BLM

Environmental Assessment

for

Mesa Mule Deer Winter Habitat Improvement Project

Prepared by

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Pinedale Field Office

Pinedale, Wyoming

WY-100-EA10-303

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WY-100-EA10-303

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1.0 INTRODUCTION

The Mesa Mule Deer Winter Habitat Improvement Project, WY-100_EA10-303, is a wildlife habitat improvement project. The project area is located in Sublette County approximately 5.5 miles south-southwest of Pinedale, WY. The legal location of the project is T33 R109 S 30 and 31 and R110 S 25 and 36. This Environmental Assessment (EA) was prepared by the Bureau of Land Management (BLM) Pinedale Field Office (PFO), Pinedale Wyoming.

1.1 Background

The September, 2008 Record of Decision (ROD) for the Pinedale Anticline Oil and Gas Exploration and Development Project sets the stage for an increased development scenario on an area of approximately 198,037 acres. The drilling of 4399 wells from 600 well pads has been identified as a potential in the ROD; at a minimum it provides for an increase in development over what has occurred to date. A portion of this area known as the Mesa has been well documented relative to its importance for wintering mule deer from the Sublette Mule Deer Herd. The area known as the Mesa sits on the northern end of the anticline, and has been documented to winter from 3000-5000 mule deer. Recent studies have identified both direct and indirect losses of mule deer winter habitat, including 1520 acres of direct habitat loss, from the construction of well pads and access roads. Indirect losses appear to be even greater and are attributable to the associated winter disturbance from drilling and other development activities. In the 2007 study, data collected from the Mesa indicated that mule deer numbers declined during the first 4 years (2001-2004) of gas development and increased the following 3 years (2005-2007) for an overall decline of 30%. Because of these associated declines and an even greater level of future development, there is a need to determine if on-site mitigation might be a potential for helping to alleviate the habitat losses. This project is designed to enhance available winter forage by increasing production, palatability and preference and potentially pave the way for future treatments on a larger scale.

1.2 Purpose and Need for the Proposed Action

The purpose of this project is to improve wintering mule deer habitat through vegetation treatment while maintaining Greater sage-grouse habitat.

Existing conditions in the analysis area present opportunities for improvements. The following need for the proposed action was identified:

- Natural gas development on the Mesa has led to direct and indirect habitat losses on and adjacent to development sites and there is a need to offset these impacts through improvements to off-site areas.

The objectives of the project are to improve sagebrush productivity for wintering mule deer while maintaining canopy cover for sage-grouse nesting benefits.

Decision to be Made:

There are 2 decisions to be made:

First determine whether impacts of the action alternatives are significant. If the impacts are significant, a NOI (Notice of Intent) to prepare an Environmental Impact Statement (EIS) will be prepared. If the impacts are not significant, a Finding of No Significant Impact (FONSI) will be prepared. If a FONSI is prepared, the second decision is to determine in the Decision Record (DR) whether to authorize an alternative.

1.3 Relationship to Statutes, Regulations, Plans or Other Environmental Analyses

Name of Plan/s: Pinedale Resource Management Plan (RMP)
Date Approved: November 26, 2008
Regulations at 1610.5-3 require actions to be in conformance with the approved land use plan. The Proposed Action is in conformance with the Pinedale RMP. RMP decisions pertaining to this proposal include:

Pages 2-17 and 2-18 Livestock Grazing Management
Goal
Maintain and/or enhance livestock grazing opportunities and rangeland health.

Objectives
Maintain, restore, or enhance livestock grazing to meet the Wyoming Standards for Rangeland Health and achieve allotment objectives.

Actions
Livestock grazing in areas of crucial big game winter ranges will be managed to maintain or enhance vegetation condition and forage availability for wildlife, as appropriate.

Pages 2-34 Soils Management
Goal
Prevent or mitigate impacts on soil stability, productivity, and water infiltration to prevent accelerated erosion and chemical degradation of the soil resource, and provide for optimal plant growth.

Pages 2-37 and 2-38 Vegetation Management
Goal
Maintain and/or enhance native vegetation community health, composition, and diversity in conformance with Wyoming Standards for Rangeland Health.

Objectives
Manage permitted actions to control the spread of and/or eradicate noxious weed infestations.

Ensure Special Status Plant Species habitats are maintained at a level sufficient for long-term species sustainability.

Conduct vegetation treatments to maintain important vegetation types and meet vegetation management goals.

Actions
All vegetation treatments will be assessed for the potential to introduce invasive species before a treatment method is selected.

Special Status Plant Species surveys are required on potential habitats before any project or activity is approved.

Vegetation treatments will be designed to reduce erosion, protect Special Status Plant Species, enhance vegetation community and watershed health, increase forage production, and enhance wildlife habitats.

Treated areas will generally be rested from livestock grazing for a minimum of two full growing seasons after treatment unless the appropriate level of environmental analysis determines that shorter durations are adequate. Analysis could indicate a need for a longer rest period.

Vegetation treatments will be designed and implemented to prevent introduction and reduce the spread of invasive species.

<u>Page 2-45 to 2-52: Wildlife and Fish Habitat Management</u>
Goal
Maintain or enhance aquatic and wildlife habitat.

Maintain functioning big game habitats and migration corridors that allow free movement and use of habitats.

Sustain the sagebrush biome on a landscape scale to provide the amount, continuity, and quality of habitat necessary to maintain viable populations of sage-grouse and other sagebrush obligate species.

Objectives
Maintain sufficient undisturbed or minimally disturbed habitats to maintain persistent, well-distributed, self-sustaining, and productive populations of all native and desirable non-native fish (e.g., brook, brown, and rainbow trout) and wildlife species within the planning area.

Maintain and enhance big game habitats to support big game populations at Wyoming Game and Fish Department (WGFD) planning objective levels.

Maintain raptor habitats and territories within the planning area to ensure long-term species sustainability and widely distributed functioning habitats in accordance with the Migratory Bird Treaty Act (MBTA).

Maintain sufficient undisturbed or minimally disturbed greater sage-grouse source habitats to maintain persistent, well-distributed, self-sustaining, productive populations of sage-grouse within the planning area.

Maintain sufficient, undisturbed, or minimally disturbed sensitive species habitats to ensure persistent, well-distributed, self-sustaining, and productive populations of sensitive species within the planning area.

Actions in Unavailable Areas
No surface disturbing or disruptive activities are permitted in big game crucial winter ranges from November 15 to April 30.

Permitted activities potentially affecting the habitat of Special Status Species will be considered on a case-by-case basis.

Surveys for Special Status Species will be conducted on BLM-administered public lands and mineral estate before any federal project or federal activity is implemented.

Other Sensitive Species: If surveys conducted within areas not subject to timing limitations identify sensitive species' life-cycle activities, surface disturbing activities will be delayed until wildlife activity is completed.

Surface disturbing and disruptive activities will be avoided in suitable nesting and early brood-rearing habitat within 2 miles of occupied greater sage-grouse leks from March 15 to July 15.

Human activity will be avoided between 8:00 p.m. and 8:00 a.m. from March 1 to May 15 within one-quarter mile of the perimeter of occupied sage-grouse leks.

Surface disturbing activities are prohibited in suitable habitat within one-quarter mile of occupied leks.

All surface disturbing and disruptive activities are prohibited in greater sage-grouse winter concentration areas from November 15 through March 15.

Wyoming Executive Order (EO) 2008-2, and the Wyoming Stipulations for Development in Core Sage-grouse Population Areas, will be considered when permitting activities.

Prior to initiating surface disturbing activities within potential raptor habitat, surveys will be conducted for nesting, roosting, and foraging activity within a 1-mile radius of the proposed activity.

The following seasonal restrictions for activities near active raptor nest, roosting sites, and foraging areas will be imposed:

- February 1 through July 31, within one-half mile of all active raptor nests
- April 1 through August 15, within one-half mile of burrowing owl nesting habitat
- February 1 through July 31, within 1 mile of all active ferruginous hawk nests
- February 1 through August 15, within 1 mile of bald eagle nests.

<u>RMP ROD Appendix 18 Pages 18-16 to 18-26</u>
Activities and habitat alterations that may disturb bald eagles will be restricted within suitable habitats that occur within bald eagle buffer zones:
Zone 1 (within one-half mile February 1 to August 15) is intended to protect active and alternative nests. For active nests, minimal human activity levels are allowed during the period of first occupancy to 2 weeks after fledging.
Zone 2 (within one-half to 1 mile from the nest) is intended to protect bald eagle primary use areas and permits light human activity levels.
Zone 3 is designated to protect foraging/concentration areas year-round. Zone 3 would include one of two larger areas, depending on habitat types: a) 2.5 miles extending in all directions from the nest or b) one-half mile from the bank of all streams within 2.5 miles of the nest. Site-specific habitat types and foraging areas will be evaluated to determine which Zone 3 buffer applies. Zone delineation depends on habitat types. Exceptions may be made after consultation with United States Fish and Wildlife Service (USFWS).

Minimal human activity levels— Essentially no human activity with the following exceptions:
Existing patterns of ranching and agricultural activities.
Nesting surveys and banding by biologists experienced with eagles.
River traffic by boats that continue travel at the rate of the main current and at a frequency which results in no boat traffic for at least 30 percent of the daylight hours (fishing from boats with such movement rates and frequency is acceptable).

Light human activity levels— This level allows for day use and low impact activities, such as boating, fishing, and hiking but at low densities and frequencies. Excluded activities include extended use and activities such as heavy construction, timber harvest, seismic exploration,

blasting, concentrated use associated with recreation centers (e.g., picnic areas, boat landings), permanent housing, and helicopters or jets within one-half mile of the ground.

Moderate human activity levels— Low impact (light) activity levels are included, but intensity of such activities is not limited. A limited number of recreation centers designed to avoid eagle conflicts may be considered. Other activities, such as construction, seismic exploration, blasting, and timber harvest, should also be designed to specifically avoid disturbance. Designing projects or land uses to avoid eagle conflicts requires sufficient data to formulate a site-specific management plan.

Projects with the potential to disturb bald eagles should be implemented in the least amount of time and during periods least likely to affect the bald eagle.

BLM Instruction Memorandum (IM) No. WY-2010-012 for sage-grouse leks inside Core Areas.

For sage-grouse leks inside Core Areas:

- Surface disturbing activity or surface occupancy is prohibited or restricted on or within a 0.6 mile radius of the perimeter of occupied or undetermined sage-grouse leks.
- Disruptive activity is restricted on or within 0.6 mile radius of the perimeter of occupied or undetermined sage-grouse leks from 6pm to 8am from March 15 – May 15.

For sage-grouse nesting/early brood-rearing habitat inside Core Areas:

- Surface disturbing and/or disruptive activities are prohibited or restricted from March 15 – June 30. This restriction should be applied to suitable sage-grouse nesting and early brood-rearing habitat within Core Areas.

For sage-grouse leks inside Core Areas:

- Surface disturbing activity or surface occupancy is prohibited or restricted on or within a 0.6 mile radius of the perimeter of occupied or undetermined sage-grouse leks.
- Disruptive activity is restricted on or within 0.6 mile radius of the perimeter of occupied or undetermined sage-grouse leks from 6pm to 8am from March 15 – May 15.

For sage-grouse nesting/early brood-rearing habitat inside Core Areas:

- Surface disturbing and/or disruptive activities are prohibited or restricted from March 15 – June 30. This restriction should be applied to suitable sage-grouse nesting and early brood-rearing habitat within Core Areas.

For sage-grouse winter habitat/concentration areas:

- Surface disturbing and/or disruptive activities in mapped or modeled sage-grouse winter habitats/concentration areas that support Core Area populations, are prohibited or restricted from November 15 – March 14.

Other Authorities

This EA fulfills the National Environmental Policy Act (NEPA) of 1969 requirement for site-specific analysis. The Proposed Action is in accordance with 43 Code of Federal Regulations (CFR) 1610.5-3(a); 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; MBTA of 1918, as amended; and the Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing, August 12, 1997.

1.4 Scoping, Public Involvement and Issues

The BLM decision-making process is conducted in accordance with the requirements of the Council on Environmental Quality (CEQ) regulations implementing NEPA and the United States Department of Interior (USDI) and BLM policies and procedures implementing NEPA. NEPA and the associated regulatory and policy framework require federal agencies to involve the interested public in their decision-making.

On August 14, 2009, a scoping package was mailed to 41 individuals and organizations. The scoping package described the proposed action. Six (6) responses were received and analyzed (Appendix A). Three issues were identified through the scoping process: risk of fertilizer burn, forb response, and Greater sage-grouse.

This EA has been developed in consultation and coordination with the allotment's grazing permittees, state and local agency personnel, other affected parties, and interested members of the public-at-large.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Alternative 1 – No Action Alternative

The No Action Alternative is not to take the action.
This alternative makes no changes to the project area.

