U.S. Department of the Interior
Bureau of Land Management

O'Neil PPA Vegetation Treatments

Environmental Assessment

DOI-BLM-NV-E030-2016-0012-EA

O’Neil Project Planning Area (PPA) Vegetation Treatments

Environmental Assessment

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1. INTRODUCTION

1.1 Background

The Bureau of Land Management (BLM), Elko District, Wells Field Office (WFO) is proposing to implement vegetation treatment projects to protect, improve, and restore habitat for various wildlife species, especially Greater sage-grouse (*Centrocercus urophasianus*; GRSG), and restore natural vegetative conditions in the O’Neil Project Planning Area (PPA) in northeastern Elko County, Nevada. The proposed O’Neil PPA Vegetation Treatments would occur over a 10-year period, as budgets allow.

The O’Neil PPA was identified as an ecological assessment area by the Northern Great Basin Fire and Invasive Assessment Team (FIAT) (BLM, 2015a). For the purpose of this project, the O’Neil PPA includes the FIAT PPA boundaries plus additional lands within the Elko District that border Idaho and Utah (See Figure 1). The project encompasses an area of approximately 2.44 million acres (ac), of which approximately 208 thousand acres are being analyzed for treatment (the “Project Area”). The proposed vegetation treatments are in conformance with the BLM’s Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment (ARMPA) (BLM, 2015b).

References to the CEQ regulations throughout this environmental assessment (EA) are to the regulations in effect prior to September 14, 2020. The revised CEQ regulations, effective September 14, 2020, are not referred to because the NEPA process associated with the Proposed Action began prior to this date.

1.2 Purpose and Need

The purpose of the proposed project is to meet the habitat objectives outlined in Table 2-2 of the 2015 ARMPA (BLM, 2015b) as updated by the 2022 Plan Maintenance Action #5 (BLM, 2022), for “protecting and preserving GRSG and its habitat on BLM-administered lands in Nevada and northeastern California” (BLM, 2015b). The BLM is part of a public agency and private partnership called the Sage-Grouse Initiative (SGI), whose members’ commitment to improve and restore GRSG habitat enabled the U.S. Fish and Wildlife Service (USFWS) to find that listing the GRSG as endangered or threatened under the Endangered Species Act (ESA) was not warranted (USFWS, 2015a). However, to further improve the status of the GRSG, the land use plan amendments developed between 2010 and 2015 need to be implemented and monitored (NRCS, 2015). A secondary purpose of the proposed project is for BLM to meet its responsibility under the Healthy Forest Restoration Act (HFRA) of 2003 (Public Law 108–148), to conduct hazardous fuels reduction projects to protect watersheds and address threats to rangeland health across the landscape.

In support of the SGI and the USFWS’ GRSG not warranted finding, the BLM’s FIAT conducted wildfire and invasive species assessments within 5 priority landscapes within GRSG sagebrush (*Artemisia* spp.)-dominated habitat. The FIAT assessments identified priority habitat areas and management strategies to reduce threats to GRSG (BLM, 2015a). Three threats to sage-grouse habitat were specifically identified: wildfire, invasive annual grasses, and conifer expansion. The management strategies and conservation activities identified for implementation to reduce these threats included:

- Habitat restoration
- Fuels management

- Fire operations
- Post-fire rehabilitation

The need for the project is therefore identified as conservation, enhancement, and protection of sagebrush ecosystems within the O'Neil PPA, implementation of specific management strategies and conservation activities to maintain the status of the GRSG and its habitat, and the protection of habitat for sagebrush-obligate species that are at substantial risk from wildfire due to drought conditions and hazardous fuels at the landscape level.

Action is needed at this time to treat undesirable vegetation components in areas of moderate Resistance and Resilience (Chambers, et al., 2014a) as identified through the FIAT process, in order to realize the greatest net conservation gain to sagebrush ecosystems and associated species, and for the proposed planning area to be in, or work towards, conformance with the ARMPA (BLM, 2015b) There is additional need to maintain and improve vegetation communities, improve Fire Regime Condition Classes (FRCC), and maintain or improve wildlife habitat and rangeland, especially in areas that have been altered by establishment of invasive annual species, or have been affected by fire, drought, disease, or conifer encroachment.

1.3 Decision to be Made

The decision to be made is to determine whether or not to approve the proposed treatments for implementation.

1.4 Conformance with Applicable Land Use Plans

This EA is in conformance with the following documents:

1985 Wells Resource Management Plan (BLM, 1985):
Management actions.

Terrestrial Wildlife Habitat:

- Improve habitat in areas identified as potential reintroduction sites for native species of wildlife (p. 20).
- Chain or burn, and seed 5,500 acres to improve crucial big game habitat (p. 21).
- Vegetation manipulation that would alter the potential natural plant composition will not be allowed in riparian areas. Crested wheatgrass is not considered a native species in riparian areas (p. 22).

Riparian/Stream Habitat:

- Improve high and medium priority riparian/stream habitat to at least a good condition (p. 22).

Threatened or Endangered Species:

- Manage habitat so as to protect animal and plant species of particular concern to Federal and State governments (p. 23).

2004 Elko and Wells Resource Management Plans Approved Fire Management Amendment and Decision Record (BLM, 2004):

Decision: *Section 1.1 Major Decisions*

- Fire Prevention: Use of prescribed burning, mechanical, chemical and biological (including grazing) treatments to reduce wildfire fuel hazards (p. 3).
- Fire Rehabilitation: Conduct fire rehabilitation activities to emulate historic or pre-fire ecosystem structure, functioning, and diversity, and to restore a healthy stable ecosystem (p. 3).

2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment (BLM, 2015b) and updated 2021 Habitat Maps from the 2022 Maintenance Plan Action #5 (BLM, 2022):

- Goal SSS 1: Conserve, enhance, and restore the sagebrush ecosystem upon which GRSG populations depend in an effort to maintain and/or increase their abundance and distribution, in cooperation with other conservation partners (p.2-3).
- Objective SSS 1: Manage land resource uses to meet GRSG habitat objectives, as described in Table 2-2. The habitat objectives will be used to evaluate management actions that are proposed in GRSG habitat. Managing for habitat objectives will ensure that habitat conditions are maintained if they are currently meeting objectives or if habitat conditions move toward these objectives in the event that current conditions do not meet these objectives (p. 2-3; see EA Appendix A. 2015 ARMPA Table 2-2 Habitat Objectives for GRSG).
- Objective VEG 2: On public lands, establish, maintain, and enhance a resistant and resilient sagebrush vegetative community and restore sagebrush vegetation communities to reduce GRSG habitat fragmentation and maintain or reestablish GRSG habitat connectivity over the long term.
- Objective VEG 4: Improve GRSG habitat by removing invading conifers in the number of acres shown in Table 2-2 by decade for the next 50 years (p. 2-15).
- Objective FIRE 1: …GRSG habitat will be prioritized commensurate with property values and other critical or sensitive habitats to be protected, with the goal to restore, enhance, and maintain areas suitable for GRSG.
- Objective FIRE 5: Protect and enhance…areas of connectivity that support GRSG populations, including large contiguous blocks of sagebrush, through fuels management and incorporation of the FIAT assessment.

1.5 Compliance with Laws, Regulations and Other Plans

The EA and proposed action are in compliance with the following laws and regulations:

- Clean Air Act of 1970, as amended
- Endangered Species Act of 1973, as amended
- Federal Land Policy Management Act of 1976, as amended
- Healthy Forests Restoration Act of 2003
- Migratory Bird Treaty Act of 1918, as amended, and Executive Order 13186 (2001)
- National Environmental Policy Act of 1970
- National Historic Preservation Act of 1966, as amended

Please note this list is not all-inclusive; for additional laws, Executive Orders, Handbooks and Manuals please see Appendix C of both the *Programmatic EIS (PEIS) for Fuel Breaks in the Great Basin* (BLM, 2020) and the *PEIS for Fuels Reduction and Rangeland Restoration in the Great Basin* (BLM, 2021).

The EA and proposed action are in compliance with directives from the following local plan:

2010 Elko County Public Land Use & Natural Resource Management Plan
Noxious Weeds and Invasive Species (p. 75):

- Directive 8-2: Prevent the introduction, reproduction and spread of designated noxious weeds and invasive exotic plants.
- Directive 8-4: Implement the most economical and effective control methods for the target weeds.

Air Quality (p. 76):

- Directive 9-1: Air quality must be protected with a balanced approach that provides economic growth without a detriment to the social, aesthetic, cultural and ecological values of the County.

Forestry and Forest Products (p.79):

- Directive 11-1: Promote multiple use of public forest resources to realize sustainable and continuous provisions of timber, forage, firewood, wildlife, fisheries, recreation and water.
- Directive 11-2: Support the prompt salvage of forest losses due to fire, insect infestation or other events. In many cases this may include the construction of temporary roads to facilitate the harvest of fire-damaged trees. After the fire-damaged trees are essentially harvested, the federal land management agency responsible for that area will consult with Elko County regarding the reclamation of the temporary roads.
- Directive 11-3: Support the management of woodlands/forest by ecological condition for a diversity of vegetation communities. Grass and shrub ecosystems with no or few invasive species are preferable to pinyon/juniper monocultures.
- Directive 11-5: Recognize the importance of maintaining healthy aspen communities and encourage activities that will retain and improve the vigor of these communities while maintaining agricultural grazing and multiple uses.

Wildlife and Wildlife Habitat (p. 91):

- Directive 19-1: Identify, protect and preserve wildlife species and habitats. Wildlife and fisheries' populations are recognized as a renewable resource and therefore should be managed accordingly. Coordination of federal and state wildlife and fisheries' management and enforcement is encouraged.
- Directive 19-3: Identify habitat needs of wildlife species, such as adequate forage, water, cover, etc. and provide for those needs in time, to attain reasonable population levels compatible with other multiple uses.
    1. Wildlife habitat improvement projects such as guzzlers should be continued as appropriate. The projects should take into consideration impacts on other uses.

Habitat Conservation Planning (p. 95):

- Directive 23-1: Promote proactive habitat conservation planning in conformance with the Elko County Ecosystem Conservation Strategy to improve the habitat of species at risk of being listed under the Endangered Species Act, and to help avoid the adverse impacts associated with such listings.
- Directive 23-2: Habitat conservation planning should consider the economic and social consequences of the conservation efforts being considered.

1.6 Scoping, Public Involvement, and Issues Background

The WFO has conducted an environmental analysis of the proposed project in accordance with the National Environmental Policy Act (NEPA) (EA #DOI-BLM-NV-E030-2016-0012-EA). The WFO determined that an appropriate level of NEPA analysis and documentation for this project was an Environmental Assessment (EA), likely resulting in a Finding of No Significant Impact (FONSI). As an initial step in the process, the BLM distributed a scoping package outlining the proposed treatment methods and restoration goals for the project to 158 persons, agencies, and organizations on March 2, 2016, and to nine Native American tribes on April 15, 2016. A list of individuals, agencies and organizations consulted as part of the scoping process is provided in Section 4.2 of this EA.

As a result of comments received, the BLM revised the original proposed action by adding treatment units, modifying the size of some of the treatment units, and adding herbicide treatments.

In addition to the public scoping, the BLM has provided information sharing letters and attended Council meetings to provide additional information with potentially affected Native American tribes regarding this proposed project and no formal requests for Government-to-Government consultation has been received to date.

The BLM held a public tour of portions of the proposed vegetation treatments on May 19, 2021. This tour provided the interested public an opportunity to visit some proposed treatment areas, ask questions and engage in discussions of proposed treatments with BLM. Three members of the public attended the tour along with two employees of the Nevada Department of Wildlife (NDOW).

1.6.1 Internal Scoping

An Interdisciplinary Team (ID Team) of BLM resource specialists met on May 15, 2020, and defined a list of potentially affected resources to be analyzed in the EA. Subsequently, the ID Team developed a list of preliminary issues for detailed analysis (Table 7). The ID Team also developed a list of resources and issues that were eliminated from detailed analysis (Appendix C).

2. PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The Proposed Action alternative is to implement vegetation treatments in the treatment units described below. The proposed treatments would meet the purpose and need of the project by implementing recommended management strategies and conservation activities to maintain the status of the GRSG and its habitat. The entire project area consists of 2,436,281 acres.

The objectives of the Proposed Action would be to:

- Provide a benefit to sage-grouse, and meet the goals and objectives identified in the FIAT and ARMPA.
- Protect and promote healthy sagebrush-steppe ecosystems by reducing the density of encroaching junipers that out compete understory vegetation and increase the landscape’s susceptibility to large-scale erosion and uncharacteristically large wildfires.
- Improve the health, vigor, and acreage of the native sagebrush-steppe vegetation and promote natural resiliency of this vegetation.
- Maintain or improve wildlife habitat by providing multiple successional stages of more diverse vegetative communities. Additionally, opportunities exist to treat the landscape in a manner beneficial to other BLM sensitive species such as bighorn sheep, sage sparrow, Brewer’s sparrow, and pygmy rabbit.
- Benefit mule deer and implement the Secretarial Order 3362 by promoting browse vegetation to meet the nutritional requirements for wintering mule deer.

2.1.1 Adaptive Management

Given the 10-year timeline of the Project and the need for flexibility in treatment applications throughout the Project Area, the BLM proposes to use adaptive management in its implementation of the Project. Under this adaptive management concept, the BLM would implement a primary treatment method or methods to achieve the objectives set forth for each treatment unit. Treatment methods available for consideration are described below.

Adaptive management, as adapted from the National Research Council and adopted by the United States Department of the Interior (DOI), “is a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a ‘trial and error’ process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders” (DOI, 2008).

2.1.2 Treatment Site Selection

The purpose of the selected treatments is to improve vegetation diversity, improve wildlife habitat, and decrease hazardous fuels loading. The BLM will select treatment sites within specified and described treatment units by evaluating to determine the most appropriate treatment type and resource protection measures based on slope, aspect, terrain, soil, vegetation composition, vegetation condition, amount of fuel/biomass needed to be removed, overall access on site, visual disturbance, and proximity to major roads. The treatment types and sites would be selected by BLM resource managers in coordination with the NDOW specialists. The BLM would implement treatments on sites in mosaic designs with irregular edges to mimic natural boundaries. Unless specifically stated otherwise, all design features and protective measures in Section 2.1.5 apply to both implementation and maintenance.

In selecting treatment sites, the BLM would focus in areas where residual herbaceous vegetation is adequate to promote native release, or areas with adequate understory that have relative importance to the site. The BLM would consider treatment methods individually or in combination, to achieve the desired results.

Trees to be removed would include single-leaf pinyon (*Pinus monophyla*) and Utah juniper (*Juniperus osteosperma*). If trees were found to be infested with forest insects and disease within the treatment units, they would be a priority for removal. Removed diseased trees would not be available for commercial or personal timber use.

2.1.3 Proposed Vegetation Treatment Units

Proposed vegetation treatment units include 12 restoration units totaling 96,329 acres, 15 conifer removal units totaling 87,133 acres, and 413 miles of linear fuel breaks (totaling 25,000 acres). Total area proposed for treatment is 208,462 acres, which is less than 9% of the total project area. The proposed vegetation treatments may be implemented individually or in combination, depending on site conditions. Proposed treatments would only be implemented on those sites which are determined to be appropriate per the design and protective procedures set forth below in Section 2.1.5. The locations of the proposed treatment units within the O’Neil PPA are shown in Figure 3 through Figure 7, and the units described in Table 1, Table 2, and Table 3.

2.1.3.1 Restoration Treatment Units

Since 1999 over 830,000 acres of the O’Neil PPA has been impacted by wildfire. Cumulative loss of sagebrush associated with these fires over a short period of time has had drastic impacts on GRSG populations and other sagebrush obligate species within the PPA. Many of these fires were seeded through Emergency Stabilization and Rehabilitation operations, however not all the treatments successfully established due to competition from annual weeds and grasses or lack of precipitation. The proposed restoration treatments are designed to use multiple types of tools to successfully restore these degraded sites back to suitable habitat for GRSG and various other wildlife species that occupy sagebrush habitats. All the proposed restoration treatments are in previously burned sites and are within 3 miles of known occupied leks. The desired outcome of the proposed treatments is to meet the specific habitat objectives for seasonal habitats that are provided by the ARMPA (Table 2-2, BLM 2022 and BLM 2015b) and Stiver et al. (2015). Specific treatment acres, objectives and types are in the table below:

Table 1. Restoration Treatment Units

Unit No.	Proposed Treatment Acres by Land Status	Current Vegetation Communities	General Treatment Objectives	Proposed Treatment Methods
1	18 Mile Fire BLM: 299 ac PVT: 44 ac Total: 343 ac	Previously burned black sagebrush (*Artemisia nova*) site currently dominated by invasive species halogeton (*Halogeton glomeratus*) and cheatgrass (*Bromus tectorum*); some native perennial grasses, no shrubs present.	Improve shrub, forb, and grass composition to provide for lekking, nesting, brood rearing, and winter habitat and reduce the amount of invasive species. See EA, Appendix A.	Herbicide, drill seeding, harrowing, broadcast seeding, shrub planting, temporary fencing.
2	21 Mile Fire BLM: 174 ac PVT: 269 ac Total: 443 ac	Previously burned Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and black sagebrush sites dominated by invasive species halogeton and cheatgrass; some native perennial grasses, little to no sagebrush.	Improve shrub, forb, and grass composition to provide for lekking, nesting, brood rearing, and winter habitat, and reduce the amount of invasive species. See EA, Appendix A.	Herbicide, drill seeding, harrowing, broadcast seeding, shrub planting, temporary fencing.
3	Bell Canyon Fire BLM: 2,859 ac Total: 2,859 ac	Previously burned black sagebrush and single-leaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*) woodlands currently dominated by invasive species including halogeton and cheatgrass; some native perennial grasses, little to no sagebrush.	Improve shrub, forb, and grass composition for wildlife, and reduce the amount of invasive species. See EA, Appendix A.	Herbicide, drill seeding, harrowing, broadcast seeding, shrub planting, temporary fencing.
4	Cow Creek Seeding BLM: 3,422 ac Total: 3,422 ac	Big sagebrush (*Artemisia tridentata* spp.) site currently dominated by perennial grasses composed of both native and introduced exotic species (crested wheatgrass; *Agropyron cristatum*), largely devoid of shrubs.	Establish big sagebrush spp. to provide security cover near leks and cover for nesting, brood rearing, and winter habitat. See EA, Appendix A.	Sagebrush seedling plantings.

Unit No.	Proposed Treatment Acres by Land Status	Current Vegetation Communities	General Treatment Objectives	Proposed Treatment Methods
5	Deer Fire BLM: 15,776 ac Total: 15,776 ac	Previously burned antelope bitterbrush, Wyoming big sagebrush, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), low sagebrush (also known as little sagebrush; *Artemisia arbuscula*), and black sagebrush sites currently comprised of perennial grasses and forbs, devoid of shrub species.	Establish antelope bitterbrush and sagebrush spp. to provide cover for nesting, brood rearing, and winter habitat. See EA, Appendix A.	Sagebrush and antelope bitterbrush seedling plantings
6	Hepworth Fire BLM: 7,440 ac PVT: 5,444 ac Total: 12,884 ac	Previously burned Wyoming big sagebrush and black sagebrush communities currently dominated by native perennial grasses and forbs, largely lacking sagebrush spp.	Establish Wyoming and black sagebrush to provide security cover near leks and cover for nesting, brood rearing, and winter habitat within 3 miles of active or pending leks. See EA, Appendix A.	Herbicide, drill seeding, harrowing, broadcast seeding, shrub planting, temporary fencing.
7	North Gollaher Seeding BLM: 13,999 ac PVT: 660 ac Total: 14,659 ac	Previously burned basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and low sagebrush sites, currently dominated by native perennial grasses and forbs, largely devoid of sagebrush.	Establish sagebrush spp. to provide security cover near leks and cover for nesting, brood rearing, and winter habitat within 3 miles of active or pending leks. See EA, Appendix A.	Sagebrush seedling plantings.
8	Salmon Fire BLM: 4,805 ac PVT: 41 ac Total: 4,846 ac	Previously burned, mountain big sagebrush and antelope bitterbrush (*Purshia tridentata*) sites currently comprised of perennial grasses and forbs, devoid of shrub species.	Establish antelope bitterbrush and sagebrush spp. to provide cover for nesting, brood rearing, and winter habitat. See EA, Appendix A.	Sagebrush and antelope bitterbrush seedling plantings, temporary fencing.

Unit No.	Proposed Treatment Acres by Land Status	Current Vegetation Communities	General Treatment Objectives	Proposed Treatment Methods
9	Scott Creek Fire BLM: 14,682 ac PVT: 408 ac Total: 15,090 ac	Previously burned big sagebrush, black sagebrush, and low sagebrush sites, currently dominated by native perennial grasses and forbs, area largely devoid of sagebrush.	Establish sagebrush spp. to provide security cover near leks and cover for nesting, brood rearing, and winter brood rearing, and winter habitat within 3 miles of active or pending leks. See EA, Appendix A.	Sagebrush seedling plantings.
10	South Cricket Fire BLM: 5,349 ac PVT: 6,140 ac Total: 11,489 ac	Previously burned big sagebrush sites dominated by native perennial grasses and forbs, area largely devoid of sagebrush.	Establish big sagebrush to provide security cover near leks and cover for nesting, brood rearing, and winter habitat. See EA, Appendix A.	Sagebrush seedling plantings.
11	West Fork Fire BLM: 3,035 ac PVT: 1,036 ac Total: 4,071 ac	Previously burned mountain big sagebrush and black sagebrush communities currently dominated by native perennial grasses and forbs, area largely devoid of sagebrush.	Establish sagebrush spp. to provide security cover near leks and cover for nesting, brood rearing, and winter habitat. See EA, Appendix A.	Herbicide, drill seeding, harrowing, broadcast seeding, shrub planting, temporary fencing.
12	Wilkins Seeding BLM: 10,447 ac Total: 10,447 ac	Previously burned Wyoming big sagebrush and black sagebrush communities currently occupied by native perennial grasses and forbs with some presence of invasive species including cheatgrass and halogeton. Area largely devoid of sagebrush spp.	Establish Wyoming and black sagebrush to provide security cover near leks and cover for nesting, brood rearing, and winter habitat within 3 miles of active or pending leks. See EA, Appendix A.	Sagebrush seedling plantings.
Total	BLM: 82,287 ac PVT: 14,042 ac Total: 96,329 ac			

2.1.3.2 Conifer Treatment Units

Conifer removal areas targeted for treatments are sagebrush communities where pinyon and juniper trees have become established. The stage of woodland development on sagebrush ecological sites would influence the type of treatment method selected, follow-up treatment methods and management, understory competition, seed pools, and vegetation response following management. As described by (Tausch, Miller, Roundy, & Chambers, 2009) and (Miller R. , Tausch, McArthur, Johnson, & Sanderson, 2008) the three stages of woodland succession are as follows:

- Phase I – trees are present, but shrubs and grasses are the dominant vegetation that influence ecological process (hydrologic, nutrient, and energy cycles) on the site;
- Phase II – trees are co-dominant with shrubs and herbs, and all three vegetation layers influence ecological processes on the site: and
- Phase III – trees are the dominant vegetation and the primary plant layer influencing ecological processes on the site. Shrubs no longer dominate the understory.

Stand characteristics can be used to classify the phase of development (e.g., percent of maximum potential tree canopy cover, leader growth), but specific numbers would vary by site. Early indicators of tree dominance include shrub mortality and reduced leader growth on trees less than 10 feet in height (Tausch, Miller, Roundy, & Chambers, 2009). (Roundy, 2014) suggests a tree dominance index, which relates tree cover to relative tree cover (tree + shrub + tall perennial grass cover), is a better indicator of phase, although the specific numbers would vary by site. Research on numerous sites throughout the Great Basin suggests that Phase I is less than 34 percent relative tree cover, Phase II is 34 to 68 percent relative tree cover, and Phase III is greater than 68 percent relative tree cover (Roundy, 2014).

A 3-mile buffer around sage grouse leks was used to identify areas for potential treatment. Pinyon-juniper (PJ) woodlands within each buffered area were identified as conifer units. The area within each conifer unit was separated into the PJ Successional Phases. The areas containing Phase I and Phase II were combined to create the 15 Conifer Removal Treatment Units. These areas represent the areas that could most benefit GRSG with the removal of PJ. These sites were also identified in the FIAT Planned Treatment Areas (BLM, 2015a).

Table 2. Conifer Removal Areas within Conifer Treatment Units

Unit No.	Proposed Removal Area Acres by Land Status	Proposed Removal Area Acres by Successional Phase	General Treatment Objectives	Proposed Treatment Methods
13	18 Mile BLM: 2,687 ac PVT: 2,750 ac Total: 5,437 ac	Phase I: 3,984 ac Phase II: 1,453 ac	Reduce the amount of Phase I and Phase II conifer expansion within 3 miles of active and pending leks. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.

Unit No.	Proposed Removal Area Acres by Land Status	Proposed Removal Area Acres by Successional Phase	General Treatment Objectives	Proposed Treatment Methods
14	Corral Canyon BLM: 4,230 ac PVT: 683 ac Total 4,913 ac	Phase I: 2,412 ac Phase II: 2,501 ac	Reduce the amount of Phase I and Phase II conifer expansion within 3 miles of active and pending leks. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.
15	Dakes Reservoir BLM: 812 ac PVT: 811 ac Total: 1,623 ac	Phase I: 1,317 ac Phase II: 306 ac	Reduce the amount of Phase I and Phase II conifer expansion within 3 miles of active and pending leks. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.
16	Deadman Creek BLM: 2,149 ac PVT: 2,223 ac Total: 4,372 ac	Phase I: 2,681 ac Phase II: 1,691ac	Reduce the amount of Phase I and Phase II conifer expansion within 3 miles of active and pending leks. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.
17	Division Canyon BLM: 6,192 ac PVT: 109 ac Total: 6,301 ac	Phase I: 4,198 ac Phase II: 2,103 ac	Reduce the amount of Phase I and Phase II conifer expansion within 3 miles of active and pending leks. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.
18	East Crittenden BLM: 2,369 ac PVT: 498 ac Total: 2,867 ac	Phase I: 1,691 ac Phase II: 1,176 ac	Reduce the amount of Phase I and Phase II conifer expansion within 3 miles of active and pending leks. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.

Unit No.	Proposed Removal Area Acres by Land Status	Proposed Removal Area Acres by Successional Phase	General Treatment Objectives	Proposed Treatment Methods
19	Eccles BLM: 1,234 ac PVT: 18 ac Total: 1,252 ac	Phase I: 1,063 ac Phase II: 189 ac	Reduce the amount of Phase I and Phase II conifer expansion within 3 miles of active and pending leks. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.
20	Fivemile Draw BLM: 1,158 ac PVT: 1,430 ac Total: 2,588 ac	Phase I: 2,094 ac Phase II: 494 ac	Reduce the amount of Phase I and Phase II conifer expansion within 3 miles of active and pending leks. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.
21	Goose Creek BLM: 515 ac PVT: 750 ac Total: 1,265 ac	Phase I: 962 ac Phase II: 303 ac	Reduce the amount of Phase 1 and Phase II conifer expansion within 200 meters of riparian areas occurring in GRSG brood rearing habitat. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.
22	Granites BLM: 14,492 ac PVT: 1,244 ac Total: 15,736 ac	Phase I: 11,258 ac Phase II: 4,478 ac	Reduce the amount of Phase 1 and Phase II conifer expansion within 3 miles of active or pending leks and within 200 meters of riparian areas occurring in GRSG brood rearing habitat. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.

Unit No.	Proposed Removal Area Acres by Land Status	Proposed Removal Area Acres by Successional Phase	General Treatment Objectives	Proposed Treatment Methods
23	Murdocks BLM: 6,505 ac PVT: 8,190 ac Total: 14,695 ac	Phase I: 6,434 ac Phase II: 8,261 ac	Reduce the amount of Phase 1 and Phase II conifer expansion within 3 miles of active or pending leks and in upper elevations identified as brood rearing habitat for GRSG, and/or mule deer (*Odocoileus hemionus*) winter range. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.
24	Mustang Draw BLM: 2,840 ac PVT: 238 ac Total: 3,078 ac	Phase I: 1,984 ac Phase II: 1,094 ac	Reduce the amount of Phase I and Phase II conifer expansion within 3 miles of active and pending leks. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.
25	North Pequops BLM: 8,734 ac PVT: 1,551 ac Total: 10,285 ac	Phase I: 7,954 ac Phase II: 2,331 ac	Reduce the amount of Phase 1 and Phase II conifer expansion within 3 miles of active or pending leks and in mid and upper elevations identified as brood rearing. habitat for GRSG, and/or mule deer winter range. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.
26	Rock Springs BLM: 11,654 ac PVT: 242 ac Total: 11,896 ac	Phase I: 7,302 ac Phase II: 4,594 ac	Reduce the amount of Phase I and Phase II conifer expansion within 3 miles of active and pending leks. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.

Unit No.	Proposed Removal Area Acres by Land Status	Proposed Removal Area Acres by Successional Phase	General Treatment Objectives	Proposed Treatment Methods
27	Sugarloaf BLM: 680 ac PVT: 145 ac Total: 825 ac	Phase I: 623 ac Phase II: 202 ac	Reduce the amount of Phase I and Phase II conifer expansion within 3 miles of active and pending leks. See EA, Appendix A.	Hand thinning, mastication, broadcast and drill seeding, pile burning, greenwood fire cutting, herbicide, temporary fencing.
Total	BLM:66,251 ac PVT: 20,882 ac Total: 87,133	Phase I: 55,955 ac Phase II: 31,178 ac		

2.1.3.3 Fuel Break Treatment Units

Linear fuel breaks are designed to disrupt fuel continuity by removing all or most of the vegetation, or replacing linear fuels, such as cheatgrass, with discrete plants, to create a discontinuous fuel source. Discontinuous fuels reduce the spread rate and intensity of surface fires. Removal or reduction of stands of woody plants, reducing the number of plants with volatile oil content (such as big sagebrush and rabbitbrush [*Ericameria nauseosa*]), and increasing the number of plants with higher moisture content also create fuel breaks by reducing fuel loading and potential for fire ignition (NRCS, 2016).

Methods to create fuel breaks include:

- Disking a strip to remove vegetation. Disk lines are 10 to 25 feet wide to create breaks for wildfires.
- Mowing of vegetation, up to 500 feet (total width) adjacent to roadways, to reduce the shrub canopy to 4 to 6 inches high.
- Create vegetative fuel breaks by establishing 500-foot-wide strips of perennial, fire-resistant vegetation. Individual plants are spaced widely apart to reduce the rate of spread and intensity of wildfires.
- Consider the maintenance or rehabilitation of existing fuel breaks before new fuel breaks are constructed.

Table 3. Fuel Break Treatment Units

Unit No.	Proposed Treatment Acres by Land Status	Current Vegetation Communities	General Treatment Objectives	Proposed Treatment Methods
28	O’Neil PPA Fuel Breaks BLM: 316 miles PVT: 97 miles Total: 413 miles *With 500-foot buffer: BLM: 19,006 ac PVT: 5,944 ac Total: Up to 25,000 ac	Roadside vegetation is mainly dominated by sagebrush spp. intermixed with native perennial grasses and forbs. In previously burned areas vegetation is comprised of perennial grasses and forbs and cheatgrass.	Create a break in the continuity of fuels that would allow suppression actions to be conducted safely and more effectively to reduce overall fire size[1]. Within the fuel break, reduce standing sagebrush, reduce flashy fine fuels such as cheatgrass, and create a more fire-resistant vegetation community along roadsides.	Mowing, herbicide, harrowing, broadcast and drill seeding, mastication, hand thinning, disking, temporary fencing.

