saline Lowland 10-14” Foothills and Basins West R034AY238WY	4	.09
Saline Lowland drained 10-14” Foothills and Basins West R034AY240WY	4	.09
Minor Components	1077	25
Total:	**4232**	**99**

Table 32: Jewett Ryegrass Individual Allotment Ecological Sites (Ryegrass Focus Area)

Ecological Site	BLM Acres	Percent of Allotment
Loamy 10-14” Foothills and Basins West R034AY222WY	1675	43
Clayey 10-14” Foothills and Basins West R034AY204WY	2	1
Gravelly 10-14” Foothills and Basins West R034AY212WY	132	3
Shallow Clayey 10-14” Foothills and Basins West R034AY258WY	335	9
Sandy 10-14” Foothills and Basins West R034AY250WY	460	12
Coarse Upland 10-14” Foothills and Basins West R034AY208WY	314	8
Shallow Loamy 10-14” Foothills and Basins West R034AY262WY	77	2
Very Shallow 10-14” Foothills and Basins West R034AY276WY	12	.3
Saline Lowland drained 10-14” Foothills and Basins West R034AY240WY	19	.4
Saline Lowland 10-14” Foothills and Basins West R034AY238WY	16	.4
Minor Components	787	20
Total:	**3879**	**99**

Table 33: Round Valley Ryegrass Individual Allotment Ecological Sites (Ryegrass Focus Area)

Ecological Site	BLM Acres	Percent of Allotment
Loamy 10-14” Foothills and Basins West R034AY222WY	4120	41
Gravelly 10-14” Foothills and Basins West R034AY212WY	290	3

Ecological Site	BLM Acres	Percent of Allotment
Saline Lowland 10-14” Foothills and Basins West R034AY238WY	336	3
Saline Lowland drained 10-14” Foothills and Basins West R034AY240WY	393	4
Shallow Loamy 10-14” Foothills and Basins West R034AY262WY	87	1
Very Shallow 10-14” Foothills and Basins West R034AY276WY	12	0.1
Clayey 10-14” Foothills and Basins West R034AY204WY	376	4
Shallow Clayey 10-14” Foothills and Basins West R034AY258WY	1077	10
Sandy 10-14” Foothills and Basins West R034AY250WY	70	1
Saline Upland 10-14” Foothills and Basins West R034AY244WY	274	3
Coarse Upland 10-14” Foothills and Basins West R034AY208WY	129	1
Saline Subirrigated 10-14” Foothills and Basins West R034AY242WY	2	.02
Minor Components	2934	29
Total	**10100**	**100**

Table 34: Horse Creek – Ryegrass Allotment Ecological Sites (Ryegrass Focus Area)

Ecological Site	BLM Acres	Percent of Allotment
Loamy 10-14” Foothills and Basins West R034AY222WY	1917	53
Gravelly 10-14” Foothills and Basins West R034AY212WY	202	5
Saline Lowland 10-14” Foothills and Basins West R034AY238WY	58	2
Saline Lowland drained 10-14” Foothills and Basins West R034AY240WY	68	2
Shallow Loamy 10-14” Foothills and Basins West R034AY262WY	21	1
Very Shallow 10-14” Foothills and Basins West R034AY276WY	22	1
Clayey 10-14” Foothills and Basins West R034AY204WY	381	10
Shallow Clayey 10-14” Foothills and Basins West R034AY258WY	154	4

Ecological Site	BLM Acres	Percent of Allotment
Sandy 10-14” Foothills and Basins West R034AY250WY	2	.05
Minor Components	811	22
Total	**3636**	**100**

Table 35: Lower Horse Creek Allotment Ecological Sites (Ryegrass Focus Area)

Ecological Site	BLM Acres	Percent of Allotment
Loamy 10-14” Foothills and Basins West R034AY222WY	872	47
Gravelly 10-14” Foothills and Basins West R034AY212WY	149	8
Very Shallow 10-14” Foothills and Basins West R034AY276WY	62	3
Shallow Clayey 10-14” Foothills and Basins West R034AY258WY	9	0.5
Clayey 10-14” Foothills and Basins West R034AY204WY	137	7
Shallow Loamy 10-14” Foothills and Basins West R034AY262WY	91	5
Sandy 10-14” Foothills and Basins West R034AY250WY	30	2
Saline Lowland 10-14” Foothills and Basins West R034AY238WY	.06	-
Saline Lowland drained 10-14” Foothills and Basins West R034AY240WY	.07	-
Minor Components	517	28
Total	**1871**	**100**

Table 36: Q5 Soaphole Allotment Ecological Sites (Soaphole Focus Area)