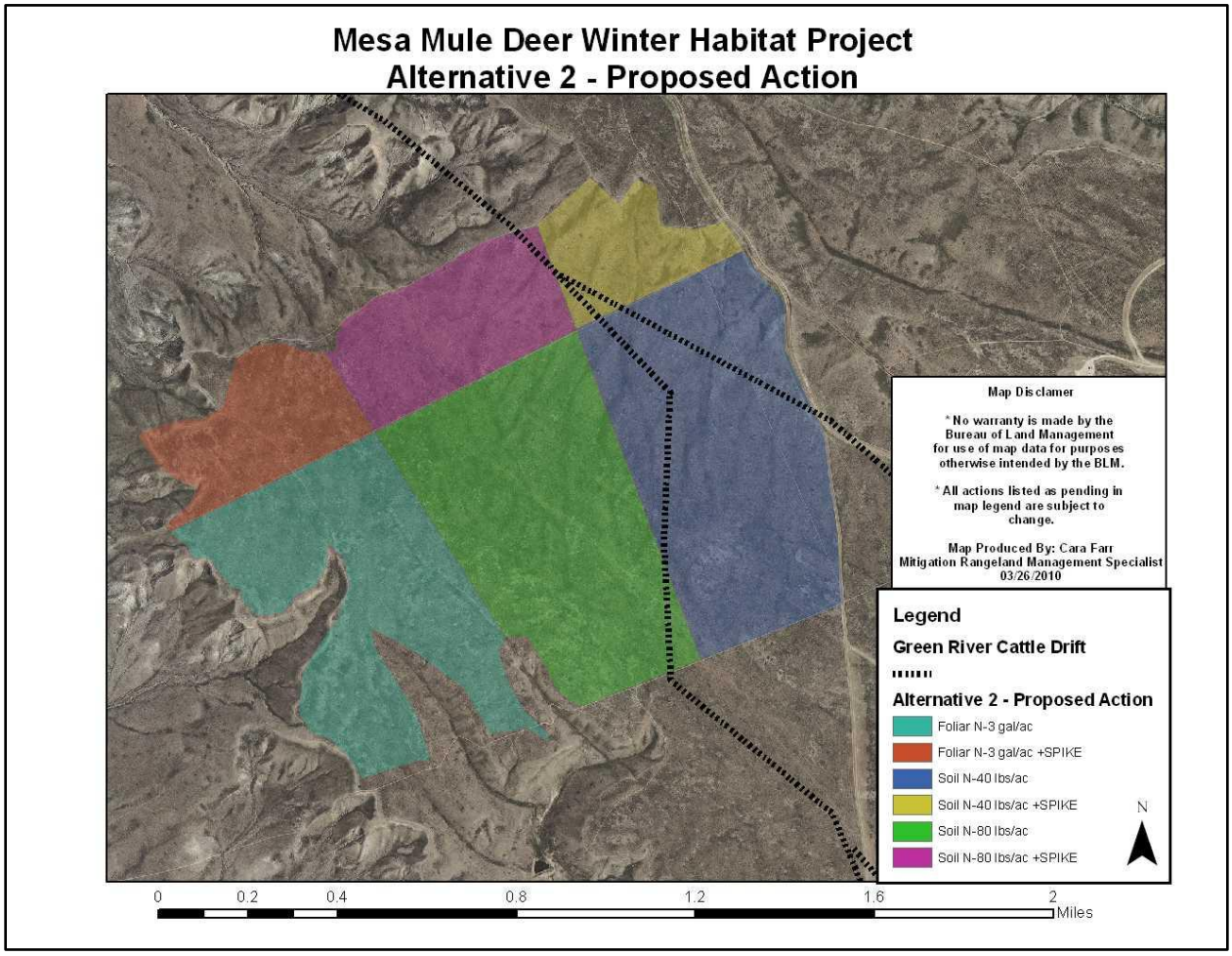
2.2 Alternative 2 – Proposed Action

The objective of the proposed action is to improve sagebrush productivity for wintering mule deer through the application of 2 rates of dry fertilizer (nitrogen) and a similar rate/application of a foliar fertilizer. In addition, a light application of Spike© is proposed to thin sagebrush across the 3 fertilizer applications, in order to determine if greater sagebrush production (per acre) will be achieved with fewer plants and compared to the 3 fertilizer treatments. The objective of the thinning treatment will be to thin sagebrush but maintain approximately 15% canopy cover to maintain sage-grouse nesting benefits. Current sagebrush canopy is estimated at 18-22%. No rest from grazing is proposed for this treatment. (Map 1)

Full implementation of proposed action of:

- Six treatments
    - Late Fall Soil N application at 40 lbs N/acre (213 ac)
    - Late Fall Soil N application at 80 lbs N/acre (204 ac)
    - Spring Foliar N application at 3 gal N/acre (171 ac)
    - Late Fall Soil N application at 40 lbs N/acre with Spike © (52 ac)
    - Late Fall Soil N application at 80 lbs N/acre with Spike © (88 ac)
    - Spring Foliar N application at 3 gal N/acre with Spike © (62 ac)
- Spike© rate is 0.2-0.5 lbs ai/ac
- Foliar N product is NDemand ©
- Soil N product is Urea (46-0-0) or Can 27 (27-0-0)
- Applications will be applied by helicopter
- Fall Applications will occur in late October/early November
- Spring Applications will occur in late May/early June
- Total treatment acreage of 790 acres

Map 1. Alternative 2 – Proposed Action

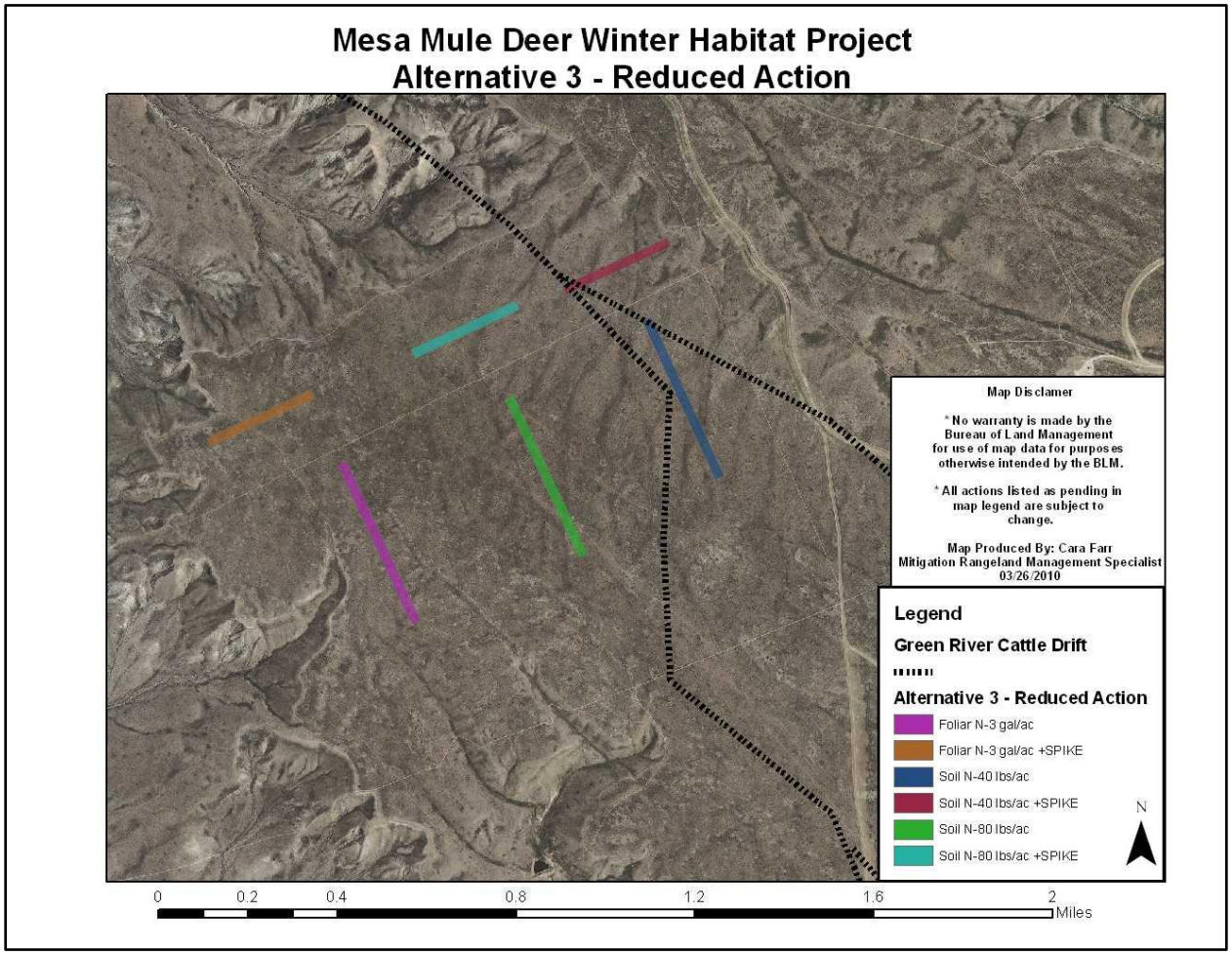


2.3 Alternative 3 – Reduced Action

Alternative 3 includes all six treatments at much smaller acreages than Alternative 2. The treatments are situated around monitoring transects that were established in 2009. The treatments are approximately 120 feet wide by 2075 feet long (fertilizer only) or 120 feet wide by 1375 feet long (fertilizer with Spike©). No rest from grazing is proposed for this treatment. (Map 2)

- All six treatments will be used at reduced sized situated around monitoring transects.
    - Late Fall Soil N application at 40 lbs N/acre (6 ac)
    - Late Fall Soil N application at 80 lbs N/acre (6 ac)
    - Spring Foliar N application at 3 gal N/acre (6 ac)
    - Late Fall Soil N application at 40 lbs N/acre with Spike © (4 ac)
    - Late Fall Soil N application at 80 lbs N/acre with Spike © (4 ac)
    - Spring Foliar N application at 3 gal N/acre with Spike © (4 ac)
- Spike© rate is 0.2-0.5 lbs ai/ac
- Foliar N product is NDemand ©
- Soil N product is Urea (46-0-0) or Can 27 (27-0-0)
- Applications will be applied by helicopter
- Fall Applications will occur in late October/early November
- Spring Applications will occur in late May/early June
- Total treatment acreage of 30 acres

Map 2. Alternative 3 – Reduced Action



2.4 Alternative 4 – Sage-grouse Action

Alternative 4 was formed due to concerns for Greater sage-grouse. The spring foliar application was eliminated due to nesting birds. All proposed treatment was removed from within a 0.6 mile buffer of a nearby active lek. No Spike© will be applied in this alternative. With the changes in treatments, this is the only alternative with a different treatment layout. The two treatments included in this alternative were shifted to the west and expanded to include their respective Spike© areas from the proposed action. No rest from grazing is proposed for this treatment. (Map 3)

- Only two of the six treatments will occur in this alternative
  - Late Fall Soil N application at 40 lbs N/acre (228 ac)
  - Late Fall Soil N application at 80 lbs N/acre (240 ac)
- No spring application
- No application within 0.6 mile lek buffer
- No spike treatment

- Soil N product is Urea (46-0-0) or Can 27 (27-0-0)
- Applications will be applied by helicopter
- Fall Applications will occur in late October/early November
- Total treatment acreage of 468 acres

Map 3. Alternative 4 – Sage-grouse Action

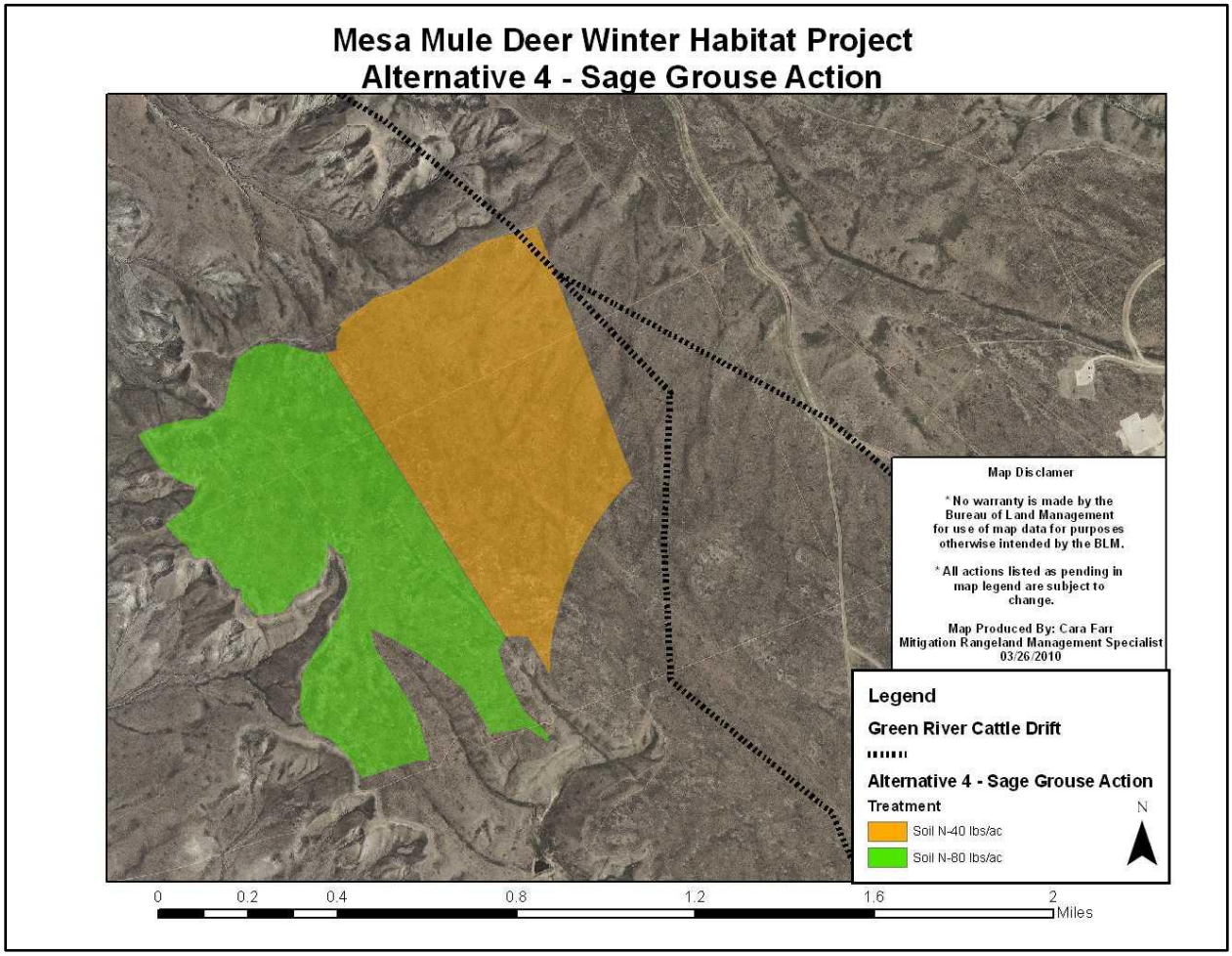


Table 1. Treatment Acreages associated with the Alternatives.