[1] Assumes maximum 500-foot strip for fire break.

2.1.4 Proposed Treatment Methods

The proposed vegetation treatment methods and techniques may be implemented individually or in combination, depending on site conditions. Proposed treatments would only be implemented on those sites which are determined to be appropriate per the design and protective procedures in Section 2.1.5. Table 4 provides a matrix of treatment methods that may be used within each type of treatment unit.

Table 4. Treatment Methods and Techniques by Treatment Unit Type

Treatments	Restoration Areas	Conifer Reduction Areas	Linear Fuel Breaks
Herbicide			
Ground Application	x	x	x
Aerial Application	x	x	x
Mechanical			
Mastication (includes chipping)		x	x
Hand Thinning (chainsaw)		x	x
Green Firewood Cutting		x	
Mowing	x		x

Treatments	Restoration Areas	Conifer Reduction Areas	Linear Fuel Breaks
Vegetative Fuel Breaks	x		x
Pile Burning		x	x
Seeding and Planting			
Broadcast and Drag	x	x	x
Drill	x	x	x
Harrow	x		x
Disk	x		x
Seedling Planting	x	x	
Vegetation Treatment Protection			
Closures	x	x	x
Protective Fencing	x	x	x

The following is a description of each treatment method and the rationale for its use in the treatment units.

2.1.4.1 Herbicide

The entire O'Neil PPA would be analyzed for herbicide application and implementation would be for the control of noxious weeds and non-native invasive vegetative species (collectively referred to as weeds hereafter unless specifically distinguished). Spot and broadcast herbicide application techniques may include, but are not limited to:

- **Ground Application:** e.g., all-terrain vehicles (ATVs)/utility-terrain vehicles (UTVs), tractor and truck mounted units, backpack sprayers or handgun.
- **Aerial Application:** e.g., fix-winged aircraft, helicopters.

A combination of pre- and post-emergent herbicides would be used to suppress weed species to successfully introduce shrubs, forbs, and grasses into the treatment units and improve rangeland health. Large-scale broadcast application (300+ acres) would be typical of restoration, conifer removal, and fuel break treatments (Table 1-3), including maintenance of proposed treatments, while spot application (<300 acres) would be typical for control of weeds within the O'Neil PPA and may be inside or outside of proposed treatment units. Actual herbicide application would be based on existing knowledge of infestations, on-going inventories, management/site objectives, and adaptive management.

Herbicides, either alone, or in combination with others as listed below or previously approved herbicides (BLM, 1998; BLM, 2011), would be incorporated into a tank mix of water or oil, surfactants, deposition aid, or other adjuvants. Herbicide uses and applications would be constrained by the herbicide label, state law, BLM policy, the Standard Operating Procedures (SOPs) and other mitigation measures adopted in the *PEIS for Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States* (BLM, 2007a) and the *Final PEIS for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Lands in 17 Western States* (BLM, 2016a) and any additional measures adopted by the Decision Record for this EA.

Herbicides proposed by the BLM for application throughout the life of this project would include aminopyralid, fluroxypyr, imazapic, and rimsulfuron. Application timing is spring through fall, depending on target weed species, weather conditions, and plant growth. Typically, pre-emergent herbicide applications target annual species such as cheatgrass and are applied in the fall before the first rain event (i.e., imazapic and rimsulfuron), while post-emergent herbicide applications target broadleaf weeds and are applied to actively growing plants during spring and fall (i.e., aminopyralid, fluroxypyr, imazapic, and rimsulfuron). Refer to Table 5. Herbicide Information.

The above active ingredients, with the exception of imazapic which was analyzed in the *2007 Final Vegetation Treatments Using Herbicides Programmatic Environmental Impact Statement* (BLM, 2007a), were analyzed in *the Final PEIS for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on Bureau of Land Management Lands in 17 Western States* (BLM, 2016a).

Table 5. Herbicide Information.

Herbicide[1]: Representative Trade Names *Common Targets*	**Selective to Plant Types** Pre / post emergent *Point of application*	**Areas Where Registered Use is Appropriate**						**Typical Application Rate (pounds A.I. or A.E./acre/year)**	**Maximum Application Rate (pounds A.I. or A.E./acre/year)**[2]	**Aerial Spray**[3]	**Half-life in Soils (days)**[4]
		Rangeland	*Forest and Woodland*	*Aquatic / Wetland*	*Oil, Gas, & Mineral Sites*	*Rights-of-Way*	*Recreation & Cultural Sites*				
Aminopyralid: Milestone *Thistles, knapweeds*	**Broadleaf and some annual grasses** Post *Soil or Foliar*	□	□		□	□	□	0.078	0.11	Yes	32 - 533
Fluroxypyr: Comet, Vista *Kochia, mustards, black henbane, spurge*	**Broadleaf** Post *Foliar*	□	□		□	□	□	0.26	0.5	Yes	7 - 23
Imazapic: Plateau, Panoramic 2SL *Spurge, knapweed, and annual grasses such as cheatgrass*	**Annual grasses and some broadleaf** Pre and Post *Soil or Foliar*	□	□		□	□	□	0.09375	0.1875	Yes	120 - 140
Rimsulfuron: Laramie, Grapple *Puncturevine and annual grasses such as cheatgrass*	**Annual grasses and some broadleaf** Pre and Post *Soil or Foliar*	□	□		□	□	□	0.0469	0.625	Yes	5 - 40

1. See Appendix G. Approved BLM Herbicide Formulations for Aminopyralid, Fluroxypyr, Imazapic and Rimsulfuron for the full list of herbicide trade names approved for use on lands managed by the BLM in Nevada, including formulations with two or more active ingredients.
2. Maximum pounds active ingredient (AI) or acid equivalent (AE) per acre per year are determined by herbicide product label and information analyzed in Risk Assessments.
3. The active ingredient sulfometuron as a stand-alone or in a tank mix will not be applied aerially per the 2007 PEIS ROD (BLM, 2007b).
4. The length of time an herbicide remains active in the soil is called soil persistence or soil residual. Half-life refers to the amount of time (in days) for a herbicide to be broken down and disappear. Several factors including, but not limited to: application rate, temperature, soil moisture, soil pH, soil type, and activity of soil organisms have an impact on soil half-lives. Also see Environmental Effects Section 3.6.2.

2.1.4.2 Mechanical

Mechanical treatments would include:

Mastication: Mastication utilizes a piece of heavy equipment that selectively mulches vegetation. Mastication is used instead of chaining when the site has adequate understory vegetation, and seeding may not be essential to obtain objectives. Mastication also has slope limitations of 30 percent. Mastication would be the preferred treatment method for those areas of the project in woodland succession Phases II where selective tree thinning is needed.

Mastication may involve equipment such as Bull Hog, Hydro Axe, or any machine designed for shredding and/or mulching of tree species. The machine is mounted onto a tracked or wheeled vehicle. A general overview of masticating equipment can be found in the Understory Biomass Reduction Methods and Equipment Catalog (USFS, 2000). Mastication equipment mounted onto tracked or wheeled vehicles are more selective in tree removal than chaining. Wood chips and branch/leaf mulch would be dispersed on site, not to exceed a depth of six inches, two feet in length and four inches in diameter. All stumps would be ground so they are no greater than 6 inches in height on the uphill side above mineral soil. Mastication may be in coordination with seeding operations, allowing mulch and chips to cover seed. Any trees found to have old-growth characteristics (large with gnarled branches, crown is irregular shaped with dead branches often interspersed, bark is thick and plate like, diameter at root collar is >20") would be retained. All brush and mountain mahogany would be left untreated. Trees containing raptor nests discovered during project implementation would be retained. This treatment method has less ground disturbance than chaining, but more than selective hand thinning.

Hand Thinning (selective cutting): Hand thinning methods include cutting dead, diseased, or healthy trees using chainsaws. Selective cutting may include one tree to several acres of trees, depending on site evaluation and treatment objectives. Hand thinning would primarily occur in Phase I woodland development areas within sagebrush habitat, with the goal to remove the encroaching trees. The main objective would be to halt and reverse establishment of pinyon and juniper trees into sagebrush dominated habitat. Hand thinning would primarily be utilized in areas where tree cover densities are less than 20 percent. All conifer removal treatment units would be evaluated for hand thinning treatments, which would be implemented on sites where vegetation removal needs to be highly selective, or on sites requiring minimal to no ground disturbance. Pinyon and juniper trees within the treatment units would be removed retaining any mountain mahogany if encountered. Any trees found to have old-growth characteristics (large with gnarled branches, crown is irregular shaped with dead branches often interspersed, bark is thick and plate like, diameter at root collar is >20") would be retained. Boles (trunk) would be cut and left as close to the ground as possible, with stump (part of bole left in ground) heights not to exceed 6 inches. Trees containing raptor nests discovered during project implementation would be retained. Cut trees may be removed, chipped, lopped and scattered (limbs [slash] from thinned trees would be cut into pieces less than 4 feet in length and scattered, so that no tree slash is piled or protruding higher than 24 inches from the ground), or piled and burned, based on site evaluation and objectives.

2.1.4.3 Pile Burning

Prescribed fire treatments would be limited to the burning of hand-stacked piles (pile burning) following hand thinning treatments. Prescribed pile burning would be used where fuel reduction is needed to prevent wildfire potential, and to enhance wildlife habitat. To reduce fire spread into desired vegetation and to minimize soil damage, piles would be burned when there is adequate ground moisture or following a recent precipitation event. Pile burns would follow the prescriptions outlined in the burn plan for each specific treatment unit.

Not all hand thinning treatments would be piled and burned. Piles would be constructed using the debris and dead material on site after the implementation of a mechanical treatment. Piles would be burned based on environmental conditions, following a developed burn plan, and in accordance with the ARMPA (BLM, 2015b).

2.1.4.4 Green Firewood Cutting

All proposed “conifer removal” areas would be opened to green firewood cutting for commercial and non-commercial uses prior to treatments. Firewood cutting is currently allowed within the proposed treatment units; however, the cutting of green trees is not currently authorized. The authorization of green firewood cutting within the proposed treatment units would allow the public to utilize the pinyon and juniper that would be removed during later treatments. Designated areas would have maps, and project boundaries would be appropriately displayed to avoid unauthorized off-road travel. Trees that are to be left intact within the treatment units would be appropriately flagged to prohibit their cutting. Following treatments, fuelwood harvest may be allowed in some areas after successful establishment of understory species has occurred.

2.1.4.5 Mowing

Mowing tools such as rotary mowers pulled by tractors or self-propelled and straight-edged cutter bar mowers can be used to cut herbaceous and small woody vegetation less than three inches in diameter. The vegetation can be cut to a height anywhere between two inches to eighteen inches above the ground surface. Mowing is most commonly used in Fuel Break creation and maintenance. The target height for mowed Fuel Breaks is four to six inches above mineral soil. Mowing is designed to reduce vegetative matter not completely remove it. Mowing is also used to create a mosaic of uneven-aged stands and enhance wildlife habitat. Removing a portion of the shrub canopy through mowing would also facilitate herbicide treatment of cheatgrass.

2.1.4.6 Vegetative Fuel Break (Green Strips)

Fuel breaks are defined as a strip or block of land on which the vegetation, debris and detritus have been reduced and/or modified to control or diminish the risk of the spread of fire crossing the strip or block of land. Vegetative fuel breaks are the practice of establishing or using patterns of fire resilient vegetation and/or material to reduce wildfire occurrence and size (BLM, 1987). Vegetative fuel breaks reduce the chance of a fire starting and they also slow the rate that a fire will spread. Plants growing in vegetative fuel breaks are normally widely spaced with little or no litter between the plants which reduces the ability of fire to spread. Decreased fuel, shorter plant height, and higher fuel moisture content of the plants growing in the green strip will rapidly slow a fire when it encounters a green strip (Davidson & Smith, 1997). Vegetative fuel breaks generally require site preparation, selection of plant materials, seeding, post seeding and long-term management to maintain them for long-term success.

Plants used in green strips must be adapted to the site, able to compete with annual weeds, easy to establish, have low flammability, produce an open canopy and have resilience and regrowth capabilities (Monsen S. , 1994). Palatability to grazing animals and other management considerations are also important. Plants must be able to disrupt fuel continuity, reduce fuel accumulations and volatility and contain high moisture content.

The most common plants used in green stripping in low rainfall areas (less than 15 inches annual precipitation) are crested wheatgrass, Siberian wheatgrass (*Agropyron fragile*), Russian wildrye (*Psathyrostachys juncea*), Sandberg’s bluegrass (*Poa secunda*), bottlebrush squirreltail (*Elymus elymoides*), Ladak alfalfa (*Medicago sativa*), Lewis flax (*Linum lewisii*) and forage kochia (*Bassia prostrata*). In higher rainfall areas Idaho fescue (*Festuca idahoensis*) and small burnet (*Sanguisorba minor*) would be considered.

2.1.4.7 Seeding and Planting

All treatment units would be evaluated for seeding or planting regardless of the other treatment proposed for implementation. Seeding of primarily native species would be completed in areas where existing herbaceous understory has been compromised and is not sufficient for native release. Seeding would occur on disturbed sites when it has been determined that native perennial vegetation response and on-site seed source would be inadequate. Seeding may be applied in areas where, in response to wildfires, the vegetation has developed an undesirable species composition. Areas that do not respond to mowing treatments with desired understory vegetation would be seeded with appropriate native vegetation. To establish herbaceous understory vegetation, drill and/or aerial seeding would be conducted in areas where it is determined that native release is insufficient.

Seeding would be implemented in the fall/winter months when conditions are most desirable. Seed mixes would consist of a variety of grasses, forbs and shrubs that are appropriate for the site characteristics. Preference would be given to using native seed mixes that are locally collected or are from the same seed transition zone; however, if it is determined that the threat of invasive species establishment, or site characteristics may prevent meeting treatment objectives, non-native perennials may be utilized to meet GRSG habitat objectives. Seed mixes would be determined by using the Ecological Site Descriptions (ESD) and appropriate Disturbance Response Groups (DRG) to select the appropriate species and rates for each treatment unit (Stringham, 2011). Seeding may also be included in the maintenance of all treatment units.

A variety of seeding and planting methods may be employed, depending on the terrain, soil type, soil moisture, and seed species:

Broadcast and Chain: broadcast application of seed is done aerially or by truck or ATV-mounted applicators. Broadcasting is followed by dragging a heavy chain across the seeded area to enhance soil-to-seed contact, which can be a critical factor in successful seeding.

Drill: Drill seeding involves mechanically pressing the seed into the ground, or creating a furrow, placing the seed at a certain depth, and covering the seed, ensuring proper seeding depth and ground to seed contact. Drill seeding is accomplished by rangeland or *Truax* seed drills pulled behind a tractor, truck, or similarly capable vehicle.

Harrow: application of seed by broadcast method followed by pulling a series of spikes (usually attached in rows to a metal frame) along the ground to cover the seed and smooth the soil, thus enhancing the ground-to-seed contact.

Disk: Disking is preparation of the seed bed by plowing the land using large metal disks that slice through and turn over an approximately four to six-inch thick surface layer of turf and/or hardened soil.

Seedling Plantings: Previously burned areas that are not meeting GRSG habitat objectives may be selected for shrub seedlings to be planted by hand. This is generally done in the early spring while soil moisture is adequate to allow for seedling establishment but may also occur during the fall. Species include sagebrush, and bitterbrush in the higher elevations.

2.1.4.8 Vegetation Treatment Protection

Closures: Treatment units may be closed to livestock grazing in order to allow the vegetation to establish successfully. The closures would occur until establishment objectives are met. Grazing decisions would be issued in accordance with 43 Code of Federal Regulations (CFR) 4110.3-2(a) to temporarily suspend active Animal Unit Months (AUMs) within the closed treatment units. The treatment units would be reopened to livestock grazing once establishment objectives in the grazing decisions are met and the associated temporarily suspended AUMs would be reinstated on the grazing permit.

Protective Fences: Protective fences may be constructed around treatment boundaries or sensitive areas on an as-needed basis to allow livestock to graze the untreated portions of the area, rather than removing livestock from the entire grazing allotment. Fencing would be constructed according to BLM guidelines (BLM Manual 1741-1; Fencing) for wildlife concerns (e.g., smooth wire on the bottom, proper wire spacing). The protective fences are proposed to be temporary; however, it may be deemed necessary for the fences to remain and become permanent to protect the integrity of the treatment.

2.1.5 Design Features and Protective Measures

The vegetation treatments that comprise the Proposed Action incorporate Design Features and Protective Measures (DFPMs) that would be part of the specific treatment project plan. These include SOPs established for herbicide use (see Appendix H). The purpose of the DFPMs is to avoid or minimize any potential adverse environmental effects of the treatments.

The following is a list of design features to be incorporated into proposed projects outlined in the Proposed Action. The General DFPMs apply to all the Treatment Methods & Techniques; the Treatment specific DFPMs are in addition to the General DFPMs and apply only to that treatment type.

2.1.5.1 General DFPMs Common to All Treatments

1. Use best available science, applicable land use plan guidance (see Sections 1.4 & 1.5), and professional judgement when designing and implementing fuels reduction, rangeland restoration and fuel break projects.
2. During treatment design and implementation, for sensitive visual resource classes, use careful location (e.g., use topography for project screening), minimal disturbance, and consideration of visual contrasts with the surrounding landscapes. For example, drill seed vegetation in a serpentine pattern or modify drilling, so that drill rows are not as apparent.
3. Treatment areas will be monitored both pre-and post-treatment on a multiple-year basis to ensure that project objectives are achieved. Each treatment will be monitored before implementation and then each of the first three, fifth- and tenth years following treatments.

4. All proposed projects would comply with Section 106 of the National Historic Preservation Act (NHPA) by avoiding all historic properties in accordance with the measures outlined in the *State Protocol Agreement between the Bureau of Land Management, Nevada and the Nevada State Historic Preservation Officer for Implementing the National Historic Preservation Act* (BLM and SHPO, 2014). Specifically, the Protocol at section V.D.2.a. provides that the BLM may avoid impacts to historic properties by implementing standard measures that are appropriate for undertakings such as vegetation treatments for fire rehabilitation reseedings and wildlife habitat improvements. The standard measures that may be utilized to avoid adverse impacts to historic properties during project implementation are avoidance, project redesign, use of buffer zones for protection, site monitoring, or data recovery (BLM and SHPO, 2014, pp. 22-24).
5. Cultural and paleontological inventories and consultations appropriate to the scale and level of disturbance would occur in advance of project activities; the results would be used early in project planning to determine the need for project redesign or other avoidance measures. Potential adverse effects on historic properties would be avoided during ground-disturbing activities. A cultural resource specialist would identify avoidance areas before treatment begins, including subsequent retreatments.
6. The need for a paleontological inventory would be determined based on criteria set forth in BLM Instruction Memorandum (IM) 2016-124, using potential fossil yield classification, if available, or geologic characteristics and previous study data, if not. Ground-disturbing and chemical treatments in areas with paleontological resources would be addressed on a site-by-site basis. Project activities at significant paleontological sites would be coordinated with the regional BLM paleontologist to determine mitigation or monitoring needs in areas with a high potential for fossil resources. This would be done to minimize adverse effects.
7. In the event of an unanticipated discovery (cultural or paleontological resource) all ground disturbing activity within 100 feet of the find must cease until the resource is evaluated by an appropriate BLM resource specialist. For historic properties, the BLM would follow the post-review discoveries procedures as outlined in 36 CFR § 800.13(b). If human remains or objects covered by the Native American Graves Protection and Repatriation Act (NAGPRA) are encountered, all work would cease within 100 feet of the discovery, and the BLM Authorized Officer would be contacted immediately by phone, with written follow-up, and other guidelines set forth in 43 CFR§ 10 would be followed.
8. Riparian habitat buffers will be in place for all projects to prevent impacts to riparian and wetland zones. No mechanical treatments will take place within 100 feet of all perennial systems, 50 feet of all intermittent systems or wetland areas (like wet meadows), and 30 feet of all ephemeral drainages.
9. No heavy equipment refueling will occur within 300 feet of any stream channel, riparian area, wetland, or wet meadow.
10. No pile burning or burning of downed woody material will be conducted within 100 feet of stream channels, riparian areas, wetlands, or wet meadows.
11. Only aquatically registered pesticide formulations would be applied near water. For non-aquatic formulations, the following buffers apply: backpack/handgun is 10 feet to the water’s edge of

streams, ponds, and other waterways; 25 feet for broadcast application using ground-based equipment; 100 feet for aerial application (BLM, 1994).

12. Habitats of less mobile species tied to specific geographic areas (e.g., a particular spring or stream, a burrow complex, a unique and locally rare patch of habitat) would be avoided. Examples include burrow complexes used by burrowing owls or pygmy rabbits or riparian habitats used by special status species such as redband trout.
13. Depending on the time of year, these selected treatments could have the potential for destruction of active nests or disturbance of breeding behavior of migratory bird species. To avoid this impact, the BLM would conduct nest surveys prior to any surface-disturbing activities that would occur during the avian breeding season (March 15 through July 31). If nests are located, or if other evidence of nesting (e.g., mated pairs, territorial defense, carrying nest material, transporting food) is observed, a protective buffer (the size depending on the habitat requirements of the species) would be delineated and the buffer area would be avoided to prevent destruction or disturbance to nests and birds until they are no longer active, or the area is removed from project consideration.
14. The project area contains raptor nesting sites as detailed in Section 3.7.1. These nest sites are subject to seasonal and spatial protection from disturbance to avoid displacement and mortality of raptor young. BLM would conduct or require raptor nesting surveys to be conducted by a BLM-approved wildlife biologist using current USFWS protocols. Such surveys shall be conducted no more than 14 days prior to commencement of surface-disturbing activities in an area. If disturbance does not occur within 14 days of the survey, the site shall be resurveyed. If during any surveys, nests or nesting behavior are documented, the area must be avoided until the young have fledged from the nest or the nest fails. Nest results would be determined by the above-mentioned wildlife biologist. For example, if a Cooper's hawk (*Accipiter cooperii*) nest is found to exist within 0.25 mile of a treatment unit, no activity would be authorized within a 0.25-mile buffer of the nest from March 15 through August 31, or from March 15 through the date that young have fledged and are no longer dependent upon the nest, as determined by a BLM-approved biologist. The seasonal buffer distances for raptor nests are displayed in Table 6 on the following page.
15. This project area contains lands identified as mule deer crucial winter range (Figure 16). Prior to implementation/maintenance of each treatment area, the BLM will consult with the NDOW to obtain the most current seasonal range maps. For those treatment areas that are within mule deer crucial winter range, the BLM and the NDOW will coordinate prior to surface disturbance during the winter months to minimize disturbance to deer. Coordination with the NDOW and the associated determinations will be recorded in written correspondence (either letter or email format) between the two agencies prior to treatment implementation.
16. This project contains lands which have been identified as GRSG strutting grounds (leks) that are subject to seasonal protection from disturbance during the period of March 1 through May 15 between 6:00 PM and 9:00 AM. Seasonal restrictions from disturbance apply within 4 miles of active and pending status GRSG leks. The most current lek data provided by the NDOW would be used to delineate active and pending leks at the time of implementation and maintenance.

Table 6. Raptor nest seasonal restrictions and spatial buffers.

Species	Seasonal timing restriction[1]	Spatial Buffer[1] (miles)
Turkey Vulture	3/1[2] – 8/15	0.5
Osprey	4/1-8/31	0.5
Northern Harrier	4/1 – 8/15	0.5
Golden Eagle	1/1 – 8/31	0.5
Bald Eagle	1/1 – 8/31	1.0
Northern Goshawk	3/1 – 8/15	0.5
Cooper's Hawk	3/15 – 8/31	0.5
Sharp-shinned Hawk	3/15 – 8/31	0.5
Red-tailed Hawk	3/15 – 8/15	0.5
Swainson's Hawk	3/1 – 8/31	0.5
Ferruginous Hawk	3/1 – 8/1	0.5
American Kestrel	4/1 – 8/15	0.125[3]
Merlin	4/1-8/31	0.5
Prairie Falcon	4/1 – 8/31	0.25
Peregrine Falcon	2/1 – 8/31	1.0
Barn Owl	2/1 – 9/15	0.125[3]
Long-eared Owl	2/1 – 8/15	0.25
Short-eared Owl	3/1 – 8/1	0.25
Flammulated Owl	4/1 – 9/30	0.25
Western Screech-owl	3/1 – 8/15	0.25
Great Horned Owl	12/1 – 9/30	0.25
Northern Pygmy Owl	4/1 – 8/1	0.25
Burrowing Owl	3/1 – 8/31	0.25
Northern Saw-whet Owl	3/1 – 8/31	0.25

[1]Romin, L.A. and J.A. Muck. (2002). Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances. USFWS, Salt Lake Field Office, Salt Lake City, UT.
[2] Herron, G.B., C.A. Mortimore, and M.S. Rawlings. (1985). Nevada Raptors: Their Biology and Management. Nevada Department of Wildlife, Biological Bulletin No 8, Reno, NV.
[3]Romin and Muck (2002) did not recommend a specific spatial buffer due to apparent high population densities and ability to adapt to human activity. However, Elko BLM recommends a spatial buffer because of the remote nature of many raptor nest sites in Nevada and the likelihood that they would not be conditioned to human activities.

17. This project area contains lands which have been identified as GRSG nesting/early brood-rearing areas (Spring Habitat) that are subject to seasonal protection from disturbance during the period of April 1 through September 15 (Figure 22). The most current seasonal range maps provided by U.S. Geological Survey (USGS) would be used to delineate brood rearing habitat at the time of implementation and maintenance.
18. This project area contains lands which have been identified as GRSG late brood-rearing areas (Summer Habitat) that are subject to seasonal protection from disturbance during the period of June 15 through September 15 (Figure 23). The most current seasonal range maps provided by U.S. Geological Survey (USGS) would be used to delineate brood rearing habitat at the time of implementation and maintenance.

19. This project area contains lands which have been identified as GRSG winter habitat that are subject to seasonal protection from disturbance during the period of November 1 through February 28 (Figure 24). The most current seasonal range maps provided by USGS would be used to delineate winter habitat at the time of implementation and maintenance. Winter timing restrictions may be modified on a treatment-by-treatment basis, in coordination with the NDOW, if it is determined that local variations in timing exist, there would be negligeable disturbance to GRSG in a particular treatment unit, or it is determined that benefits of long-term habitat improvement outweigh potential short-term disturbance. Coordination with the NDOW and the associated determinations will be recorded in written correspondence (either letter or email format) between the two agencies prior to treatment implementation.
20. The project area contains lands especially important to pinyon jays and would be identified as leave areas for the benefit of this species. These sites include up to 1,200m buffer zones around nesting colonies. Also especially important are middle-aged stands of Phase II pinyon pine that are highly productive in terms of mast crop and are often found on north to east-facing slopes, out of direct mid-afternoon sun, or on the margins of mesic meadows. Specific DFPMs for pinyon jay from Ammon and Boone (2019) include:
    a. Conduct clearance surveys for nesting colonies during March 1through May 30.
    b. Buffer nesting colony sites by 1,200m (0.7 miles) of no disturbances or vegetation removal (this distance includes roosting and other colony-related activities, as opposed to only the 500m distance between annual colony shifts described by Somershoe et al. (2020).
    c. Avoid removing high-priority pinyon pines elsewhere in the home range of pinyon jays, especially open, multi-aged and mid-successional stands that reliably bear cones. These stands are likely to occur in Unit 23 and Unit 25 on Murdock Mountain and the north Pequop Range (Figure 25).
21. Applicable SOPs and Mitigation Measures from the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement (PEIS) and Record of Decision* (BLM 2007a Table 2-8 and BLM 2007b Appendix B) and the *Final PEIS on using Aminopyralid, Fluroxypyr, and Rimsulfuron* (BLM, 2016a, Table 2-5) would be required.
22. To eliminate the transport of vehicle-borne weed seeds, roots or rhizomes, all vehicles and heavy equipment used for the completion, maintenance, inspection or monitoring of ground-disturbing activities, or for authorized off-road driving would be free of soil and debris capable of transporting weed propagules. All such vehicles and equipment would be cleaned prior to entering or leaving the work site or treatment area. Cleaning efforts would concentrate on tracks, feet and tires, and on the undercarriage. Special emphasis would be applied to axles, frames, cross members, motor mounts, on and underneath steps, running boards, and front bumper/brush guard assemblies. Vehicle cabs would be swept out and refuse would be disposed of in waste receptacles. Equipment would arrive at the treatment unit already cleaned of all dirt, plant parts, and debris. Any subsequent cleanings (i.e., before moving between treatment units) would be recorded using global positioning systems or other mutually acceptable equipment and provided to the BLM District Office Weed Coordinator or designated person.

23. The BLM will survey treatment units for noxious weeds prior to project implementation. BLM will avoid staging and traveling through surveyed weed infestations and any weeds discovered within the treatment sites would be avoided. Prior to ground disturbing activities, the BLM may apply an herbicide pre-treatment to control weed species. The type of herbicide used will be dependent of the weed species present but will be chosen from one of the approved herbicides for Elko District BLM (BLM, 1998).
24. All materials used for rehabilitation or site stabilization will be certified weed free in accordance with the North American Invasive Species Management Association (NAISMA) and Nevada Department of Agriculture (NDA) standards. This may include, but is not limited to, gravel, hay/straw, and mulch.
25. During the implementation and maintenance of treatments, government and contractor vehicles and equipment would be authorized to drive off existing roads. Any new vehicle tire tracks/paths that are created would be removed and/or rehabilitated to prevent further usage.
26. Where feasible, place equipment (e.g., vehicles and mechanical treatment equipment) in previously disturbed areas.
27. Minimize ground-disturbing treatments in areas with highly erosive soils. Highly erodible soils are those soils that have a potential to erode at a rate far greater than what is considered tolerable soil loss. The potential erodibility of a soil takes into consideration a) rainfall and runoff, b) the susceptibility of the soil to erosion and c) the combined effects of slope length and steepness.
28. Avoid or minimize ground-disturbing activities when soils are saturated. Soils, site factors, and timing of application must be suitable for any ground-based equipment used for project implementation. This is to avoid excessive compaction, excessive rutting (< 3 inches deep), or damage to the soil surface layer. Equipment would be used on the contour, where feasible. Work can resume when the ground is sufficiently dry.
29. Use sediment retention practices during project design and implementation to minimize sediment discharge into streams, lands, and wetlands from such treatments as mowing, disking, and seeding. Sediment retention practices include siltation or filter berms, filter or silt fences, filter strips, sediment barriers and/or sediment basins. This is to protect designated beneficial uses.
30. For safety and to protect site resources (e.g., soil, vegetation) treatment methods involving equipment generally would not be applied on terrain exceeding 35 percent slope.
31. Signs would be installed in treatment areas during activities for public safety.
32. During times of high fire danger, all government and contractor equipment would be equipped with a functional spark arrestor. Operators would be required to have, at a minimum, a shovel and a working fire extinguisher on hand.
33. Vegetation treatments would be designed to take advantage of normal livestock grazing rest periods, when possible, to minimize impacts to livestock grazing permits. Permittees and right-of-way (ROW) holders would be notified of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.
34. No public firewood permits for greenwood aspen or mahogany would be authorized; only pinyon and juniper greenwood cutting would be allowed within the treatment areas. Dead or down wood permits would still be authorized for pinyon, juniper, and mahogany.