Ecological Site	BLM Acres	Percent of Allotment
Loamy 10-14” Foothills and Basins West R034AY222WY	1556	60
Shallow Loamy 10-14” Foothills and Basins West R034AY262WY	162	6
Clayey 10-14” Foothills and Basins West R034AY204WY	171	7
Gravelly 10-14” Foothills and Basins West R034AY212WY	135	5
Very Shallow 10-14” Foothills and Basins West R034AY276WY	27	1
Subirrigated 10-14” Foothills and Mountains West R034AY274WY	.04	-
Wetland 10-14” Foothills and Mountains West R034AY278WY	.03	-

Ecological Site	BLM Acres	Percent of Allotment
Minor	554	21
Total	**2605**	**100**

Table 37: Grindstone Soaphole Allotment Ecological Sites (Soaphole Focus Area)

Ecological Site	BLM Acres	Percent of Allotment
Loamy 10-14” Foothills and Basins West R034AY222WY	1902	45
Shallow Loamy 10-14” Foothills and Basins West R034AY262WY	72	2
Clayey 10-14” Foothills and Basins West R034AY204WY	541	13
Gravelly 10-14” Foothills and Basins West R034AY212WY	536	13
Very Shallow 10-14” Foothills and Basins West R034AY276WY	74	2
Saline Upland 10-14” Foothills and Basins West R034AY244WY	1	-
Saline Subirrigated 10-14” Foothills and Basins West R034AY242WY	54	1
Saline Lowland drained 10-14” Foothills and Basins West R034AY240WY	32	1
Minor Component	970	23
Total	**4182**	**100**

Table 38: Mount Airy Common Allotment Ecological Sites (Mesa Focus Area)

Ecological Site	BLM Acres	Percent of Allotment
Loamy 10-14” Foothills and Basins West R034AY222WY	4674	48
Shallow Loamy 10-14” Foothills and Basins West R034AY212WY	445	5
Clayey 10-14” Foothills and Basins West R034AY204WY	199	2
Lowland 10-14” Foothills and Basins West R034AY228WY	1	0.01
Gravelly (Gr) 7-9" Green River and Great Divide Basins R034AY112WY	945	10
Very Shallow (VS) 7-9" Green River and Great Divide Basins R034AY176WY	472	5
Saline Upland (SU) 7-9" Green River and Great Divide Basins R034AY144WY	224	2
Loamy (Ly) 7-9" Green River and Great Divide Basins R034AY122WY	210	2

Ecological Site	BLM Acres	Percent of Allotment
Clayey (Cy) 7-9" Green River and Great Divide Basins R034AY104WY	199	2
Shallow Loamy (SwLy) 7-9" Green River and Great Divide Basins R034AY162WY	61	1
Subirrigated (Sb) 15-19" P.Z., Foothills and Mountains West R043BY274WY	3	.03
Wetland (WL) 15-19” P.Z., Foothills and Mountains West R043BY278WY	1	.01
Badlands	524	5
Minor Components	1774	18
Total	**9732**	**100**

Appendix I

Seasonal wildlife stipulations for all surface disturbing activities. From the Pinedale RMP as amended by the ARMPA (BLM 2008b, BLM 2015).

Affected Areas	Restriction	Restricted Area
Big Game Crucial	November 15–April 30 Winter Ranges	Pronghorn, elk, moose, and mule deer crucial winter ranges
Parturition Areas	May 1–June 30	Designated parturition areas
Elk Feedgrounds	November 15–April 30	Within elk feedgrounds NSO within 1 mile of elk feedgrounds
Mountain Plover Nest	April 10–July 10	Determine on case-by-case basis (in the oil and gas Traditional Leasing and Unavailable Areas)
Bald Eagle Nest	February 1–August 15	Within 1-mile radius
Bald Eagle Winter Roost	November 1–April 1	Within 1-mile radius
Golden Eagle Nest	February 1–July 31	Within ½-mile radius
Osprey Nest	February 1–July 31	Within ½-mile radius
Swainson's Hawk Nest	February 1–July 31	Within ½-mile radius
Ferruginous Hawk Nest	March 1–July 31	Within 1-mile radius
Goshawk Nest	February 1–July 31	Within ½-mile radius
Prairie Falcon Nest	February 1–July 31	Within ½-mile radius
Rough-Legged Hawk Nest	February 1–July 31	Within ½-mile radius
American Kestral Nest	February 1–July 31	Within ½-mile radius
Northern Harrier Nest	February 1–July 31	Within ½-mile radius
Great Horned Owl Nest	February 1–July 31	Within ½-mile radius
Red-Tailed Hawk Nest	February 1–July 31	Within ½-mile radius
Short-Eared Owl Nest	February 1–July 31	Within ½-mile radius
Burrowing Owl Nest	April 1–August 15	Within ½-mile radius
Other Raptor Nests	February 1–July 31	Within ½-mile radius
CRCT Habitat	June 1—August 15	Within the stream
Greater Sage-Grouse Leks **Inside PHMAs**	Surface occupancy and surface disturbing activities will be prohibited	Within 0.6 miles of occupied lek perimeter
Greater Sage-Grouse Leks **Outside PHMAs**	Surface occupancy and surface disturbing activities will be prohibited	Within 0.25 miles of occupied lek perimeter
Greater Sage-Grouse Breeding, Nesting, and Early Brood-Rearing Habitat **Inside PHMAs**	Surface Disturbing and/or disruptive activities will be prohibited from March 15 - June 30	Throughout the PHMA