Treatment	Alternative 1 - No Action	Alternative 2 - Proposed Action	Alternative 3 - Reduced Action	Alternative 4 - Sage-grouse Action
Soil N- 40 lbs/ac	0	213	6	228
Soil N - 80 lbs/ac	0	204	6	240
Foliar N - 3 gal/ac	0	171	6	0
Soil N - 40 lbs/ac + Spike	0	52	4	0
Soil N - 80 lbs/ac + Spike	0	88	4	0
Foliar N - 3 gal/ac + Spike	0	62	4	0
Total Acres Treated	0	790	30	468

2.5 Project Design Features

Project design features are elements of the project design that are applied in the action alternatives (Alternatives 2, 3, and 4). These features were developed to reduce or avoid negative environmental effects of the proposed action on resources:

Wildlife Resources

Timing Stipulations for entire project

- No surface disturbing or disruptive activities are permitted in big game crucial winter ranges from November 15 to April 30.
- Prior to initiating surface disturbing activities within potential raptor habitat, surveys will be conducted for nesting, roosting, and foraging activity within a 1-mile radius of the proposed activity.
- If a raptor nest is found within 1-mile of the project area, project implementation will be restricted by timing stipulations for raptor nests as directed in the RMP:
    - The following seasonal restrictions for activities near active raptor nest, roosting sites, and foraging areas will be imposed:
        - February 1 through July 31, within one-half mile of all active raptor nests
        - April 1 through August 15, within one-half mile of burrowing owl nesting habitat
        - February 1 through July 31, within 1 mile of all active ferruginous hawk nests
        - February 1 through August 15, within 1 mile of bald eagle nests.
- Permitted activities potentially affecting the habitat of Special Status Species will be considered on a case-by-case basis.
- Surveys for Special Status Species will be conducted on BLM-administered public lands and mineral estate before any federal project or federal activity is approved.
- Other Sensitive Species: If surveys conducted within areas not subject to timing limitations identify sensitive species' life-cycle activities, surface disturbing activities will be delayed until wildlife activity is completed.

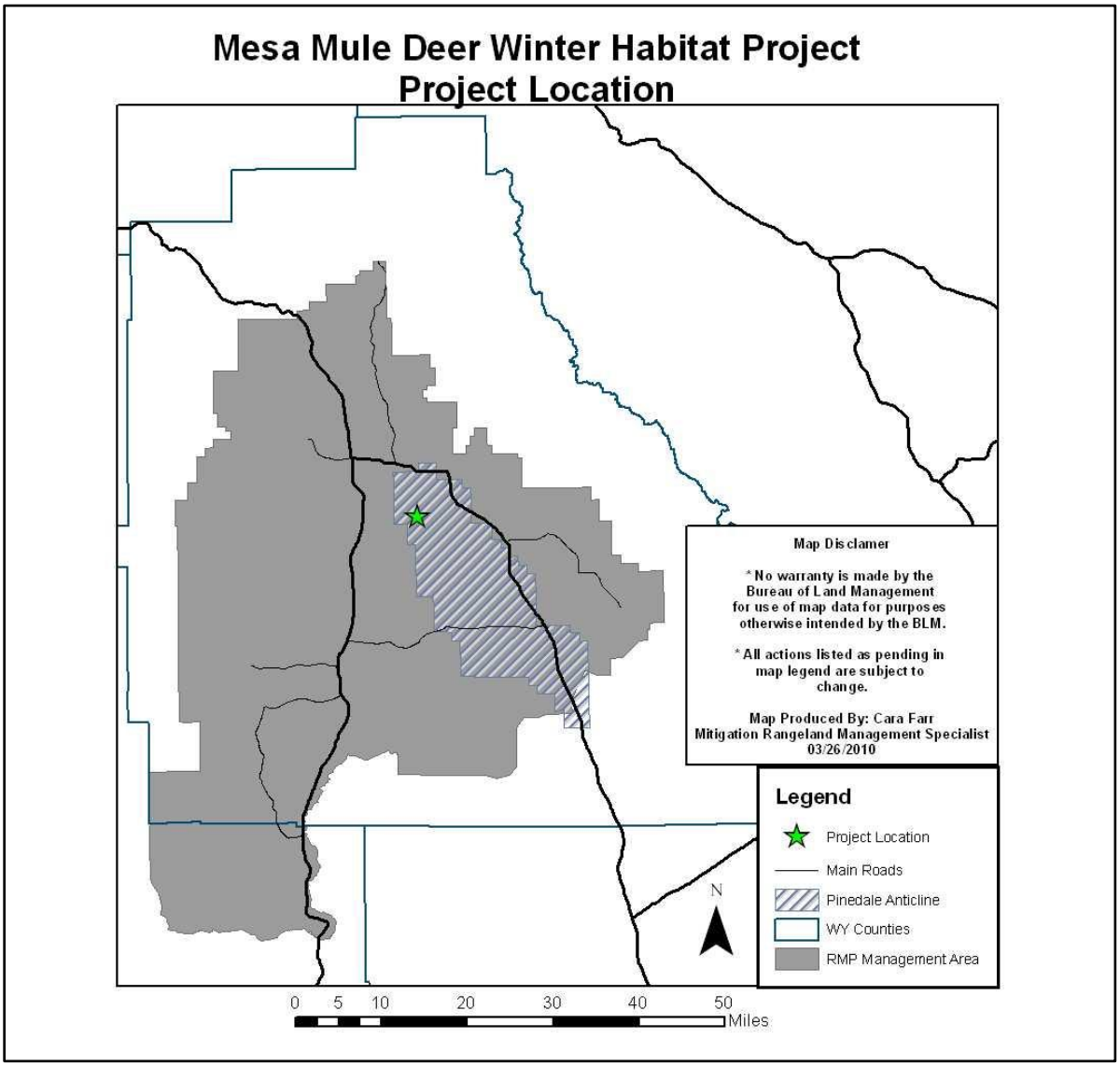
- Surface disturbing and disruptive activities will be avoided in suitable nesting and early brood-rearing habitat within 2 miles of occupied greater sage grouse leks from March 15 to July 15.
- Surface disturbing and disruptive activities will be avoided in suitable nesting and early brood-rearing habitat within 2 miles of occupied greater sage grouse leks from March 15 to July 15.
- Human activity will be avoided between 8:00 p.m. and 8:00 a.m. from March 1 to May 15 within one-quarter mile of the perimeter of occupied sage grouse leks.
- Surface disturbing activities are prohibited in suitable habitat within one-quarter mile of occupied leks.
- All surface disturbing and disruptive activities are prohibited in greater sage grouse winter concentration areas from November 15 through March 15.
- Wyoming Executive Order 2008-2, and the Wyoming Stipulations for Development in Core Sage grouse Population Areas, will be considered when permitting activities.
    - For sage-grouse leks inside Core Areas:
        - Surface disturbing activity or surface occupancy is prohibited or restricted on or within a 0.6 mile radius of the perimeter of occupied or undetermined sage-grouse leks.
        - Disruptive activity is restricted on or within 0.6 mile radius of the perimeter of occupied or undetermined sage-grouse leks from 6pm to 8am from March 15 – May 15.
    - For sage-grouse nesting/early brood-rearing habitat inside Core Areas:
        - Surface disturbing and/or disruptive activities are prohibited or restricted from March 15 – June 30. This restriction should be applied to suitable sage-grouse nesting and early brood-rearing habitat within Core Areas.
    - For sage-grouse winter habitat/concentration areas:
        - Surface disturbing and/or disruptive activities in mapped or modeled sage-grouse winter habitats/concentration areas that support Core Area populations, are prohibited or restricted from November 15 – March 14.

3.0 AFFECTED ENVIRONMENT

3.1 Introduction

The Mesa Mule Deer Winter Habitat Improvement Project lies within the Pinedale Anticline Project Area (PAPA) and the Pinedale RMP area. This analysis tiers to the PAPA Supplementary Environmental Impact Statement (SEIS) and the Pinedale RMP Final Environmental Impact Statement (FEIS). (Map 4)

Map 4. Project Location with the RMP Area and PAPA



The following are not present or will not be affected and will not be further analyzed:

Air Quality
Areas of Critical Environmental Concern (ACEC)
Environmental Justice
Prime or Unique Farmlands
Flood Plains
Hazardous or Solid Wastes
Mineral Resources
Paleontology
Recreation
Visual Resource Management
Water Quality and Prime or Sole Source of Drinking Water
Wetlands and Riparian Zones
Wild and Scenic Rivers
Wilderness Values

3.2 Wildlife

The Mesa Mule Deer Winter Habitat Improvement project is located in the Mesa area of Sublette County, Wyoming. The project area consists entirely of sagebrush steppe habitat. Elevation ranges of the project area range from approximately 7500 feet up to 7700 feet. The objective of the project is to improve sagebrush productivity for wintering mule deer through the application of fertilizer. In addition, a light application of Spike© is proposed to thin sagebrush in fertilized areas to determine if greater sagebrush production (per acre) will be achieved with less plants. The objective of the thinning treatment will be to thin sagebrush but to try to maintain approximately 15% canopy cover to maintain sage-grouse nesting benefits.

Wildlife habitats and their functions in the PAPA, including wintering, breeding, and nesting habitats, were described in detail in the PAPA SEIS and supporting documents. Impacts associated with development of the PAPA were addressed in the SEIS and this analysis tiers to the 2008 document. A portion of the project is located within the Potential Development Area (PDA) as identified and defined in the SEIS. The PDA is available for year-round development and requests for year-round development in this area require approval of the BLM Authorized Officer.

Impacts and a risk assessment associated with Tebuthiuron application were addressed in Vegetation Treatments using Herbicides FEIS in June 2007 by the BLM and findings from this analysis have been incorporated into this report.

<u>Big Game</u>

Pronghorn

Most of the PAPA coincides with habitats used by pronghorn primarily during spring, summer, and fall and during spring and fall migrations. Winter ranges within the PAPA are

occupied by pronghorn that migrate from distant summer ranges in Grand Teton National Park (GTNP) and Bridger-Teton National Forest (BTNF). Pronghorn may begin migrating to the PAPA as early as October in some years, or as late as December in others, taking approximately 1 month to complete the trip. Pronghorn returning to GTNP may begin moving in April or earlier, depending on snow conditions (SEIS).

Pronghorn from the Sublette Herd Unit use the project area during the spring, summer, and fall and migrate through the area on their way to and from crucial winter ranges located to the south of the project area.

Mule deer

The Mesa portion of the PAPA provides crucial winter range for approximately 3,000 – 5,000 migratory mule deer that populate portions of 4 different mountain ranges in northwest Wyoming. Mule deer from the Sublette Herd Unit summer in the mountainous terrains surrounding the Mesa and migrate to winter ranges on the Mesa and along the Wind River front, traveling up to 60 to 100 miles. A few mule deer appear to be yearlong residents of the Pinedale Mesa (Sawyer, 2007).

Winter ranges for mule deer are often the limiting factor (crucial) for migratory mule deer populations. Sagebrush is the primary forage species for wintering mule deer on the Mesa and maintaining healthy sagebrush communities is a key component for successful mule deer management. Recent studies have identified both direct and indirect losses of mule deer winter habitat on the Mesa, including 1520 acres of direct habitat loss from the construction of well pads and access roads. Direct habitat loss of sagebrush communities from oil and gas development may be reducing the overall carrying capacity of the mule deer winter range. These native sagebrush communities which provide key winter habitat for mule deer may take a decade or more to re-establish after being reclaimed. Indirect losses appear to be even greater and are attributable to the associated winter disturbance from drilling and other development activities. Indirect loss of habitat occurs when animals avoid areas around oil and gas infrastructure due to increased human activity (Sawyer, 2007).

The proposed project area provides crucial winter range for mule deer in the Sublette Herd Unit that winter in the area. Depending on snow conditions, mule deer arrive on winter ranges in late October during more severe winters and later in the year during mild winters. If winter conditions are mild, deer may move northwest, to the vicinity of Cora Butte. Migration back to summer ranges typically begins in late March or early April, depending on weather conditions (SEIS).

Moose

The riparian areas along the Green River to the west and the New Fork River to the east of the Mesa provide year long habitat for moose including crucial winter range. There are no WGFD designated ranges in the immediate project area for moose and this species will not be discussed further.

Elk
Spring, summer and fall range for elk is located to the west of the Mesa. There are no WGFD designated ranges in the immediate project area for elk and this species will not be discussed further.

Raptors
Many common raptor species are known to nest, migrate, and seasonally reside in the vicinity of the PAPA. These include golden eagle, red-tailed hawk, ferruginous hawk, great horned owl, bald eagle, Swainson's hawk, northern harrier, prairie falcon, American kestrel, merlin, osprey, and short-eared owl. Sharp-shinned hawk, Cooper's hawk, northern goshawk, burrowing owl, and long-eared owl may also be present in the PAPA during the summer. Birds that may winter in the PAPA include golden eagle, red-tailed hawk, rough-legged hawk, and great horned owl, as well as other less common species. These raptors and all other migratory birds are protected under the MBTA in which taking, killing, or possessing migratory birds is unlawful (SEIS).