35. Equipment will avoid the removal, alteration or destruction of mining claim monuments, survey monuments, or any other legal monuments regulated by the State of Nevada under Nevada Revised Statute (NRS) 517.030.
36. The implementation and maintenance of treatments cannot interfere with any active or ongoing mineral operations.
37. Surveys would be conducted for cadastral monuments and markers prior to any surface disturbing activities. If any monuments or markers are disturbed, they would be restored after treatment where possible, or survey notes updated to reflect such disturbance.

2.1.5.2 Herbicide

1. All herbicide treatments would be applied as per the herbicide label, State law, all BLM policies, *PEIS for Vegetation Treatments with Herbicides* (BLM, 2007a), *PEIS for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron* (BLM, 2016a), the *1998 Programmatic Environmental Assessment of Integrated Weed Management on Bureau of Land Management Lands* (BLM, 1998), and associated *2011 Noxious Weed Treatment Determination of NEPA Adequacy* (DNA) (BLM, 2011).
2. All herbicide applications would be made by Nevada State licensed/certified personnel (appropriate to applicator) and would be overseen by BLM personnel.
3. See Appendix H. Standard Operating Procedures (SOPs) and Mitigation Measures for Applying Pesticides.
4. Permittees would be notified of proposed herbicide treatments, and any needed livestock grazing, feeding, or slaughter restrictions for areas within herbicide applications would be identified.
5. Herbicides of low toxicity to livestock would be used, where feasible.
6. As directed by the herbicide label, livestock would be removed from treatment sites prior to herbicide application, where applicable.
7. Whenever possible and whenever needed, herbicide treatments would be scheduled when livestock are not present in the treatment unit.
8. The different types of herbicide application equipment and methods would be taken into account, where possible, to reduce the probability of contamination of non-target livestock & wildlife food and water sources.

2.1.5.3 Mechanical

1. Pinyon Juniper (PJ) treatments: the removal or disturbance to trees with old growth characteristics would be avoided. Any trees found to have old-growth characteristics will be retained and left untreated. The oldest PJ stands would be incorporated into leave areas (Fairchild J. A., 1999). PJ stands at the age of 400 years or older would not be treated and would be designed into leave areas (Miller, Tausch, & Waichler, 1999). Old Growth Specifications are as follows:
    - Large with gnarled branches

- Crown is irregular shaped with dead branches often interspersed
- Bark is thick and plate like
- Diameter at root collar is >20”

2. Any mountain mahogany or aspen encountered during treatments would be retained.
3. PJ treatments: boles (trunk) shall be cut as close to the ground as possible with stump heights not to exceed 6 inches; boles shall be fully separated from their stump. No limbs shall be left attached to the boles or stumps.
4. Hand Thinning: limbs (slash) from thinned trees shall be cut and scattered next to the tree bole or as close as possible while not allowing slash height to exceed 24 inches from ground level. Limb stubs should be no more than 3 inches. Dragging of materials should be limited to what is necessary to meet the 24-inches slash height requirement.
5. Mulch, being the byproduct of mechanical mastication, will not be greater than:
   - Six inches deep.
   - Two feet in length.
   - Four inches in diameter.
6. Fuel breaks will not exceed 500 feet in total treatment width and would reduce vegetative cover to no less than 2 inches above mineral soil, with the goal of a 4-to-6-inch average mow height above mineral soil.
7. Bare soil (disked) portions of fuel breaks adjacent to roadways would not exceed 25 feet on either side of the roadway.
8. Where feasible, fuel breaks would be constructed where vegetation disturbance by wildfires or surface-disturbing activities has already occurred.
9. Mowed fuel breaks would be re-mowed when grass has reached a height between 1 and 2 feet or exceeds the Tons Per Acre of the Grass Fuel Model 2 (GR2), as described in Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model (Scott & Burgan, 2005).
10. Fuel breaks in a Right of Way (ROW) must be compatible with the ROW holder's grant prior to construction of the fuel break.
11. During fuel break implementation, the location, minimal disturbance, and consideration of visual contrasts with the surrounding landscapes, would be considered. For example, vegetation may be drill seeded in a serpentine pattern or using drill modifications, such as minimum-or-no-till drills, slick discs, and drag chains, so that drill rows are not apparent.

2.1.5.4 Pile Burning

1. Prescribed fire operations would be conducted by qualified personnel and follow prescription parameters as defined in the burn plans to reduce impacts to air quality and soil.
2. Debris piles created during project implementation would only be ignited when burn conditions are within burn plan prescription—the prescription, would require soils to be either wet or frozen enough to adequately prevent the spread of fire into vegetation adjacent to the piles.

3. Through site-specific smoke analysis, the BLM would comply with the Nevada Department of Environmental Quality or other state air monitoring group (if one is created in the future) to ensure that smoke emissions from treatments remain below the National Ambient Air Quality Standard for PM2.5. The BLM would identify smoke-sensitive receptors at the site-specific project level.
4. Signs would be posted on primary roads accessing the area being burned to alert drivers of the potential for reduced visibility due to smoke.
5. Ensure atmospheric conditions are within prescriptions (generally, mixing heights and transport winds would be adequate to disperse smoke) when a prescribed burn is ignited and monitor smoke throughout the fire.
6. If smoke threatens unacceptable impacts on transportation safety or communities (visual impairments or health), ignition should cease, provided control of the burn is not compromised.
7. Locally adapted or genetically appropriate perennial forbs and grasses would be seeded in pile burn sites to facilitate establishment of vegetation when native forbs and grasses have not reestablished after one growing season.

2.1.5.5 Seeding & Planting

1. All of 7 CFR Part 201- Federal Seed Act Requirements would be followed throughout the entire seed procurement process including the sampling and testing of all seed lots for invasive and noxious weeds to ensure that noxious weed seeds are not present. Drill seeding operations would be completed following the contour of the land as much as possible to reduce potential water erosion. Intact stands of sagebrush and native perennial vegetation would not be disturbed.

2.1.5.6 Vegetation Treatment Protection

1. Fences would be built in accordance with BLM Manual H-1741-1 (BLM, 1989). Modifications may be incorporated into the design based on consultation with NDOW and subsequent recommendations to minimize adverse impacts to wildlife. Let down fences (as defined in BLM Manual H-1741-1 Chapter 4) could be constructed in big game crucial ranges and migration corridors to provide safe movement of wildlife.
2. The top fence wire would be secured above horizontal braces to minimize perching by predatory birds.
3. If steel pipe corners are used, domed pipe caps would be secured to the top of steel pipes to prevent wildlife entry and to minimize predatory bird perching.
4. Visibility of fences constructed within 5/8 mile of seasonal sage-grouse ranges would be increased by utilizing appropriate measures such as installing wide stays, deflectors and/or white-topped posts. Type or brand of reflectors used would be selected from those that have been previously tested and determined to be effective.

2.1.6 Maintenance

The BLM proposes to maintain the above treatments to ensure original project objectives continue to be met. Project maintenance, including re-treatment, would be completed as needed over the life of the plan.

The treatment objectives from the proposed action (see Tables 1 through 3 in Section 2.1 and EA Appendix A) are based on agency-specific objectives and resource benefits, listed in Section 2.1, for sagebrush steppe ecosystems. Maintenance may include any of the proposed actions individually or in any combination outlined in Tables 1 through 3.

2.1.7 Monitoring

Monitoring would be conducted to evaluate the effectiveness of projects completed to determine if goals and objectives are being made in the attainment of desired conditions within the Project Area for which treatments have been completed. Treatment areas will be monitored both pre-and post-treatment on a multiple-year basis to ensure that project objectives are achieved. Each treatment will be monitored before implementation and then each of the first three, fifth- and tenth years following treatments. Progress would be attained through meeting the objectives of Table 2-2 of the ARMPA (See EA Appendix A). In some situations, already collected BLM Assessment, Inventory, and Monitoring (AIM) data may be used to determine baseline conditions, if no ecosystem changes have occurred since the data was collected (e.g., fire).

The monitoring plan for each of the Project Areas will include the following studies in upland and riparian areas, as determined by an BLM ID Team of resource specialists. Some examples of monitoring studies that could be used to meet the proposed action objectives are:

- Upland Monitoring Studies: Assessment, Inventory, and Monitoring (AIM), Rangeland Health Standards and Guidelines, Key Management Area utilization (Key Forage Plant Method), Trend/Frequency (Nested Frequency Method), Use Pattern Mapping (Key Forage Plant Method), Production (Double-Weight Sampling Method), ecological condition, Ecological Site Inventory, Line-Intercept, vegetation and ground cover, and photo points, etc.
- Riparian Monitoring Studies: Proper Functioning Condition (PFC), Riparian-Wetland Utilization Monitoring, Multiple Indicator Monitoring (MIM), Photo Trend, and Water Quality.
- Wildlife Habitat Monitoring Studies: Utilization, condition, cover and big game habitat condition and trend, wildlife use studies, sage grouse telemetry studies, fence/wildlife risk studies, etc.
- Climate/Precipitation Monitoring Studies: Rain gauge data, weather station data, NOAA data, etc.
- Invasive and Noxious Weed Monitoring: Pre-treatment and post treatment monitoring would be completed within vegetation treatment areas.

Monitoring and analysis would be required to determine whether objectives are being met (see Tables 1 through 3 in Section 2.1 & EA Appendix A) and determine if additional treatments are needed to attain the desired condition. These studies would serve as the basis for making any future changes in management. Livestock permittees, interested public, and other resource specialists from the BLM and other State and Federal agencies would be invited to participate in a Cooperative Monitoring Agreement and provide input and interpretation to all monitoring studies within the Project Area. Information would continue to be collected from existing BLM studies in Project Areas. Monitoring sites established outside of treatment areas could be used to compare results on treated vs. untreated areas. Monitoring sites would be selected at random and/or targeted locations, using spatially balanced methods to optimize data collection across the Project Areas.

Post project implementation vegetation monitoring would be done to determine if objectives were being met. This may include but would not be limited to monitoring vegetation for community composition, diversity, vigor, productivity, and ground cover. If monitoring indicates a post implementation treatment site is moving toward an undesirable vegetation pathway or state, adaptive management procedures (Section 2.1.1. Adaptive Management) are in place and would be utilized to address the given situation on the specific project site. The adaptive management procedures may include but would not be limited to reseeding, pinyon-juniper removal, harrowing, seedling planting, the use of herbicide and fence construction to limit herbivore access to the site.

2.2 No Action Alternative

Under the No Action alternative, there would be no implementation of vegetation treatments or management strategies within the O’Neil PPA. GRSG habitat would not be restored, invasive species would not be reduced, fuels would not be managed to reduce wildfire threat, and previously burned areas would not be rehabilitated beyond current level of activities. Wildfire management of the proposed treatment units would continue to be guided by the existing resource management plan and amendments. The BLM would not be supporting the plans developed under the SGI or the ARMPA to restore and maintain GRSG and its habitat. The No Action alternative would not meet the purpose and need of the project.

2.3 Alternatives Considered but Eliminated

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). In developing the proposed action, the BLM ID Team consulted with specialists (including NDOW), cooperators, and the public to review and consider alternative ways to manage the treatment units.

Public comments received in response to the original proposed action provided suggestions for alternate methods for achieving the purpose and need. In response to public scoping, the BLM revised the original proposed action by adding treatment units, modifying the size of some of the treatment units, and adding herbicide treatments.

The BLM also reviewed the ARMPA (BLM, 2015b) to determine what implementation restrictions on treatment types or timing need to be met with the project.

The Proposed Action to be analyzed is a result of these consultations. There were no other alternatives dismissed.

3. AFFECTED ENVIRONMENT AND IMPACTS ANALYSIS

This section describes the existing environment of the area that would be affected by the Proposed Action and alternatives and discloses the potential direct, indirect and cumulative impacts. Resources and issues that were determined by the BLM ID Team to be present but without potential for significant impacts are summarized with a rationale for elimination from analysis in Appendix C. The issues brought forward for analysis are a result of internal and external scoping and are identified in Table 7. This approach follows 40 CFR 1500.1(b), which states "NEPA documents must concentrate on the issues that are truly significant to the action in question, rather that amassing needless detail" and 40 CFR 1500.4(g), directing reduction of excessive paperwork by "Using the scoping process, not only to identify significant environmental issues deserving of study, but also to deemphasize insignificant issues, narrowing the scope of the environmental impact statement process accordingly." The terms "effects" and "impacts" as used in these regulations and this document are synonymous.

Table 7. Issues Brought Forward for Analysis

Section & Issue No.	Issue Statement	Impact Indicator
Section 3.5 Issue 1	How would proposed restoration, conifer removal and fuel break treatments affect vegetation types?	acres of treatment
Section 3.6 Issue 2	How would the proposed use of herbicide active ingredients imazapic, aminopyralid, rimsulfuron and fluroxypyr for aerial (broadcast) and ground-based application (spot and broadcast) affect target vegetation (weeds), grazing/livestock, vegetation and special status plants, wildlife and special status wildlife species, T&E species, water quality, and riparian and wetland resources?	acres of treatment
Section 3.7 Issue 3	How would proposed treatments affect wildlife habitat including Special Status Species?	acres of treatment
Section 3.8 Issue 4	How would proposed temporary allotment closures and fences affect livestock grazing?	AUMs for acres seeded or acres fenced to protect seeding
Section 3.9 Issue 5	How would the project impact Fire Management?	acres of treatment
Section 3.10 Issue 6	Will the planned treatments cause temporary, short-term, and/or long-term impacts to resources that generate social and/or economic conditions in the form of market and/or non-market ecosystem services that serve the needs and interests of the public?	Social and/or economic impacts measured in jobs, labor income, value added, fiscal conditions, social conditions and/or availability/disposition of ecosystem services and resilience.

3.1 Tiering

This EA is tiered to the analysis and effects disclosed in the following NEPA documents:

- *PEIS for Fuel Breaks in the Great Basin* (BLM, 2020; Fuel Breaks PEIS).

- *PEIS for Fuels Reduction and Rangeland Restoration in the Great Basin* (BLM, 2021; Fuels PEIS).
- *PEIS for Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States* (BLM, 2007a).
- *Final PEIS for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on Bureau of Land Management Lands in 17 Western States* (BLM, 2016a).

3.2 Direct and Indirect Effects

To comply with NEPA, the BLM is required to address specific elements of the environment that are subject to requirements specified in statutes, regulations, or executive orders.

Environmental effects according to 40 CFR 1508.8 include:

- Direct effects, which are caused by the action and occur at the same time and place; and
- Indirect effects, which are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

The environmental effects of the Proposed Action and No Action alternative described in this EA are primarily derived through the analysis of the expected changes that implementation of each alternative would have on the existing conditions of the resources described in the sections below.

3.3 Cumulative Effect Study Areas

For the purpose of this EA, cumulative effects are analyzed as the sum of all past and present actions, the Proposed Action or alternative, and reasonably foreseeable future actions (RFFAs). As defined in 40 CFR 1508.7, a cumulative effect is an effect on the environment that results from the incremental effect of the action when added to other past, present, and RFFAs, regardless of which agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

For each affected resource, a Cumulative Effects Study Area (CESA) was developed appropriate to the geographical extent of anticipated effects. CESAs developed for the affected resources are shown in Table 8.

Table 8. Cumulative Effects Study Areas

Issues	Acres	CESA Name	Description	Rationale
3.5 How would proposed restoration, conifer removal and fuel break treatments affect vegetation types?	2,436,281	O’Neil PPA CESA Boundary	O’Neil PPA boundary polygon.	Restoration, conifer removal and fuel breaks are site specific in scope and would be implemented only in Treatment areas. Vegetation outside of treatment units would not be directly affected by treatments. However, treatments are expected to indirectly affect vegetation outside of the treatment areas by limiting catastrophic wildfire
3.6 How would the proposed use of herbicide active ingredients imazapic, aminopyralid, rimsulfuron and fluroxypyr for aerial (broadcast) and ground-based application (spot and broadcast) affect target vegetation (weeds), grazing/livestock, vegetation and special status plants, wildlife and special status wildlife species, T&E species, water quality, and riparian and wetland resources?	2,436,281	O’Neil PPA CESA Boundary	O’Neil PPA boundary polygon.	Herbicide treatments are site specific in scope and would be implemented throughout the PPA, dependent on current and future location of infestations.
3.7 How would proposed vegetation treatments affect wildlife habitat?	2,436,281	O’Neil PPA CESA Boundary	O’Neil PPA boundary polygon.	The large size of the project area encompasses the vast majority of relevant species populations.
3.7 How would proposed vegetation treatments affect migratory birds and nesting raptors?	2,436,281	O’Neil PPA CESA Boundary	O’Neil PPA boundary polygon.	The large size of the project area encompasses the vast majority of relevant species populations.
3.7 How would proposed vegetation treatments affect terrestrial special status species?	9,703,591	Special Status Species CESA Boundary	Fine-scale GRSG HAF polygons that overlap Project Area.	Sage-grouse is an umbrella species for sagebrush-associated species.

Issues	Acres	CESA Name	Description	Rationale
3.8 How would proposed temporary allotment closures and fences affect livestock grazing?	2,607,293	Allotment	Allotment boundaries where treatment areas with fences and closures are proposed.	Closures and fences would be implemented at the pasture or allotment level.
3.9 How would the project impact Fire Management?	2,436,281	O’Neil PPA CESA Boundary	O’Neil PPA boundary polygon.	The large size of the project area encompasses the vast majority of relevant influences from treatments.
3.10 Will the planned treatments cause temporary, short-term, and/or long-term impacts to resources that generate social and/or economic conditions in the form of market and/or non-market ecosystem services that serve the needs and interests of the public?	18,202,224	O’Neil PPA Socioeconomic CESA Study Area	Elko County, NV; Twin Falls and Cassia counties, ID; Box Elder County, UT	Counties are proximal to the project area and contain populations that project actions may directly and/or indirectly impact.

3.4 Past, Present, and Reasonably Foreseeable Future Actions

For Lands and Minerals actions, past is defined as actions that are closed, present is defined by authorized and expired actions, and reasonably foreseeable is defined as pending actions. These figures are compiled from Legacy Rehost System 2000 (LR2000) reports (except for oil and gas exploration where the acreage was found from each project casefile) within each CESA boundary. There is no geospatial component to LR2000 so each township and range that was wholly and partially within a CESA boundary was included in the report, meaning that the acreage for each action type may be greater than what is within that CESA boundary. Be advised that acreage for past and reasonably foreseeable actions are not always accurate as appropriate case file adjudication may not have occurred for incomplete applications or applications that were withdrawn; or that the case file has not been adjudicated to reflect the exact acreage for pending (not processed) cases. In addition, if only part of a project was within the CESA boundary, the entire project acreage was counted. Acres for the remaining actions are calculated using GIS layers.

For Wildfire Suppression (burned area), past is defined as the number of acres burned in the past twenty years (2000 to 2020). Present is defined as the number of acres burned in 2020. Future wildfire suppression is defined as the yearly average for the past twenty years, then multiplied by ten for the projected number of acres burned over the next ten years (the expected duration of the proposed action).

For Emergency Stabilization and Restoration (ES&R) treatments, past is defined as the number of burned acres treated in the past twenty years (2000 to 2020). Present is defined as the number of burned acres treated in 2020. Future ES&R treatments is defined as the yearly treatment average for the past twenty years. Then multiplied by ten for the projected number of burned acres treated over the next ten years (the expected duration of the proposed action).

For Weed Treatments, past is defined as treatments completed over the last 20 years from (2000 to 2020), present is defined as acres completed in 2020, and future weed treatments are defined as the yearly treatment average for the past 20 years, then multiplied by 10 (the expected duration of the proposed action). Weed treatment includes all types of treatment methods (herbicide, biological, and manual/mechanical) that target noxious weed and non-native invasive vegetation.

For Fuels Treatments, past is defined as the number of acres treated in the past twenty years (2000 to 2020). Present is defined as the number of acres treated in 2020. Future Fuels treatments is defined as the yearly treatment average for the past twenty years, then multiplied by ten for the projected number of acres treated over the next ten years (the expected duration of the proposed action).

For analysis purposes, the total number of acres affected may outnumber the acres of the CESA; this is because effects from multiple actions can occur on the same acreage, e.g., a right-of-way, wildfire suppression and ES&R actions can all effect the same area.

Table 9. O'Neil PPA CESA Boundary Past, Present and RFFAs

Action Type	Past	Present	Reasonably Foreseeable
Lands Actions (Acres)			
Right-of-Ways	119,528	19,792	3,443
Leases/Permits	374,297	504	3
Disposals/Transfers	249,963	4,277,433	1,923

Action Type	Past	Present	Reasonably Foreseeable
Restoration/Prevention Actions (Acres)			
Wildfire Suppression (Burned)	737,753	2,073	368,876
ES&R	295,414	4,608	147,707
Weed Treatments	16,467	433	8,234
Fuels Treatments	6,171	992	3,085
Minerals Actions (Acres)			
Oil and Gas Exploration	6	7	0
Geothermal Exploration	2	1	0
Solid Leaseables	0	0	5
Mineral Materials	70	133	0
Notices	245	19	0
Plans of Operations	367	4,172	3,626
Livestock Grazing (Acres)			
Allotment Acres	2,607,293	2,607,293	2,607,293

Table 10. Special Status Species CESA Boundary Past, Present and RFFAs

Action Type	Past	Present	Reasonably Foreseeable
Lands Actions (Acres)			
Right-of-Ways	232,449	130,017	5,749
Leases/Permits	56,006	1,788	394
Disposals/Transfers	5,338,851	5,616,496	3,926,551
Restoration/Prevention Actions (Acres)			
Wildfire Suppression (Burned)	2,027,846	21,588	1,013,923
ES&R	368,312	24,114	184,156
Weed Treatments	66,674	2,811	33,337
Fuels Treatments	9,540	4,375	42,262
Minerals Actions (Acres)			
Oil and Gas Exploration	6	7	0
Geothermal Exploration	2	1	0
Solid Leaseables	640	0	5
Mineral Materials	10,430	13,343	0
Notices	413	50	20
Plans of Operations	415	5,427	3657
Livestock Grazing (Acres)			
Allotment Acres (includes USFS Allotments)	8,359,195	8,359,195	8,359,195

Table 11. Allotment CESA Boundary Past, Present and RFFAs

Action Type	Past	Present	Reasonably Foreseeable
Lands Actions (Acres)			
Right-of-Ways	136,135	28,693	3,467
Leases/Permits	464,727	1,222	3
Disposals/Transfers	651,650	4,316,190	4,175

Action Type	Past	Present	Reasonably Foreseeable
Restoration/Prevention Actions (Acres)			
Wildfire Suppression (Burned)	671,372	11,437	335,686
ES&R	258,870	11,366	123,725
Weed Treatments	17,622	464	8,811
Fuels Treatments	11,044	992	5,522
Minerals Actions (Acres)			
Oil and Gas Exploration	6	7	0
Geothermal Exploration	2	1	0
Solid Leaseables	0	0	5
Mineral Materials	90	138	0
Notices	281	27	7
Plans of Operations	372	2308	291
Livestock Grazing (Acres)			
Allotment Acres	2,607,293	2,607,293	2,607,293

3.5 Issue 1: Effects of Treatments on Vegetation Types & Associated Habitats

How would proposed restoration, conifer removal and fuel break treatments affect vegetation types and associated habitats?

3.5.1 Affected Environment

The O'Neil PPA Project area contains a wide range of elevations, rainfall, temperatures, and soil types. The composition of species in the various plant communities is determined by soils, slope and aspect, elevation, and precipitation, with considerable overlap in range. This results in a variety of vegetation communities, however there are two main vegetation communities that are the focus of the O'Neil PPA treatment areas: Shrub Steppe and Pinyon Juniper (PJ) Woodlands. The estimated area of vegetation that could be affected by the proposed action is 208,414 acres of Shrub Steppe and PJ Woodlands. That is 8% of the 2,436,281-acre project area, which is a little more than 3% of the Wells Field Office and less than 2% of the Elko District. There are five other vegetation communities discussed because they can be found in proposed treatment areas and of their importance to the overall health of the ecosystem: Riparian, Aspen, Curlleaf Mountain Mahogany, Perennial Grasslands and Invasive Annual Grasses.

Shrub Steppe and PJ Woodland communities in the Great Basin were little influenced by humans before Anglo-American settlement in the mid-1800s. Since then, a variety of interacting factors, including excessive livestock grazing, conversion to agriculture, urban and exurban development, recreation activities, mining and energy development, invasive plant species, altered fire regimes, and climate change, have caused widespread changes in the structure and function of Shrub Steppe communities. Of these factors, the greatest threats to the persistence of historical Shrub Steppe communities in the O'Neil PPA (Figure 8) are the invasion of non-native annual grasses, primarily cheatgrass (*Bromus tectorum*), into low- and mid-elevation sagebrush, and the encroachment of pinyon (*Pinus monophylla*) and juniper (*Juniperus osteosperma*) species into mid- and high-elevation sagebrush (Chambers, et al., 2014a; Chambers J. C., et al., 2014b; Miller, Chambers, Pyke, Pierson, & Williams, 2013).

Fire ecology plays an important role in vegetation dynamics and plant community composition. Fire suppression and other anthropogenic influences alter susceptible vegetative communities from grass, forb, and shrub communities to juniper dominated states with shallow rooted grasses and few shrubs. This contributes to the loss of sagebrush-dominated areas and increases the risk of high-severity fires. Such fires are the result of increased fuel loading and the creation of dense, closed-canopy woodlands susceptible to crown fires (Chambers J. C., et al., 2014b; Rowland, Widsom, Suring, & Meinke, 2006). It is stated in the Fuels PEIS that “Fire has always been an integral natural process in most ecosystems in the project area; however, human factors are shortening the fire return intervals and influencing larger wildfire footprints in these ecosystems, pushing them beyond their historical ranges of variability. Human factors include human fire starts, fire suppression, grazing management, and invasive annual grass expansion. Sagebrush ecosystems have among the most clearly altered fire regimes due to these factors (Shinneman, et al., 2018)”. For further discussion of the changes to fire regimes effects of fire on the Great Basin see the Fuels PEIS, Section 3.2 Fire & Fuels (BLM, 2021).

Shrub Steppe

Shrub Steppe landscapes are dominated by rolling, grassy plains or “steppe,” with an overstory of sagebrush and other woody shrubs. Various habitat features such as streams, wetlands, rocky talus slopes, and canyons support a variety of plants and animals uniquely adapted to the harsh and sensitive Shrub Steppe ecosystem. According to the LandFire data, there are 1,879,842 acres of Shrub Steppe identified in the project area (Figure 9). Areas of Shrub Steppe to be treated don’t currently meet the identified habitat objectives for GRSG in Table 2-2 of the 2015 ARPMA (BLM, 2015b; BLM, 2022) see also Appendix A in this EA.

Sagebrush species within the O’Neil PPA include Wyoming big sagebrush (*Artemisia tridentata spp. wyomingensis*); basin big sagebrush (*Artemisia tridentata spp. tridentata*); mountain big sagebrush (*Artemisia tridentata spp. vaseyana*); and black sagebrush (*Artemisia nova*). Other common shrubs include rabbitbrush (*Chrysothamnus nauseosus*), antelope bitterbrush (*Purshia tridentata*), serviceberry (*Amelanchier alnifolia*), snowberry (*Symphoricarpos longiflorus*), currant (*Ribes ssp*.) and wild rose (*Rosa woodsia*).

Understories include a variety of native grasses and forbs, seeded non-native grasses and, to a lesser extent, invasive annuals. Perennial bunchgrass bluebunch wheatgrass (*Pseudoroegneria spicata*) is the most widespread; other perennial bunchgrass species include bottlebrush squirreltail (*Elymus elymoides*); Idaho fescue (*Festuca idahoensis*); Thurber’s needlegrass (*Achnatherum thurberianum*); prairie junegrass (*Koeleria macrantha*); Indian ricegrass (*Achnatherum hymenoides*); and basin wildrye (*Leymus cinereus*) which are some of the most common deep rooted bunch grasses that are indicative of shrub steppe communities. These deep-rooted grasses have large root structures compared to their foliar vegetation. This allows them to capture larger amounts of moisture during the infrequent wetting events. Needle-and-thread grass (*Stipa comata*) is a less common grass species across the area but appears on many sites with bluebunch wheatgrass and Idaho fescue. Sandberg’s bluegrass (*Poa secunda*) is a common shallow-rooted perennial grass in the Shrub Steppe; although not deep-rooted, these plants have extensive lateral roots that are effective at capturing rainfall from brief rain events and allow Sandberg’s bluegrass to successfully compete with emerging native bunchgrass seedlings.

Crested wheatgrass (*Agropyron cristatum*) is also commonly found throughout the shrub steppe plant community. Although crested wheatgrass is not a native bunchgrass to the area, it has been used in plantings for over 100 years and is considered by many to be naturalized. Crested wheatgrass is commonly planted on public and private lands to improve available forage, combat halogeton (*Halogeton glomeratus*) and to prevent invasion by annual grasses after a wildfire. Most of the past crested wheatgrass seeding in the project area were in efforts to combat halogeton infestations.

Forbs provide the majority of plant species richness in stable-state Shrub Steppe systems, are important seasonal food sources for wildlife like the GRSG, provide erosion control through rapid establishment, and help prevent soil-nutrient loss. There are over a hundred commonly seen forbs in Shrub Steppe and Perennial Grasslands within the project area. Arrowleaf balsamroot (*Balsamorhiza sagitatta*) is often the most widespread and abundant forb; other major forb species include hawksbeard (*Crepis spp*.); phlox (*Phlox* spp.); western yarrow (*Achillea millefolium*); lomatium (*Lomatium* spp.); lupine (*Lupinus* spp.); groundsel (*Senecio integerrimus*); and mule's ears (*Wyethia amplexicaulis*).

On the soil surface, a fragile community of microscopic organisms may form a biological soil crust, which locks in moisture, fixes atmospheric nitrogen, helps prevent erosion, and is often present in the interspace between perennial plants. For additional discussion of biological soil crusts see the *PEIS for Fuels Reduction and Rangeland Restoration in the Great Basin*, Section 3.5.1 Biological Soil Crusts (BLM, 2021).

Invasive annual grasses in the Shrub Steppe ecosystem compromise habitat diversity, alter the grazing season and do not provide as much consistent forage biomass as native perennial bunchgrasses. Invasive annual grasses increase wildfire threat as they can provide an abundant source of dry "fine fuels" earlier in the season than native bunchgrasses. Invasive annual grasses are discussed more in-depth later in this section.

Pinyon Juniper Woodlands

This vegetation community consists of natural PJ Woodlands made up primarily of pinyon pine (*Pinus monophylla*) and juniper (*Juniperus osteosperma*), as well as areas where PJ has encroached into Riparian, mid-elevation Shrub Steppe, Aspen, and Mountain Mahogany vegetation types. There are 519,195 acres of PJ Woodlands identified in the project area (Figure 10 through Figure 13). There are only two areas in the southern end of the project area where pinyon pine are known to occur substantially in the community: the North Pequops treatment area and the Murdock Mountain treatment area (Figure 12). The remaining PJ Woodlands in the project area are dominated by junipers. PJ treatments were identified using a 3-mile buffer of Active/Pending sage-grouse leks to meet habitat objectives in Table 2-2 of the 2015 ARPMA (BLM, 2015b; BLM, 2022); see also Appendix A in this EA.

Perennial and annual herbaceous species are still present, but their presence in the community is limited. Species include bluebunch wheatgrass, Thurber's and Sandberg's bluegrass, basin wildrye and needle-and-thread grass. Juniper and pinyon trees are prevalent enough to dominate these areas; however, black sagebrush, antelope bitterbrush and curlleaf mountain mahogany (*Cercocarpus ledifolius*) can be located within the understory.