Affected Areas	Restriction	Restricted Area
Greater Sage-Grouse Breeding, Nesting, and Early Brood-Rearing Habitat **Outside PHMAs**	Surface Disturbing and/or disruptive activities will be prohibited from March 15 - June 30	Within in 2-miles of occupied lek perimeter
Greater Sage-Grouse Winter Concentration Areas	Surface Disturbing and/or disruptive activities will be prohibited from December 1 - March 14	Throughout identified winter concentration areas

Appendix J

Paleontology Appendix: Concerning Potential Fossil Yield Classification

Potential Fossil Yield Classification (PFYC) System
Occurrences of paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used for assessing the potential for the occurrence of paleontological resources. The Bureau of Land Management, Pinedale Field Office is considered to hold significant fossils at the level of Class 5.

Using the Potential Fossil Yield Classification (PFYC) system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher potential. This classification is applied to the geologic formation, member, or other distinguishable unit, preferably at the most detailed mappable level. It is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class; instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment.

The PFYC system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources. The classification should be considered at an intermediate point in the analysis, and should be used to assist in determining the need for further mitigation assessment or actions.

The descriptions for the classes below are written to serve as guidelines rather than as strict definitions. Knowledge of the geology and the paleontological potential for individual units or preservational conditions should be considered when determining the appropriate class assignment. Assignments are best made by collaboration between land managers and knowledgeable, permitted researchers.

Class 1 – Very Low Geologic units that are not likely to contain recognizable fossil remains.

• Units that are igneous or metamorphic, excluding reworked volcanic ash units.

• Units that are Precambrian in age or older.

(1) Management concern for paleontological resources in Class 1 units is usually negligible or not applicable.

(2) Assessment or mitigation is usually unnecessary except in very rare or isolated circumstances.

The probability for impacting any fossils is negligible. Assessment or mitigation of paleontological resources is usually unnecessary. The occurrence of significant fossils is non-existent or extremely rare.

Class 2 – Low Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant non-vertebrate fossils

• Vertebrate or significant invertebrate or plant fossils not present or very rare.

• Units that are generally younger than 10,000 years before present.

• Recent aeolian deposits.

• Sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration).

(1) Management concern for paleontological resources is generally low.

(2) Assessment or mitigation is usually unnecessary except in rare or isolated circumstances.

The probability for impacting vertebrate fossils or scientifically significant invertebrate or plant fossils is low. Assessment or mitigation of paleontological resources is not likely to be necessary. Localities containing important resources may exist, but would be rare and would not influence the classification. These important localities would be managed on a case-by-case basis.

Class 3 – Moderate or Unknown Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential

• Often marine in origin with sporadic known occurrences of vertebrate fossils.

• Vertebrate fossils and scientifically significant invertebrate or plant fossils known to occur intermittently; predictability known to be low.

(or)

• Poorly studied and/or poorly documented. Potential yield cannot be assigned without ground reconnaissance.

Classes 3a – Moderate Potential Units are known to contain vertebrate fossils or scientifically significant non-vertebrate fossils, but these occurrences are widely scattered. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for hobby collecting. The potential for a project to be sited on or impact a significant fossil locality is low, but is somewhat higher for common fossils.

Class 3b – Unknown Potential Units exhibit geologic features and preservational conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or the area is known. This may indicate the unit or area is poorly studied, and field surveys may uncover significant finds. The units in this Class may eventually be placed in another Class when sufficient survey and research is performed. The unknown potential of the units in this Class should be carefully considered when developing any mitigation or management actions.

(1) Management concern for paleontological resources is moderate; or cannot be determined from existing data.

(2) Surface-disturbing activities may require field assessment to determine appropriate course of action.