Documented raptor nests in the area are primarily located along the riparian areas of the Green and New Fork River river corridors. Common raptors that have been documented in the area include ferruginous hawk, red-tailed hawk, bald eagle, golden eagle, Swainson's hawk, osprey, Cooper's hawk, sharp-shinned hawk, American kestrel, prairie falcon, short-eared owl and great-horned owl. According to BLM records, a historic red-tailed hawk nest (last active in 1999) and a historic ferruginous hawk nest (discovered in 2007 as remnants) are within 1-mile of the project area. There are no known active raptor nests (active within the past 3 years) within 1-mile of the project area.

Fisheries
There are no fish or fisheries habitats within the project area.

FEDERALLY THREATENED, ENDANGERED SPECIES AND CANDIDATE SPECIES
Federally threatened, endangered and candidate species that may occur within the project area are listed in **Table 2.**

Table 2. Threatened, Endangered and Candidate Species that may occur within the project area.

SPECIES	STATUS	HABITAT	OCCURRENCE IN PROJECT AREA
Black-footed ferret (*Mustela nigripes*)	Endangered	Prairie dog towns	Does not occur
Canada lynx (*Lynx canadensis)*	Threatened	Montane forests	Does not occur
Gray wolf *(Canis lupus)*	Nonessential/ experimental populations	Greater Yellowstone Ecosystem	Does not occur
Greater sage-grouse *(Centrocercus urophasianus)*	Candidate	Basin prairie shrub, mountain foothill shrub	Present
Grizzly bear (*Ursus arctos horribilis*)	Threatened	Montane forests	Does not occur
Kendall Warm Springs dace (*Rhinichthys osculus thermalis*)	Endangered	Kendall Warm Springs, Sublette County	Does not occur
Yellow-billed cuckoo *(Coccyzus americanus)*	Candidate	Riparian areas west of Continental Divide	Does not occur
Colorado River Fish Species	Endangered	Yampa, Green and Colorado River systems downstream of Wyoming	Occurs downstream

Greater sage-grouse

Greater sage-grouse are dependent on sagebrush habitats year-round. The general distribution of greater sage-grouse is associated with the distribution of sagebrush (*Artemisia* spp.), and in particular, big sagebrush (*A. tridentata*). Greater sage-grouse require open areas within the sagebrush community for leks where they perform courtship rituals. These strutting grounds (lek sites) are considered “traditional” or “historic” because the birds return to them annually. Adult male greater sage-grouse arrive first on leks, usually by mid-March, thereafter joined by sub-adult males and females. Females move to nest site vicinities several days after copulation. Although reports indicate that most females nest within 2 miles of leks where they breed, some greater sage-grouse hens in the PAPA have nested farther than that. Greater sage-grouse hens tend to nest in the same vicinity in consecutive years.

After nesting, the hens move to brood areas that support forb understory or succulent vegetation (i.e., riparian areas or irrigated fields) and large populations of insects in late spring and late summer. The sage-grouse diet consists almost entirely of sagebrush during late fall and winter (FEIS).

Greater sage-grouse breeding, nesting, brood-rearing, foraging and winter habitats are present within the project area. According to the WGFD 2009 greater sage-grouse database, one occupied lek, the Oil Fork Road lek, is located within 0.1 miles of the project area. There are 5 additional occupied leks and two unoccupied leks located within approximately 4-miles of the project area. According to BLM records, several historic nest locations are present throughout the immediate project area and within 4-miles of the project area.

The project area is also located within winter habitat for sage-grouse. Greater sage-grouse movements to winter ranges can take some time and may occur between late August and December. Wintering greater sage-grouse depend, in part, on sagebrush extending above the snow (FEIS).

According to BLM Instructional Memorandum (IM) No. WY-2010-012 it is the policy of the Wyoming BLM to manage sage-grouse seasonal habitats and maintain habitat connectivity to support population objectives set by the WGFD. This guidance is consistent with the guidelines provided in the Governor's Sage-grouse Implementation Team's Core Population Area strategy and the Governor's Executive Order (State of Wyoming Executive Department Executive Order 2008-2) that delineates core population areas and stipulations. The entire project area is located within the Governor's Designated Sage-grouse Core Area in the "Daniel" core area.

Colorado River Fish Species

The four federally endangered Colorado Fish species include the bonytail *(Gila elegans),* Colorado pikeminnow *(Ptychocheilus lucius),* humpback chub *(Gila cypha),* and razorback sucker *(Xyrauchen texanus).* Federal agency actions resulting in water depletions to the Colorado River system may affect these endangered species and their designated critical habitats and requires formal consultation with the USFWS. No water depletions are associated with the proposed action. There are no anticipated effects to Colorado River fish species from the proposed action and these species will not be discussed further.

Wyoming BLM Sensitive Species

Wyoming BLM sensitive species that may occur within the project area are listed in **Table 3.**

Table 3. BLM Wyoming Sensitive Species that May Occur within the Project Area.

SENSITIVE SPECIES COMMON NAME	SCIENTIFIC NAME	HABITAT	OCCURRENCE IN PROJECT AREA
Mammals			
Idaho pocket gopher	*Thomomys idahoensis*	Shallow stony soils	May occur
Long-eared myotis	*Myotis evotis*	Conifer and deciduous forests, caves and mines	Does not occur
Pygmy rabbit	*Brachylagus idahoensis*	Basin prairie and riparian shrub	Present
White-tailed prairie dog	*Cynomys leucurus*	Basin prairie shrub, grasslands	Does not occur
Birds			
Bald eagle	*Haliaeetus leucocephalus*	Areas with open water and near concentrations of winter ungulates, waterfowl, and/or fish	May occur
Brewer's sparrow	*Spizella breweri*	Basin prairie shrub	May occur
Burrowing owl	*Athene cunicularia*	Grasslands, basin prairie shrub	Does not occur
Ferruginous hawk	*Buteo regalis*	Basin prairie shrub, grassland, rock outcrops	May occur
Loggerhead shrike	*Lanius ludovicianus*	Basin prairie shrub, mountain foothill shrub	May occur
Long-billed curlew	*Numenius americanus*	Grasslands, plains, foothills, wet meadows	May occur
Mountain plover	*Charadrius montanus*	Grasslands, basin prairie shrub	Does not occur
Northern goshawk	*Accipter gentilis*	Conifer and deciduous forest	Does not occur
Peregrine falcon	*Falco peregrines*	Tall cliffs	Does not occur
Sage sparrow	*Amphispiza belli*	Basin prairie shrub, mountain foothill shrub	May occur
Sage thrasher	*Oreoscoptes montanus*	Basin prairie shrub, mountain foothill shrub	May occur

Trumpeter swan	*Cygnus buccinator*	Open woodlands, streamside willow and alder groves	Does not occur
White-faced ibis	*Plegadis chihi*	Marshes, wet meadows	Does not occur
Fish			
Bluehead sucker	*Catostomus discobolus*	Bear, Snake and Green river drainages, all waters	Does not occur
Flannelmouth sucker	*Catostomus latipinnis*	Colorado River drainage, large rivers, streams and lakes	Does not occur
Roundtail chub	*Gila robusta*	Colorado River drainage, large rivers, streams and lakes	Does not occur
Northern leatherside chub	*Lepidomeda copei*	Bear, Snake and Green River drainages, clear, cool streams and pools	Does not occur
Hornyhead Chub	*Nocomis biguttatus*	Lower Laramie and North Laramie River Watersheds	Does not occur
Colorado River cutthroat trout	*Oncorhynchus clarki pleuriticus*	Colorado River drainage, clear mountain streams	Does not occur
Fine-spotted Snake River cutthroat trout	*Oncorhynchus clarki spp.*	Snake River Drainage, clear, fast water	Does not occur
Yellowstone cutthroat trout	*Oncorhynchus clarki bouvieri*	Yellowstone Drainage, small mountain streams and large rivers	Does not occur
Amphibians			
Boreal toad (Northern Rocky Mountain population)	*Bufo boreas boreas*	Pond margins, wet meadows, riparian areas	Does not occur
Northern leopard frog	*Rana pipiens*	Beaver ponds, permanent water in plains and foothills	Does not occur
Columbia Spotted frog	*Ranus luteiventris*	Ponds, sloughs, small streams	Does not occur

Idaho pocket gopher
Idaho pocket gopher habitat includes subalpine mountain meadows, shrub steppes and various grasslands, and rocky, shallow soils. Pocket gophers stay underground most of the time and forage above ground only at night or on overcast days (WYNDD). Idaho pocket gophers have been documented near Big Piney and in the extreme eastern region of the Pinedale BLM planning area (FEIS) and are highly unlikely to occur within the PAPA (SEIS). It is unknown whether Idaho pocket gophers inhabit the project area.

Pygmy rabbit
Dense sagebrush and relatively deep, loose soils are important characteristics of pygmy rabbit habitat in general. Overall shrub canopy in pygmy rabbit habitat typically ranges from 21-36%. The diet of the pygmy rabbit primarily consists of sagebrush, but also includes grasses and forbs in the spring and summer (WDFW 1995).

On the Mesa, pygmy rabbits have been observed in characteristic habitats including drainages with dense, tall sagebrush and in loamy soils. Pygmy rabbits have also been observed in uncharacteristic habitat on the Mesa including flat areas with short sagebrush and in association with soil mounds near sagebrush (FEIS). Pygmy rabbit habitat is present throughout the project area. Pygmy rabbit surveys and monitoring are being conducted within the PAPA for the wildlife matrix monitoring for the Pinedale Anticline Project Office (PAPO). Surveys conducted in 2009 found pygmy rabbits and fresh sign present within the project area.

Bald eagle
The bald eagle was listed as an endangered species in 1967 and subsequently reclassified as threatened in 1995. The USFWS removed (delisted) the bald eagle in the lower 48 states of the United States from the Federal List of Endangered and Threatened Wildlife by final rule dated July 9, 2007, effective August 8, 2007.

Bald eagle nesting, foraging and winter habitats are located along the New Fork and Green rivers adjacent to the Mesa. The nearest documented bald eagle nest is located 2 miles southwest of the project area. This nest was active in 2009 and fledged 2 young. In the winter of 2009-2010, four bald eagle roost sites were documented approximately 1.75 miles to the west of the project area.

Ferruginous hawk
Ferruginous hawks construct their big, bulky nests on the ground or occasionally in lone trees or on rock ledges. They nest only in areas with abundant prey, typically small rodents. During winter, ferruginous hawks are often found around colonies of prairie dogs, which make up much of their winter diet (FEIS).

There are no known active ferruginous hawk nests within the project area. Ferruginous hawks may use the area for foraging. A historic nest location was documented 1-mile east of

the project area in 2007. According to BLM records, this nest has not been active in the last 3 years and it is unknown when this nest was last active. In 2009 the nest was documented in poor condition with only remnants of the nest remaining.

Loggerhead shrike
The loggerhead shrike generally prefers open country with shrubs and low trees for nesting and spiny shrubs for impaling prey items. This species has been documented north of Fontenelle Reservoir within the PFO (FEIS) and is possibly found within the PAPA (SEIS). The project area may contain suitable habitat for loggerhead shrikes.

Long-billed curlew
Long-billed curlews usually nest in prairie and grassy meadows near water but occasionally choose dry upland sites. This species nests in scattered areas throughout the northern half of the PFO and near Fontenelle Reservoir (FEIS) and is possibly found within the PAPA (SEIS). The project area may contain suitable habitat for long-billed curlew.

Sagebrush Obligate Songbirds
As with all federal agencies, BLM is mandated to protect migratory birds under the MBTA (16 U.S.C. 703-711), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), EO 13186 (January 10, 2001), and BLM IM 2008-050 (BLM, 2008). Under IM 2008-050, BLM has committed to minimize unintentional take of migratory birds and optimize their conservation until a national Memorandum of Understanding with USFWS is established as required under EO 13186 (SEIS). The Brewer's sparrow, sage sparrow and sage thrasher are sagebrush obligate songbirds that depend on sagebrush habitats for nesting and foraging (FEIS). The upland sagebrush steppe habitat in the project area provides suitable habitat for sagebrush obligate songbirds

3.3 Watershed and Rangeland Resources

Climate
The climate in the PAPA is semiarid and continental, with short, dry summers and long, cold winters. July and August are the hottest months of the year, while December and January are the coldest. Freezing temperatures can occur anytime of the year (Martner, 1986). According to the National Weather Service (NWS), Pinedale's mean temperature in January is 12.6°F with a mean of 59.8°F in July (Western Regional Climate Center, 2007). Annual precipitation (including rain and the water equivalent in snow) in the PAPA averaged 10.6 inches over the 30 water years (a water year extends from October through September) from 1970-1971 through 1999-2000. Snowfall from October through April averages 58 inches in the PAPA. (SEIS)

Beginning in 2000 and continuing through 2003, precipitation in the PAPA was consistently below the 30-year average, exhibiting drought conditions. Total snowfall (October through April) in the PAPA has been below the 30-year average of 58 inches since 1987 (including winter 2006-2007) except during winter 2003-2004. Maximum monthly temperatures,

averaged by water year, have generally been above the 30-year average. Average maximum monthly temperature in 2006 was the warmest since 2000. (SEIS)

The region is subject to strong and gusty winds, reflecting channeling and mountain valley flows due to complex terrain. During the winter, strong winds are often accompanied by snow, producing blizzard conditions. The closest comprehensive wind measurements were collected in the Jonah Field Project Area adjacent to the southeast corner of the PAPA at a meteorological station operated by British Petroleum (BP) from 1999 through 2003. Winds in the PAPA are from the west to northwest approximately 40 percent of the time. While the annual mean wind speed is 11.2 miles per hour (mph), wind speeds in excess of 19 mph occur more than 12 percent of the time. (SEIS)

Soils

Soils coinciding with the PAPA were classified into four broad groups, based primarily on differences in geologic origin (i.e., parent material and topographic or geomorphic position). The groups include: 1) terrace soils; 2) soils on pediment, alluvial fans and low terraces; 3) upland soils; and 4) alluvial soils on flood plains (SEIS). No prime farmlands exist within the PAPA. The only soil group found in the project area is upland soils.