Historically, PJ stands persisted in fire-safe habitats such as shallow or ashy soil and rocky areas; PJ now occurs across a broad variety of soils and terrain creating a high degree of stand heterogeneity in structure, composition, function, and varying effects on ecological processes such as hydrology and nutrient cycling. Based off LandFire data and ESDs, it is estimated that there were approximately 58,000 acres of PJ type vegetation communities present during pre-Euro-American settlement. Currently there are approximately 519,195 acres of PJ type vegetation communities in the project area (Figure 14). The rapid conversion of Shrub Steppe to PJ Woodland has occurred across a wide variety of sagebrush communities, soils, and topography since the 1880s (Miller & Rose, 1995; Young & Evans, 1981; Burkhardt & Tisdale, 1976). The combination of spatial and temporal diversity creates a vast array of structurally different juniper communities, many of which are changing. Juniper woodland function and structure changes across different soils, landscape positions, and stages of development. During woodland development, low densities of trees in the early phases of encroachment add structural heterogeneity to shrub steppe community types. However, as woodlands continue to develop, tree function changes with size, distribution, and density. As woodland function and structure shift across varying landscapes and stages of development, there are marked effects on community composition, diversity, and associated soils. Junipers are able to use allelopathic traits to eliminate surrounding vegetation increasing their success. Wildlife habitat suitability is also altered across time and space (Miller & Rose, 1999). Allelopathy is defined “as any direct or indirect harmful effect of one plant on another through production of chemical compounds that escape into the environment” (Rice, 1984).

The encroachment of PJ Woodlands is categorized in Phases I, II and III. Phases have been developed separately by Miller et al. (2014) and Roundy (2014) using two different cover calculation methods, resulting in two sets of reference cover percentages available for identifying Phases. The Roundy (2014) Phases will be used for Phase identification in the project area: Phase I is less than 34 percent relative tree cover, Phase II is 34 to 68 percent relative tree cover, and Phase III is greater than 68 percent relative tree cover. Currently there are 298,905 acres of Phase I; 134,188 acres of Phase II; and 86,102 acres of Phase III identified in the project area.

Riparian

According to LandFire data, Riparian and aquatic ecosystems comprise approximately 2 percent of the land surface in the project area or a little less than 50,000 acres (Figure 10 through Figure 13). Riparian areas are supported by the only surface water in the region, and most are small and isolated from one another (Skudlarek, 2006; Sada, et al., 2001). Despite their small size, these ecosystems support most of the biodiversity in the region.

Since pre-Euro-American settlement there has been around a 5% reduction in overall Riparian areas in O’Neil PPA or over a 2,000-acre loss. Most riparian and aquatic systems have been altered from historical conditions; the changes in riparian and aquatic system condition have resulted from altered discharge due to dams and diversions, excessive use by nonnative ungulates, road construction in valley bottoms, and invasions of non-native vegetation and aquatic animals. In areas prone to stream incision, these perturbations (deviations) have increased the rate and magnitude of downcutting (Chambers & Miller, 2004). In most aquatic and riparian communities, composition has been functionally altered from organisms that are intolerant of harsh and degraded conditions to organisms that tolerate pollution and harshness. In addition, the vast majority of springs have been seriously degraded by lower surface discharge caused by groundwater pumping and diversions and by non-native ungulate grazing (Sada, Vinyard, & Hershler, Environmental characteristics of small springs in northern Nevada, 1992).

In riparian areas along perennial stream reaches, woody species include coyote willow (*Salix exigua*), yellow willow (*Salix lutea*), wild rose and quaking aspen (*Populus tremuloides*). Meadows are characterized by wetland obligate (always occur) and facultative (sometimes occur) graminoids and forbs such as Nebraska sedge (*Carex nebrascensis*), tufted hairgrass (*Deschampsia cespitosa*), Baltic rush (*Juncus arcticus*), and western mountain aster (*Symphyotrichum spathulatum*). Basin and mountain big sagebrush occur in dry meadows and along ephemeral (intermittent) stream reaches.

PJ encroaches into riparian habitat and alters habitat functionality, through increased water uptake, the addition of tree structure that may not have historically been present and potential dominance of the vegetation community at these sites.

Aspen

Quaking Aspen is a minor component in this landscape and covers less than 0.003% of the project area or a little less than 6,000 acres (Figure 10 through Figure 13). Historically, Aspen covered approximately 0.004 % of the project area or around 10,500 acres, making the current acreage a 43% reduction in coverage. Aspen stands are commonly associated with meadow edges, rocky outcrops, riparian areas, and areas with relatively high-water tables. Aspen occur at 6,500 to over 8,000 feet in elevation, on 0–45% slopes across all aspects. In eastern Nevada, aspen do not exist in the large, extensive stands (several hundred acres) common to the Rocky Mountains or Canadian provinces; aspen are typically found in isolated upland stands where soil and moisture conditions are favorable (perched water tables) or as stringers along stream corridors (Cobb & Vavra, 2003).

Aspen communities are known for their high plant diversity, with an understory of shrubs, grasses and forbs. Characteristic understory grasses include Idaho fescue, pinegrass (*Calamagrostis rubescens*), Great Basin wildrye, or blue wildrye (*Elymus glaucus*), mountain brome (*Bromus marginatus*), and shrubs include sagebrush, snowberry, serviceberry, chokecherry (*Prunus virginiana),* and wild rose, with forbs consisting of larkspur (*Delphinium spp.*), waterleaf (*Hydrophyllum spp.*), penstemon (*Penstemon spp.*), geranium (*Geranium spp.*), iris (*Iris spp.*), lupine and violet.

PJ encroaches into aspen stands and alters the habitat functionality through resource competition with the existing clone and degradation of habitat quality for aspen-associated wildlife and plant species. Aspen stands are considered critically important to preserve and protect from further degradation.

Curlleaf Mountain Mahogany

Curlleaf mountain mahogany is a common species to be found mixed in with PJ at higher elevations. As PJ transitions from Phase I to Phase III, it gradually chokes curlleaf mountain mahogany out of the vegetation community as it is out competed for light, water and nutrients and is left in isolated pockets; without disturbance it ends up removed from the system due to lack of recruitment.

Currently there is less than 6,000 acres of curlleaf mountain mahogany outside of PJ dominated areas. The most common plants to coexist with curlleaf mountain mahogany are snowberry, juniper, and big sagebrush. Typical site characteristics are well-drained dry hills and rocky slopes throughout the area at elevations from 5,000 to 8,500 feet.

Increases in curlleaf mountain mahogany abundance are often attributed to decreased fire frequency (Gruell, Eddleman, & Jaindl, 1994; Gruell, 1982). Curlleaf mountain mahogany recolonization can be quick if seed in the soil is unharmed, but postfire establishment can take several decades following severe fires that destroy the seed bank and kill parent plants (Gruell, Bunting, & Neuenschwander, 1985).

Curlleaf mountain mahogany has thick bark and may survive "light" fires (Gruell, Bunting, & Neuenschwander, 1985). Sprouts following fire are rare and short lived (Bacon & Dell, 1985; Neuenschwander, 1978). Most often curlleaf mountain mahogany is killed by fire, and regeneration is by seedling establishment fires (Gruell, Bunting, & Neuenschwander, 1985). Seed may come from curlleaf mountain mahogany trees avoiding fire in low fuel areas (Dealy, 1974) or by seed surviving in soil (Johnson C. G., 1998).

Perennial Grasslands

Perennial Grasslands in the project area are areas of Shrub Steppe that have been altered by disturbance such as historic vegetation projects and wildfire; there are a little over 126,000 acres identified in the project area (Figure 10 through Figure 13), compared to a historical average of around 6,000 acres. These changes have removed the shrub component and left a perennial and annual understory and can be void of native shrub seed sources. Natural recolonization would take hundreds of years; however, shrubs will eventually naturally re-establish and begin to dominate the vegetative composition of these areas. The large-scale loss of structure reduces the site’s overall diversity and reduces resistance to invasive annuals. There are 15,589 acres of Perennial Grasslands identified to be treated that don’t currently meet the habitat objectives for GRSG in Table 2-2 of the 2015 ARPMA (BLM, 2015b; BLM, 2022) due to lack of shrub cover; see also Appendix A in this EA.

Grass and forb species found in Perennial Grasslands are the same as those found in the Shrub Steppe, including the addition of crested wheatgrass. Although crested wheatgrass is not a native bunchgrass to the area, it has been used in plantings for over 100 years and is considered by many to be naturalized.

Invasive Annual Grasses

Annual Grasslands in the project area are historic communities of Shrub Steppe that have been altered by wildfire or other disturbance and are now dominated by cheatgrass, and other non-native weeds such as halogeton, mustard (*Brassicae* ssp.) and Russian thistle (*Salsola tragus L.*). There are a little over 82,000 acres identified in the project area (Figure 10 through Figure 13). Approximately 18,030 acres of Annual Grasslands are identified in treatments and don’t meet the habitat objectives for GRSG in Table 2-2 of the 2015 ARPMA (BLM, 2015b; BLM, 2022); see also Appendix A in this EA.

Cheatgrass not only changes the fire frequency of a site, but also the fire volatility, intensity and the extent that an area is likely to burn in the future. Cheatgrass infested areas burn at a much greater frequency, every 3-5 years. At this frequency, native shrubs and perennial grasses cannot recover and after a few wildfire cycles a cheatgrass monoculture develops, further expanding and increasing fire frequency. In many places, repeated fire in areas with shortened fire return intervals has caused cheatgrass to replace sagebrush communities (Barbour & Billings, 2000).

Additional annual grasses of concern include medusahead (*Taeniatherum caput-medusae*) and ventenata (*Ventenata dubia*) as they are similar to cheatgrass in how they impact vegetation communities; these have yet to be documented in the project area but have the potential for spread into the area.

3.5.2 Environmental Impacts

3.5.2.1 Proposed Action

The Proposed Action would implement vegetation treatments to actively modify treatment areas to meet the 2015 ARMPA Table 2-2 habitat objectives for the benefit of GRSG (BLM, 2015b; BLM, 2022) and other wildlife species dependent on sagebrush ecosystems. Adaptive management would allow for the assessment of treatments and identification of needs for retreatment to meet objectives. DFPMs in Section 2.1.5 would avoid or minimize potentially adverse impacts from the treatments. Fuel loading would be reduced to lower the risk of catastrophic, vegetation-type changing wildfires. Encroaching pinyon and juniper would be reduced or eliminated, and areas seeded or planted to facilitate establishment of desirable native plant species would make progress towards meeting the 2015 ARMPA Table 2-2 habitat objectives for GRSG (BLM, 2015b; BLM, 2022)

Impacts to biological soil crusts are discussed in both the Fuels PEIS (BLM, 2021) and the Fuel Breaks PEIS (BLM, 2020). Treatments can remove or damage biological soil crust. The effects to the plant community may be more intense (Miller, Warren, & St. Clair, 2017) because biological soil crusts stabilize soil, reduce or eliminate erosion, retain soil moisture, and shelter and increase germination success for seeds.

3.5.2.1.1 Proposed Treatment Types

<u>Restoration Treatments</u>

Approximately 96,329 acres or close to 47% of the treatment area is proposed for restoration treatments. Approximately 68,954 acres of degraded Shrub Steppe, 14,518 acres of Perennial Grasslands and 12,857 acres of Annual Grasslands would be impacted, or 72%, 15% and 13% of the respective vegetation community in the project area. The effects of restoration treatments on vegetation are discussed in detail in the Fuels PEIS Section 4.2. (BLM, 2021) and are summarized below.

Restoration treatments using the methods identified in Table 4 would, as described in the Fuels PEIS, remove, modify or add vegetation to achieve identified objectives. Impacts of restoration treatments include temporary disturbance during implementation, altering plant community composition by reducing biomass and cover, increasing diversity by seeding or planting desired plant species and altering plant community structure and function. Treatments would improve vegetative health, resistance and resilience, as the resulting vegetation conditions would be less susceptible to dominance by invasive annual grasses (Chambers, et al., 2017) and future disturbances. The combined effects of restoration projects would be a more diverse plant community structure, with better functioning nutrient and hydrologic cycling and more vigorous constituent vegetation. These features would indicate a community with increased resistance and resilience (Chambers, et al., 2014a). Treatments would help restore degraded, sagebrush communities to a more resistant and resilient condition. Increased resistance to invasive annual grass colonization, and resilience from disturbances, would, in turn, modify wildfire behavior by restoring natural burn patterns and lengthening fire return intervals. Restoration of plant diversity, especially forbs, would increase pollinator resources and enhance the potential for long-term persistence of plants (BLM, 2021). These benefits to vegetation from restoration treatments would help meet the goals and objectives of the proposed action in Section 2.1 of this document. The long-term benefits would greatly outweigh any of the expected short-term impacts caused by restoration treatments.

Conifer Reduction Treatments

Approximately 87,133 acres or a little less than 43% of treatment area is proposed for conifer removal of Phase I and Phase II PJ Woodland. This is 17% of the 519,195 acres of PJ Woodland identified in the project area using Sage-Grouse Initiative's (SGI) tree cover mapping data. SGI's tree cover data also shows there are 298,905 acres of Phase I; 134,188 acres of Phase II; and 86,102 acres of Phase III PJ. According to LandFire data and ESDs historically there were approximately 58,000 acres of PJ in the project area. Using the treatment methods identified in Table 4, Phase I and Phase II PJ encroachment would be reduced or eliminated and desired species seeded or planted to improve Shrub Steppe and meet objectives. If all 87,133 acres of Phases I and II were treated, there would be 432,062 acres of untreated PJ Woodlands remaining in the project area. The effects of conifer reduction treatments on vegetation are discussed in detail in the Fuel PEIS Section 4.2. (BLM, 2021).

As described in the Fuels PEIS, treatments in Phase I would decrease the likelihood of transition to Phase II and III, and potentially enhance the opportunity for natural expansion of the understory. Treatments in Phase II would reduce fuels and in turn the associated fire risk. Removal methods would be designed to facilitate understory restoration; treatment areas with degraded understory would be treated with seeding and planting to minimize the potential for annual grass establishment (BLM, 2021).

Removing PJ Phase I and Phase II prior to fire helps reduce the fuel loadings, resulting in lower fire intensities. Fires with lower intensities leave more viable plants and seeds, allowing native plants to reestablish themselves quickly and leaving nonnatives less of an opportunity to take over. For more discussion on how fire affects Great Basin vegetation, see the Fuels PEIS, Section 3.2 Fire & Fuels (BLM, 2021).

Conifer treatments could directly impact vegetation by removing or damaging (i.e., breaking, trampling) non-target plants in the short-term (0-3 years). When vegetation is removed and soil is exposed, early successional species colonize the site; invasive species may establish and spread if there is a seed source nearby degrading the overall condition of plant communities. Surface disturbing activities could also indirectly affect vegetation over the long term by disrupting seed banks and mixing, eroding, or compacting soils. Soil erosion would reduce the substrate available for plants and soil compaction could limit seed germination. Impacts to plants occurring after germination but prior to seed set could be particularly harmful as both current and future generations would be affected.

Adaptive management, combining treatment methods and the DFPMs in Section 2.1.5 would minimize these risks. Over the long-term, removal of PJ would allow shrubs and herbaceous vegetation to reoccupy these sites, thereby improving plant community composition, structure, and function. Miller et al. (2014) found that after juniper removal treatments in juniper encroached sagebrush steppe, perennial herbaceous cover (tall grasses and forbs) and shrub cover increased above pre-treatment and control levels within one to three years. Refer to Table 4 for the treatment methods and techniques proposed for this treatment type.

Linear Fuel Break Treatments

Construction and maintenance of 413 miles of linear fuel breaks, or 24,950 acres (approximately 1% of the project area), is proposed to protect remaining intact and/or recovering Shrub Steppe. The effects of fuel break treatments on vegetation are discussed in detail in the Fuel Breaks PEIS Section 4.6. (BLM, 2020).

As described in the Fuel Breaks PEIS, the construction of fuel breaks would cross most vegetation types in the project area. The fuel breaks are designed to remove or reduce vegetation and would be constructed along previously disturbed linear features, such as roads and rights-of-ways. State and Transition models will be used to help predict the best path to a treatment's desired sate; but in the event of an unpredicted outcome, additional treatments maybe needed to bring a portion of the treatment to its desired state. Fuel breaks result in localized changes in vegetation, resulting in changes to flame length and potentially rates of spread. Treatment methods would remove or reduce vegetation, prepare and sow seedbeds, thereby changing the structural and functional components of vegetation in the fuel breaks in the long term (BLM, 2020). Refer to Table 4 for the treatment methods and techniques proposed for this treatment type.

3.5.2.1.2 Proposed Treatment Methods

Herbicide

Impacts of herbicide treatments are analyzed in Section 3.6 under Issue 2.

Mechanical

Mastication

Mastication can be used to selectively remove woody vegetation while leaving the herbaceous vegetation in place, and at the same time preparing a seed bed or providing protective mulching on-site (BLM, 1991). Mastication also reduces the amount of standing hazardous fuels. Mastication machinery could directly impact non-target vegetation in the short term by breaking or uprooting plants and disturb soils and the existing seed bank. The extent to which vegetation is disturbed would dictate the magnitude of impacts to vegetation (i.e., above and below-ground productivity) over the long term. Potential negative impacts of mechanical treatments, or any of the treatments where vehicles and equipment are used, is inadvertent spread of invasive non-native seeds or plant parts from one treatment site to another. These areas could serve as vectors for the spread of invasive and weedy species potentially impacting adjacent vegetation; however, design features specific to avoiding weed spread (See Section 2.1.5) would minimize this risk. Materials created from mastication (wood chips) would reduce erosion and increase soil organic matter over the long term. Annual and perennial grass production would increase in areas where mastication takes place due to increased inorganic nitrogen available in the soil (Young, Roundy, & Eggett, 2014).

Hand Thinning

Hand thinning of PJ (or cutting and leaving PJ in place) would be executed using hand tools (chain saws, loppers and other hand tools) producing negligible direct impacts to nontarget plants occupying the PJ understory or interspaces. PJ material (branches, boughs, etc.) left in place or scattered would cover and help stabilize exposed soils, improving soil productivity over the long term which would promote robust vegetation communities. The release of resources currently in use by PJ would have benefits for all the plants left in the area. The plant species left would have added water and nutrients, helping make them a more resistant and resilient plant community. The use of chainsaws has the potential to start fires, damage non-target species and have minor petroleum spills; however, design features (Section 2.1.5) specific to avoiding these types of hazards help reduce their chances of occurring.

Green Firewood Cutting

Green Firewood Cutting has similar impacts to that of Hand Thinning. This treatment helps to remove hazardous fuels from the treatment site, while leaving some scattered slash as soil cover and micro-relief. The targeted vegetation is removed but there is added risk of resource damage to non-target vegetation, accidental fires caused by wood cutters, weed spread, and additional roads and disturbance. However, with permit stipulations for wood cutting most of the adverse effects would be minimized.

Mowing

Mowing (Brush Beating) is the most common treatment technique used in the construction and maintenance of fuel breaks. Impacts of mowing are discussed in detail in the Fuel Breaks PEIS, Section 4.6 Vegetation (BLM, 2020). Mowing would cut vegetation above the ground surface, reducing fuel heights in the short term and indirectly lowering flame length and reducing rates of fire spread in the fuel break. Mowing could increase the potential for release of both desired perennial grasses and forbs (Monsen, Stevens, & Shaw, 2004), and invasive annual grasses (Davies, Bates, & Nafus, 2011).

Vegetative Fuel Breaks

Vegetative fuel breaks (greenstrips) alter the treatment area to plants that are more fire resistant as described in Section 2.1.4.6 of this document and the Fuel Breaks PEIS, Section 2.3 Fuel Break Types and Vegetation States (BLM, 2020). The plant species selected tend to have higher moister content and stay greener longer, and they have shorter stature and larger interspaces. This helps to slow fire progress for a longer period of the fire season, in effect shortening the length of time fires can burn rapidly through the fuel break. All of these characteristics also help prevent fires from spreading rapidly, giving firefighters much needed time to safely establish anchor points and control lines. Some of the plants used in vegetative fuel breaks are nonnative plants. This would alter the vegetative state of the treatment area to a seeded state but would meet the goals and objectives of the treatment by protecting important habitat from large catastrophic wildfires.

Pile Burning

Pile burning removes plant biomass and is used in combination with hand thinning when the amount of residual material would prevent attainment of objectives. Impacts of pile burning are discussed in detail in the Fuels PEIS, Section 4.2 Vegetation (BLM, 2021) and the Fuel Breaks PEIS, Section 4.6 Vegetation (BLM, 2020). Heat generated during prescribed fire treatments can damage or kill existing desired vegetation; physical, chemical, and biological properties of the soil can also be altered. Design Features (Section 2.1.5) would limit or eliminate the risk of fire spreading outside the target area (pile) and/or impacting vegetation other than the targeted fuels (dried PJ material and debris) and minimize the risk of introduction and spread of weeds.

Seeding and Planting

Seeding and planting would increase desirable vegetation to the restoration treatment areas and help to move vegetation more quickly toward desired conditions. All of the proposed seeding techniques (see Section 2.1.4.7 for descriptions) have some level of plant & soil disturbance involved in their implementation. Equipment tires or tracks would disturb existing vegetation and compact soil, limiting water infiltration and seed germination. Seedling planting would create the least surface disturbance. The soil disturbance effects of seeding and planting treatments are short-term and limited in spatial scope to the project footprint. Establishment of vegetation from planting projects is a long-term effect that can spread beyond the planting area as planted species spread after establishment.

Vegetation Treatment Protection

Closures

Treatment units may be closed to livestock grazing in order to allow the vegetation to establish successfully. The closures would occur until establishment objectives are met. Closures of treatments would allow plants to grow without added livestock pressure, allowing for potentially faster and more successful establishment of plants seeded or planted in treatment areas, leading to increased plant cover, biomass, and diversity. The treatment units would be reopened to livestock grazing once establishment objectives in the grazing decisions are met and the associated temporarily suspended AUMs would be reinstated on the grazing permit.

Protective Fencing

Protective Fencing could be used in combination with all types of treatments. Fences around treatments would allow plants to grow without added livestock pressure, allowing for potentially faster and more successful establishment of plants seeded or planted in treatment areas, leading to increased plant cover, biomass, and diversity. Fences shall not be constructed or reconstructed within 1.2 miles from the perimeter of occupied leks, unless the collision risk can be mitigated through design features or markings (e.g., mark, laydown fences, and design).

3.5.2.2 No Action Alternative

Under the No Action Alternative, none of the proposed treatments would be implemented. Areas that have departed from their desired vegetative state would continue to degrade in their resistance and resilience and move further from the desired condition identified in the 2015 ARMPA Table 2-2 and vegetation management objectives would not be met within the proposed treatment areas. As vegetation community types grow older and more decadent, species composition and productivity, and age and species diversity would continue to degrade or decrease over time. In addition, the susceptibility of vegetation communities to disease and insect infestation could increase. Annual invasive species would continue to spread in vegetation communities; it is likely that type conversion from shrub-grassland communities to cheatgrass or other annual species would increase, having a lasting detrimental impact on the landscape. PJ encroachment would continue, and Shrub Steppe vegetation would continue to degrade, the structural and biological diversity would diminish and eventually be replaced by PJ Woodlands. Uncontrolled wildfire in untreated Shrub Steppe with mature sagebrush and in juniper encroachment could result in type conversion to a plant community dominated by invasive annuals and noxious weeds. Juniper could expand into surrounding areas, increasing the acreage of Phase I vegetation conditions in and around the project area. The likelihood of severe wildfire would increase over time and fire behavior would not be altered to give firefighters the needed time and safety to control fires. Treatments could be implemented in the project area, but they would not have a coordinated, landscape-scale implementation and would only meet small parts of the purpose and need. Areas proposed for treatment may never receive treatments to meet management objectives.

3.5.2.3 Cumulative Impacts

The CESA for this issue was established to the proposed treatment area boundaries. The time-based scale for the CESA begins 20 years ago to incorporate WFO’s past fuels treatments and fire effects and extends

10 years into the future, the projected end of the Proposed Action. This CESA was chosen because plants, rooted in soil, are not transient over long distances, with the exception of wind distributed seeds. Indirect effects of actions affecting vegetation are spatially confined to a short distance from the action. All past, present, and future actions outside of the proposed treatment areas will have little direct or indirect impact on vegetation resources within the project area. Actions that could cumulatively affect vegetation include Lands, Restoration/Prevention, Minerals, Recreation and Livestock Grazing. These uses are likely to continue in the future on or near the project area. See Table 9 for O'Neil PPA CESA Boundary Past, Present and RFFAs acreages.

Wildfire history indicates that fire will continue to affect areas within the project area. Intense/severe fires can effectively reset vegetative communities from mature/late successional plant communities (e.g., shrubs and perennial grass dominated communities) to early seral plant communities (e.g., annual and perennial forb and grass dominated communities). Future wildfire suppression activities will vary temporally and spatially depending on annual fire severity and extent. Suppression related disturbances are generally restricted to bulldozer constructed fire lines (dozer lines). Both wildfire and suppression activities may increase the risk of invasive annual species spreading into vegetation communities. Species composition in areas burned by wildfire and in dozer lines will depend on the success of rehabilitation treatments and/or natural vegetation recovery following fire.

Permitted livestock grazing has the potential to affect vegetation by altering biomass and species composition across the entire project area. There are 25 grazing allotments within the O’Neil PPA boundary. Current livestock grazing permits include grazing schedules along with terms and conditions to achieve or make significant progress toward meeting BLM Standards for Rangeland Health. As public land grazing permits are renewed, the BLM is required to adjust management of allotments not currently meeting rangeland health standards by changing the timing, frequency, intensity, and/or duration of grazing.

Ongoing and future livestock grazing is projected to maintain or improve upland vegetation overall (i.e., continue to meet or make significant progress toward meeting Standards 1-8). However, livestock grazing will continue to result in plant community alterations in localized areas adjacent to fences, gates, and livestock facilities (e.g., troughs and supplement sites). Livestock grazing is expected to continue at current levels into the foreseeable future unless changes are made as a result of permit renewal to address issues detected during that process.

It is difficult to quantify the spatial and temporal extent of OHV use, camping, hunting, bird watching, hiking, backpacking and sightseeing. These activities can affect vegetation by harming individual plants, impacting communities and increasing gaps between vegetation. Susceptibility to weed invasion would increase in these areas and can cause moderate effects.

Other vegetation treatments include ESR treatments in response to wildfire and ongoing noxious weed treatments by the Elko District. Vegetation rehabilitation efforts for fire are ongoing and include large-scale drill and aerial seeding, seedling planting, and herbicide application. Noxious weed treatments include chemical, biological, and manual treatments. The extent to which these and other past and future ESR and weed treatment efforts are successful will influence plant community condition across the analysis area.

The vegetation treatments will have little effect off-site and are unlikely to be affected by off-site actions, except for climate change and the establishment of more non-native or invasive plant species from adjacent, untreated areas back into the treatment area. Increasing fuel loads on adjacent, untreated sites, could pose the threat of catastrophic wildlife burning the treated site. Potential impacts from overgrazing of the treated site would be controlled by the allotment evaluation process (BLM, 2004). These, in conjunction with fire prevention techniques, appropriate fire response and post-fire rehabilitation measures, would improve the health of the vegetative communities by increasing species diversity and improving age structure, which would lead to greater vegetative production overall. The vegetation treatments will result in healthier vegetative communities, create diverse vegetation mosaics, and improve or restore GRSG habitat. This change in vegetative structure across the landscape will provide a diversity of wildlife habitat, improved wildlife and livestock forage, and reduce the occurrence of large severe wildfire events (BLM, 2004).

3.6 Issue 2: Effects of Herbicide Active Ingredients

How would the use of herbicide active ingredients imazapic, aminopyralid, rimsulfuron and fluroxypyr for aerial (broadcast) and ground-based application (spot and broadcast) affect target vegetation (weeds), grazing/livestock, vegetation and special status plants, wildlife and special status wildlife species, T&E species, water quality, and riparian and wetland resources?

3.6.1 Affected Environment

The information presented in Table 12 is based on existing GIS data and field observations. Approximately 3,042 acres of noxious weeds and non-native invasive species are mapped within the O’Neil PPA. They are mostly known to occur along roads, rights-of-ways, and riparian areas. Many non-native invasive species such as cheatgrass, halogeton, Russian thistle, and annual mustards (e.g., tumble mustard and clasping pepperweed) are also included in Table 12. Noxious weeds and non-native invasive plants are known to occur in the O’Neil PPA, but their distribution is not well documented in existing data. These species are typically located in lower elevations and disturbed areas. It is estimated that acres of infestation for these species are in the hundreds or thousands. Also refer to Appendix F for a list of weeds known to occur in Elko District.

Table 12. Noxious weeds and non-native invasive plants known to occur in the O’Neil PPA.