This classification includes a broad range of paleontological potential. It includes geologic units of unknown potential, as well as units of moderate or infrequent occurrence of significant fossils. Management considerations cover a broad range of options as well, and could include pre-disturbance surveys, monitoring, or avoidance. Surface-disturbing activities will require sufficient assessment to

determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources. These units may contain areas that would be appropriate to designate as hobby collection areas due to the higher occurrence of common fossils and a lower concern about affecting significant paleontological resources.

Class 4 – High Geologic units containing a high occurrence of significant fossils, vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface disturbing activities may adversely affect paleontological resources in many cases.
Class 4a – Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two acres. Paleontological resources may be susceptible to adverse impacts from surface disturbing actions. Illegal collecting activities may impact some areas.

Class 4b – These are areas underlain by geologic units with high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.
• Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.
• Areas of exposed outcrop are smaller than two contiguous acres.
• Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
• Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

(1) Management concern for paleontological resources in Class 4 is moderate to high, depending on the proposed action.

(2) A field survey by a permitted paleontologist is often needed to assess local conditions.

(3) Management prescriptions for resource preservation and conservation through controlled access or special management designation should be considered.

(4) Class 4 and Class 5 units may be combined as Class 5 for broad applications, such as planning efforts or preliminary assessments, when geologic mapping at an appropriate scale is not available. Resource assessment, mitigation, and other management considerations are similar at this level of analysis, and impacts and alternatives can be addressed at a level appropriate to the application.
The probability for impacting significant paleontological resources is moderate to high, and is dependent on the proposed action. Mitigation considerations must include assessment of the disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access resulting in greater looting potential. If impacts to significant fossils can be anticipated, on-the-ground surveys prior to authorizing the surface disturbing action will usually be necessary. On-site monitoring or spot-checking may be necessary during construction activities.

Class 5 – Very High Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation.

Class 5a – Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two contiguous acres. Paleontological resources are highly susceptible to adverse impacts from surface disturbing actions. Unit is frequently the focus of illegal collecting activities.

Class 5b – These are areas underlain by geologic units with very high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has very high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.
- Areas of exposed outcrop are smaller than two contiguous acres.
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
- Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

(1) Management concern for paleontological resources in Class 5 areas is very high.

(2) A field survey by a permitted paleontologist is usually necessary prior to surface disturbing activities or land tenure adjustments. Mitigation will often be necessary before and/or during these actions.

(3) Official designation of areas of avoidance, special interest, and concern may be appropriate.
The probability for impacting significant fossils is high. Vertebrate fossils or scientifically significant invertebrate fossils are known or can reasonably be expected to occur in the impacted area. On-the-ground surveys prior to authorizing any surface disturbing activities will usually be necessary. On-site monitoring may be necessary during construction activities.

Standard Paleontology Locality Form

Attachment 1
Locality form

H-8270-1 - GENERAL PROCEDURAL GUIDANCE
FOR PALEONTOLOGICAL RESOURCE MANAGEMENT
BLM MANUAL Rel. 8-69, Appendix 4, Page 1 07/13/98
Form 8270-3 (Temporary) (May 1994) United States
Department of the Interior, Bureau of Land Management
Paleontological Locality Form
1. Permit #/Permittee:

2. Repository/Acct #:

3. Locality #:

Plant Vertebrate Invertebrate Other

4. Formation (and subdivision, if known): _____

5. Age: _____

6. Country: _____

7. BLM District: _____

8. Resource Area: _____

9. Map name: _____

10. Map source: _____

11. Map size: _____

12. Map edition: _____

13. Latitude (deg., min., sec.,
direction):_____

14. Longitude (deg., min., sec.,
direction):_____
or: (Preferred): UTM Grid Zone _____ m E
_____ m N

15. Survey (Sec., T & R):
_____

16. Taxa Collected/observed:
_____
_____

17. Collector: _____

18. Date: _____

19. Remarks:
_____
_____
_____
_____
_____
_____
_____
_____

Appendix K – Threatened & Endangered and Special Status Species Table

Threatened, Endangered, and Special Status wildlife species that may be found in the Pinedale Field Office