Upland soils have the greatest surface area in the PAPA. Sensitive soils within this group include steep, shallow soils or areas of exposed soil. These soils have a high runoff rate and erosion potential. The high runoff rate limits the effective moisture these soils receive and their shallow depth limits their water holding capacity. This causes them to be droughty, which severely limits their reclamation potential. National Cooperative Soil Survey (NCSS) mapping was recently completed by Natural Resources Conservation Service (NRCS).The two dominant soils mapped in the project area are Jemdilon gravelly loam, 1 to 4 percent slopes (590 acres, 74% of the project area), and Foursees-Taffom Complex, 2 to 45 percent slopes (195 acres, 25% of the project area). Other soils found in the project area include Badland, Conpeak, Cryluha, Dahlquist, Fonce, Golphco, and Twocabin.

Jemdilon soils are found on intermontane basins and paleoterraces formed from alluvium of metamorphic and sedimentary rock. These are well drained soils with low organic matter content. This soil has a sodic horizon within 30 inches of the soil surface. Jemdilon soils are correlated to the Loamy (Ly) 10-14” Foothills and Basins West ecological site.

Foursees soils are found on escarpments and intermontane basins formed from alluvium of igneous, metamorphic and sedimentary rock. These are well drained soils with low calcium carbonate equivalent. This soil has a sodic horizon within 30 inches of the soil surface. Foursees soils are correlated to the Clayey (Cy) 7-9” Green River and Great Divide Basins ecological site.

Taffom soils are found on escarpments and intermontane basins formed from alluvium of igneous, metamorphic and sedimentary rock over residuum of sandstone and shale. These

are well drained soils with low organic matter content and low calcium carbonate equivalent. This soil has a sodic horizon within 30 inches of the soil surface. Foursees soils are correlated to the Gravelly (Gr) 7-9" Green River and Great Divide Basins ecological site.

Soil samples from the project area were sent to the University of Wyoming Soil Testing Laboratory. Three composite samples were taken, one for each proposed fertilizer treatment. The textures for all three sites were determined to be clay loam with less than 3.5 percent organic matter. The sites had pH's in the range of 7.1 to 7.4, slightly alkaline. These soils are neither saline nor sodic based on the electrical conductivity (<4mmhos/cm) and pH (<8.5). However, there are sodic horizons described for each soil map unit.

Fertilizer recommendations were provided by the University of Wyoming Soil Testing Laboratory for a target of 0.5 tons/acre of grass or grass-legume mixture. Site one was recommended 33 lbs nitrogen per acre and 33 lbs phosphorous per acre. Site two was recommended 37 lbs nitrogen per acre and 24 lbs phosphorous per acre. Site three was recommended 37 lbs nitrogen per acre and 29 lbs phosphorous per acre. No recommendation was given for increased sagebrush production.

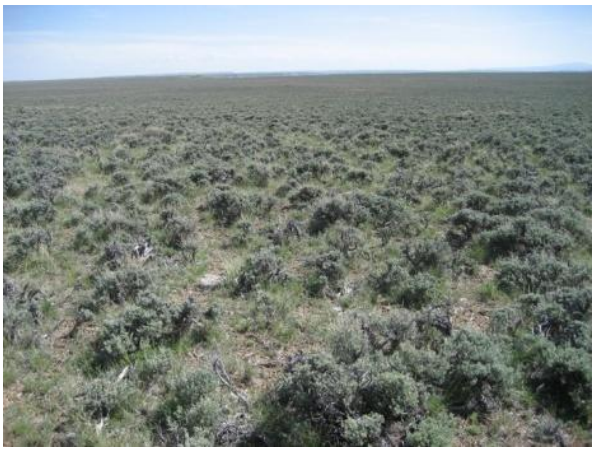
Vegetation

BLM described nine vegetation types (excluding human settlements) in the PAPA. Some types were composites of two sub-types, for example high density and low density Wyoming big sagebrush were combined as sagebrush steppe vegetation (SEIS). The only vegetation type found in the project area is sagebrush steppe.

There are three dominant ecological sites in the project area: Loamy (Ly) 10-14" Foothills and Basins West at approximately 590 acres, Clayey (Cy) 7-9" Green River and Great Divide Basin at approximately 90 acres, and Gravelly (Gr) 7-9" Green River and Great Divide Basin at approximately 40 acres. The dominant site for the project area is the Loamy (ly) 10-14" Foothills and Basins West site and interpretations will be based on this ecological site. No data on plant community was collected. Dominant grass species from the control transect include thickspike wheatgrass, Letterman's needlegrass, Sandberg's bluegrass, and muttongrass. From this data and analysis of pictures the plant community for the site is assumed to be in the big sage/rhizomatous wheatgrass community (Photo 1 and 2).

The WGFD has evaluated sagebrush production on the Mesa since 2004 (Scribner, 2006). This WGFD winter range sagebrush monitoring effort will be used as control transects for the treatments. Production, measured as average length of sagebrush leaders was greatest in 2004 (1.25 inches) following a winter with average snowfall and above average precipitation for the water year. Sagebrush production declined in 2005 (average leader length = 0.73 inch) following a winter with below average snowfall but above average precipitation for the entire water year. Total precipitation for water year 2005-2006 was only 6.94 inches, less than the previous three water years.

Photo 1 and 2. Project Site Photographs.



As a consequence, sagebrush production on the Mesa measured in 2006 averaged 0.12 inch; the lowest average measurement over the three year testing period (Scribner, 2006). Annual sagebrush growth appears to be related to moisture from winter snowfall. Because total snowfall (October through April) in the PAPA has been below the 30-year average of 58 inches since 1987 (except during winter 2003-2004, Section 3.3), sagebrush production, and most likely production of other plants in the PAPA, has been limited. WGFD data indicates very few young sagebrush plants in the region with most plants classified as mature or decadent (Scribner, 2006). (SEIS)

Special Status Species

Threatened and Endangered Species

Ute Ladies'-tresses Orchid.

Ute ladies'-tresses orchid *(Spiranthes diluvialis)* was listed as threatened in 1992. In Wyoming, Ute ladies'-tresses orchid have been located on old oxbows or flood plain terraces associated with small streams on sites that remain moist (meadow plant communities) throughout the summer, either due to seasonal flooding or sub-irrigation (Fertig, 2000). All four of the known populations in Wyoming occur in the eastern half of the state. Searches were conducted in western Wyoming (Jackson Hole, National Elk Refuge, and Green River Basin) during the 1990s (Fertig, 2000). Given the elevation ranges and precipitation regimes associated with site occurrence, the species' presence within the PAPA is unlikely. There are no known occurrences of the Ute ladies'-tresses orchid within the project area. There is no habitat in the project area fitting the requirements of the plant. There are no anticipated effects to the Ute ladies'-tresses orchid from the project and this species will not be discussed further.

Blowout Penstemon

In Wyoming, blowout penstemon (*Penstemon haydenii*) is found on sandy blowouts and sand dunes in the early stages of plant development (Heidel et al., 2007). There are no

known records of blowout penstemon in the or near the project area. There is no habitat in the project area fitting the requirements of the plant. There are no anticipated effects to the blowout penstemon from the project and this species will not be discussed further.

BLM Sensitive Plants

The BLM has indicated that the following special status plant species may occur within the Pinedale Resource Area and, based on their habitat associations, are likely to occur in the PAPA: large-fruited bladderpod, Beaver Rim phlox, tufted twinpod, Meadow pussytoes, Trelease's milkvetch, Cedar Rim thistle, and Big Piney milkvetch could occur if suitable habitats are present. There are no known occurrences of the BLM sensitive plants within the project area. The site will be surveyed for sensitive plant species prior to treatment. There are no anticipated effects to these plants from the project and these species will not be discussed further.

Invasive, Non-native Species.

Noxious weeds are defined in EO 13112 as those “species whose introduction does or is likely to cause economic or environmental harm or harm to human health.” Noxious weed species, when introduced to an area, are aggressive and often dominate natural communities. They are often able to establish in areas following disturbance. The State of Wyoming has designated 23 weeds as noxious, few of which are known to be a problem within the planning area. Current management includes annual monitoring and treatment of identified infestations.

Other weed species present within the project area, although not officially designated noxious, can be disruptive to native plant communities. These include cheatgrass, halogeton, and Russian thistle. Of these, cheatgrass is the most problematic in the project area. Weeds are present primarily in areas of disturbance, including along roads, in areas of oil and gas development, and in heavily grazed areas. Cheatgrass has been found in nearby reclamation efforts.

Cheatgrass (*Bromus tectorum L.*) is also known as “Downy Brome”. It is in the Poaceae family and can be 4 to 30 inches tall. Cheatgreass is a non-native invasive grass species. Cheatgrass has two germinating periods, early spring before native grasses and in the fall after native grasses have gone dormant. This physiological adaptation has allowed Cheatgrass to outcompete native grasses.

Cheatgrass is highly flammable and densely growing populations provide ample, fine-textured fuels that increase fire intensity and regimes. Cheatgrass cures earlier than perennial grasses and is burnable by mid-May to early June. When wildfire starts, dense stands of cheatgrass near and under sagebrush encourage crown fires that spread rapidly. With each fire, cheatgrass becomes more prevalent, eventually changing the landscape from a sage brush/bunchgrass community to a monoculture, unfit for sage brush/bunchgrass obligate species and livestock.

Range

There are 50 permittees on the 16 livestock grazing allotments that coincide with the PAPA. Approximately 37,000 (maximum restriction) livestock are stocked within various allotments and various times during the annual cycle. Most livestock are cattle, although some permittees graze limited numbers of horses. There are approximately 165,738 allotted acres in the PAPA. (SEIS)

The project area lies entirely within the Mesa Common Allotment. The Mesa Common Allotment is 57,649 acres (55,789 Federal, 120 State, 640 Private) with 5003 AUMs (4701 Federal, 197 State, 105 Private). There are 14 permittees that use the Mesa Common Allotment for different set dates from May 1st to November 15th with the heaviest use in May and June (Table 4).

The Mesa Common Allotment and Trapper's Point just to the north of the allotment, is a crucial area for "The Green River Stock Drift," a century-old seasonal stock driveway considered part of a potential Sublette County Rural Ranching Traditional Cultural Property and a potential Rural Historic Landscape. Increases in wellfield activities have led to increased incidences as they relate to grazing management, including loss/movement of stock watering locations, fence/gate/cattleguard issues, and disruption in movement of the Green River Stock Drift.

In 2003 and 2004, the BLM proposed a 25 percent reduction in PAPA allotments use because of drought. The number of livestock grazing on BLM allotments was moderately reduced during that time. In 2005, moisture levels and range conditions improved, and the 2005 grazing season returned to normal levels and permitted numbers.

3.4 Cultural Resources

The proposed project area is located within a cultural sub region designed in the 2008 BLM RMP FEIS for the PFO as "The Mesa" (2008 BLM, 3.3.2). This area is known to contain sparse concentrations of cultural resources primarily associated with prehistoric use of the wildlife migration corridor for big game procurement and is known to contain a high number of stone circle sites. Lithic resource procurement is known to be widespread throughout the Mesa, primarily the quartzite cobbles that cap the Mesa, and is expressed as the Mesa Lithic Landscape (48SU2928). A significant stone alignment location (Mesa Stone Circle Site-48SU368) is located approximately 1 kilometer from the proposed project Area of Potential Effect (APE). This type of proposed project (herbicide treatment) is limited in its potential to adversely affect cultural resources. The 2007 *BLM Vegetation Treatments Using Herbicides Final Programmatic EIS* notes that herbicide treatments used to control invasive species are a benefit to maintaining historic landscapes (4-146).

4.0 ENVIRONMENTAL EFFECTS

4.1 Direct and Indirect Effects

4.1.1 *Wildlife*

Alternative 1 – No Action Alternative

The No Action Alternative would allow wildlife to utilize the project area as they currently are without changes.

Alternative 2 – Proposed Action

Alternative 2 includes treating 790 acres of sagebrush with aerial applications of fertilizer and Spike© via helicopter in the spring and fall. A foliar spring application of liquid nitrogen is proposed in late May to early June and a fall application of soil nitrogen (granular form) would occur in late October to early November. Spike© (pellets) would also be applied aerially during both the spring and fall fertilizer applications. The helicopter will fly from 10 to 60 feet above the ground depending on the type (dry or liquid) of application. For wildlife in general, the proposed aerial applications by a helicopter would cause some localized disturbance to wildlife in the area during the application including dispersal and/or avoidance.

Wildlife will be exposed to low levels of fertilizer and Tebuthiuron during and following the application. Impacts and a risk assessment associated with Tebuthiuron application were addressed in Vegetation Treatments using Herbicides FEIS in June 2007 by the BLM and findings from this analysis have been incorporated into this report. Tebuthiuron has moderate toxicity to most terrestrial species. In mammals, Tebuthiuron is considered to have low acute dermal toxicity, but adverse effects can occur when organisms are exposed for greater periods of time (e.g., via diet). Tebuthiuron is essentially non-toxic to birds and slightly toxic to honeybees. Study results indicate that direct spray impacts are not likely to pose a risk to terrestrial animals at the BLM typical application rate (0.5 lbs a.i./ac). Acute and chronic risk to avian and mammalian herbivores is predicted using the maximum application rate (4.0 lbs a.i./ac) (BLM 2007). The proposed rate of Tebuthiuron (0.2-0.5 lbs a.i./ac) for the project does not exceed the BLM typical application rate. The effects of nitrogen fertilizer on wildlife could not be found during literature searches and is unknown for this analysis.