Common Name	Scientific Name	Duration[1]	Growth Form	Noxious Weed Classification[2]	Acres[3]	Proposed Herbicide(s)[4]
Black henbane	*Hyoscyamus niger*	Biennial	Broadleaf	B	1,277	Aminopyralid and fluroxypyr
Bull thistle	*Cirsium vulgare*	Biennial	Broadleaf	NL	110	Aminopyralid, fluroxypy, and imazapic
Canada thistle	*Cirsium arvense*	Perennial, creeping roots	Broadleaf	C	238	Aminopyralid and fluroxyyr
Cheatgrass	*Bromus tectorum*	Annual	Grass	NL	---	Aminopyralid, imazapic, and rimsulfuron
Clasping pepperweed	*Lepidium perfoliatum*	Annual	Broadleaf	NL	<1	Imazapic
Common mullein	*Verbascum thapsus*	Biennial	Broadleaf	NL	33	Aminopyralid and fluroxypyr
Common St. John’s wort	*Hypericum perforatum*	Perennial	Broadleaf	A	8	Aminopyralid
Curly dock	*Rumex crispus*	Perennial	Broadleaf	NL	30	Aminopyralid, fluroxypyr, and imazapic
Diffuse knapweed	*Centaurea diffusa*	Biennial	Broadleaf	B	<1	Aminopyralid
Dyer’s woad	*Isatis tinctoria*	Biennial	Broadleaf	A	<1	Imazapic
Field bindweed	*Convolvulus arvensis*	Perennial, creeping roots	Broadleaf	NL	3	Imazapic and fluroxypyr
Field pennycress	*Thlaspi arvense*	Annual	Broadleaf	NL	1	Fluroxypyr
Halogeton	*Halogeton glomeratus*	Annual	Broadleaf	NL	60	Imazapic
Hoary cress	*Cardaria draba*	Perennial, creeping roots	Broadleaf	C	358	Imazapic
Jointed goatgrass	*Aegilops cylindria*	Annual	Grass	A	<1	Imazapic
Kochia	*Bassia scoparia*	Annual	Broadleaf	NL	---	Fluroxypyr
Leafy spurge	*Euphorbia esula*	Perennial, creeping roots	Broadleaf	B	100	Fluroxypyr and imazpaic
Lesser burdock	*Arctium minus*	Biennial	Broadleaf	NL	3	---
Musk thistle	*Carduus nutans*	Biennial	Broadleaf	C	15	Aminopyralid, imazapic, and fluroxypyr
Poison hemlock	*Conium maculatum*	Biennial	Broadleaf	C	34	Imazapic
Prickly lettuce	*Lactuca serriola*	Annual	Broadleaf	NL	<1	Fluroxypyr
Perennial pepperweed	*Lepidium latifolium*	Perennial, creeping roots	Broadleaf	C	3	Imazapic
Puncturevine	*Tribulus terrestris*	Annual	Broadleaf	C	2	Imazapic, fluroxypyrand rimsulfuron
Russian knapweed	*Rhaponticum repens*	Perennial, creeping roots	Broadleaf	C	103	Aminopyralid and imazapic
Russian thistle	*Salsola tragus*	Annual	Broadleaf	NL	4	Aminopyralid and imazpaic
Saltcedar	*Tamarix ramosissima*	Perennial	Shrub/Tree	C	<1	Aminopyralid (tank mixed with triclopyr)

Common Name	Scientific Name	Duration[1]	Growth Form	Noxious Weed Classification[2]	Acres[3]	Proposed Herbicide(s)[4]
Scotch thistle	*Onopordum acanthium*	Biennial	Broadleaf	C	572	Aminopyralid
Spotted knapweed	*Centaurea maculosa*	Biennial	Broadleaf	B	6	Aminopyralid
Sulfur cinquefoil	*Potentilla recta*	Perennial	Broadleaf	A	36	Aminopyralid
Tumble mustard	*Sisymbrium altissimum*	Annual	Broadleaf	NL	<1	Imazapic
Westen waterhemlock	*Cicuta douglasii*	Perennial	Broadleaf	C	<1	---
White horehound	*Marrubium vulgare*	Perennial	Broadleaf	NL	9	---
Yellow salsify	*Tragopogon dubius*	Biennial	Broadleaf	NL	<1	---

1. Denotes most typical duration for species. Depending on precipitation, soil moisture, and temperature, some broadleaf plants may act as annual, biennial, or short-lived perennial.
2. Noxious weeds are classified by the Nevada Department of Agriculture (NDA) for the purpose of prioritizing and implementing noxious weed control projects (Nevada Revised Statute 555 and Nevada Administrative Code 555). NDA Noxious Weed Classification includes three categories and are defined as follows:
   A: Weeds that are generally not found or that are limited in distribution throughout the State. Such weeds are subject to active exclusion from the State, active eradication wherever found, and active eradication from the premises of a dealer of nursery stock.
   B: Weeds that are generally established in scattered populations in some counties of the State. Such weeds are subject to active exclusion where possible and active eradication from the premises of a dealer of nursery stock.
   C: Weeds that are generally established and generally widespread in many counties of the State. Such weeds are subject to active eradication from the premises of a dealer of nursery stock
   NL: Not listed as a noxious weed by the NDA. These species are managed based on Elko District priorities and under Executive Order 13112 (February 1999) which requires Federal agencies to "(i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; [and] (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded…"
3. Acres are rounded to the nearest whole number, unless acre value is less than 1 acre (indicated as "<1"). The acres provided do not serve as a limiting factor for treatments since additional infestations and previously unmapped/unknown weed species found during on-going inventory efforts and additional weed species susceptible to herbicide active ingredients will be treated. A value of "---" indicates species is known to occur based on field observations, but no quantified GIS data is available.
4. This list is intended as a guide. The "Proposed Herbicide(s)" column is based on review of herbicide labels and DiTomaso et al. 2013. If aminopyralid, fluroxypry, imazapic, or rimsulfuron is not listed ("---" is listed), then previously approved chemicals (BLM 1998) will primarily be used to treat those weed species.

3.6.2 Environmental Impacts

3.6.2.1 Proposed Action

Under this alternative, the four proposed active ingredients aminopyralid, fluroxypyr, imazapic, and rimsulfuron would be used for broadcast and/or spot application throughout the O’Neil PPA using aerial and ground-based application methods (1998 EA active ingredient use would continue in combination with these or as a stand-alone). Typically, large-scale broadcast applications would occur within restoration, conifer removal, and fuel break treatment units, while spot applications would be more representative for applications throughout the O’Neil PPA. Approximate acres treated via largescale broadcast aerial or ground will be 3,645 acres in restoration treatment units, 87,134 acres conifer removal treatment units, and up to 25,000 acres in fuel break treatment units (Table 1 through 3); approximately 3,042 acres of existing infestations in/out of proposed treatment areas will be treated via ground-based spot application (See Table 12). Many infestations such as weed species that are perennial with creeping roots and/or areas with an existing weed seed bank need consecutive treatments for several years in order to reduce underground root material and deplete weed seed banks. Additionally, largescale treatments may need re-treated for project maintenance or if initial treatments are unsuccessful.

The four proposed active ingredients are effective for treating noxious weeds and non-native invasive plants. The use of imazapic and rimsulfuron would allow more effective control of annual weed species, especially cheatgrass by providing selective control at low rates via largescale broadcast application. Aminopyralid can also be effective for annual grass control typically at higher application rates via spot application. Additionally, all four active ingredients are effective for use on various broadleaf weed species (Table 13 through 16. Summary of Environmental Effects). For example, rimsulfuron has activity on the annual broadleaf weed puncturevine. Aminopyralid is effective on many knapweed and thistle species, it requires less product (lower application rates), and will replace many of the applications normally completed using the restricted use pesticide picloram. Fluroxypyr is effective for treating black henbane and hard to kill weeds such as annual kochia and Russian thistle (due to herbicide resistance in some instances).

Analysis of impacts to target vegetation (weeds), grazing/livestock, upland vegetation and special status plants, wildlife and special status wildlife species, T&E species, water quality, and riparian and wetland resources is tiered to the 2007 and 2016 PEISs (BLM, 2007a) (BLM, 2016a). Summary of impact by resource and herbicide active ingredient is provided below in Table 13 to 16 Summary of Environmental Effects. Herbicide uses and applications would be constrained by mitigation measures and SOPs in the 2007 PEIS Record of Decision (ROD) (BLM 2007b; Table 2 Mitigation Measures p. 2-4 to 2-6 & Appendix B) and 2016 PEIS ROD (BLM, 2016b, pp. A-9 to A-15, Table A-2, Table A-3) and any additional measures adopted by the Decision Record for this EA. Also refer to this EA, Appendix G, for a complete list of BLM Approved Herbicides.

Table 13. Summary of Environmental Effects for the Use of Aminopyralid

Resource	Proposed Herbicide: Aminopyralid
Noxious Weeds and Non-Native Invasive Vegetation (Target Vegetation) (BLM 2016a, p. 4-25 to 4-33)	Selective, post-emergent herbicide. Aminopyralid is effective at controlling Russian knapweed, various thistles, and other invasive plants of rangelands (DiTomaso and Kyser 2006, Enloe et al. 2008). It is an alternative to other growth regulator herbicides that are commonly used on broadleaf invasive plants, such as picloram, clopyralid, 2,4-D, and dicamba. Studies have also found aminopyralid to be as or more effective than the currently approved growth regulator herbicides at lower application rates (Enloe et al. 2007; Enloe et al. 2008). Aminopyralid has a higher specific activity than other growth regulator herbicides, so less of it needs to be used to achieve the same result (Iowa State University 2006). In mixtures with other active ingredients, it can be used on hard-to-control species like poison hemlock (DiTomaso et al. 2013). Also see Table 12. Noxious weeds and non-native invasive plants known to occur in the O’Neil PPA.
Grazing/Livestock (BLM 2016a, p. 4-65 to 4-66)	The Risk Assessment for aminopyralid predicted that none of the possible scenarios of aminopyralid exposure (direct spray, contact with foliage after direct spray, ingestion of food items contaminated by direct spray) would pose a risk of adverse effects to livestock. Even scenarios that assume 100 percent of the diet comes from treated vegetation indicated no risk to livestock. While aminopyralid is unlikely to adversely affect survival, growth, or reproduction of livestock, aminopyralid is persistent in vegetation and does not break down in plants (Corteva Agriscience 2019), and therefore may be present in the urine or manure of livestock that have grazed in aminopyralid-treated rangelands. Therefore, after grazing aminopyralid-treated forage, livestock must graze for 3 days in an untreated pasture without desirable broadleaf plants before returning to an area where desirable broadleaf plants are present.
Soils (BLM 2016a, p. 4-10 to 4-13)	Aminopyralid is broken down in the soil by microbes and sunlight, with an average half-life of 34.5 days (Dow AgroSciences 2005). The main mode of degradation in the environment is expected to be microbial metabolism in soils. Microbial metabolism can be slow in some soils, especially at lower soil depths and appears to be very slow (half-lives well above a year) in aquatic systems. Persistent in plant materials and the manure of animals that have eaten plant materials treated with this herbicide. Aminopyralid is weakly adsorbed to soil, and therefore is unlikely to be transported off-site in large amounts on wind-blown soil. Because of its moderate persistence, high mobility, and low soil adsorption, aminopyralid has a high potential for surface water runoff. Leaching of aminopyralid has not been documented at levels below 30 centimeters.

Resource	Proposed Herbicide: Aminopyralid
Vegetation and Special Status Plants (BLM 2016a, p. 4-25 to 4-33; 4-38 to 4-40)	Because aminopyralid is primarily used to manage weedy broadleaf species, it poses a risk to non-target native forbs and other desirable species in treatment areas. Key flowering plant families that are affected by aminopyralid include the Asteraceae (aster), Fabaceae (legume), and Polygonaceae (buckwheat) families. Aminopyralid may effect non-target broadleaf plants indirectly if urine or manure from animals that graze on treated pasture within 3 days of the herbicide application comes into contact with these plants (Iowa State University 2006). Aminopyralid is persistent in plant materials and may remain in undigested remains of treated vegetation for more than 2 years (Oregon State University 2009; Corteva 2019). Risks for adverse effects to terrestrial plants would be high if there was direct exposure to aminopyralid as a result of a direct spray (as part of a treatment or accidental) or an accidental spill. For non-target aquatic plants, however, Risk Assessments predicted no risk under direct spray or spill scenarios. Aminopyralid is not approved for aquatic uses. The risk assessment results indicate that use of aminopyralid right up to the water’s edge would not harm aquatic plants (AECOM, 2015). Apart from direct spray scenarios, risks to terrestrial plants would generally be low. Risks associated with off-site drift decrease as the distance from the treatment site increases and the application height gets lower. For aerial applications, the smallest modeled distance at which no risk was predicted ranges from 1,200 to 1,800 feet, depending on the application rate and type of aircraft used. Distances for ground applications are much lower, ranging from 25 to 400 feet. For surface runoff, root-zone groundwater flow, and wind erosion scenarios, no risks to non-target terrestrial or aquatic plants were predicted under the majority of the evaluated conditions (AECOM, 2015). The Conservation Agreement and Strategy for Goose Creek Milkvetch identifies noxious weeds and invasive weeds, specifically cheatgrass and leafy spurge as threats. Aminopyralid is typically not used to treat those species (cheatgrass may be treated via spot applications) but will be used to target other susceptible weed species. Direct spray of Goose Creek milkvetch will be avoided. Best Management Practices prescribed by the Conservation Agreement and Strategy to avoid impacts to milkvetch plants within occupied habitat will be followed (p. 24-26; Conservation Actions #11 [specific to cheatgrass] and #32 to 37 [specific to noxious weeds]).
Wildlife and Special Status Wildlife Species (BLM 2016a, p. 4-51 to 4-57; 4-60 to 4-62	The risk assessment for aminopyralid predicted that exposure to this active ingredient would not pose a risk to terrestrial wildlife (including pollinators) under any of the modeled exposure scenarios. Risk quotients were all below the level of concern of 0.5 (acute high risk). Therefore, exposure of wildlife to this active ingredient by direct spray, contact with sprayed vegetation, or ingestion of plant materials or prey items that have been exposed to this active ingredient is not a concern from a toxicological perspective.

Resource	Proposed Herbicide: Aminopyralid
Fish (including T&E species) and Aquatic Species (BLM 2016a, p. 4-41 to 4-47)	The Risk Assessment for aminopyralid indicates that this herbicide would not pose a risk to fish or aquatic invertebrates in ponds or streams as a result of any of the modeled exposure scenarios (AECOM, 2015). The Risk Assessment included a direct spray scenario and a worst-case scenario involving a spill of the active ingredient into the aquatic habitat, as well as off-site drift and surface runoff scenarios. Based on toxicity data reviewed for the Risk Assessment, aminopyralid exposures to fish of as high as 100 ppm did not result in any observable mortality or sub-lethal effects. Additionally, the Risk Assessment indicates that aminopyralid is not likely to accumulate in fish tissue. Toxicity data for aquatic invertebrates was similar, with no adverse effects observed at concentrations of nearly 100 ppm. No effects to T&E species would occur as no treatment will take place within riparian areas with Lahontan cutthroat trout (LCT).
Water Quality (BLM 2016a, p. 4-14 to 4-19)	Aminopyralid is moderately persistent and has high mobility in most soils because of its low soil adsorption values (EPA 2005b). Therefore, it is transported to surface water and groundwater. Breakdown by microbes in soil is the primary form of dissipation. Aminopyralid's mobility and high water solubility suggest that the herbicide is prone to leaching (Lindenmeyer 2012). However, in past studies, leaching of aminopyralid has not been documented at levels below 1 foot (EPA 2005a). In water, aminopyralid is stable and does not readily react with water, but is broken down by sunlight. The half-life by photolysis is very short, at 0.6 days (EPA 2005a). Therefore, it is expected that aminopyralid rapidly dissipates in clear, shallow surface water (EPA 2005b). Within fast-moving water it rapidly dissipates through mixing. The major metabolic products of photolysis in water are oxamic acid and malonamic acid, neither of which would form in large concentrations, or are of concern from a toxicity standpoint (EPA 2005a). Once aminopyralid leaches down to anaerobic soil depths, degradation is likely to slow, which could be a factor in groundwater contamination (EPA 2005b). At one study in Montana, aminopyralid was detected in groundwater in one of 23 wells (Schmidt and Mulder 2009), indicating that there is some risk of groundwater contamination. It is expected that concentrations of aminopyralid in groundwater would be greatest in areas with a high-water table and when rainfall happens immediately after application (EPA 2005b). Neither aminopyralid nor its major metabolic products are included on the Environmental Protection Agency's (EPA) list of drinking water contaminants (EPA 2013). Because of its moderate persistence, high mobility, and low soil adsorption, aminopyralid has a high potential for surface water runoff.

Resource	Proposed Herbicide: Aminopyralid
Riparian and Wetland Systems (BLM 2016a, p. 4-21 to 4-23)	Aminopyralid could be used in dry wetlands and riparian areas. Therefore, any herbicide that remains adsorbed to soil particles could be released into the water if these areas become flooded or saturated following the treatments. Aminopyralid does not have activity on submerged aquatic species, such as watermilfoil, and would not be applied directly to the water column to treat unwanted aquatic vegetation. However, it may be effective at controlling riparian invasive plants. Field research trials support use of aminopyralid to manage emerged shoreline invasive plant species (e.g., invasive thistle species; Peterson et al. 2013). Aminopyralid is effective against many invasive herbaceous broadleaf weeds and may offer improvements in control of Russian olive and saltcedar. One study found that adding aminopyralid to triclopyr increased its control of these species without injuring desirable understory grass vegetation (Sluegh et al. 2011). Aminopyralid has a photodegradation half-life of 0.6 days in aquatic systems (EPA 2005b). In anaerobic systems, however, the active ingredient is persistent, with a half-life between 462 and 990 days (EPA 2005b). As described in the Risk Assessment for aminopyralid, non-target aquatic plants are not at risk for adverse effects from exposure to aminopyralid, even under direct spray and worst-case spill scenarios. However, non-aquatic plants (including riparian species and emergent wetland plants) would be at risk for adverse effects if a broadcast spray treatment were to occur near wetland and riparian habitats.

Table 14. Summary of Environmental Effects for the Use of Fluroxypyr

Resource	Proposed Herbicide: Fluroxypyr
Noxious Weeds and Non-Native Invasive Vegetation (Target Vegetation) (BLM 2016a, p. 4-25 to 4-33)	Selective, post-emergent herbicide. Fluroxypyr is effective on annual and biennial invasive plants, particularly when tank-mixed with another herbicide such as 2,4-D, dicamba, metsulfuron methyl, picloram, or triclopyr. It would be used to manage species such as puncturevine, kochia, mustards, and leafy spurge. Fluroxypyr has been shown to have a synergistic effect when mixed with 2,4-D to control certain broadleaf invasive plants (Smith and Mitra 2006), and to improve control of leafy spurge when mixed with picloram (Peterson 1989). Fluroxypyr has been identified as an option for addressing invasive plants that are resistant to herbicides with different modes of action. Its uses would likely include administrative sites and rights-of-way where resistance to currently approved herbicides could be a problem. For instance, kochia that is resistant to acetolactate synthase- (ALS-) inhibiting herbicides can be treated with fluroxypyr, although kochia can also develop a resistance to fluroxypyr (Montana State University Extension 2011). Also see Table 12. Noxious weeds and non-native invasive plants known to occur in the O'Neil PPA.

Resource	Proposed Herbicide: Fluroxypyr
Grazing/Livestock (BLM 2016a, p. 4-65 to 4-66)	According to the risk assessment, fluroxypyr does not have a risk of causing adverse health effects to livestock as a result of dermal exposure or ingestion scenarios. Fluroxypyr does not have any grazing restrictions for livestock, including lactating and non-lactating dairy animals. However, livestock must not eat treated forage for at least 2 days before slaughter for meat (per the herbicide label).
Soils (BLM 2016a, p. 4-10 to 4-13)	Mobile to very mobile in soil, but its movement is reduced by its quick initial microbial degradation. Fluroxypyr has two major metabolites: a pyridine and a methoxypyridine. Fluroxypyr degrades first to the pyridine and then to the methoxypyridine, which is persistent in soil. This second degradant has a high tendency to adsorb to soil, and is slowly degraded in place by microbial degradation and volatilization. In field studies submitted to the EPA, fluroxypyr was generally not found below a soil depth of 6 inches; this may vary depending on soil type (may be found deeper in coarser soils) and amount of rainfall.
Vegetation and Special Status Plants (BLM 2016a, p. 4-25 to 4-33; 4-38 to 4-40)	Fluroxypyr is a selective herbicide that controls broadleaf species. It does pose a risk to non-target forbs, as well as desirable woody species in treatment areas. Risks for adverse effects to terrestrial plants would be high if there was direct exposure to fluroxypyr as a result of a direct spray (as part of a treatment or accidental) or an accidental spill. Risks to terrestrial plants from off-site drift are generally low. No risks to terrestrial plants were predicted for surface runoff exposure scenarios. For wind erosion scenarios, no risks were predicted for non-target terrestrial plants under the majority of the evaluated conditions (AECOM, 2014a). The Conservation Agreement and Strategy for Goose Creek Milkvetch identifies noxious weeds and invasive weeds, specifically cheatgrass and leafy spurge as threats. Fluroxypyr will be used to treat leafy spurge and other susceptible weeds; direct spray of Goose Creek milkvetch will be avoided. Best Management Practices prescribed by the Conservation Agreement and Strategy to avoid impacts to milkvetch plants within occupied habitat will be followed (p. 24-26; Conservation Actions #24 to #31 [specific to leafy spurge] and #32 to 37 [specific to noxious weeds]).
Wildlife and Special Status Wildlife Species (BLM 2016a, p. 4-51 to 4-57; 4-60 to 4-62)	The risk assessment for fluroxypyr predicted that exposure to fluroxypyr would not pose a risk to most terrestrial wildlife (including pollinators) under any of the modeled exposure scenarios; the Risk Assessments indicate that there is a low risk under typical and maximum rates to special status species pollinators under the 100 percent absorption scenario (direct spray). All other risk quotients were all below the level of concern of 0.5 (acute high risk); Therefore, exposure of wildlife to this active ingredient by direct spray, contact with sprayed vegetation, or ingestion of plant materials or prey items that have been exposed to this active ingredient is not a concern from a toxicological perspective.

Resource	Proposed Herbicide: Fluroxypyr
Fish (including T&E Species) and Aquatic Invertebrates (BLM 2016a, p. 4-41 to 4-51)	The Risk Assessment for fluroxypyr indicates that this herbicide would not pose a risk to fish or aquatic invertebrates in ponds or streams under any of the modeled exposure scenarios. The Risk Assessment included a direct spray scenario and a worst-case scenario involving a spill of the active ingredient into the aquatic habitat, as well as off-site drift and surface runoff scenarios. Based on toxicity data presented in the Risk Assessment, no effects to fish were observed after exposure to fluroxypyr at concentrations of approximately 7 milligrams per liter (mg/L). The Risk Assessment also indicated that based on the literature, fluroxypyr may accumulate in fish tissue. Toxicity data for aquatic invertebrates indicated that no adverse effects were observed at concentrations of 56 mg/L. No effects to T&E species would occur as no treatment will take place within riparian areas with LCT.
Water Quality (BLM 2016a, p. 4-14 to 4-19)	Based on soil adsorption characteristics, fluroxypyr is expected to have a high mobility in soil. However, it has a low potential for movement to groundwater because it is rapidly broken down by microbes in the soil (soil half-life is 1 to 3 weeks; National Library of Medicine 2011). In field studies submitted to the EPA, fluroxypyr was generally not found below a soil depth of 6 inches (EPA 1998), although this may vary depending on soil type and amount of rainfall. In sandy soils, the potential to leach to groundwater is much higher, and has been identified as a concern (NYSDEC 2006). Factors that influence the rate of fluroxypyr degradation in soils include soil microbes, organic matter, temperature, and soil moisture (Tao and Yang 2011). In water, fluroxypyr does not readily break down by photolysis, but is biodegraded by microorganisms in the water and undergoes hydrolysis under certain conditions. The aquatic half-life is fairly short, at 5 to 14 days (National Library of Medicine 2011). The two major biotransformation products of fluroxypyr (a pyridine and a methoxypyridine), may be more persistent in water than fluroxypyr (Health Canada 2017). Studies of fluroxypyr in Sweden detected both fluroxypyr and pyridine in the groundwater beneath a railway treatment site (Cederlund et al. 2012). Neither fluroxypyr nor its two major biotransformation products are included on the EPA's list of drinking water contaminants (EPA 2013). Because of its quick rate of breakdown, fluroxypyr is expected to have a low risk of surface water runoff. A Forest Service risk assessment for this active ingredient determined that up to 10 percent of applied herbicide would leave a site in surface water runoff in areas with clay soils and high rates of rainfall. For most other soils, about half this amount was expected to run off, with virtually no runoff from predominantly sandy soils (SERA 2009).

Resource	Proposed Herbicide: Fluroxypyr
Riparian and Wetland Systems (BLM 2016a, p. 4-21 to 4-23)	Fluroxypyr would have minimal use in wetland and riparian habitats, except for spot treatments of certain target species. It is not approved for use in aquatic habitats or wetlands when water is present. Therefore, the amount of this active ingredient that is likely to be released to wetland and riparian areas under normal application scenarios is very small. Accidental spills or movement from adjacent upland areas could result in more of the active ingredient entering wetland or riparian habitats. Fluroxypyr is short-lived in anaerobic environments. In anaerobic soil the half-life is 14 days or less (National Library of Medicine 2011). In anaerobic aquatic habitats, the half-life is 8 days (EPA 1998). The breakdown products may persist for longer. As described in the Risk Assessment for fluroxypyr, non-target aquatic plants are not at risk for adverse effects from fluroxypyr under direct spray or surface runoff scenarios. However, they would likely be harmed by an accidental spill of fluroxypyr into a pond or stream in which they occur. The risks of such a spill occurring would be reduced by applicable Standard Operating Procedures.

Table 15. Summary of Environmental Effects for the Use of Imazapic

Resource	Proposed Herbicide: Imazapic
Noxious Weeds and Non-Native Invasive Vegetation (Target Vegetation) (BLM 2007a, p. 4-44 to 4-50 & 4-53)	Selective, pre- and post-emergent herbicide. Imazapic, an acetolactate synthase (ALS) -inhibitor, is used for treatment of invasive annual grasses such as cheatgrass and jointed goatgrass. It is selective for these grasses at low rates, leaving the perennial herbaceous species critical for restoration unharmed. It is also effective at higher application rates on perennial weed species such as leafy spurge and hoary cress. Also see Table 12. Noxious weeds and non-native invasive plants known to occur in the O’Neil PPA.
Grazing/Livestock (BLM 2007a, p. 4-124 to 4-126 & 4-129)	Risk quotients for terrestrial animals were all below the most conservative level of concern (LOC) of 0.1, indication that direct spray or drift of imazapic would be unlikely to pose a risk to livestock (ENSR 2005). Based on label direction, there would be no restrictions on livestock use of treated areas. Additionally, the majority of largescale broadcast imazapic treatments will be applied in the fall when livestock are not present (avoid direct spray).
Soils (BLM 2007a, p. 4-13 to 4-16 & 4-18)	Imazapic would be moderately persistent to persistent in soils and has not been found to move laterally with surface water. Most imazapic would be lost through bio-degradation. Adsorption to soil increases with decreasing pH and increasing organic matter and clay content.

Resource	Proposed Herbicide: Imazapic
Vegetation and Special Status Plants (BLM 2007a, p. 4-44 to 4-50 & 4-53; p. 4-71 to 4-73 & 4-76)	Imazapic would be primarily used to control pre-emergent nonnative invasive annual grasses when native plants are dormant in the fall. At the low rates used to select for invasive annual grasses, imazapic poses a low risk to other terrestrial plants. At the maximum rate, imazapic poses a moderate risk to non-target terrestrial forbs and some grasses. Terrestrial plants are not at risk from off-site drift, surface runoff or wind erosion of imazapic. When used to control invasive annual grasses, imazapic did not affect perennial forb cover. However, it reduced the cover of native annual forbs, and Sandberg's bluegrass (*Poa secunda*) for at least three years post-treatment (Pyke et al. 2014). Susceptibility of native perennial plants as adults or seedlings is unknown for many species and soil types; thus, there is some uncertainty about the retention of native perennials when this herbicide is used as a selective herbicide for invasive annual grasses, and about the success of revegetation efforts immediately following herbicide applications. Native annual plants, if they emerge at the same time as invasive annual grasses, may be susceptible and harmed by imazapic applications (Pyke 2011). Imazapic applied to reduce cheatgrass fuel continuity has been successful and has not reduced some perennial grasses (Shinn and Thill 2004, Miller 2006, Davison and Smith 2007). Imazapic used at low rates (typically 6 oz. per acre) would reduce invasive annual grass cover and fire risk in the sagebrush steppe, forest, and woodland communities. Higher application rates would be used to selectively control perennial weed species, mostly through spot application. The Conservation Agreement and Strategy for Goose Creek Milkvetch identifies noxious weeds and invasive weeds, specifically cheatgrass and leafy spurge as threats. Imazapic is effective for the control of both weed species, as well as others. Direct spray of Goose Creek milkvetch will be avoided. Best Management Practices prescribed by the Conservation Agreement and Strategy to avoid impacts to milkvetch plants within occupied habitat will be followed (p. 24-26; Conservation Actions #11 [specific to cheatgrass], #24 to #31 [specific to leafy spurge], and #32 to 37 [specific to noxious weeds].
Wildlife and Special Status Wildlife Species (BLM 2007a, p. 4-96 to 4-103 & 4-105)	Imazapic rapidly metabolizes and does not bioaccumulate. Imazapic is not highly toxic to most terrestrial animals. Mammals are more susceptible during pregnancy and larger mammals are more susceptible than small mammals. No adverse short-term exposure risks to birds were noted for imazapic, but some chronic growth reduction was noted. None of the risk ratings for susceptible or non-susceptible mammals or birds shows any ratings that exceed the level of concern. Imazapic is one of the lowest toxic risks to wildlife of herbicides evaluated for use (SERA 2004). No studies on invertebrates were found. Very little information on toxicity to terrestrial invertebrates is available. Even at exposure associated with direct spray, there is no basis for expecting mortality in honeybees (SERA 2004).
Fish (including T&E Species) and Aquatic Species (BLM 2007a, p. 4-76 to 4-87 & 4-92 to 4-96)	The average half-life for imazapic in a pond is 30 days, and this herbicide has little tendency to bioaccumulate in fish (Barker et al. 1998). According to the manufacturer's label, imazapic has a high runoff potential from soils for several months or more after application. Accidental direct spray and spill scenarios generally pose no risk to fish when imazapic is applied at either the typical or maximum application rate. Risk Assessments show fish are not at risk from off-site drift or surface runoff of imazapic. No effects to T&E species would occur as no treatment will take place within riparian areas with LCT.

Resource	Proposed Herbicide: Imazapic
Water Quality (BLM 2007a, p. 4-24 to 4-29 & 4-33)	In aquatic systems, imazapic rapidly photodegrades with a half-life of one to two days (Tu et al. 2001). Since aerobic biodegradation occurs in soils, aerobic biodegradation is likely important in aquatic systems. Aquatic dissipation half-lives have been reported from 30 days (water column) to 6.7 years in anaerobic sediments (SERA 2004). Little is known about the occurrence, fate, or transport of imazapic in surface water or groundwater (Battaglin et al. 2000). However, according to the herbicide label for Plateau, in which imazapic is the active ingredient, it is believed to be a groundwater contaminant (BASF 2008).
Riparian and Wetlands (BLM 2007a, p. 4-36 to 4-39 & 4-41)	Imazapic risk to aquatic plants from accidental spills is moderate to high at the maximum application rate and low to moderate at the typical application rate (there is no acute risk to aquatic plants in standing water at the typical application rate). Aquatic plants are generally not at risk from off-site drift, except when applied aerially at the maximum application rate with a buffer of 100 feet or less. Imazapic rapidly degrades through photo degradation in aquatic systems (SERA 2004).

Table 16. Summary of Environmental Effects for the Use of Rimsulfuron

Resource	Proposed Herbicide: Rimsulfuron
Noxious Weeds and Non-Native Invasive Vegetation (Target Vegetation) (BLM 2016a, p. 4-25 to 4-33)	Selective, pre- and post-emergent herbicide. Rimsulfuron is effective against cheatgrass in the fall pre-emergence, or post-emergence in the fall or spring. It provides a longer window of control than imazapic, although it must be used at the highest label rates for effective spring applications. Rimsulfuron can also be used to control larger cheatgrass plants than imazapic (Beck, No date). The effectiveness of rimsulfuron at controlling cheatgrass and medusahead rye has been documented (Zhang et al. 2010), although there is conflicting evidence about its effectiveness relative to currently approved active ingredients (primarily imazapic). Some studies with rimsulfuron indicate that it is not as effective at controlling cheatgrass as imazapic or sulfometuron methyl (Clements and Harmon 2013). However, there is also evidence that rimsulfuron is more effective than imazapic under certain conditions (Hirsch et al. 2012). Also see Table 12. Noxious weeds and non-native invasive plants known to occur in the O'Neil PPA.
Grazing/Livestock (BLM 2016a, p. 4-65 to 4-66)	According to the Risk Assessment, rimsulfuron does not pose a risk to mammals under any of the modeled exposure scenarios. These include scenarios involving direct spray, indirect contact with foliage after direct spray, and ingestion of food that has been treated with the active ingredient. The label for rimsulfuron products includes a grazing restriction for range and pasture areas. No livestock grazing should occur on treated sites for 1 year following application to allow newly emerged grasses sufficient time to establish.