Common Name	Special Status	General Habitat	Presence in Sublette Mule Deer Mitigation Plan Project Area
MAMMALS			
Black-Footed Ferret	Federally Listed Endangered Species - BLM Sensitive	Closely associated with prairie dog towns of 12.5 acres or larger (burrows used for denning and shelter) and rely almost entirely on these rodents as prey.	**NOT PRESENT** – Large (>200acres) prairie dog towns have not been documented within the project area. All areas have been blocked cleared from survey by USFWS.
Canada Lynx	Federally Listed Endangered Species - BLM Sensitive	High-elevation forested areas that support ample populations of snowshoe hares and other preferred prey species.	**NOT PRESENT** – There is no suitable habitat within or adjacent to the project area..
Grizzly Bear	Federally Listed Endangered Species - BLM Sensitive	Montane forests	**NOT PRESENT** - Grizzly Bears are known to occur in the Upper Green River Basin, primarily on USDA Forest Service lands but occasionally have roamed onto BLM administered lands in the past. There is no suitable habitat within the project area.
Long-Eared Myotis	BLM Sensitive	Frequently found roosting under the bark or within cavities of ponderosa pine trees during the daytime, although it can also be found at much higher and lower elevations in deciduous forests and in caves.	**NOT PRESENT** - The long-eared myotis has been reported throughout the PFO (Orabona et.al. 2012). There is no suitable roosting habitat within the project area..
Idaho Pocket Gopher	BLM Sensitive	Can be found in subalpine mountain meadows, shrub steppes, and various grasslands, but appears to favor rocky, shallow soils.	**NOT PRESENT** – In 1911 multiple specimens were collected approximately 4 miles west of the project area. To date no recent observations have been documented within the project area (WYNDD 2014)
BIRDS			
Western Yellow-Billed Cuckoo	Federally Listed Threatened - BLM Sensitive	Large tracts of deciduous riparian woodlands with dense, scrubby undergrowth. Cuckoos frequently use willow thickets for nesting and they forage among large cottonwoods (Bennett & Keinath, 2001).	**NOT PRESENT** – Given the lack of suitable habitat It is unlikely that the Western Yellow Billed Cuckoo exists within the project area. The surrounding area along Horse Creek, Cottonwood Creek, and Green river does support suitable habitat but there are no recorded observations.
Northern Goshawk	BLM Sensitive	Conifer and deciduous forests	**NOT PRESENT -** The nearest goshawk observations have been made in the Wyoming Range west of the project area. With limited habitat potential it is unlikely goshawks utilize the project area.
Trumpeter Swan	BLM Sensitive	Lakes, ponds, marshes and other wetlands areas	**UNLIKELY** - The only suitable habitat within the project area is along the Green River riparian corridor. Projects outlined in the Proposed Action are not located within suitable habitat. There would be no impacts to existing habitats or populations.
White-faced Ibis	BLM Sensitive	Marshes and wet meadows	**NOT PRESENT** - Confirmed as nesting in the PFO (Orabona et.al. 2012) but no documentation of the species in the project area. These birds could stop over at local stock reservoirs but would likely prefer nesting outside of the project area within the adjacent Green River and New Fork River riparian areas.

BIRDS			
American Peregrine Falcon	BLM Sensitive	Peregrine falcons nest on high cliffs, trees, high riverbanks, towers, and tall buildings.	**NOT PRESENT** - This species is considered uncommon in the PFO, but some nesting has occurred (Orabona et.al. 2012). There is no suitable habitat within the project area.
Long-Billed Curlew	BLM Sensitive	Long-billed curlews usually nest in prairie and grassy meadows near water but occasionally choose dry upland sites.	**UNLIKELY** - Nesting and breeding has been documented in the PFO (WYNDD 2014). There is no suitable habitat within the proposed treatment areas however the species may occur along the agricultural lands associated with the nearby Horse Creek riparian corridor.
Special Status Fish Species			
Colorado River Cutthroat Trout	BLM Sensitive	Colorado River Drainage, clear mountain streams	**NOT PRESENT** - The project area is dominated by upland sagebrush with no suitable Colorado cutthroat stream habitat present. Therefore no current or historical habitat occurs within the area. The nearest potential habitat occurs within the adjacent Horse Creek, Cottonwood Creek, and Green River riparian corridors.
Yellowstone Cutthroat Trout	BLM Sensitive	Yellowstone drainage, small mountain streams and large rivers.	**NOT PRESENT** - No habitat within the project area.
Bluehead Sucker	BLM Sensitive	Bear, Snake, and Green river drainages, all waters	**NOT PRESENT** - No habitat within the project area.
Flannelmouth Sucker	BLM Sensitive	CO river drainage, large rivers, streams and lakes	**NOT PRESENT** - No habitat within the project area.
Roundtail Chub	BLM Sensitive	CO river drainage, mostly large rivers also streams and lakes	**NOT PRESENT** - No habitat within the project area.
Northern Leatherside Chub	BLM Sensitive	Bear, Snake and Green River drainages, clear cool streams and pools	**NOT PRESENT** - No habitat within the project area.