The shift in plant community dynamics that is expected to occur with the fertilizer treatments would result in a boost in sagebrush growth, a potential increase in sagebrush palatability and a shift to a higher proportion of grasses. This shift in plant community dynamics could increase the amount of forage available for wildlife on the Mesa. A decrease in shrub canopy cover in the Spike© treatment area could create unsuitable habitat in the short term for some species of wildlife dependent on greater sagebrush canopy. Stratifying the age structure in shrub communities and potentially increasing forb and grass diversity would benefit wildlife species overall in the long term. A potential invasion of cheat grass and other invasive species in the treatment areas

would decrease the quality and functionality of the sagebrush steppe habitat for virtually all species of wildlife.

Big Game

The proposed helicopter applications of fertilizer and Spike© could cause some localized disturbance to big game in the area during the aerial applications including dispersal and/or avoidance. Aerial application during the spring and fall may occur during big game migration depending on weather conditions and timing of migrations.

The shift in plant community dynamics that is expected to occur with the treatments would result in a boost in sagebrush growth, a potential increase in palatability and a shift to a higher proportion of grasses. This shift in plant community dynamics could increase the amount of forage available for big game on the Mesa. In particular, an increase in production of sagebrush could increase the amount of forage available on crucial winter range for mule deer. Migrating pronghorn would also benefit from an increase in the production of sagebrush.

Raptors

The proposed helicopter applications of fertilizer and Spike© could cause some localized disturbance to raptors in the area during the aerial applications including dispersal and/or avoidance. Aerial application during the spring would occur during raptor nesting season. No active raptor nests are documented within 1-mile of the project area.

The shift in plant community dynamics that is expected to occur with the treatments would result in a boost in sagebrush growth, a potential increase in palatability and a shift to a higher proportion of grasses. This shift in plant community dynamics could increase the amount of forage and cover available for raptor prey species on the Mesa.

Greater sage-grouse

The proposed helicopter application of fertilizer and Spike© could cause some localized disturbance to sage-grouse in the area during the aerial application including dispersal and/or avoidance. There is an occupied lek within 0.1 miles of the project area and historical documented nest locations within and surrounding the project area. Aerial application during the spring would occur during sage-grouse nesting season and may cause nesting sage-grouse to flush due to the noise and downdraft caused by the helicopter. Nests, eggs, young and adult birds that are in the project area could be sprayed with fertilizer and Spike©. The effects of directly spraying sage-grouse with fertilizer are unknown.

A spring application would not comply with management actions identified in the 2008 RMP. Specifically:

> Surface disturbing and disruptive activities will be avoided in suitable nesting and early brood-rearing habitat within 2 miles of occupied greater sage-grouse leks from March 15 to July 15.

A spring application would also not comply with conservation measures identified in the BLM Instruction Memorandum (IM) No. WY-2010-012 for sage-grouse leks inside Core Areas. Specifically:

> For sage-grouse leks inside Core Areas:
> - Surface disturbing activity or surface occupancy is prohibited or restricted on or within a 0.6 mile radius of the perimeter of occupied or undetermined sage-grouse leks.
> - Disruptive activity is restricted on or within 0.6 mile radius of the perimeter of occupied or undetermined sage-grouse leks from 6pm to 8am from March 15 – May 15.
>
> For sage-grouse nesting/early brood-rearing habitat inside Core Areas:
> - Surface disturbing and/or disruptive activities are prohibited or restricted from March 15 – June 30. This restriction should be applied to suitable sage-grouse nesting and early brood-rearing habitat within Core Areas.

The fertilizer application could decrease the population of insects in the treated areas which could decrease the food supply of sage-grouse (Yosef and Deyrup 1998). Insects, especially ants and beetles are an important component of early brood-rearing habitat (Connelly et al 2000). For the first three to four weeks after hatching, chicks feed primarily on insects which provide the high protein diet needed for rapid growth (WGFD 2007).

The shift in plant community dynamics that is expected to occur with the fertilizer treatments would result in a boost in sagebrush growth and a shift to a higher proportion of grasses. This shift in plant community dynamics could increase the amount of cover and forage available for sage-grouse on the Mesa year round. It is unknown what the response of forbs will be to the fertilizer treatment. An increase in forbs would benefit sage-grouse. Forbs are an important food source for sage-grouse, and in particular chicks that eat forbs until early fall (Connelly et al 2000). A decrease in forbs would reduce the quality and functionality of the habitat for sage-grouse.

The Spike© treatment would decrease the canopy cover of sagebrush in this treatment area. The current sagebrush canopy was measured at 18-22% in 2009. The overall goal of the treatment is to maintain at least 15% canopy cover in order to maintain sage-grouse nesting habitat. Most nesting habitat can be identified as patches of sagebrush with 15-30% canopy cover with at least 15% canopy cover of grasses and at least 10% canopy cover of a diversity of forbs (WGFD 2007). If the canopy cover decreases below

15% the amount of nesting habitat and cover available for sage-grouse in this treatment area would be reduced. Stratifying the age structure in shrub communities and potentially increasing forb and grass diversity would benefit sage-grouse overall in the long term. The entire project area is within a WGFD designated winter concentration area for sage-grouse. Winter habitat is generally defined as sagebrush stands with 10-30% canopy cover and heights of 10-14 inches above the snow cover (Connelly et al 2000). Maintaining at least 15% sagebrush canopy cover should maintain the functionality and quality of the habitat for sage-grouse in winter.

If a spring fertilizer application alternative is selected, an exception must be requested by the project proponent. An Exception is a one-time relief from the Conditions of Approval (COA) applied to any surface disturbing or human disruptive activities, such as but not limited to, Application for Permit to Drill (APD), stipulations applied to a right-of-way (ROW), habitat treatments, and range projects. The project lead, operators, and lease holders must initiate requests in writing, and this documentation must be received by the BLM at least 2 weeks prior to the potential activity start date.

<u>Sensitive Species</u>

Idaho pocket gopher

The proposed helicopter applications of fertilizer and Spike© could cause some localized disturbance to Idaho pocket gophers in the area during the aerial applications including dispersal and/or avoidance. Although it is likely that gophers would flee or retreat in burrows during aerial applications, it is possible that pocket gophers may be directly sprayed with fertilizer and/or Spike© if gophers are above ground during the applications. The effects of this possible occurrence with fertilizer are unknown. The potential effects of Tebuthiuron were discussed above.

The shift in plant community dynamics that is expected to occur with the fertilizer treatments would result in a boost in sagebrush growth, a potential increase in palatability and a shift to a higher proportion of grasses. This shift in plant community dynamics could increase the amount of forage and cover available for Idaho pocket gophers on the Mesa.

The Spike© treatment would decrease the canopy cover of sagebrush in this treatment area. The current sagebrush canopy was measured at 18-22% in 2009. The overall goal of the treatment is to maintain at least 15% canopy cover. The effects of decreasing the shrub canopy cover in Idaho pocket gopher habitat are unknown because very little is currently known about its biology and ecology (Griscom et al 2010).

Pygmy rabbits

The proposed helicopter applications of fertilizer and Spike© could cause some localized disturbance to pygmy rabbits in the area during the aerial applications including dispersal and/or avoidance. Although it is likely that rabbits would flee or retreat in

burrows during aerial applications, it is possible that pygmy rabbits may be directly sprayed with fertilizer and/or Spike© if rabbits are above ground during the aerial applications. The effects of this possible occurrence with fertilizer are unknown. The potential effects of Tebuthiuron were discussed above.

The shift in plant community dynamics that is expected to occur with the fertilizer treatments would result in a boost in sagebrush growth, a potential increase in palatability and a shift to a higher proportion of grasses. This shift in plant community dynamics could increase the amount of forage and cover available for pygmy rabbits on the Mesa.

The Spike© treatment would decrease the canopy cover of sagebrush in this treatment area. The current sagebrush canopy was measured at 18-22% in 2009. The overall goal of the treatment is to maintain at least 15% canopy cover. Decreasing the shrub canopy cover may create unsuitable habitat for pygmy rabbits as studies have shown that the average shrub canopy cover in pygmy rabbit habitat ranges from 21-36% (WDFW 1995).

Bald eagle

The proposed helicopter applications of fertilizer and Spike© could cause some localized disturbance to bald eagles that are in the area during the aerial applications including dispersal and/or avoidance. Aerial application during the spring would occur during bald eagle nesting season. No active bald eagle nests are documented within 1-mile of the project area. An active bald eagle nest was documented in 2009 approximately 2-miles southwest of the project area along the floodplains of the Green River. Sagebrush steppe is the dominant habitat that is present between the project area and the bald eagle nest. The helicopter will fly in the immediate project area and will not be flying within 1-mile of the bald eagle nest.

The shift in plant community dynamics that is expected to occur with the treatments would result in a boost in sagebrush growth, a potential increase in palatability and a shift to a higher proportion of grasses. This shift in plant community dynamics could increase the amount of forage and cover available for bald eagle prey species on the Mesa.

Ferruginous hawk

The proposed helicopter applications of fertilizer and Spike© could cause some localized disturbance to ferruginous hawks in the area during the aerial applications including dispersal and/or avoidance. Aerial application during the spring would occur during nesting season. No active ferruginous hawk nests are documented within 1-mile of the project area.

The shift in plant community dynamics that is expected to occur with the treatments would result in a boost in sagebrush growth, a potential increase in palatability and a

shift to a higher proportion of grasses. This shift in plant community dynamics could increase the amount of forage and cover available for raptor prey species on the Mesa.

Loggerhead shrike, long-billed curlew and sagebrush obligate songbirds
The proposed helicopter application of fertilizer and Spike© could cause some localized disturbance to avian species in the area during the aerial applications including dispersal and/or avoidance. Aerial application during the spring would occur during nesting season. Nests, eggs, young and adult birds that are in the project area could be sprayed with fertilizer and Spike©. The effects of directly spraying avian species with fertilizer are unknown. The potential effects of Tebuthiuron were discussed above.

The fertilizer application could decrease the population of insects in the treated areas which could decrease the food supply of avian species. A study in Florida on loggerhead shrikes found lower insect populations in a pasture sprayed with fertilizer in comparison to a pasture that was not sprayed. The decreased prey base negatively affected the reproduction and survival of loggerhead shrikes in the area (Yosef and Deyrup 1998).

The shift in plant community dynamics that is expected to occur with the fertilizer treatments would result in a boost in sagebrush growth, a potential increase in palatability and a shift to a higher proportion of grasses. This shift in plant community dynamics could increase the amount of forage and cover available for avian species on the Mesa.

The Spike© treatment would decrease the canopy cover of sagebrush in this treatment area. The current sagebrush canopy was measured at 18-22% in 2009. The overall goal of the treatment is to maintain at least 15% canopy cover. Decreasing the shrub canopy cover may reduce the amount of nesting habitat and cover available for avian species in this treatment area.

Alternative 3 – Reduced Action
Alternative 3 proposes treating 30 acres of sagebrush with aerial applications of fertilizer and Spike© via helicopter in the spring and fall. The effects of Alternative 3 are the same as Alternative 2 but at a much smaller scale. The same stipulations in Alternative 2 would apply to Alternative 3.

Like Alternative 2, Alternative 3 would also not comply with management actions identified in the 2008 RMP or conservation measures identified in the BLM Instruction Memorandum (IM) No. WY-2010-012 for sage-grouse leks inside Core Areas.

Alternative 4– Sage-grouse Action
Alternative 4 includes two fall fertilizer sagebrush treatments (468 acres). This alternative eliminates the spring fertilizer application and the entire Spike© treatment and no treatments will occur within 0.6 miles of an occupied sage-grouse lek. The effects of

the soil fertilizer treatment in Alternative 4 are the same as Alternative 2 with a smaller total acreage being treated. Eliminating the spring application, the Spike© treatment, and not treating areas within 0.6 miles of occupied sage-grouse leks would reduce the effects to sage-grouse and other sagebrush obligate species including pygmy rabbits and songbirds. Impacts to other avian species that are not sagebrush obligates but use sagebrush habitats would also be reduced. The sagebrush canopy cover would not be reduced in this alternative because there will not be a Spike© treatment. The same stipulations in Alternative 2 would apply to Alternative 4.

Big Game

The effects of the fall fertilizer treatment on big game would be the same as in Alternative 2.

Raptors

The proposed helicopter applications of fertilizer could cause some localized disturbance to raptors in the area during the aerial application including dispersal and/or avoidance. Aerial application during the fall would occur outside of raptor nesting season after young have fledged and left the nest. Many raptor species that reside in the area during the summer begin migrating in September and are likely to be gone from the area by late October when the treatment would occur (WYNND). Raptor species that may be present in the area at this time are species that either stay in the area year round or migrate to the area for the winter.

The shift in plant community dynamics that is expected to occur with the treatments would result in a boost in sagebrush growth, a potential increase in palatability and a shift to a higher proportion of grasses. This shift in plant community dynamics could increase the amount of forage and cover available for raptor prey species on the Mesa.

Greater sage-grouse

The fertilizer application could decrease the population of insects in the treated areas which could decrease the food supply of sage-grouse. Insects, especially ants and beetles are an important component of early brood-rearing habitat (Connelly et al 2000). For the first three to four weeks after hatching, chicks feed primarily on insects which provide the high protein diet needed for rapid growth (WGFD 2007).