Resource	Proposed Herbicide: Rimsulfuron
Soils (BLM 2016a, p. 4-10 to 4-13)	Breaks down rapidly in soil, with aerobic metabolism the primary route of degradation. Its mobility in soil ranges from moderate in clay and silt loams to very mobile in sandy loams. Its tendency to adsorb to soil varies by soil type and is greatest in soils with high organic matter or clay content. Rimsulfuron has a low risk of leaching to groundwater.
Vegetation and Special Status Plants (BLM 2016a, p. 4-25 to 4-33; 4-38 to 4-40)	Rimsulfuron is a selective herbicide that targets annual species and has minimal effects on perennial species. There is some evidence that application of rimsulfuron can result in an increase in perennial grass cover at treatment sites, compared to no discernable effect by imazapic (Hergert et al 2012). The Risk Assessments indicate that rimsulfuron poses a high risk to non-target terrestrial plants under direct spray scenarios. An accidental direct spray of rimsulfuron into an aquatic habitat (stream or pond), or a spill of rimsulfuron into a pond, would pose a high risk for adverse effects to non-target aquatic plants. Non-target terrestrial vegetation would be at a low risk for adverse effects from off-site drift of rimsulfuron from treatment sites. There are no predicted risks to non-target terrestrial or aquatic plants in streams as a result of surface runoff of rimsulfuron from a nearby treatment site. In the pond setting, however, chronic exposures to surface runoff of this herbicide could potentially affect aquatic plants under certain site conditions. For wind erosion scenarios, no risks were predicted for non-target terrestrial plants under the majority of the evaluated conditions (AECOM, 2014b). The Conservation Agreement and Strategy for Goose Creek Milkvetch identifies noxious weeds and invasive weeds, specifically cheatgrass and leafy spurge as threats. Rimsulfuron will be used to control cheatgrass and other susceptible weeds; direct spray of Goose Creek milkvetch will be avoided. Best Management Practices prescribed by the Conservation Agreement and Strategy to avoid impacts to milkvetch plants within occupied habitat will be followed (p. 24-26; Conservation Actions #11 [specific to cheatgrass] and #32 to 37 [specific to noxious weeds].
Wildlife and Special Status Wildlife Species (BLM 2016a, p. 4-51 to 4-57; 4-60 to 4-62	The risk assessment for rimsulfuron predicted that none of these exposure scenarios would pose a risk to any type of terrestrial wildlife (including pollinators). Risk quotients were all below the level of concern of 0.5 (acute high risk). Therefore, use of rimsulfuron on public lands does not present a toxicological concern for wildlife.
Fish (including T&E Species) and Aquatic Invertebrates (BLM 2016a, p. 4-41 to 4-51)	Based on the results of the Risk Assessment, none of the modeled exposure scenarios were associated with risks to fish or aquatic invertebrates in streams or ponds, even under the worst-case accidental spill scenarios. Based on toxicity data reviewed for the Risk Assessment, exposures to concentrations of rimsulfuron as high as 390 mg/L does not result in adverse effects to fish, although the potential for chronic effects is not known. Additionally, the Risk Assessments indicates that rimsulfuron is not likely to accumulate in fish tissue. Lower concentrations of the herbicide were noted to cause adverse effects to aquatic invertebrates, with test organisms affected at 50 mg/L of rimsulfuron. No effects to T&E species would occur as no treatment will take place within riparian areas with LCT.

Resource	Proposed Herbicide: Rimsulfuron
Water Quality (BLM 2016a, p. 4-14 to 4-19)	Rimsulfuron is unstable in soil, and therefore likely has a low risk of leaching to groundwater. The pH of the site conditions are likely a factor, with rimsulfuron less mobile in acidic conditions. Its metabolites may have a greater likelihood of contaminating groundwater, particularly the second metabolite, which is not readily degraded (Metzger et al. 1998). There is little available information about rimsulfuron and its metabolites in terms of groundwater and surface water contamination. One study in sandy soils found no rimsulfuron in groundwater following an herbicide application, but did find the first metabolite in the soil water at a depth of 3.3 feet, for as long as 3 years, in concentrations unsafe for drinking water. Concentrations of the second metabolite were much lower (Rosenbom et al. 2010). In aquatic systems, rimsulfuron is broken down via biodegradation and photodegradation. The biodegradation half-life is estimated at 10 days under aerobic conditions (NYSDEC 2009). However, neither rimsulfuron nor its two metabolites are included on the EPA’s list of drinking water contaminants (EPA 2013). Given its fairly rapid dissipation rate in the soil, rimsulfuron has a low risk of surface runoff. If a rain event were to occur a week after application of rimsulfuron, only a very small portion of the active ingredient would be available for movement (NYSDEC 1997).
Riparian and Wetland Systems (BLM 2016a, p. 4-21 to 4-23)	Rimsulfuron is not likely to be used much in or near wetland and riparian areas, except for spot treatments of certain target species. Similar to fluroxypyr, only small amounts of this chemical are likely to enter wetland and riparian areas under normal application scenarios, although larger amounts could enter these habitats as a result of an accidental spill or movement from an adjacent treatment site. Rimsulfuron has a high rate of soil adsorption in soils with high organic content (Metzger et al. 1998). However, it is quickly degraded under anaerobic conditions. In anaerobic soil the half-life is approximately 18 days. In anaerobic aquatic habitats, the half-life is less than 2 days (NYSDEC 2009). Breakdown products may persist for longer. According to the Risk Assessment, rimsulfuron poses a risk to non-target aquatic plants under direct spray, accidental spill, spray drift, and certain surface runoff scenarios. Risks associated with surface runoff would be limited to aquatic plants in ponds and would be greatest in areas with 50 inches of precipitation or more per year. Non-aquatic plants, such as riparian and emergent wetland species would also be at risk for adverse effects from treatments in nearby upland areas.

3.6.2.2 No Action Alternative

The proposed active ingredients aminopyralid, fluroxypyr, and rimsulfuron would not be applied in the O'Neil PPA and therefore no impacts associated with the application of those chemicals would occur to livestock, soils, non-target vegetation, wildlife, T&E species, and riparian systems. However, imazapic may be applied within the O'Neil PPA. Imazapic's use would be limited to site specific locations as analyzed in previously completed Environmental Assessments for cheatgrass control in fuel breaks and post-fire rehabilitation. For specific information regarding imazapic analysis and project locations refer to the 2010 Elko District Vegetation Treatment Maintenance Project EA (BLM, 2010).

The active ingredients (BLM, 1998) currently approved for use are appropriate for broadleaf and/or woody species control on approximately 3,042 acres; however, only three active ingredients are appropriate for control of annual grasses in rangeland: glyphosate, imazapic, and sulfometuron with limitations. Glyphosate and imazapic are both non-selective to grasses and broadleaf species, which makes them not an ideal selection for largescale broadcast application. Sulfometuron is not allowed for aerial application, which is often needed for largescale project implementation (BLM, 2007a). Therefore, without the use of imazapic or rimsulfuron largescale treatments, especially annual grass control, would be difficult to effectively implement under this alternative. Additionally, herbicides that could be used at lower rates and be effective for broadleaf forb control, namely aminopyralid, would not be available for use.

3.6.2.3 Cumulative Impacts

The CESA for noxious weeds and non-native invasive plants is the O'Neil PPA boundary. Weeds are introduced and spread by wind, water, wildlife, and people. Several past, present, or reasonably foreseeable actions have an impact on noxious weeds and non-native invasive plants. Roadways, waterways, off-road recreation (i.e., hunting), utility rights-of-way (Ruby Pipeline), mineral exploration and development, homestead/ranchette development, existing plant community (i.e., resistance to invasion and resiliency after disturbance), livestock grazing, weed management activities, vegetation treatments, wildfires, and post-fire restoration efforts all play a role in impacting weeds. The no action alternative would limit the use of active ingredients to those already approved (BLM, 1998). The already approved active ingredients are not adequate to treat large invasive grass infestations and require larger chemical use rates to be effective. The proposed action would allow greater success treating noxious weeds and non-native species with more appropriate active ingredients at lesser chemical use rates. The approval of rimsulfuron and imazapic would be used to better control large annual grass treatments. The proposed action would also allow for the use of aminopyralid, which is effective on broadleaf and woody species at much lower rates than the active ingredients currently approved for use. Overall, the proposed action would help to decrease the amount of noxious and invasive weeds while using lower chemical rates and therefore less overall chemical. When the proposed action is combined with cumulative actions there is expected to be an overall increase in native species due to less competition with invasive and noxious species.

3.7 Issue 3: Effects of Treatments on Wildlife & Special Status Species

How would proposed treatments affect wildlife habitat including Special Status Species?

3.7.1 Affected Environment

General Wildlife

Approximately 350 species of terrestrial vertebrates occur in northeastern Nevada (See Appendix E), including representatives of all major taxa: mammal, bird, reptile and amphibian. A host of invertebrate and aquatic wildlife species also occur in appropriate habitats. Many of these species may inhabit the project area on a seasonal basis while others are year-long residents. Approximately 100 birds, 70 mammals, and several reptile, amphibian and invertebrate species are found in sagebrush-steppe, the dominant habitat type throughout the project area.

Big Game

The project area lies primarily within the eastern portion of NDOW Big Game Management Area 07, in addition to all of Hunt Unit 081. Big game winter and migration corridor habitats have become a recent focus of interagency conservation efforts, as outlined in Secretarial Order 3362 (SO3362). This order directs appropriate bureaus within the Department of the Interior to work collaboratively with State game management partners and others to conserve and/or improve priority western big-game winter range and migration corridors in sagebrush ecosystems and in other ecotypes as necessary. These focal habitats were identified and delineated by the NDOW and within the Project Area include 983,401 acres of Area 07 winter mule deer habitat and 102,881 acres of Area 6-7 pronghorn habitat (Figure 15).

Mule deer

Mule deer occur in a diversity of habitat types throughout Nevada but occur in highest densities in montane shrub-dominated communities and are often found on open south-facing slopes in winter. Mule deer browse on a wide variety of woody plants and may graze on grasses and forbs, especially in spring/early summer when plants are most succulent. Mule deer are a secondary successional species, taking advantage of plant species that are often the result of some type of disturbance. They exhibit a high degree of selectivity, not only for the plant species they choose to eat, but also for the specific parts of the plant and the time of year that a particular plant may be eaten. Browse species include sagebrush, bitterbrush, serviceberry, snowbrush, and snowberry. When deer are feeding on browse, they prefer the most tender parts, the new shoots and tips or leaders. Leaders are the most nutritious, most easily bitten off, most flavorful, and most easily digested part of the browse.

The Area 07 mule deer herd summers in higher elevations north of Interstate 80 and winters primarily south of I-80 in the Toano and Pequop Ranges. Aerial composition surveys within Area 07 in December 2019 revealed a composition of 28 bucks:100 does:50 fawns (n=1,440). A combination of large fires, drought, and perhaps an overabundance of older forage plants has impacted these herds in recent years (NDOW, 2020). Conifer encroachment has also resulted in degraded habitat quality where shrubs have concomitantly been reduced. It is possible that existing habitat is not sufficient to support deer numbers observed during previous decades, although recent mild winter conditions may allow for improved fawn recruitment in the near-term.

Of the 983,401 acres of winter habitat identified through the SO3362 process, there is overlap with 15,979 acres of Conifer Phase I and II treatment areas and 39,679 acres of restoration area (Figure 15). See Figure 16 for distribution of mule deer seasonal habitats within the project area.

Pronghorn

Key habitat factors include open or rolling terrain comprised of vegetation cover no more than 25" tall (15" preferred), a variety of woody browse (favored during fall-winter), perennial forbs (favored during spring-fall) and perennial grasses (favored prior to curing). Within the Elko District, pronghorn populations have prospered in recent years, in some areas occupying all available summer habitat (Figure 17). Negative impacts to winter shrub habitats have resulted from recent wildfires, although in general these fires have been an overall benefit to pronghorn as long as burned areas have not converted to annual grasslands. Pronghorn herds occupy distinct seasonal ranges within the District and undertake variable degrees of migration, depending on the juxtaposition of seasonal ranges, weather and traditional migration patterns. The 2019 statewide population estimate for pronghorn was about 30,000 which is essentially unchanged from the previous few years (NDOW, 2020). Although 102,881 acres of winter habitat identified through the SO3362 process occur within the project area, none of these acres overlap with treatment areas (Figure 15).

Rocky Mountain Elk

Key components of elk habitat include thermal and hiding cover during both summer and winter, suitable forage primarily in the form of perennial bunchgrasses, and available water during all seasons. In recent years many of the elk herds within the District were exceeding population objectives and liberal hunting quotas were instituted to help bring population numbers in line with objectives. The 2020 population estimate was up slightly to 13,000 and is now generally in line with population objectives (NDOW, 2020). Although initial effects of large-scale wildfire on local herds were not favorable, these herds are now using these areas due to the recovery of perennial grasses, forbs, and aspen stands. Most elk herds within the District undertake seasonal migrations between habitats, although this species has significantly more year-round range than sympatric mule deer or pronghorn herds. See Figure 18 for distribution of elk seasonal habitats within the project area. No SO3362 habitats for elk have been designated in the Project Area.

Bighorn Sheep (BLM Sensitive but discussed with big game)

The Badlands bighorn herd resides year-round within and around the Badlands Wilderness Study Area, southwest of the town of Jackpot (Figure 19). This small herd experienced an all-age die-off during fall 2014 due to severe chronic pneumonia (NDOW, 2020). Since 2017, 10 bighorn have been radio-collared from this herd and most of these collared animals remained within the traditional use area that has been identified. Occupied bighorn habitat overlaps with 3,419 acres of the Salmon Fire restoration area (Figure 19). No SO3362 habitats for bighorn have been designated in the Project Area.

Migratory Birds

For most migrant and resident species, nesting habitat is critical for supporting reproduction in terms of both nest sites and food. Also, because birds are generally territorial during the nesting season, their ability to access and utilize sufficient food is limited by the quality of the occupied territory. During non-breeding seasons, birds are generally non-territorial and feed across a wider range of habitats.

The sage-grouse umbrella strategy (discussed below) assumes that managing for sage-grouse will simultaneously benefit other sagebrush obligate species of conservation concern (Rowland, Widsom, Suring, & Meinke, 2006). By applying this strategy, migratory bird species that occur within low and mid-elevation shrub steppe are anticipated to benefit from overall conservation practices afforded to sage-grouse. Migratory bird species associated with PJ woodland that may be impacted by the proposed action are discussed below. An additional species, pinyon jay, is discussed with Special Status Species.

Virginia's warbler **-** This species occurs in steep shrub-conifer habitats throughout the intermountain west. Virginia's warbler are ground nesters and generally breed in open PJ habitat, usually on steep slopes under shrubs. Foraging occurs in the mid-levels of PJ woodland. This species is expected to occur in the project area.

Black-throated gray warbler **-** Black-throated gray warblers inhabit extensive juniper stands but prefer pinyon pine (Pavlacky Jr. & Anderson, 2001). They nest in shrubs and conifers, foraging primarily on arthropods. Black-throated gray warblers forage throughout the PJ treatment areas but primarily use contiguous Phase II and III areas.

Juniper titmouse - This species occurs in dry, open PJ woodlands, preferring high juniper cover, senescent trees, dead limbs, and presence of pinyon pines (Cicero, 2000; Laudenslayer Jr. & Balda, 1976). It may partially excavate its own nest cavity if the wood is soft or rotten (Cicero, 2000) and is known to use cavity-nest sites created by woodpeckers; therefore, they tend to prefer areas with older pinyon and juniper trees where more nesting cavities are available.

Special Status Species

As described in Manual 6840, BLM special status species are: (1) species listed or proposed for listing under the Endangered Species Act (ESA), and (2) species requiring special management consideration to promote their conservation and reduce the likelihood, and need, for future listing under the ESA. Bureau sensitive species lists are reviewed and updated every five years by each State Director. Additionally, all federal candidates, proposed, and delisted species in the five years following delisting are designated as Bureau sensitive species. Within the Elko District, 97 species were designated as BLM sensitive by the Nevada BLM State Director in 2017 and included birds, reptiles, amphibians, mammals, fish, invertebrates, and plants (See Appendix A). Many of these species as well as other wildlife species of concern are also discussed in the NDOW Wildlife Action Plan (WAPT, 2012). A few of the prominent special status species that occur or have the potential to occur in the project area include the Greater sage-grouse, pygmy rabbit, bighorn sheep, multiple bat species, multiple raptor species, dark kangaroo mouse, pinyon jay and Goose Creek milkvetch. Sensitive species that have the potential to be negatively impacted by the proposed action are discussed below.

Greater Sage-Grouse and Sagebrush Obligate Species

Sage-grouse occupy lek, nesting, brood-rearing, and winter habitats within the project area. Range-wide declines in recent decades led to a 2010 determination by the US Fish and Wildlife Service that listing under the Endangered Species Act was "warranted but precluded" by higher priorities. A later 2015 finding concluded that listing was not warranted (USFWS, 2015a) but the species nevertheless remained a BLM Sensitive Species. A variety of factors have been identified as potential causes for the decline of GRSG, including vegetation succession, increased predation, habitat changes (amount and/or quality), fragmentation, land treatments, inappropriate grazing practices, and especially loss to wildfire outside the historic range of variation (in both size and frequency) with subsequent invasion of annual non-native species such as cheatgrass and annual mustards. Fire suppression and historic overgrazing have likely facilitated the expansion of juniper woodlands (Miller & Rose, 1999). While many factors influence sage-grouse productivity, the only factor that has been consistently manageable is habitat (Connelly, Schroeder, Sands, & Braun, 2000). Sage-grouse require habitat with an overstory of sagebrush and a robust understory of large perennial grasses, preferred food forbs and with access to meadow/riparian habitats to meet their nesting, brood-rearing, fall and winter cover and forage needs. Sagebrush is essential in all seasons.

Since the mid-1800’s, pinyon and juniper woodland expansion has increased dramatically across the Intermountain West and has been particularly impactful to sagebrush habitats in the Great Basin, where 90% of such expansion has occurred in sagebrush-steppe habitat (Miller, et al., 2011). Such woodland expansion is currently still under way at an annual rate of 0.46%, due primarily to infilling of encroached areas (Filippelli, et al., 2020). Woodland encroachment into sagebrush-steppe is detrimental to greater sage-grouse and other sagebrush-obligate species because it results in the loss, degradation, or fragmentation of intact sagebrush habitat (Gillihan, 2006). This expansion is believed to be slowly reducing the suitability of the habitat available for sage-grouse and creating additional perching locations for raptors and ravens that prey on sage-grouse or their eggs. Sage-grouse avoid conifer-encroached sagebrush habitats (Doherty, Naugle, Walker, & Graham, 2008) and use declines or is unlikely when conifer overstory is present; leks are abandoned when canopy cover exceeds 4% (Baruch-Mordo, et al., 2013) and Coates et al. (2017) reported that sage-grouse survival would benefit from reduction to as low as 1.5% conifer canopy cover.

The mechanical removal of juniper from sagebrush-steppe is an effective management tool for improving sage-grouse habitat (Connelly, Schroeder, Sands, & Braun, 2000). Historically, sagebrush-steppe contained few high perches from which raptors and corvids could launch predatory attacks. Since 2010 within the Burley Field Office immediately to the north of the Project Area, the BLM has partnered with the Natural Resource Conservation Service (NRCS), Idaho Department of Fish and Game (IDFG), Pheasants Forever, and private landowners to treat more than 25,220 acres of Phase I and 6,350 acres of Phase II and III juniper across respective land jurisdictions. Likewise, juniper reduction treatments on Spruce Mountain, south of the Project Area within the WFO, have demonstrated a net improvement in sagebrush community health, particularly in desirable browse, perennial grasses and forbs available to a host of sagebrush-associated wildlife species.

Specific habitat objectives for seasonal habitats are provided by the ARMPA (BLM 2015b; Appendix A) and Stiver et al. (2015). The 2015 ARMPA delineated HMAs, shown in Figure 20. These HMAs are defined as follows (BLM, 2015b):

- PHMA - BLM-administered lands identified as having the highest value to maintaining sustainable GRSG populations. Areas of PHMA largely coincide with areas identified as priority areas for conservation in the USFWS’s Conservation Objectives Team (COT) report (USFWS, 2013). These areas include breeding, late brood-rearing, winter concentration areas and migration or connectivity corridors.

- GHMA - BLM-administered lands where some special management will apply to sustain GRSG populations; these are areas of occupied seasonal or year-round habitat outside of PHMA.
- OHMA - BLM-administered lands identified as unmapped habitat in the Draft Land Use Plan Amendment (LUPA)/EIS that are within the planning area and contain seasonal or connectivity habitat areas.

The ARMPA also identified specific Sagebrush Focal Areas (SFA), a subset of PHMA (Figure 20). Sagebrush Focal Areas were derived from greater sage-grouse stronghold areas described by the USFWS in a memorandum to the BLM titled "Greater Sage-Grouse: Additional Recommendations to Refine Land Use Allocations in Highly Important Landscapes" (USFWS, 2014). SFAs are depicted on Figure 20. The 2022 Plan Maintenance Action #5 (BLM, 2022) revised HMA boundaries based on updated habitat modeling conducted by USGS in 2021 (the "2021" maps). These revised HMAs are depicted in Figure 21 and resulted in the following changes to HMA acreages within the Project area:

- PHMA: –262,472 ac;
- GHMA: +154,013 ac; and
- OHMA: +100,634 ac.

Seasonal habitat objectives were also updated by this maintenance action and are contained in Appendix A. Because the 2022 Plan Maintenance Action (BLM, 2022) resulted in a decrease in the most restrictive management category (PHMA) and increases in less restrictive GHMA and OHMA, the analysis conducted using the older versions of these HMAs was retained because it was considered the most conservative. It was further determined by the BLM that analyses conducted using the 2015 ARMPA HMA acreages and distributions would not be significantly different were the 2022 metrics used. The Project Area contains 1,383,814 acres of PHMA, 157,378 acres of GHMA, 73,188 acres of OHMA and 98,655 acres of Non-Habitat (Figure 20 and Figure 21). These figures include 1,060,835 acres of SFA. All seasonal habitat types are represented (Breeding habitat: March 1-June 30, Summer habitat: June 15-September 15 and Winter habitat: November 1- February 28). Several of these seasonal habitats may overlap, highlighting the importance of these areas to sage-grouse.

The following Goals, Objectives and Management Actions were identified within Section 2.1.1 Special Status Species in the ARMPA:

Goal SSS 1: Conserve, enhance, and restore the sagebrush ecosystem upon which GRSG populations depend in an effort to maintain and/or increase their abundance and distribution, in cooperation with other conservation partners.

Objective SSS 1: Manage land resource uses to meet GRSG habitat objectives, as described in Table 2-2. The habitat objectives will be used to evaluate management actions that are proposed in GRSG HMA. Managing for habitat objectives will ensure that habitat conditions are maintained if they are currently meeting objectives or if habitat conditions move toward these objectives in the event that current conditions do not meet these objectives.

In nesting habitat, the ARMPA specified the desired condition of conifer encroachment as (Table 2-2):

- <3% phase I (>0 to <25% cover)
- No phase II (25 to 50% cover)
- No phase III (>50% cover)

In addition, <2% of the landscape cover within 0.6 miles of leks should be comprised of pinyon and juniper cover. Within two miles of leks, preference is for no structures (e.g., trees or manmade structures, not including fences) taller than one meter. However, analysis for this document was based on the previous version of Table 2-2 and uses the larger three-mile buffer for treatment areas around leks.

In winter habitat, the ARMPA specified the desired condition of conifer encroachment as (Table 2-2):

- <5% phase I
- No phase II (25 to 50% cover)
- No phase III (>50% cover)

Finally, Greater sage-grouse is an umbrella species and managing the landscape to maintain key sage-grouse habitat attributes can help to conserve other species that rely on the same habitats (Rowland, Widsom, Suring, & Meinke, 2006; Hanser & Knick, 2011; Copeland, et al., 2014). Given the high proportion of the O'Neil PPA project area that is designated habitat for sage-grouse, using the sage-grouse umbrella approach to conserve/enhance habitat for a host of sagebrush-associated or sagebrush-obligate species is an effective approach. These species include but are not limited to Brewer's sparrow, sage thrasher, pygmy rabbit and mule deer (Copeland, et al., 2014).

Sage Thrasher

Nevada contains about one-fifth of the global population of sage thrasher (GBBO, 2010). Breeding Bird Survey results indicate possible declines in the state dating from approximately 1980 (GBBO, 2010). Sage thrashers are consistently more numerous in areas with greater cover of high-quality sagebrush, and they are often positively associated with greater shrub height and vertical complexity. They avoid areas with junipers, even if present in low densities. The Project Area contains abundant habitat for sage thrasher. This and other shrub-nesting species may benefit from conifer removal projects in sagebrush habitat (Holmes, Maestas, & Naugle, 2017).

Brewer's Sparrow

Brewer's sparrow populations have declined by ~2% per year in recent years (GBBO, 2010). It is most abundant in relatively large sagebrush patches, both in valley floors and montane sagebrush settings, and is negatively affected by the widespread loss and degradation of high-quality sagebrush habitat (GBBO, 2010). While perennial grasses are a valuable component of occupied habitat, this species forages mostly in shrubs (>75% of over 600 observation periods) and relatively little on open ground between shrubs or at base of bunchgrasses (Wiens, Van Horne, & Rotenberry, 1987). The Project Area contains abundant habitat for Brewer's sparrow.

Pygmy rabbit

The NatureServe global status for the pygmy rabbit is "apparently secure" (G4). In Nevada, it is rated as vulnerable (S3). General habitat for pygmy rabbits is primarily found on big sagebrush-dominated plains and alluvial fans where plants occur in tall, dense clumps. Selected habitat often occurs on deep loamy soils allowing for the excavation of burrows. Dense stands of sagebrush located adjacent to permanent and intermittent streams, fence rows, or near ditches may provide avenues of dispersal. Sagebrush makes up 99% of diet in the winter and 51% in summer with wheatgrasses and bluegrasses being highly preferred (WAPT, 2012). Cheatgrass invasion is detrimental to pygmy rabbit habitat through increased fire frequency and size as well as being a barrier to dispersal once established as a monoculture (Larrucea & Brussard, 2008; WAPT, 2012).

Pygmy rabbit burrow complexes have been documented south of Thousand Springs Creek and this species may occur in appropriate habitat throughout the project area. As a sagebrush-obligate, the pygmy rabbit has been similarly impacted by the altered habitat indicators discussed for sage-grouse and factors that impact sagebrush communities are likely to impact both species.

Pinyon Jay and PJ obligates

The pinyon jay and pinyon pine have a mutualistic relationship; pinyon nuts are a primary food source for pinyon jays and in turn, caching of pinyon nuts by jays is the primary long-distance dispersal mechanism for pinyon pines (Ligon, 1978). Pinyon jay populations in the Great Basin have undergone dramatic declines in recent decades despite the widespread expansion and infilling of pinyon-juniper woodland habitat. While Nevada contains over a quarter of the global population, annual percentage declines within the state averaged -4.55% from 1967 to 2015 (Sauer, et al., 2017).

Although it is likely that several causes have contributed to the decline of pinyon jay populations (e.g., historic large-scale clearing of habitat to support the mining industry, habitat enhancement for other species or to create better livestock grazing, fuels reduction efforts and climate change), Somershoe et al. (2020) identified sage-grouse habitat improvement projects as one potential cause of habitat loss. These projects most often involve complete removal of pinyon and juniper trees, most often at their lower elevation limits which are areas favored by jays, within sagebrush communities. Between 2010-2017, over 1.1 million acres of conifers were treated through the Natural Resource Conservation Service' Sage-Grouse Initiative and Utah's Watershed Restoration Initiative (unpublished data cited in Somershoe et al., 2020).

Within the Great Basin pinyon jays primarily occupy pinyon-juniper woodland habitats (Somershoe, et al., 2020). Nest colony sites tend to have somewhat denser tree cover (typically Phase II) than caching sites. Boone et al. (2021) reported that caching locations occurred on lower elevation sites with flatter slopes and high shrub and grass cover (similar to Phase I PJ vegetation). Many caching locations also occurred in the pure shrubland habitat located down-slope from the woodland-shrubland ecotone. Foraging locations corresponded to a mosaic of Phase I and Phase II pinyon-juniper successional stages (Boone, Witt, & Ammon, 2021). Roost sites were found in relatively high-density stands, usually within ~550 yards (500 meters) of the nesting colony. Denser woodland interiors (Phase III) at higher elevations tend to be avoided for most daily activities, with the possible exception of roosting (from J. Boone and E. Ammon, unpublished data *in* Somershoe et al., 2020). Within the project area, pinyon jay habitat includes primarily singleleaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus utahensis*) with limited occurrences of limber pine (*P. flexilis*) at higher elevations. See Figure 25 for the distribution of singleleaf pinyon within the project area.

Pinyon jays appear to use Phase I woodlands most frequently, Phase II woodlands at an intermediate level, and Phase III woodlands rarely (J. Boone and E. Ammon, unpublished data *in* Somershoe et al., 2020). There is some evidence for a positive association of co-occurrences of pinyon jay and several other PJ-associated species including black-throated gray warbler, juniper titmouse, gray flycatcher, Woodhouse's scrub jay, mountain chickadee and gray vireo (J. Boone, unpublished data). This suggests that impacts to pinyon jay habitats may similarly impact these other species and that pinyon jay may serve as an umbrella species for other PJ-obligates or associated species.

The project area lies on the periphery of pinyon jay range in northeastern Nevada, generally coinciding with the extent of pinyon pine distribution, although jays may wander widely in winter in search of alternative food sources or when caching (Somershoe, et al., 2020). See Figure 26 for a recent characterization of pinyon jay distribution and PJ habitat within the Great Basin, including the project area (Boone, Witt, & Ammon, 2021). One Breeding Bird Survey route (Rancho Grande) exists within the northeastern corner of the project area. This route has been surveyed 26 times between 1988 to 2019. During this time, pinyon jays were detected in 10 separate years and consisted of a mean annual total of 5.6 jays, indicating that when present they are not typically comprised of large flocks (https://www.pwrc.usgs.gov/BBS/PublicDataInterface/index.cfm).

<u>Raptors</u>

***Buteo* hawks -** Ferruginous and Swainson's hawks often occur sympatrically during the breeding season. In Nevada, ferruginous hawks prefer open, rolling sagebrush near the pinyon-juniper interface (GBBO, 2010), often nesting in isolated, older juniper trees at the end of or near the edge of a stringer of trees at the shrub-steppe interface. Their favored prey is rabbits (*Lepus* spp.), but they are also known to take other small rodents and occasionally birds and reptiles. The species has probably undergone recent population declines within Nevada (GBBO, 2010) although relative stability of wintering populations has recently been inferred from statewide surveys during 2013-2018 (Miller, Carlisle, Barnes, Haley, & Jeffress, 2019). There are four documented ferruginous nests within proposed treatment areas all of which were last confirmed in 2003 or earlier (NDOW 2017 raptor nest database).

The Swainson's hawk is a summer resident in Nevada (Herron, Mortimore, & Rawlings, 1985). Often associated with agricultural and riparian areas, it will also use sagebrush steppe, nesting in scattered junipers, cliffs or other trees (GBBO, 2010). Favored prey on breeding territories includes rabbits and ground squirrels. Local populations have likely been in recent decline (GBBO, 2010), however, recent restrictions on pesticide use on their wintering grounds in South America appear to have resulted in positive population trends. There are no documented nests within proposed treatment areas (NDOW 2017 raptor nest database).

Ferruginous hawks occasionally overwinter in northern Nevada while Swainson's hawks leave the area entirely. It is likely that additional nest sites for these two species exist that are not documented.

***Eagles* -** Bald eagles and golden eagles receive protection under the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act. Within the project area, the golden eagle is a year-round resident while the bald eagle is a spring/fall migrant and winter resident. Suitable bald eagle winter habitat is widely dispersed on uplands, irrigated lands and riparian areas throughout the Project Area. Recent data suggest declines in golden eagle populations both regionally and statewide, but the trend is inconclusive in Nevada (Kochert, Steenhof, McIntyre, & Craig, 2002; Sauer, Hines, & Fallon, 2008), while bald eagle winter populations are stable to increasing (Buehler, 2000; Sauer, Hines, & Fallon, 2008;

WAPT, 2012). There are four documented golden eagle nests within the proposed treatment areas (NDOW 2017 raptor nest database).