The shift in plant community dynamics that is expected to occur with the fertilizer treatments would result in a boost in sagebrush growth and a shift to a higher proportion of grasses. This shift in plant community dynamics could increase the amount of cover and forage available for sage-grouse on the Mesa year round. It is unknown what the response of forbs will be to the fertilizer treatment. An increase in forbs would benefit sage-grouse. Forbs are an important food source for sage-grouse, and in particular chicks that eat forbs until early fall (Connelly et al 2000). A decrease in forbs would reduce the quality and functionality of the habitat for sage-grouse.

Alternative 4 complies with both management actions identified in the 2008 RMP and the conservation measures identified in BLM IM No. WY-2010-012.

Sensitive Species

Idaho pocket gopher

The effects of the fall fertilizer treatment on Idaho pocket gophers would be the same as in Alternative 2. The shift in plant community dynamics that is expected to occur with the fertilizer treatments could increase the amount of forage and cover available for Idaho pocket gophers on the Mesa. Sagebrush canopy cover should not decrease with the fertilizer treatments and current suitable habitat for Idaho pocket gophers should remain intact and continue to be functional.

Bald Eagle

The proposed helicopter applications of fertilizer could cause some localized disturbance to bald eagles that are in the area during the aerial application including dispersal and/or avoidance. Aerial application during the fall would occur outside of nesting season after young have fledged and left the nest. The helicopter will only be flying in the immediate project area and will not be flying within 1-mile of the bald eagle winter roost locations. The shift in plant community dynamics that is expected to occur with the treatments could increase the amount of forage and cover available for bald eagle prey species on the Mesa.

Pygmy rabbits

The effects of the fall fertilizer treatment by helicopter on pygmy rabbits would be the same as in Alternative 2. The shift in plant community dynamics that is expected to occur with the fertilizer treatments could increase the amount of forage and cover available for pygmy rabbits on the Mesa. Sagebrush canopy cover should not decrease with the fertilizer treatments and current suitable habitat for pygmy rabbits should remain intact and continue to be functional for pygmy rabbits.

Ferruginous hawk

The proposed helicopter applications of fertilizer could cause some localized disturbance to ferruginous hawks in the area during the aerial application including dispersal and/or avoidance. Aerial application during the fall would occur outside of raptor nesting season after young have fledged and left the nest. Ferruginous hawks that reside in the area during the summer begin migrating in September and are likely to be gone from the area by late October when the treatment would occur (WYNND). The shift in plant community dynamics that is expected to occur with the treatments increase the amount of forage and cover available for raptor prey species on the Mesa.

Loggerhead shrike, long-billed curlew and sagebrush obligate songbirds
The proposed helicopter application of fertilizer could cause some localized disturbance to avian species in the area during the aerial application including dispersal and/or avoidance. Aerial application during the fall would occur outside of the nesting season after young have fledged and left the nest. Birds that are in the project area during the aerial application could be sprayed with the fertilizer. The effects of directly spraying avian species with fertilizer are unknown.

The fertilizer application could decrease the population of insects in the treated areas which could decrease the food supply of birds inhabiting the area during this time. Fall migration of avian species inhabiting the Mesa can begin as early as July, but most birds leave from mid-August through October (WYNDD). It is likely most migrating bird species would be gone from the Mesa area by late October or early November when the treatment would occur.

The shift in plant community dynamics that is expected to occur with the fertilizer treatments could increase the amount of forage and cover available for avian species on the Mesa. Sagebrush canopy cover should not decrease with the fertilizer treatment and current suitable habitat for avian species should remain intact and continue to be functional for avian species using the sagebrush habitat.

4.1.2 *Watershed and Rangeland Resources*

The effects of the treatments in the project are unknown. No treatments of this kind are documented in the Upper Green River Valley area. The following discussion shows the predicted effects based on the best available science.

Introduction to Environmental Effects

Effects of Nitrogen Fertilizer

Fertilizers have been used for many years to increase crop production on agricultural lands. There is limited research on the effects of fertilizing sagebrush rangeland. Goetz (1969) asserts that “nitrogen fertilizer may be a valuable tool for range improvement when factors of plant and soil response to the applied nitrogen are known and applied on a range site basis.” It is believed that the most limiting nutrient on semiarid and arid lands is nitrogen (Miller et al, 1991). However, water is the most limiting growth factor in the west (Miller et al, 1991). It has been shown that if there is not adequate plant available water, fertilizing with nitrogen will not increase production (Havlin et al, 1999). In a 1979 synthesis of rangeland fertilization studies, Schmisseur and Miller recommended to not fertilize sites that receive less than ten to twelve inches of precipitation per year. In many studies, the greatest increases in rangeland production were related to the greatest years of precipitation (Barrett, 1979; Schmisseur and Miller, 1979; Pumphrey and Hart, 1973). Schmisseur and Miller (1979) contend that increases in production are greatest on sites with adequate soil moisture, low soil fertility, and deep medium-textured soils with good structure.

Fertilization can increase plant water use efficiency by increasing root growth and water intake efficiency (Havlin et al, 1999; Schmisseur and Miller, 1979). Sneva (1963) found in wet years that fertilization improved sagebrush establishment but caused high mortality of young plants in dry years. Schmisseur and Miller (1979) found that plant vigor was decreased in below average precipitation years. Even with adequate soil moisture, Goetz (1970) found leaf drying was delayed early in the season but happens rapidly late in the growing season. During times of drought, soil surface application of fertilizer results in less effective water recovery in plants (Havlin et al, 1999). This is in part due to stimulation of root development at the zone of fertilization (Havlin et al, 1999). Top-dressing, or fertilizing the soil surface, is the standard method for fertilization of rangelands. This application method results in stimulated root growth at the soil surface. During times of high soil moisture, this is not a concern. When the soil moisture is low, plants must obtain water from lower in the soil profile. With increased root growth at the soil surface, there are not as many roots deeper in the profile.

Another concern for low precipitation areas is “fertilizer burn.” Fertilizer burn is the desiccation of plants similar to drought due to excessive salt concentration in the soil (Havlin et al, 1999). This effect is most common in coarse-textured soils. One tool to determine potential fertilizer burn is the Salt Index of the fertilizer. The Salt Index is determined by osmotic pressure with higher values showing higher potentials of fertilizer burn. The Salt Indices of the proposed treatments are shown in Table 5. Of all the references reviewed only one noted the occurrence of fertilizer burn. Baldwin et al (1974) found the effects of fertilizer burn when using an application of 1200 pounds nitrogen per acre.

Table 5. Salt Indices of the Proposed Chemicals

Brand	Nitrogen Type	Salt Index (per unit N)
Can-27	Ammonium Nitrate	2.99
NDemand	Urea	1.62
Spike	Urea	1.62

There is conflicting information about the best time for fertilizer application in cool semiarid climates. Havlin and others (1999) recommend applying in late fall when the soil temperature is below 50° F. Schmisseur and Miller (1979) recommend application of fertilizer in the spring when soil moisture can be predicted better. Pumphrey and Hart (1973) found that spring applications had more plant production than fall applications. No consistent recommendation for application timing was found.

Nitrogen efficiency can vary by fertilizer application method. Top-dressing typically results in reduced efficiency of nitrogen recovery (Havlin et al, 1999). Pumphrey and Hart (1973) found that efficiency of nitrogen recovery was greatest in applications less

than 30 pounds per acre. Nitrogen fertilization tends to have little to no residual effects after the year of application (Havlin et al, 1999; Pumphrey and Hart, 1973).

There is a large amount of conflicting evidence on the overall effect of nitrogen on rangeland productivity. Carpenter and West (1987) determined that nitrogen fertilization had little to no effect on perennial plant growth in unirrigated desert conditions. Other research has shown no effect and decreases in total forage on fertilized sites (Sneva, 1963; Pumphrey and Hart, 1973). Goetz (1969) found a decrease in basal cover coupled with an increase in total dry matter on a fertilized site. This is explained by a plant composition change shifting towards grasses. In 1979, Barrett found an increase in total production. Goetz (1969) argues that the probability of increasing the production of a site is closely related to the natural potential of the site.

Nitrogen fertilization effects on big sagebrush were more uniform. Increased leader growth, denser foliage, and increased reproductive stems were found in several studies (Sneva et al, 1983; Carpenter, 1975; Miller et al 1991; Armstrong, 2007). While most studies showed an increase in production, there were studies with dissenting results. Two studies found that increases in sagebrush growth were related to precipitation not fertilization (Bayoumi and Smith, 1976; Barrett, 1979). Carpenter and West (1987) saw no sagebrush response to fertilization. In 1963, Sneva found that there was an increase of mortality in young sagebrush plants.

Grass response to fertilization was very consistent. Grasses were found to increase in all studies reviewed (Miller et al, 1991; Barrett, 1979; Goetz, 1969, Goetz, 1970, Carpenter, 1975). However, forb response to fertilizer treatments was inconsistent. Forbs had limited responses to fertilizers and when a response was noted in the studies, forbs were seen to decrease (Baldwin et al, 1974; Goetz, 1969; Carpenter, 1975).

Introduced species were able to capitalize on fertilizer additions better than native species in rangelands. In most studies reviewed, cheatgrass was seen as a principal increaser with nitrogen fertilizer (Sneva, 1963; Pumphrey and Hart, 1973; Baldwin et al, 1974; Rauzi et al, 1968; Armstrong, 2007; Schmisseur and Miller, 1979). Schmisseur and Miller (1979) recommend not fertilizing cheatgrass areas because fertilizer will encourage cheatgrass growth at the expense of perennial species.

Preferential selection of fertilized sites by wildlife and domestic livestock was noted in many studies. Barrett (1979) found increased use of fertilized sites by pronghorn. In 1975, Carpenter found mule deer showed partiality to fertilized locations. Elk winter range studies showed fertilized range received up to 50% more use by big game (Bayoumi and Smith, 1976; Skovlin et al, 1983). Domestic livestock showed up to five times higher use of fertilized rangelands than unfertilized rangelands (Baldwin et al 1974; Barrett, 1979; Skovlin et al, 1983). Pumphrey and Hart (1973) hypothesized that any increase of production seen from fertilization would be used by grazing.

No research was found on foliar applications on rangelands. General concerns with foliar applications are timing and rate. The application must take place during growth so that nutrients can penetrate leaf cuticles or stomata (Havlin et al, 1999). Also the rate must be very low, less than 1-2% of the solution, in order to prevent fertilizer burn on the leaves (Havlin et al, 1999).

Effects of Spike© (Tebuthiuron)

Tebuthiuron is a relatively non-selective herbicide absorbed by plant roots through the soil for use against broadleaved and woody weeds and grasses. Tebuthiuron disrupts photosynthesis by blocking electron transport and the transfer of light energy. Because of its non-selectivity, tebuthiuron should be used in areas dominated by invasive species, particularly woody invasives, such as in rangelands or ROWs invaded by shrubs, trees, and other undesirable species.

The strength of this herbicide is its use as a habitat modifier in BLM sagebrush management. At low rates of application, tebuthiuron is used to thin sagebrush to create more favorable habitat for sagebrush-dependent species. A review of several articles produced the following table showing application rate in pounds of active ingredient per acre (lbs ai/ac) and percent kill (McDaniel et al 2005; Olson et al 1994; Whitson and Alley 1984; McDaniel and Balliette 1986; Chi, 2004; Whitson et al 1988) (Table 6). All rates of 0.2 pounds active ingredient and higher showed a kill of sagebrush fifty percent or more.

Table 6. Spike© Rate and Percent Kill of Sagebrush

Spike© Rate (lbs ai/ac)	Percent Sagebrush Kill
0.20-0.29	70-82
0.30-0.39	51-80
0.50-0.59	75-100
Over 0.60	65-84

When used to thin sagebrush, several plant community composition changes were observed. Tebuthiuron resulted in an increase in grass production in several studies (McDaniel et al 2005; Olson et al 1994; Whitson and Alley 1984; McDaniel and Balliette 1986). An increase in cheatgrass was also found after two Spike© treatments (Whitson and Alley 1984; Clary et al 1985). Olson and others (1994) found a decrease in forbs with a Spike© treatment.

Threatened, endangered, and sensitive terrestrial plants in watersheds with clay and silt soils and precipitation of 50 in/yr and greater are also at risk under surface runoff scenarios. Most risk to vegetation from registered use of tebuthiuron can be avoided by

applying at the typical application rate, using buffers of more than 100 feet, and avoiding application near special status species.

In soil, tebuthiuron is resistant to abiotic degradation and biodegradation. Its field half-life ranges from 2 weeks to over 33 months. It has a low adsorption affinity to soil, with some adsorption occurring as organic matter and clay content increase. The amount of tebuthiuron recovered from application sites in north central Arizona declined from 55% of that applied after 1 year to 5% after 8 years, but then increased during the remaining 3 years of the study. The increase may have been due to release of the soil-adsorbed fraction. No metabolites were found, suggesting little or no degradation in soil (National Library of Medicine 2002). Montgomery (1997) reported that 38% of tebuthiuron applied to rangeland at a rate of 0.84 kg/ha tebuthiuron remained after 21 months. Similar results were found by Johnsen and Morton (1989), 55% of the active ingredient was found after one year. The chemical found in the soil decreased through year 8 (after application) and then increased for three years. Tebuthiuron is a persistent chemical in the soil environment.

In an evaluation of brush control and reseeding in a post oak forest using tebuthiuron applied at a rate of 2.2 kg/hectare (ha), Gay et al. (1997) determined that total soil nitrogen was unchanged after treatment regardless of the reseeding method, possibly indicating few changes to nitrogen cycling from treatment methods. After a tebuthiuron application at the rate of 1.01 kg/ha in pellet form to sagebrush semi-desert in Utah, soft brome had both reduced persistent mycorrhizal root infection and reduced mycorrhizal spore density in its rhizosphere (Allen and West 1993). The herbicide did not appear to affect germination of mycorrhizal spores collected 6 months after herbicide application. Mostafa and Helling (2003) isolated three tebuthiuron-degrading bacteria from soil. Shelton et al. (1996) demonstrated that a Streptomyces strain degraded tebuthiuron in vitro. Tebuthiuron persists in the environment, perhaps because of its low sorption affinity to soil.

Alternative 1 – No Action

The plant community would remain in the current state of big sage/rhizomatous wheatgrass. The community would continue to trend toward higher sagebrush dominance. The grass species will continue to be dominated by bluegrasses, needlegrass, and rhizomatous wheatgrasses. Forbs species will continue to trend towards mat-forming species such as buckwheats and pussytoes. (USDA NRCS, 2009)

Cheatgrass is currently found in the pipeline reclamation along the North Anticline Road. Current management is to annually monitor and treat when found. Even with on-going treatments, cheatgrass is expected to be found in the reclaimed areas.

Domestic animal use of the area is expected to continue at current rates. The Green River Stock Drift moves through the allotment and will continue. The animal use distribution patterns will not change with this alternative.

Alternative 2 – Proposed Action

Effects by Treatment

Treatment 1. Soil N- 40 lbs/ac (213 acres)

The plant community dynamics of the site will shift with the addition of fertilizer. Sagebrush should see a boost in growth. Grasses will see the highest increase in growth with the additional nitrogen. The plant composition of the site will shift to a higher proportion of grasses. The response of forbs on the site is unsure. Annuals will also see an increase of growth on the site. With an increase in annuals and grasses, there is a high risk of increased cheatgrass on the site. Cheatgrass is currently found on the eastern edge of the project area in reclaimed pipeline rights- of-way.

The plants in the area fertilized will be more susceptible to drought damage as a result of plant physiological changes. The plants will increase root growth near the soil surface to optimize nitrogen recovery. This increase of root growth will result in higher plant damage in the event of a drought due to the corresponding reduction of deep roots.

The fertilized area will see an increased use by livestock and wildlife. With increased use and no rest from grazing, the grass community may further shift towards the bluegrasses and rhizomatous wheatgrasses.

Treatment 2. Soil N- 80 lbs/ac (204 acres)

The effects of treatment 2 would be the same expected for treatment 1 with a higher increase in production.

Treatment 3. Foliar N- 3 gal/ac (171 acres)

The effects of treatment 3 would be the same expected for treatments 1 and 2 with a higher risk of fertilizer burn due to the method of fertilizer application. The effects of foliar fertilizer are the most unknown of the treatments.

Treatment 4. Soil N- 40 lbs/ac + Spike (52 acres)

The plant community dynamics of the site will shift with the addition of fertilizer and spike. Approximately 50 percent or more sagebrush will likely be killed by the Spike© treatment. Remaining sagebrush should see a boost in growth. Grasses will see the highest increase in growth with the additional nitrogen. The plant composition of the site will shift to a higher proportion of grasses than seen in the purely fertilizer treatments. The response of forbs on the site is unsure. There is a high risk of increased cheatgrass on the site.

The plants in the area fertilized and treated with Spike© will be more susceptible to drought damage than the areas solely fertilized. The additional salt content added to the soils with the application of Spike© increases the potential desiccation of the plants.

The fertilized area will see an increased use by livestock and wildlife. Increased use coupled with thinned sagebrush and no rest, the plant community may shift towards the rabbitbrush/rhizomatous wheatgrass state (USDA NRCS, 2009).

Tebuthiuron chemical will remain in the soil for up to 11 years and continue to affect plant composition. Mycorrhizal fungi will be limited by the chemical and strain plant-fungi relationships.

Treatment 5. Soil N- 80 lbs/ac + Spike (88 acres)
The effects of treatment 5 would be the same expected for treatment 4 with a higher increase in production.

Treatment 6. Foliar N- 3 gal/ac + Spike (62 acres)
The effects of treatment 6 would be the same expected for treatments 4 and 5 with a higher risk of fertilizer burn due to the method of fertilizer application.

Overall Effects of Alternative 2
The plant community dynamics of the site will shift with the project. Sagebrush and grasses will see an increase in growth with the additional nitrogen. The plant composition of the site will shift to a higher proportion of grasses especially in Spike © treatment areas where sagebrush may be reduced 50%. The response of forbs on the site is unsure. Annuals will also see an increase of growth on the site. There is a high risk of increased cheatgrass on the site. Cheatgrass is currently found on the eastern edge of the project area in a reclaimed pipeline right- of-way.

The plants in the area fertilized will be more susceptible to drought damage as a result of the treatments. Soil nitrogen cycling will not be considerably altered by the treatments. The fertilized area will see an increased use by livestock and wildlife. With increased use, the grass community may further shift towards the bluegrasses and rhizomatous wheatgrasses and the plant community in the Spike© treatment areas may shift towards the rabbitbrush/ rhizomatous wheatgrass community. Alternative 2 intersects approximately two miles of the Green River Drift.

Alternative 3 – Reduced Action

Effects by Treatment

The effects of Alternative 3 are the same as Alternative 2 but at a much smaller scale. All six treatments will occur in Alternative 3 with the following acreages.

- Soil N- 40 lbs/ac (6 acres)
- Soil N- 80 lbs/ac (6 acres)
- Foliar N- 3 gal/ac (6 acres)
- Soil N- 40 lbs/ac + Spike (4 acres)
- Soil N- 80 lbs/ac + Spike (4 acres)
- Foliar N- 3 gal/ac + Spike (4 acres)

Overall Effects of Alternative 3

The effects of Alternative 3 are the same as Alternative 2 but at a much smaller scale. The risk of cheatgrass invasion is lower than Alternative 2 due to the distance of the treatment from the reclaimed pipeline. Alternative 3 intersects approximately one tenth of a mile of the Green River Drift.

Alternative 4 – Sage-grouse Action

Effects by Treatment

The effects of Alternative 4 are the same as Alternative 2 treatments 1 and 2. Treatments one and two will occur in this alternative with the following acres.

- Soil N- 40 lbs/ac (228acres)
- Soil N- 80 lbs/ac (240 acres)

Overall Effects of Alternative 4

The plant community dynamics of the site will shift with the project. Sagebrush and grasses will see an increase in growth with the additional nitrogen. The plant composition of the site will shift to a higher proportion of grasses. The response of forbs on the site is unsure. The risk of cheatgrass invasion is lower than Alternative 2 due to the distance of the treatment from the reclaimed pipeline but higher than Alternative 3 due to the size of the treatment.

The plants in the area fertilized will be more susceptible to drought damage. Soil nitrogen cycling will not be considerably altered by the treatments. The fertilized area will see an increased use by livestock and wildlife. With increased use and no rest, the grass community may further shift towards the bluegrasses and rhizomatous wheatgrasses. Alternative 4 intersects approximately one tenth mile of the Green River Drift.

Table 7. Comparison of watershed and rangeland effects between alternatives.

Effect	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Increased production	-	790 acres	30 acres	468 acres
Increased proportion of grasses in plant community	-	790 acres	30 acres	468 acres
Increased cheatgrass	Low	High	Moderate	Moderate - High
Increased annual weeds	Low	High	High	High
50% or more reduction in sagebrush	-	202 acres	12 acres	-
Plant community shift				
Bluegrass and wheatgrass increases	-	558 acres	18 acres	468 acres
Rabbitbrush/ Rhizomatous wheatgrass	-	202 acres	12 acres	-
Risk of fertilizer burn	-	Low-Moderate	Low-Moderate	Low
Increased susceptibility to drought	Low	High	High	High
Increased animal use – Domestic and wildlife	No change	High	High	High
Green River Drift intersection	-	2 miles	0.1 miles	0.1 miles
Tebuthiuron retention	-	202 acres	12 acres	-

4.1.3 *Cultural Resources*

Alternative 1 – No Action Alternative

Cultural resource sites will not be disturbed. There will be no direct or indirect effects to significant cultural resources in the proposed project area if the "No Action' alternative is chosen.

Alternatives 2, 3, and 4 – All Action Alternatives

This type of proposed project (herbicide treatment) is limited in its potential to adversely affect cultural resources. The tebuthiuron treatment will be an aerial application and will not result in any surface disturbance. The surface sediments in the area are residual in nature and are unlikely to contain buried cultural deposits. The 2007 *BLM Vegetation Treatments Using Herbicides Final Programmatic EIS* notes that herbicide treatments used to control invasive species are a benefit to maintaining historic landscapes (4-146). The State Protocol between the BLM and State Historic Preservation Office (SHPO) lists herbicide treatments that are unlikely to affect rock art or traditional Native American plant gathering areas as an action exempt from case-by-case review (2006 State Protocol, Appendix B). The proposed project area is not known to contain nor does it have the potential to contain any rock art. Native American consultation was undertaken with the Northern Arapahoe, Eastern Shoshone, Shoshone-Bannock and Ute business councils to gather input as to any issues with the project. The Northern Arapahoe Tribal

Preservation Office responded with 'No Comment', but requested to be notified if any subsurface disturbance or buried archaeological sites are found (personal communication). No additional comments were received from the consulted parties. No Class III inventory of the proposed project area was required to assess the project's potential to impact cultural resources as no subsurface disturbance is proposed and the project has no potential to adversely affect NHPA eligible sites in the project area. This project, as currently proposed, will result in no effects to significant cultural resources.

4.2 Cumulative Effects

The cumulative effects analysis area for the project is the Mesa Common Allotment.

The PAPA EIS shows well field disturbance for the allotment at 3288.5 acres of primarily sagebrush steppe vegetation, approximately 6% of the total allotment. The reclaimed vegetation on the disturbed sites is not predicted to return to current state for up to 20 years. The reclamation would have a vegetative community with a higher proportion of grasses compared to the current state. The project would add to the overall higher proportion of grasses in the allotment increasing the percentage of the allotment with a plant community shift up to 7%.

There will be an increase in non-native invasive and noxious weeds in the allotment due to the gas field development. The treatments proposed could add to the spread of these weeds.

The quality and functionality of wildlife habitats in the project area will continue to be impacted by oil and gas development for several years within the PAPA. Impacts associated with oil and gas development in the PAPA were discussed in the SEIS.

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

Jonah Interagency Office, US EPA Region 8, Wyoming Department of Agriculture, Wyoming Landscape Conservation Initiative, Sublette County Conservation District, US Fish and Wildlife Service, Wyoming DEQ, Wyoming Game and Fish, State of Wyoming- Governor's Office, Wyoming Office of State Lands and Investments, Sublette County Commissioners, Sublette County Extension Office, Natural Resources Conservation Service, Sublette County Road and Bridge, Sublette County Weed and Pest

5.2 Others

Western Watersheds Project, neighboring landowners, and affected and interested public.

6.0 LIST OF PREPARERS

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6.1 List of Reviewers

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APPENDICES

Appendix A. Public Comments Received During Public Scoping

Comments for Mesa Mule Deer Habitat Project

Comment	Response
"We are against the idea of spraying nitrogen and spike to 'improve' winter range. It is a typical high-intensity piecemeal approach that requires significant inputs."	Thank you for your comment.
"The simplest solution to improving winter range is to remove domestic livestock."	Thank you for your comment.
"I would think the project would need a control area with which to compare the results of the six treatments . . .the control area would need to be specifically identified, so that plant measurements from the control area and the six test plots would be consistant over time."	Current WGFD winter range transects will be used as a control for the project. One transect is located immediately below the project area.
"Also, it may be helpful to have a small area in each plot fenced, so as to be able to compare results without the effect of grazing. The fenced areas could be as small as 10' by 10'."	No fencing will be used in the project. Thank you for your comment.
The project is located on top of the trail used to transport cattle off the Mesa Common Allotment to private lands. Any fencing in the project area would be a disaster for the ranching operation.	No fencing will be used in the project. Thank you for your comment.
There is a concern with the use of nitrogen on a dry landscape. 1. Without the addition of moisture there is a severe risk of fertilizer burn to the project area.	Thank you for your comment. See EA pages 36-43.
2. The addition of nitrogen will promote grasses and outcompete forbs. If there is an objective to increase forbs, nitrogen will not work.	Thank you for your comment. See EA pages 36-43.
"The project area as designed lies on the route of a major cattle trail for the Mesa Cattle. IT MUST NOT BE FENCED."	No fencing will be used in the project. Thank you for your comment.
"I question the advisability of apply nitrogen to a sage brush area on the Mesa. The controlling vegetation growth factor on the Mesa is rain fall."	Thank you for your comment. See EA pages 36-43
"In my experience if you apply nitrogen fertilizer to an area and it does not receive adequate moisture the grass and vegetation is stunted or even killed."	Thank you for your comment. See EA pages 36-43.
"There are sage-grouse that nest in the treatment area. If the fertilization works it would be good, however if it doesn't work it could be very bad for those grouse "	Thank you for your comment. See EA pages 28-36.

Comments for Mesa Mule Deer Habitat Project	
Comment	**Response**
"It may be better to try it out on a smaller less sensitive area."	Thank you for your comment. See Alternatives 3 and 4, EA pages 8-10.
No terrestrial or aquatic concerns.	Thank you for your comment.
"The Sublette County Conservation District has a real problem with this project and recommends that it be entirely denied."	Thank you for your comment.
". . . There are just too many risks involved and there are other ways of improving winter habitat."	Thank you for your comment.
"One way would be to spray with a light application of 24-D."	Thank you for your comment.