Goose Creek Milkvetch
The species is historically and currently known from the Goose Creek drainage in Cassia County, ID, Elko County, NV, and Box Elder County, UT (Baird, Tuhy, & A., 1991; Mancuso, Moseley, & Cost, 1991; Smith, 2007). Goose Creek milkvetch occurs at elevations between 4,900 - 5,885 feet (1,494 - 1,790 meters) (Smith, 2007; Shohet & Wolf, 2011). Most known locations are within an area approximately 35 miles long by 6 miles wide, oriented in a northeast to southwesterly direction along Goose Creek and extending to Rock Spring Creek in Idaho (USFWS, 2015b). The amount of known Goose Creek milkvetch habitat within the project area is approximately 2,103 acres (Figure 27).

In 2015, BLM offices in Nevada, Utah and Idaho signed a Conservation Agreement and Strategy with the USFWS that describes threats to the species and a process to implement proactive management of the species to maintain existing populations and habitat conditions (USFWS, 2015b). There is no overlap of known occupied habitat with any proposed treatment units (See Figure 27). However, because herbicide treatments may occur outside of treatment units there is the potential for impacts to individual milkvetch plants or pollinator plant species within the 500m pollinator buffer (USFWS, 2015b).

3.7.2 Environmental Impacts

3.7.2.1 Proposed Action

General Wildlife

In general, conifer reduction and restoration of degraded and/or burned habitats would benefit shrub-steppe associated species as opposed to woodland-associated species. Significant woodland encroachment into shrub communities has occurred over the past several decades, but the proposed action would help to restore the historic balance between the two communities that was traditionally maintained primarily by fire and climate. Habitat quality for shrubland-associated species would be maintained or improved across 66,251 acres and decreased for woodland-associated species. Fuel break creation would encourage conservation of currently intact habitats through a reduction in mean fire size, fire frequency and associated annual species establishment or proliferation. Restoration units would benefit from the seeding/planting of desired species and herbicide treatments intended to reduce invasive species, occurring on up to 96,329 acres.

Compared to the No Action Alternative where woodland expansion would be maintained or increased within and near the treatment areas, woodland-associated species would realize a reduction in potential habitat in Phase I and Phase II treatment areas, but the scale of this reduction when viewed in context of the region-wide conifer expansion (including implementation of Project Design Features designed to minimize impacts, especially on pinyon jays as discussed below) would not be expected to be substantial enough to negatively impact populations of these species. Species often specialize for specific habitat conditions, and what benefits one species may be a detriment to another. The best strategy is to maintain heterogeneous, patchy mosaics across the landscape of vegetation types in all stages of succession (Jones, 2019). Project design features intended to create feathered transition zones, leave islands and irregular, patchy mosaics would encourage attainment of this strategy and benefit the most species.

Big Game

Mule Deer

The Proposed Action would benefit mule deer by promoting increased distribution, abundance and vigor of browse vegetation to help meet the nutritional requirements for wintering mule deer. The proposed action would also help meet the intent of SO3362 "to enhance and improve the quality of big-game winter range and migration corridor habitat on Federal lands". Phase I and Phase II woodlands would be reduced in the amounts described for sage-grouse, representing a concomitant maintenance of or improvement in the browse plant status within mule deer habitat in general and within crucial winter and winter habitats in the SO3362 focal area (Figure 15). Fuel break and herbicide treatments would serve to conserve and/or improve mule deer habitat through reduction in the likelihood of catastrophic wildfire and control or reduction of undesirable plant species.

Pronghorn

Under the Proposed Action, pronghorn would benefit in all areas where trees are removed from their habitat as they prefer short-statured vegetation communities enabling unobstructed views. Likewise, restoration of previously burned habitats with desirable shrubs, forbs and grasses would improve the forage condition in these areas. As with most other species, pronghorn would benefit from fuel break and herbicide treatments which would serve to conserve and/or improve habitat condition through reduction in the likelihood of catastrophic wildfire and control or reduction of undesirable plant species.

Rocky Mountain Elk

Under the Proposed Action, impacts would be similar to those described for mule deer. Elk would especially benefit from the maintenance of or increase in perennial bunchgrasses as a consequence of PJ reduction and removal. Reduction in up to 87,133 acres of Phase I and II PJ would decrease the amount of actual and potential thermal cover over the long-term but relative to the extensive amount of existing late Phase II and Phase III PJ this would not be expected to be a significant impact to elk populations. Fuel break and herbicide treatments would serve to conserve and/or improve elk habitat through reduction in the likelihood of catastrophic wildfire and control or reduction of undesirable plant species. Restoration of previously burned habitats with desirable shrubs, forbs and grasses would improve the forage condition in these areas.

Bighorn sheep

Fuel break and herbicide treatments would serve to conserve and/or improve bighorn habitat through reduction in the likelihood of catastrophic wildfire and control or reduction of undesirable plant species. Restoration of previously burned habitats with desirable shrubs, forbs and grasses would improve the forage condition in these areas.

Migratory Birds

As discussed previously, managing for sage-grouse is expected to simultaneously benefit other sagebrush obligate species of conservation concern (Rowland, Widsom, Suring, & Meinke, 2006). By applying this strategy, migratory bird species that occur within low and mid-elevation shrub steppe are anticipated to benefit from overall conservation practices and habitat treatments implemented for sage-grouse.

Virginia's warbler – Because this species inhabits open shrub-conifer habitats like those targeted for conifer reduction treatments, it may be impacted through loss or degradation of preferred breeding habitat in these areas. The relative impact, however, is expected to be small given that conifer treatment areas are focused around sage-grouse leks, the collective area of which is small compared to the much more widespread available habitat areas that would not be treated. The other components of the Proposed Action would benefit conservation of currently occupied warbler habitat through decreased likelihood of burning (fuel breaks) and noxious weed invasion (herbicide treatment).

Black-throated gray warbler – This species occupies similar habitats as Virginia's above but is more likely to be associated with open to closed stands of PJ compared to the brushy interface preferred by Virginias. As such, conifer reduction treatment areas would reduce the extent of or degrade the quality of breeding habitat. Similar to Virginia's warbler, the relative impact would be expected to be small as the proportion of conifer treatment areas around sage-grouse leks is a small portion of breeding habitat available to these species throughout the project area. The other components of the Proposed Action would benefit conservation of currently occupied warbler habitat through decreased likelihood of burning (fuel breaks) and noxious weed invasion (herbicide treatment).

Juniper titmouse – Of the three PJ-associated species discussed here, juniper titmouse is the most closely associated with PJ habitat and older, denser canopy habitats. Because of this it is less likely to be impacted by conifer reduction treatments in the relatively open Phase I and Phase II treatment areas. Likewise, the relative impact would be expected to be small as the proportion of conifer treatment areas around sage-grouse leks is a small portion of breeding habitat available to juniper titmouse throughout the project area. The other components of the Proposed Action would benefit conservation of currently occupied warbler habitat through decreased likelihood of burning (fuel breaks) and noxious weed invasion (herbicide treatment).

Special Status Species

<u>Greater Sage-Grouse and Sagebrush Obligate Species</u>

Under the Proposed Action, Greater sage-grouse and other sagebrush obligates could be temporarily disturbed or displaced by human disturbance during project implementation, but impacts would be minimized by limiting operations during the sage-grouse breeding, nesting and brood-rearing seasons. If sage-grouse were to remain in the area during other seasons, they could be temporarily displaced to adjacent habitat due to mechanical equipment presence and noise, but these impacts would be eliminated or reduced through implementation of DFPM 17 described in Section 2.1.5.1. The objective of the proposed action is to increase the quantity and quality of habitat for sage-grouse and other sagebrush-obligate species. The proposed PJ and restoration treatments are expected to result in maintenance or enhancement of shrub, perennial grass, and preferred forb canopy cover and distribution when implemented under the proper conditions in the appropriate places (Bates, Davies, Hulet, Miller, & Roundy, 2017). These results would help to meet habitat objectives outlined in the ARMPA, particularly the security objective for leks and adjacent breeding habitat where tree cover would be eliminated on over 87,000 acres of breeding habitat surrounding leks (Appendix A; BLM 2015b). Increased horizontal vegetative cover is expected to improve nest concealment, forage availability, and brood survival. Additionally, nutritional quality of sagebrush may improve with healthier leader and leaf growth resulting from reduced competition with trees. Raptor, raven, and crow perching sites would be reduced or eliminated within important sage-grouse habitat. With habitat improvement, sage-grouse distribution and population increases are possible. Additional potential impacts to wildlife, including greater sage-grouse, were described in BLM 2021 (pages 4-52 through 4-55) and could include short-term habitat avoidance or flight response. Some wildlife, such as burrowing insects, small mammals, reptiles, or ground-nesting birds, could be injured or killed by treatments if they are unable to leave treatment areas quickly enough to avoid impacts. Direct impacts related to disturbance would be temporary, limited to the period of project implementation and maintenance. However, the long-term habitat improvements would be expected to offset potential short-term impacts. While other sagebrush-obligate bird species might be expected to enjoy similar benefits as sage-grouse, Bombaci and Pejchar (2016) noted in a review that impacts of woodland reduction on such species were largely non-significant or negative, at least in the first few years after treatment (Bombaci, Gallo, & Pejchar, 2017). These results were counterintuitive, and they noted additional studies will be important to further understand potential impacts across this species guild.

The PJ treatment units consist of a maximum of 55,955 ac of Phase I and 31,178 ac of Phase II woodland encroachment (87,133 total acres; Table 2). Of these, 66,251 ac are BLM-managed, and 20,883 ac are privately owned. If all BLM acres in PJ treatment areas were treated and resulted in improved or newly suitable habitat, this would represent a net improvement or creation of habitat on up to 3.9% of the project area and 76.0% of the conifer treatment units area. The influence of this improvement or increase in suitable habitat would be especially impactful because treatment areas were selected based on active lek locations which function as focal areas for sage-grouse during the critical breeding, nesting and early brood-rearing seasons. These seasonal habitats often overlap, highlighting the importance of these areas to sage-grouse. Likewise, if all restoration units were completed this would represent an additional 96,329 acres of PHMA habitat potentially improved, or 4% of the total project area. These restoration efforts would be especially impactful because they are entirely located within PHMA, the most valuable of the Habitat Management Areas for sage-grouse and several other sagebrush obligates or associates. Assuming all Phase I and Phase II woodlands on private land within the treatment units were treated in addition to all the public acres, and resulted in improved or newly suitable habitat, this would represent a cumulative net improvement or creation of habitat across 5.1% of the project area and 100% of the conifer treatment units area. These actions would benefit sage-grouse habitat and population metrics as well as benefitting habitats for sagebrush obligates or associates falling under the sage-grouse umbrella. Holmes et al. (2017) demonstrated beneficial impacts of conifer removal projects designed to retain shrub cover and structure for shrub and ground-nesting birds in southern Oregon, including Brewer's sparrow. Additional species that may benefit include but are not limited to sage thrasher and pygmy rabbit.

Finally, if all proposed fuel break treatment areas were treated to the full 500' width, sage-grouse habitat would be reduced in quality (e.g., where sagebrush is mowed to 4-6" in height) or lost (e.g., where disked or planted with fire-resistant species) on up to 25,000 ac. Risks and potential impacts to sage-grouse and other wildlife habitat in these areas would be similar to those described, considered and analyzed in the *Final PEIS for Fuel Breaks in the Great Basin* (BLM, 2020).

Pinyon Jay and PJ Obligates

Bombaci and Pejchar (2016) reported woodland thinning had largely non-significant impacts to most wildlife species although a majority of detected negative responses involved woodland birds. A southwestern study found that pinyon jays stopped nesting within parts of a known colony site after the colony site was significantly thinned but a few birds nested in untreated woodlands immediately adjacent to the treated area, suggesting fidelity to the traditional nesting area (Johnson, Petersen, Smith, & Sadoti, 2018). These findings suggested that shifting nesting sites to an adjacent untreated area depends on the availability of potentially suitable habitat, which cannot be assumed (Somershoe, et al., 2020). Treatment of Phase I and Phase II juniper would impact jays through reduction of conifers within these areas and the subsequent impacts on nesting, foraging and caching habitats. These impacts would be minimized through recommended conservation practices and project-specific stipulations, described below, intended to reduce impacts to jays and their habitat.

While comprehensive conservation practices for pinyon jay and its habitat have not been provided nor tested, Somershoe et al. (2020) suggested several considerations during conifer treatments in jay habitat within the Great Basin. Considerations applicable to this project included:

- Treatments that create "feathered" transition zones of approximately 270–550 yards (250–500 meters) between the treated area and untreated PJ woodlands more accurately mimic the transitional zones that pinyon jays use most often in the Great Basin. More specifically, a woodland / shrubland ecotone that is irregular, diverse, and gradual is likely to be more favorable for pinyon jays than a linear ecotone with sharp transition from open shrubland to dense woodland (Crist, Chambers, Phillips, Prentice, & Wiechman, 2019).
- If cheatgrass and other invasive annual plants are in the vicinity of a planned treatment area, aggressive invasive species control in post-treatment management plans decreases fire risk and fire intensity (Chambers, et al., 2017), thus lowering the risk to stands important to pinyon jays. A minimum of 20% perennial native herbaceous cover in a treatment area is recommended for preventing a large increase in cheatgrass and other annual invasive plants post-treatment (Chambers, et al., 2017).

Ammon and Boone (2019) provided more explicit follow-up recommendations to avoid impacts to nesting colonies in Nevada:

1. Conduct clearance surveys for nesting colonies during March 1-May 30.
2. Buffer colony sites by 1,200m (0.7 miles) of no disturbances or vegetation removal (this distance includes roosting and other colony-related activities, as opposed to only the 500m distance between annual colony shifts described by Somershoe et al. [2020]).
3. Avoid removing high-priority pinyon pines elsewhere in the home range of pinyon jays, especially open, multi-aged and mid-successional stands that reliably bear cones.

High-priority pinyon pine stands referred to in recommendation 3 above are most likely to be found on northeast aspects which are often shielded from mid-afternoon sun, or on the periphery of wet meadows. Identification of these sites as leave areas would be especially valuable to foraging jays. See Figure 26 for the distribution of pinyon pine within the Project Area; leaving the described pinyon pine stands within conifer treatment polygons in the north Pequop and Murdock Ranges would especially benefit pinyon jays. Likewise, buffer zones around active breeding colony sites would reduce or eliminate impacts to pinyon jays and their breeding sites. Impacts to foraging and caching habitats, which often occur along transitional ecotones, would occur through the removal of trees, but this does not necessarily preclude their use for these activities by jays as the collective area of these ecotones throughout the project area would not greatly change. Relative to the collective amount (519,195 acres) of PJ woodland cover (Phases I, II and III) that exists throughout the project area, a potential reduction of up to 87,133 acres of

Phase I and Phase II represents a maximum of 17% of the total available PJ habitat. While this reduction represents a significant amount of available habitat, implementation of the targeted conservation actions above is expected to minimize impacts to pinyon jay populations within the project area, especially at and adjacent to breeding sites. Notably, if leave areas are identified for the benefit of pinyon jay breeding colonies and high-priority pinyon pine stands, the total amount of Phase I and Phase II acres could be reduced significantly, thus further minimizing impacts to these habitats. As noted previously, actions designed to minimize or eliminate impacts to pinyon jays are similarly likely to benefit other PJ-associated species including but not limited to juniper titmouse, black-throated gray warbler, Woodhouse's scrub jay and mountain chickadee.

Raptors

Conifer reduction activities in treatment areas would avoid known active or newly documented nest sites of all raptor species, applying appropriate seasonal and spatial stipulations as detailed in Table 6. Likewise, fuel break creation would adhere to these same stipulations, thus minimizing impacts from both activities to breeding raptors and their young. Removal of Phase I and II trees could eliminate some potential nest sites in treatment areas, though the scale of removal within conifer treatment areas relative to total acres of conifer available would not be expected to result in an effective paucity of nest sites. Creation of strategically placed fuel breaks would reduce the likelihood of fire in intact habitats and the subsequent invasion of undesirable species such as cheatgrass. Herbicide treatments would work to maintain or improve habitats for favored prey species such as small mammals and lagomorphs. Thus, adherence to seasonal and spatial stipulations combined with the expected conservation benefits of fuel breaks and herbicide treatments is expected to benefit raptors including *Buteo* hawks and bald and golden eagles.

Goose Creek Milkvetch

Within treatment areas, no impacts to known milkvetch would be expected because there is no overlap with milkvetch habitat. However, because herbicide treatments could occur outside of proposed conifer reduction, fuel break and restoration treatment units, there is the potential for ancillary impacts to occupied habitat or pollinator plant species in the 500m pollinator buffer (USFWS, 2015b). The Proposed Action includes adherence to Conservation Actions described in the Conservation Agreement and Strategy that are designed to minimize or eliminate herbicide impacts to known milkvetch populations and pollinator plant species within the 500m pollinator buffer (See Tables 13-16). Thus, inclusion of such Conservation Actions during herbicide application outside of treatment areas will ensure minimization or elimination of potential impacts to Goose Creek milkvetch populations. Figure 27 shows the documented habitat of Goose Creek milkvetch within the O'Neil PPA boundary.

3.7.2.2 No Action Alternative

General Wildlife

Under the No Action Alternative, conifer encroachment of shrub-dominated vegetation communities would continue, resulting in the perpetuation of associated ecological processes including changes in the hydrologic cycle, fire regime, and the ratio of available wildlife habitats for shrub/woodland-associated species. Restoration units would not be improved through herbicide treatments or through the addition of sagebrush and other shrubs or desirable plants and would continue to be dominated in the near-term by grasses, perennial or otherwise. Currently intact wildlife habitats would not benefit from the placement and maintenance of fire breaks designed to reduce fire size and frequency within or adjacent to those habitats. Woodland-obligate or associated wildlife species would tend to benefit from continued expansion of conifer habitat into shrub and perennial grass-dominated vegetation communities while shrubland-associated species would tend to be negatively impacted.

Big Game

Mule Deer

Under the No Action Alternative, conifers would continue to expand and/or infill, decreasing the quality and distribution of palatable browse species in shrub-steppe habitats. Currently intact habitats would not benefit from implementation of fuel breaks and herbicide treatments, increasing the likelihood of habitat loss/degradation due to fire and noxious/invasive plant invasion. Restoration units would not be enhanced, resulting in a continued paucity of shrubs and other desirable species in concert with continuing or increased dominance of less desirable species such as invasive annual grasses and forbs.

Pronghorn

Under the No Action Alternative, impacts would be similar to those described for mule deer.

Rocky Mountain Elk

Under the No Action Alternative, continued conifer encroachment into shrub-steppe habitats combined with infilling of currently encroached Phase I and Phase II areas would negatively impact elk through decreased perennial bunchgrass forage over time. The relative amount of thermal cover in the form of thicker Phase II and dense stands of Phase III PJ would increase. Other impacts would be similar to those described for mule deer.

Bighorn Sheep

Under the No Action Alternative, currently intact habitats would not benefit from implementation of fuel breaks and herbicide treatments, increasing the likelihood of habitat loss/degradation due to fire and noxious/invasive plant invasion. Restoration units would not be enhanced, resulting in a continued paucity of shrubs and other desirable species in concert with continuing or increased dominance of less desirable species such as invasive annual grasses and forbs.

Migratory Birds

As discussed previously, managing for sage-grouse is expected to simultaneously benefit other sagebrush obligate species of conservation concern (Rowland, Widsom, Suring, & Meinke, 2006). By applying this strategy, migratory bird species that occur within low and mid-elevation shrub steppe would not benefit from overall conservation practices and habitat treatments implemented for sage-grouse.

Virginia's warbler – Because this species inhabits open shrub-conifer habitats like those targeted for conifer reduction treatments, it would not be impacted through loss or degradation of preferred breeding habitat in these areas. However, infilling of Phase I and Phase II PJ habitats would continue and eventually result in degradation or loss of preferred open shrub-conifer habitats. Under the No Action alternative, this species would also not benefit from strategic fuel breaks and herbicide treatment designed to target noxious weed invasion.

Black-throated gray warbler – This species occupies similar habitats as Virginia's above but is more likely to be associated with open to closed stands of PJ compared to the brushy interface preferred by

Virginia's. As such, its preferred habitat would not be impacted by conifer reduction treatments. Under the No Action alternative, this species would not benefit from strategic fuel breaks designed to reduce the occurrence of catastrophic fire on the landscape nor would it benefit from herbicide treatments intended to reduce the likelihood of noxious/invasive weed establishment and spread.

Juniper titmouse – Of the three PJ-associated species discussed here, juniper titmouse is the most closely associated with PJ habitat and older, denser canopy woodlands. The proposed conifer treatment areas occur in more open Phase I and Phase II woodlands, thus its preferred habitat is unlikely to be impacted by conifer reduction treatments. Under the No Action alternative, this species would not benefit from strategic fuel breaks designed to reduce the occurrence of catastrophic fire on the landscape nor would it benefit from herbicide treatments intended to reduce the likelihood of noxious/invasive weed establishment and spread.

Special Status Species

Greater Sage-Grouse and Sagebrush Obligate Species

Under the No Action Alternative, sage-grouse would continue to experience negative impacts if no action is taken to address woodland expansion into sagebrush-steppe habitats. Habitat conditions are expected to diminish with continued woodland encroachment and/or infilling, including the loss of shrub, grass, and forb cover. Pinyon and juniper trees may aid predators in finding sage-grouse adults, chicks, and their nests. Areas currently suitable for nesting, brood rearing, and foraging are expected to become less suitable or unsuitable due to the increase in PJ canopy cover. The amount of time before the habitat becomes unsuitable would vary by the current density of conifers, from 5 to 40 years or more. If this occurs, sage-grouse populations would become increasingly fragmented. Areas currently occupied could gradually become increasingly unsuitable until sage-grouse become locally extirpated.

Restoration units, all of which occur in PHMA, would not benefit from treatments designed to improve distribution and abundance of desirable species nor would they improve as a result of herbicide treatments designed to suppress the prevalence of invasive annual species. Currently intact grouse habitats would continue to be at risk of more frequent and larger fires that could be ameliorated by the implementation of strategic fuel breaks in the proposed action. Other sagebrush obligate species would be expected to suffer similar impacts as sage-grouse, including sage thrasher, Brewer's sparrow and pygmy rabbit.

Pinyon Jay and PJ Obligates

Pinyon jay populations and other PJ associates or obligates would not be impacted by woodland reduction treatments under the No Action Alternative. PJ habitat would continue to expand in the near term but there is no reason to expect that jay populations would not continue to decline. Currently intact habitats would not benefit from implementation of fuel breaks and herbicide treatments, increasing the likelihood of habitat loss/degradation due to catastrophic fire and continued establishment and spread of noxious/invasive plants.

Raptors

Under the No Action Alternative, continued conifer encroachment and infilling within conifer treatment areas would result in decreased shrub, grass and forb components as conifer cover increases and canopies eventually close, resulting in a loss of preferred habitat for rabbits and other small mammal prey favored by eagles, *Buteo* hawks and other raptors. Currently intact nesting and foraging habitats would not benefit from strategic fuel breaks nor the proposed herbicide treatments of noxious/invasive species.

Goose Creek Milkvetch

There would be no potential impacts from treatment activities under the No Action Alternative. In areas where conifer encroachment and woodland succession continues, tree canopies become closed and shrubs, grasses and forbs would decrease in distribution and abundance within these areas. While no known occupied habitat occurs within conifer treatment areas it is possible that undocumented populations of Goose Creek milkvetch exist within these areas and could be similarly impacted if conifer encroachment is not addressed. Currently intact occupied habitats would not benefit from implementation of fuel breaks and herbicide treatments, increasing the likelihood of habitat loss/degradation due to fire and noxious/invasive plants.

3.7.2.3 Cumulative Impacts

General Wildlife, Migratory Birds, & Raptors

This CESA is comprised of the O'Neil PPA project area, an area large enough to encompass entire population units of most species. In addition to fully implementing all conifer reduction treatments within this CESA, if all Phase I and Phase II woodlands on private land within the treatment units were treated and resulted in improved or newly suitable sagebrush habitat, this would represent 5.1% of the project area and 27.9% of the conifer treatment units area thus representing a cumulative net improvement or creation of habitat across this area for shrub-steppe associated species. Likewise, the creation and maintenance of the proposed strategic fuel breaks would add to the impact of PPRFAs described in Table 9, but ultimately, protection of intact habitats from catastrophic burning would outweigh adverse impacts of fuel breaks because the scale of protected areas is so much larger than the area directly impacted by fuel breaks. When added to the baseline impacts of actions described in Table 9 the Proposed Action is not expected to result in cumulative impacts to wildlife habitat.

Special Status Species

The CESA for Special Status Species (Figure 28) encompasses the entirety of all GRSG Habitat Assessment Framework fine scale polygons that overlap with the Project Area (Stiver, et al., 2015). These polygons were delineated as sage-grouse habitat suitability analysis areas by the BLM National Operations Center in coordination with the WFO. The fine scale boundaries encompass local populations of sage-grouse and utilize natural barriers between populations. The fine scale polygons extend north into Idaho and east into Utah using natural feature breaks such as ridgelines and watersheds. They encompass potential habitats for all other Special Status wildlife species. PPRFAs that could cumulatively affect habitats for Special Status Species include Lands, Restoration/Prevention, Minerals, Recreation and Livestock Grazing. These uses are likely to continue in the future on or near the project area. See Table 9 for PPRFA acreages and Section 3.5.2.3for cumulative impacts from treatments.

Vegetation treatments in the CESA include the Burley Landscape Sage-Grouse Habitat Restoration II, a project similarly aimed at improving sage-grouse habitat in the Burley Field Office in the Twin Falls District of southern Idaho. The US Forest Service Goose Creek Sage-grouse Habitat Restoration Project (immediately north of the tri-state junction) would remove juniper across 19,608 acres by hand cutting and 3,884 acres by mastication. Private and state land juniper treatments are expected to target at least 3,000 acres over the next few years. The West Desert District Box Elder Programmatic Vegetation

Treatments has treated roughly 3,200 acres using mastication, broadcast burning, and lop/scatter techniques. Future juniper treatment planning in the West Desert District includes approximately 18,000 additional acres to be treated using the same techniques. All treatments are designed to enhance the landscape level approach to interconnect sage-grouse habitat across all land ownerships. Future conversion from sagebrush steppe to agricultural or pasture may occur within the CESA. However proposed treatments across all lands should increase potential habitat available to sage-grouse at a higher rate than what would be lost. Increased shrub cover is expected to improve nest concealment, forage availability, and brood survival for sage-grouse and other sagebrush obligate birds. Additionally, nutritional quality of sagebrush may improve with leader and leaf growth from reduced competition with conifers, benefitting sage-grouse, pygmy rabbits and other sagebrush obligates.

In a fire-prone landscape such as the Great Basin, future wildfires and suppression actions will occur within the CESA and further reduce habitat availability for sage-grouse. Range developments such as fences, pipelines, and troughs associated with livestock grazing can cause small, localized disturbances which reduce the available forage and cover for the sage-grouse and many other wildlife species. This effect is expected to be minimal in comparison to what is available for forage and cover in surrounding areas. Fences could be potential collision hazards for some species; however, new fences would be constructed with a wildlife friendly design and may be marked depending on collision potential. Additional general impacts of many of the past, present and future actions are described in the Fuel Breaks PEIS, Section 4.7.7 (BLM, 2020) and Fuels PEIS, Section 4.7.7 (BLM, 2021).

The conifer reduction and herbicide treatments contained in the Proposed Action would help offset losses or degradation of sagebrush-steppe habitat due to actions in Table 10. Ultimately, protection of intact habitats from catastrophic burning through the creation and maintenance of strategic fuel breaks would outweigh adverse impacts because the scale of protected areas is so much larger than the area directly impacted by fuel breaks. When added to the baseline impacts of actions described in Table 10, the Proposed Action is not expected to result in adverse cumulative impacts to special status species habitat. While some short-term minor impacts are acknowledged these are outweighed by the long-term and project-wide benefits of proposed treatments in special status species habitats.

3.8 Issue 4: Effects of Treatments on Livestock Grazing Management

How would proposed temporary allotment closures and fences affect livestock grazing?

3.8.1 Affected Environment

The treatments within the O'Neil PPA project with the potential to affect livestock grazing occur within the boundaries of twenty-five grazing allotments (See Figure 29). There are additional allotments located within the project boundary, but the herbicide treatments that may occur within those areas will not affect grazing. Specific affected allotments are displayed in Table 17.

Table 17. Grazing Allotments affected by O'Neil PPA.

Allotment	Public Acres	Private Acres	Total Acres	Active AUMs
Antelope	3,256	1,441	4,697	478
Big Bend	5,1758	10,082	62,347	10,207
Black Butte	28,300	33,317	61,617	6,489
Bluff Creek	50,828	5,145	55,973	6,923

Allotment	Public Acres	Private Acres	Total Acres	Active AUMs
Canyon	18,727	1,419	20,146	1,779
Cottonwood	17,061	1,104	18,165	2,144
Dairy Valley	51,891	38,489	90,417	7,231
East Big Springs	252,984	58,374	311,358	9,789
East Buckhorn	35,655	2,370	38,025	4,189
Gamble Individual	216,938	147,459	364,397	17,938
Gulley	11,168	1,992	13,160	1,633
HD	238,801	147,762	386,563	22,827
Holborn	26,327	23,094	49,421	2,267
Hot Creek	16,745	976	17,721	4,066
Hubbard Vineyard	112,145	12,591	124,736	13,031
Jackpot	65,260	5,920	71,180	7,006
Little Goose Creek	69,223	3,498	72,721	6,282
Metropolis	24,083	17,749	41,832	2,510
Mud Springs	1,847	2,144	3,991	196
O'Neil	66,206	7,737	73,943	9,597
Pilot Valley	43,311	49,909	93,220	5,008
Salmon River	274,580	59,534	334,144	27,304
Stormy	50,938	44,881	95,819	8,836
West Big Springs	108,146	70,321	178,467	4,788
West Buckhorn	22,537	571	23,108	2,586

3.8.2 Environmental Impacts

3.8.2.1 Proposed Action

Under the proposed action, temporary fencing, livestock grazing closures, and permitted use reductions would be implemented on the 18 Mile Fire, 21 Mile Fire, and Bell Canyon Fire restoration units on the Salmon River, HD, and Gamble Individual Allotments. Table 18 displays the acres and approximate number of AUMs affected by the proposed treatments.

Table 18. Potential AUM Impacts- Restoration Polygons

Fire & Allotment	Pasture	Pasture Acres	Pasture AUMs	Affected Acres	Approximate Affected AUMs
18 Mile Fire					
Gamble Individual	East Delano Mountain	50,807.8	4,038	299	24
21 Mile Fire					
Gamble Individual	East Delano Mountain	50,807.8	4,038	174	14
Bell Canyon Fire					
HD	Bell Canyon	10,181.8	1,372	1,025	138
Salmon River	Emigrant Springs	12,155.8	1,539	1,834	232

Actual numbers of AUMs reduced would be calculated prior to treatment implementation and would be determined by factors such as final fence locations and size of closed areas. Grazing closures as necessary would be implemented through Decisions or Documented Agreements following Consultation, Cooperation, and Coordination with the permittees, agencies, and the interested publics. Rehabilitation objectives would be established as follows:

1. **Unseeded Areas:**
    a. An average of three perennial grasses per square meter rooted firmly in the soil and/or one forage shrub or forage subshrub. Perennial grasses that would count toward the three perennial grasses per square meter objective include, but are not limited to, bluebunch wheatgrass, crested wheatgrass, Siberian wheatgrass, Thurber’s needlegrass, Indian ricegrass, bottlebrush squirreltail, Idaho fescue, Russian wildrye, and other perennial grasses similar in stature.
2. **Seeded Areas:**
    a. Species selection would be based on factors such as ecological site, soils, topography, and potential for seedling establishment. An average of three perennial grasses per square meter rooted firmly in the soil and/or one forage shrub or forage subshrub. Perennial grasses that would count toward the three perennial grasses per square meter objective include, but are not limited to, bluebunch wheatgrass, crested wheatgrass, Siberian wheatgrass, Thurber’s needlegrass, Indian ricegrass, bottlebrush squirreltail, Idaho fescue, Russian wildrye, and other perennial grasses similar in stature.

The BLM believes that achieving the average of three perennial grasses per square meter is an indication there would likely be adequate amounts of roots and above ground cover to limit the redistribution and loss of soil resources, keep invasive species such as cheatgrass, if present, as a minor component of the plant community, and allow treated areas to be productive enough to allow livestock grazing to resume. In addition to the seeded species, there may be perennial and annual forbs and/or grasses present, all of which can contribute to the overall stability of the site. Given the variety of plant species that are likely to grow after the treatments, and their spatial variability across these landscapes, BLM will be analyzing the density data and related field notes and photographs to assess plant vigor and cover to help determine when the density objective is met.

Although the treated areas would be closed to livestock grazing, trailing would be authorized across those areas in the allotments. Livestock would be allowed to trail across the treated areas to move between open areas as needed. Livestock would be allowed overnight stops at or around water sources if trailing over long distances. The permittee would be required to monitor treated areas while using adjacent untreated pastures, with all livestock found in the treated and closed areas promptly removed.

The closure would remain in effect until the identified rehabilitation objectives have been met or been deemed unobtainable. The treated area would be evaluated annually for the potential to meet the objectives. Some of the factors to be considered in this evaluation would be amount of total precipitation, amount of annual grasses, amount of growing season precipitation, how close the treated areas are to meeting the rehabilitation objectives, use levels by wildlife and unauthorized use by livestock and wild horses (if applicable), and what benefits, if any, an additional growing season of rest might provide. Consideration might be given to developing alternate strategies for achieving objectives including site specific fencing or use of other livestock management tools. If additional rest is needed, the closed area(s) would remain closed. If it is determined that the objectives cannot be met after considering the factors outlined above, the treated area would be re-opened to managed livestock grazing in accordance with the terms and conditions of the grazing permits in effect.

The proposed action authorizes seeding and temporary fencing on the Conifer Removal treatment units. Treatments in Phase I juniper encroachment areas generally do not require any seeding, so no fencing or grazing closures are contemplated for those areas. Phase II juniper encroachment treatment areas may require post-treatment seeding. BLM would evaluate each treatment area for the need to seed, and if any seeded areas require protection from livestock grazing. Fencing, grazing closures, and permitted use reductions would only be implemented if necessary and if no other mechanisms are available, such as implementing treatments during periods of planned or scheduled grazing rest.

Table 19 displays the approximate AUM reductions associated with planned Phase II juniper encroachment treatment areas within each affected pasture and allotment IF such closures are deemed necessary during treatment implementation. The totals displayed for some pastures include more than one treatment unit. If necessary, specific closures and permitted use reductions would be calculated on a case-by-case basis. AUM suspensions may be larger or smaller than those indicated depending on factors such as final fence locations, size of closed area, location of treatment areas within allotments, potential disruption of grazing patterns, and other factors. Specific objectives that would need to be attained to lift the closures and restate AUMs would be determined at the time of closure.

Table 19. Potential AUM Impacts- Phase 2 Conifer Reduction

Allotment	Pasture	Pasture Acres	Pasture AUMs	Affected Acres	Approximate Affected AUMs
Big Bend	Deadline	14,520	3,523	4	0-1
Big Bend	Fivemile	18,356.1	3,801	195	0-40
Big Bend	Mud Springs Seeding	7,360.0	1,025	13	0-2
Big Bend	Trout Creek Riparian	9,091.5	3,801	87	0-36
Bluff Creek	Hardesty Creek	1,207.2	174	3	0-1
Bluff Creek	Hot Hole Native	1,862.0	262	5	0-1
Bluff Creek	Spring Creek Seeding	1,476.8	174	3	0-1
Dairy Valley	Crittenden	43,190.0	1,177	687	0-19
Dairy Valley	North Dairy Valley	20,702.5	3,990	312	0-60
Dairy Valley	South Dairy Valley	26,393.5	2,064	166	0-13
East Big Springs	East Squaw Creek	13,254	330	973	0-24
East Big Springs	N. Pequop Mountains (N)	15,115.5	1,762	348	0-41
East Big Springs	N. Pequop Mountains (S)	3,405.5	1,762	99	0-51
East Big Springs	Squaw Creek Ranch	959.2	55	104	0-6
East Big Springs	Windmill Field	3,439.7	420	60	0-7
Gamble Individual	East Delano Mountain	50,807.8	4,038	1,776	0-141
Gamble Individual	Gamble Spring	36,460.1	4,124	10	0-1
Gamble Individual	Jackson Seeding	16,634.5	413	2	0-1
Gamble Individual	Loray	48,148.4	635	2,578	0-34
Gamble Individual	Montello Flat	47,752.4	888	337	0-6
Gamble Individual	Murdock	39,371.7	2,504	919	0-58
Gamble Individual	Rocky Butte	43,985.6	4,124	55	0-6
Gamble Individual	West Delano Mountain	47,141.7	3,218	1,712	0-117

Allotment	Pasture	Pasture Acres	Pasture AUMs	Affected Acres	Approximate Affected AUMs
HD	9-Mile Mountain	48960.3	2,822	146	0-8
HD	Bell Canyon	10,181.8	1,372	93	0-13
HD	Black Mountain	50,683.2	2,450	622	0-30
HD	Burnt Creek	27,788.2	1,867	1,742	0-117
HD	Toano Draw	71,984.1	4,300	259	0-16
Jackpot	Cedar Creek	2,662.8	326	100	0-12
Little Goose Creek	Dry Gulch	22,956.5	6,275	142	0-39
Little Goose Creek	Indian Mountain	10,493.7	6,275	4	0-2
Little Goose Creek	Mustang Draw	15,852.0	6,275	136	0-54
Little Goose Creek	Summer Springs	19,684.9	6,275	801	0-256
Salmon River	Cedar Creek Seeding	7,314.8	1,114	68	0-10
Salmon River	Emigrant Spring	12,155.8	1,539	2,533	0-321
Salmon River	Canyon	56,391.3	11,781	1,284	0-268
Salmon River	Moonshine Seeding	7,757.4	1,144	220	0-32
Salmon River	Shoshone Creek	606.4	11,781	17	0-33
Salmon River	Tijuana John North	35,015.5	11,781	1,707	0-574
Salmon River	Tijuana John South	21,218.2	11,781	788	0-437
Salmon River	Trout Creek Riparian	10,531.0	11,781	1,886	0-110
Salmon River	Trout Creek Seeding	6,081.8	11,781	13	0-25
Salmon River	Willow Creek	14,919.2	11,781	2	0-2
West Big Springs	North Pequop Mountain	35,254.4	1,168	487	0-16

The proposed action authorizes seeding and temporary fencing in the Fuel Break treatment units. BLM anticipates few if any of the fuel break treatment units would require seeding, fencing, and grazing closures, but cannot rule out that none of these would need those. Each fuel break would be evaluated for seeding during construction and fencing and livestock closures would only be implemented if necessary and if no other mechanisms are available, such as implementing treatments during periods of planned or scheduled grazing rest.

Table 20 displays the potential AUM reductions associated with the fuel breaks planned in each pasture of each allotment. If constructed, corridor fencing along especially long linear fuel breaks could have substantial additional impacts to livestock grazing operations, especially if they fence off water access or otherwise disrupt normal grazing patterns. AUM suspensions may be larger or smaller than those indicated depending on factors such as final fence locations, size of closed area, location of treatment areas within allotments, potential disruption of grazing patterns, and other factors. Specific objectives that would need to be attained to lift the closures and restate AUMs would be determined at the time of closure.

Table 20. Potential AUM Impacts- Fuel Breaks

Allotment	Pasture	Pasture Acres	Pasture AUMs	Affected Acres	Approximate Affected AUMs
Barton	Barton	5,520.8	807	75	0-11
Big Bend	Fall Creek	3,326.5	1,168	23	0-8
Bluff Creek	Bald Mountain	6,566.5	960	94	0-13
Canyon	Canyon	4,257.1	445	187	0-20
Canyon	Cottonwood	1,737.1	353	60	0-12
Canyon	FFR	1,343.6	66	16	0-2
Cottonwood	Choke-a-Man 2,4	1,977.0	380	56	0-11
Cottonwood	Choke-A-Man 3,5	1,673.8	380	79	0-18
Cottonwood	FFR	1,247.4	150	111	0-13
Cottonwood	Warm Springs 1,2,3,4	1,765.5	510	78	0-23
Cottonwood	Warm Springs 5/6	3,093.4	510	80	0-13
East Big Springs	East Squaw Creek	13,254.0	330	5	0-1
East Big Springs	North Pequop Mountain	15,115.5	1,762	150	0-17
East Big Springs	Railroad Field	2,842.3	255	17	0-2
East Big Springs	Windmill Field	3,439.7	420	5	0-1
East Buckhorn	East of Twin Meadows	21,072.3	4,099	61	0-12
East Buckhorn	West of Twin Meadows	13,846.8	4,099	508	0-150
Gamble Individual	Gamble Spring	36,460.1	4,124	169	0-19
Gamble Individual	Granite Creek	10,555.3	1,431	171	0-23
Gamble Individual	Loray	48,148.4	635	73	0-1
Gamble Individual	Montello Flat	47,752.4	888	21	0-1
Gamble Individual	Murdock	39,371.7	2,504	63	0-4
Gamble Individual	Rocky Butte	43,985.6	4,124	244	0-23
Gamble Individual	Signboard	6,542.1	624	153	0-15
Gamble Individual	West Delano Mountain	47,141.7	3,218	435	0-30
Gulley	Gulley	13,173.9	1,633	265	0-329
HD	Bell Canyon	10,181.8	1,372	33	0-4
HD	Black Mountain	50,683	2,450	275	0-13
HD	Burnt Creek	27,788.2	1,867*	493	0-33
HD	HD	22,891.8	621	293	0-8
HD	Lower Loomis	16,116.4	1,173	177	0-13
HD	Pole Creek	8,631.3	572	125	0-8
HD	Toano Draw	71,984.1	4,300	560	0-90
HD	Upper Loomis	10,819.2	650	200	0-12
Hubbard Vineyard	Bull Camp Mountain	5,636.6	1548	7	0-2
Hubbard Vineyard	Cold Springs Mountain	11,292.5	2,770*	373	0-9
Hubbard Vineyard	Dry Creek Seeding	2,571.5	745	173	0-50
Hubbard Vineyard	East Hubbard Seeding	6,790.6	1,274	223	0-42
Hubbard Vineyard	FFR	3,150.5	647	148	0-33
Hubbard Vineyard	Flat	19,424.9	1,378	456	0-32
Hubbard Vineyard	Hubbard Basin	30,522.7	2,770	547	0-50
Hubbard Vineyard	Jakes Creek Mountain	8,260.0	1,897	17	0-4
Hubbard Vineyard	Middle	8,394.0	1,175	400	0-56
Hubbard Vineyard	Reservoir Seeding	5,402.0	574	115	0-12

Allotment	Pasture	Pasture Acres	Pasture AUMs	Affected Acres	Approximate Affected AUMs
Hubbard Vineyard	Triangle	3,724.2	377	24	0-2
Hubbard Vineyard	West Hubbard Seeding	6,168.8	1,275	186	0-38
Jackpot	Cedar Creek	2,662.8	326	3	0-1
Jackpot	Cottonwood	7,304.2	376	217	0-11
Jackpot	Lower Bench	6,591.6	700	188	0-20
Jackpot	Sandblow	269.8	115	7	0-3
Jackpot	South Salmon Seeding	2,574.3	600	125	0-29
Little Goose Creek	Boulder Creek Seeding	2,748.6	6,275	30	0-68
Little Goose Creek	Dry Gulch	55,956.5	6,275	385	0-43
Little Goose Creek	Indian Mountain	10,493.7	6,275	119	0-71
Little Goose Creek	Mustang Draw	15,852.0	6,275	421	0-167
Little Goose Creek	Summer Springs	19,684.9	6,275	25	0-80
Little Goose Creek	Water Gap	985.3	6,275	29	0-185
O'Neil	Airfield	1,194.1	122	81	0-8
O'Neil	Bull	667.8	83	77	0-10
O'Neil	Camp	1,075.1	98	162	0-15
O'Neil	Little Quakey	1,463.5	78	11	0-1
O'Neil	Lower Camp	6,694.8	848	7	0-1
O'Neil	Lower Deer	10,295.9	1,378	31	0-4
O'Neil	Quakey	10,113.0	1,214	33	0-4
Salmon River	Airport Seeding	2,872.8	533	11	0-2
Salmon River	Bloody Gulch	18,280.6	2,620	438	0-63
Salmon River	Cedar Creek Seeding	7,314.8	1,114	295	0-45
Salmon River	China Mountain	19,759.1	875	454	0-20
Salmon River	Cow Creek Seeding	4,959.7	1,252	76	0-19
Salmon River	Emigrant	12,155.8	1,539	195	0-25
Salmon River	Granite	56,391.3	11,781	302	0-625
Salmon River	Indian Mike	10,208.8	3,103	180	0-55
Salmon River	Knoll Creek Seeding	10,620.8	438	481	0-20
Salmon River	Knoll Mountain	8,058.6	1,708	142	0-30
Salmon River	North Gollaher	10,952.3	3,103	364	0-103
Salmon River	Salmon River 24	2,181.0	2,620	65	0-78
Salmon River	Shoshone Creek	606.4	11,781	13	0-253
Salmon River	Tijuana John North	35,015.4	11,781	62	0-21
Salmon River	Tijuana John South	21,218.2	11,781	511	0-284
Salmon River	Trout Creek Riparian	10,531.0	11,781	216	0-242
Salmon River	Trout Creek Seeding	6,081.8	731	140	0-17
West Big Springs	Holborn	16,004.3	550	242	0-8
West Big Springs	North Pequop Mountains	35,254	1,168	202	0-7
West Buckhorn	Buckhorn Ridge	9,896.2	912	332	0-31

3.8.2.2 No Action Alternative

Under the No Action Alternative none of the projects would be constructed. There would be no livestock grazing closures or temporary permitted use reductions associated with any project implementation. Fires would continue to periodically affect the landscape, which could cause temporary grazing closures. Conifers would continue spreading, which may cause forage reductions in the long term.

3.8.2.3 Cumulative Impacts

The Cumulative Effects Study Area for livestock grazing (Figure 29) consists of those grazing allotments upon which the O’Neil PPA proposes treatments. Wildfires, while not necessarily an action directly controlled by BLM, has the single largest potential impact on grazing. Wildfires typically results in temporary loss of livestock forage, resulting in short-term loss of grazing use. Implementation of the treatments in O’Neil PPA is likely to result in more resilient landscapes, which may limit the size of future fires and therefore result in fewer fire related impacts to grazing permits. Other past, present, and reasonably foreseeable actions potentially affecting grazing permits includes adjustments to permitted use resulting from public lands either being disposed of or otherwise devoted to another public purpose precluding livestock grazing, such as mining or realty actions. These would be expected to continue whether or not the actions in this project are implemented. Overall, only minor neutral to slightly positive cumulative impacts to livestock grazing are expected.

3.9 Issue 5. Effects of Treatments on Fire Management

How would the project impact Fire Management?

3.9.1 Affected Environment

Since 1999 over 830,000 acres of the O’Neil PPA has been impacted by wildfire. That means 34 percent of the project area has already been impacted by fire. Cumulative loss of sagebrush associated with these fires over a short period of time has had drastic impacts. Wildfire is a natural component of the landscape. Fire suppression on public and nonpublic lands in the project area has led to increased fuel loading and increased risk of more frequent, large, contiguous wildfires, especially in vegetation states with an invasive annual grass component. Fuel breaks are a tool to aid in fire suppression and influence wildfire behavior in the absence of direct attack suppression (Agee et al. 2000); they complement fuels reduction and rangeland restoration projects by reducing the likelihood of contiguous fires overrunning treated areas and delaying the return to historical fire cycles in treated areas. The implementation of fuel breaks in combination with these treatments is intended to slow the rate of spread and lengthen fire return intervals. Early-season fire would be less likely to spread where there are treatments and fuel breaks in place. Currently there are only two fuel break treatments in the project area, Larkspur and Tabor fuel breaks. These two small, disconnected fuel breaks only offer a minute amount of protection for the area. There is much more needed to reverse the downward trends of fire return intervals and the change of fire regimes. However, the combination of factors such as seasonal weather conditions, invasive annual grass encroachment following disturbance, and pinyon-juniper encroachment have resulted in a continued trend toward altered fire regimes at the project area scale.

3.9.2 Environmental Impacts

3.9.2.1 Proposed Action

The proposed treatments throughout the project area, including hazardous fuels reduction, pinyon-juniper removal, seedings, shrub planting, and invasive species control, will restore vegetative structure and function and reduced fuel loading in less than 9 percent of the overall project area. This will contribute to more desirable vegetation conditions and less departure from fire regimes on a site-specific level. This would however help to protect a much larger area from the effects from large scale catastrophic wildfires by producing a mosaic of differing vegetation age classes that can slow or stop fire advancement, resulting in smaller, less damaging fires. In some areas, treatments would incrementally be moving vegetation toward desired conditions. However, the rapid conversion of disturbed areas to invasive annual grasses and continued encroachment of pinyon-juniper into sagebrush communities and perennial grasslands could hinder overall success of these treatments. The level of vegetation departure from historical benchmarks continues to increase with associated effects on fire and fuels.

Treatments that reduce the amount of fuel loading would limit the ability of wildfire to advance through vegetation communities. This is because a lack of fine or heavy fuels would influence burn patterns and spread, thereby reducing the number of acres burned. In general, reducing and replacing invasive annual grasses with perennial species, varying sagebrush densities, and reducing pinyon-juniper encroachment would limit the ability of those treated areas to carry fire across the landscape and convert to invasive annual grass vegetation states following fire. Treatments would also reduce the potential of early-season fires encountering cured fuels. This is because invasive annual grasses cure earlier in the season.

Treatments would break up fuel continuity and create more heterogeneous vegetation communities. The result would be that some treated and adjacent untreated areas could burn, while others would not. This would create a patchwork, or mosaic burn pattern that would more closely resemble historical fire regimes (Duncan, Schmalzer, Breininger, & Stolen, 2015) within and immediately surrounding the treatment area. Unburned areas would maintain available seed sources to regenerate burned areas. In treated areas, subsequent recolonization by invasive annual grasses following noncontiguous fires would be less likely (Chambers, et al., 2017, p. 103). Perennial grass and forb and sagebrush communities with more age class diversity would support a long-term transition to the desired fire regimes typical in the project area. Treatments ultimately would improve vegetative health and resistance and resilience, as the resulting mosaic vegetation conditions would be less susceptible to dominance by invasive annual grasses (Chambers, et al., 2017, p. 103) and future disturbances, including fire.

Short- and long-term vegetation condition departures following treatments would directly influence wildfire seasonality and burn patterns. Treatments that reduce fine fuel and heavy fuel loading in native and nonnative perennial grass and forb vegetation states and sagebrush communities will have varying outcomes on resistance and resilience depending on the type, location, and nature of the treatment. In general, treatments in low, moderate, and high resistance and resilience sites would improve resistance to incremental increases in annual grass cover. Multiple treatments would likely be required in low resistance and resilience sites to achieve desired conditions, whereas fewer treatments would be needed in moderate and high resistance and resilience sites. Although treatment could result in the potential for disturbance and conversion of disturbed areas to invasive annual grass-dominated communities, soil moisture and temperature regimes of highly resistant and resilient sites render these areas more productive and less hospitable to invasive annual grasses than drier, warmer sites (Chambers, et al., 2014a). High underlying resistance and resilience, combined with treatments, would limit the potential for short- or long-term vegetation condition departure and changes to wildfire seasonality and burn patterns in highly resistant and resilient areas. Short-term vegetation condition departure could persist in low and moderate resistance and resilience areas until treatments are successful.

In all vegetation states, seeding would support the long-term transition of those communities to desired vegetation conditions, which would support a return to historical fire regimes. Per the 2015 ARMPA Management Decision for Vegetation*: MD VEG 7: In PHMAs and GHMAs, give preference to native seeds for restoration, based on availability, adaptation (ecological site potential), and probability of success. Where the probability of success or adapted seed availability is low, nonnative seeds may be used, as long as they support GRSG habitat objectives. Choose native plant species outlined in Ecological Site Descriptions (ESDs), where available, to revegetate sites. Emphasize use of local seed collected from intact stands or greenhouse cultivation. If the commercial supply of appropriate native seeds and plants is limited, work with the BLM Native Plant Materials Development Program, Natural Resource Conservation Service (NRCS) Plant Material Program, or State Plant Material Programs. If currently available supplies are limited, use the materials that provide the greatest benefit for GRSG. In all cases, seed must be certified as weed free (BLM, 2015b)*. A community containing these species would likely exhibit enhanced resistance to invasive annual grass invasion and resilience following disturbance like fire (see Section 3.5, Issue 1). Over the long term, restoring ecologically appropriate grasses, forbs, and shrub steppe communities would reduce departure from desired conditions of fire regimes.

The reduction and improvement of vegetation would help to reduce the threat of large-scale catastrophic wildfires. The treatments would help to bring fuels back into alignment with historical norms. Over the long term, treatments would shift vegetation to more desired conditions (see Section 3.5 Issue 1), increase resistance and resilience, and result in less departure of fire regimes. The location and magnitude of these impacts would vary based on the proposed locations and extent of potential treatments.

3.9.2.2 No Action Alternative

Under the No Action Alternative none of the treatments would be implemented. There would be no restoration treatments restoring vegetation back to pre-wildfire conditions. Conifer encroachment would continue, and shrub steppe communities would continue to decline. No fuel breaks would be constructed, areas would be left without the protection they provide for firefighters and vegetation. Vegetation's resistance and resilience would continue to decline, and invasive annuals would continue to expand. Any potential invasive annual treatments would have to be evaluated in future Emergency Stabilization & Rehabilitation NEPA. Wildfires would burn with higher intensity and severity, leading to catastrophic effects to soils, vegetation, and wildlife habitat (Miller, Chambers, Pyke, Pierson, & Williams, 2013).

3.9.2.3 Cumulative Impacts

Past, present, and reasonably foreseeable future projects, plans, or actions, and natural processes that affect fire and fuels include fire suppression that has led to uncharacteristic fuel loading and increased risk of high-intensity wildfires in grasslands and sagebrush communities; the proposed installation of 413 miles of fuel breaks (316 miles on BLM-administered lands); hazardous fuels reduction and conifer removal on 87,133 ac. (66,251 ac. on BLM-administered lands); seedings, shrub plantings and invasive plant species control projects on 96,329 ac. (82,287 are on BLM-administered land); livestock grazing; mining and fluid mineral development; recreation; and ROWs.

Since 1999 over 830,000 acres of the project area has been impacted by wildfire. This means on average 36,087 ac. are impacted every year. Surface disturbance, including burned areas, has contributed to an upward trend in the distribution of invasive annual grasses, which is expected to increase the spread of wildfires and the subsequent reestablishment of invasive annual grasses. This is expected to perpetuate the trend toward shorter fire return intervals and faster spreading fires. Wildfire suppression may employ methods such as dozing or burning to create a break in fuel. This direct effect can reduce the amount of vegetation, but indirectly this effort can stop wildfire progression which could inevitably protect adjacent areas of more valuable vegetation resources. Areas disturbed through suppression efforts and burned by wildfire are often rehabilitated through ESR plans to stabilize soils and reestablish vegetation communities. Shrub planting is expected to improve the landscape by diversifying the sagebrush age class and creating a greater seed source. These restoration activities are expected to minimize the effects of wildfire and restore vegetation to create a plant community that is more resistant to invasion by noxious weeds and invasive plants.

Past, present, and reasonably foreseeable future ROW development, recreation, and OHV use would increase the risk of fire ignitions from power lines, motor vehicles, target shooting, and campfires. Drought, increased human activity, and the conversion of native grasslands and sage communities to invasive annual grasses are combining to shorten fire return intervals, while increasing the likelihood of new ignitions from human and natural sources spreading across larger areas. Fuels reduction, rangeland restoration activities and livestock grazing would continue to reduce fuel loads and, in some cases, restore vegetation conditions to resemble historical fire regimes.

Large-scale habitat fragmentation and degradation occurs as the result of wildfire. Past ESR treatments were implemented on about 36 percent of the areas impacted by wildfire, they help remedy wildfire damage to wildlife habitats. Wildfire will continue to occur on the landscape and only a little over a third of their area will receive ESR treatments. Cumulatively, treatments implemented under the Proposed Action could combine with ESR treatments to counter the habitat fragmentation and degradation resulting from other past, present, and foreseeable future fires and therefore, over the long-term, could result in benefits to wildlife habitat.

Future fuel breaks, ROWs, recreation sites, and infrastructure associated with some types of solid and fluid mineral development would continue to provide anchor points to support wildfire suppression and, in some cases, would disrupt fire behavior by reducing flame lengths. These actions could help to minimize the rate and extent of fire spread in certain areas. Each of the factors above, when combined, would continually influence the criteria used to determine the potential fuel break locations. For example, any new authorized roads would provide new opportunities for fuel breaks, while changes in highly resistant and resilient sites, such as following fire, could change the areas where new fuel breaks may be implemented.

3.10 Issue 6. Effects of Treatments on Social and/or Economic Conditions

Will the planned treatments cause temporary, short-term, and/or long-term impacts to resources that generate social and/or economic conditions in the form of market and/or non-market ecosystem services that serve the needs and interests of the public?

3.10.1 Affected Environment

Study Area Land Ownership Data

The data reported below includes statistics from Elko County, NV, Twin Falls and Cassia counties, ID, and Box Elder County, UT. Reference community for the data was identified as the State of Nevada and non-metro counties in NV. These data layers were selected because they are proximal to the project area and contain populations that the project may directly and/or indirectly impact. The project area is found in Elko County, NV.

Federal land management decisions often have greater socioeconomic impact in regions with large federal land holdings. Of 18,202,224 total acres in the socioeconomic study area, 10,942,422 acres (60.1 percent) are federally owned lands. Elko County, NV has the largest total federal land 7,982,731 acres (72.5 percent) in the study area; federal land totals in other study area counties are substantially less in both total land and percentage (2,959,711 total acres/41.1 percent combined study area). The Bureau of Land Management (BLM) manages 8,961,237 acres (49.2 percent) of the study area's total land with Elko County, NV (62.6 percent) containing the largest BLM landholdings. In Fiscal Year (FY) 2019 the federal government paid state and local governments associated with the study area a total of $13,197,386 (in FY 2021 dollars). Of those payments, $11,577,441 (87.7 percent) were Payments in Lieu of Taxes (PILT) and $1,002,196 (7.6 percent) were from the BLM ($704,691 were paid to Elko County, NV by the BLM).

Study Area Population Demographics Data

The total population of the study area was 217,535 in 2020. Study area population increased by 24,569 people (12.7 percent) between 2010 to 2020. Twin Falls County, ID accounted for 45.9 percent of study area population growth; Elko County, NV grew at a 10.1 percent rate over the same period and accounted for 19.7 percent of total study area growth.

Out of all persons living within the study area in 2020, 52,385 people (24.1 percent) self-identified as being a member of a minority group. In Elko County, NV, 34.9 percent of the population identify as being a member of a minority group. This is compared to a total minority percentage of 50.8 percent in the State of Nevada and a total minority percentage of 27.6 percent compared to Nevada's non-metro counties. In the study area, 38,934 people (17.9 percent of study area population) identify as Latinx and 3,694 persons (1.7 percent) self-identified as Native American or indigenous alone. This is compared to a total Native American or indigenous population of 1.3 percent in the State of Nevada and a total Native American or indigenous percentage of 4.9 percent compared to Nevada's non-metro counties.

Employment, Income, and Poverty Data

The number of full- and part-time employed workers as defined by the U.S. Department of Commerce in the study area in 2020 was 124,994 (for 217,535 people). This represents an increase of 23,995 employed persons from 2001 to 2020. Nearly half of these jobs came in growing Twin Falls County, ID. Elko County, NV contributed 27,027 jobs to the study area and 12.6 percent of employment growth from 2001 to 2020. These numbers coincide with population growth and are signs of a healthier economic and social landscape. It is estimated that 32,513 jobs (26.0 percent) were in the non-services related sectors (compared to 25.2 percent in Nevada's non-Metro counties). Significant to this proposed action, 6,829 jobs in the study area are in farming (5.5 percent of all jobs). Just 2.3 percent of all jobs in Elko County, NV involve agriculture.

Per capita income in the study area in 2020 was $48,568 (as measured in 2021 dollars) – an increase of 32.4 percent from 2000 to 2020. Over the same period average earnings per job grew 20.5 percent. Significantly, Elko County, NV's average earnings per job were over $8,220 greater than the study area.

In 2020, the total number of people in the study area living with poverty, as defined by the U.S. Census Bureau, was 24,710 (11.5 percent). In the same year 14.8 percent of those living with poverty were under 18 years old (16.1 percent in Elko County, NV) and 9.1 percent (11.8 percent in Elko County, NV) were 65 years and older.

Social Values, Cultural Landscapes, and other Project-Related Data

There is a long history of open range and federally permitted ranching in the study area and ranching culture plays a significant role in the region's mythos and social and economic landscapes. In contrast to "boom and bust" industries, such as mining, agriculture provides a consistent economic base for local economies – especially when agricultural landscapes are managed under best practices that promote ecosystem resilience. As stated earlier in the EA, since 1999 over 34 percent of the PPA has been impacted by wildfire. In the study area there are widespread issues with sagebrush ecosystem loss and the spread of novel and pervasive invasive plant species. Cumulatively, these issues have impacted study area ecosystem resilience and economic potential. There is a very real possibility that the social landscapes and economic market and non-market values that are supported by resilient ecosystem services, vegetation diversity, improved wildlife habitat (for recreation and ecosystem development) and decreased hazardous fuels loading have been significantly degraded.

3.10.2 Environmental Impacts

3.10.2.1 Proposed Action

Under the proposed action, the Bureau of Land Management would authorize adaptive management restoration strategies including vegetation treatments, planting, and prescriptive fire management aimed at increasing study area ecosystem resilience. Direct, indirect, and induced economic impacts from the proposed management activities would be study-area specific and limited, contributing minimally to the overall regional economy. As adaptive management is an ongoing and flexible process, there is the potential for temporary, short-term, and long-term (up to 10 years) direct, indirect, and induced economic impacts connected to contracting and hiring local restoration employees.

The proposed actions will also reduce hazardous fuel loads on the PPA and will limit the ability of wildfire to move through the landscape. While fires may temporarily increase the economic inputs to a community through wildfire support services, this does not offset the long-term social and economic impacts large and catastrophic wildfires have on a socioeconomic landscape. Post-fire socioeconomic impacts include increased rehabilitation costs, temporary loss of access, reduction and shift in recreation and tourism activities, impacts to wildlife and activities dependent on wildlife, loss of forage, invasive species spread, and temporary loss of permitted livestock grazing.

The proposed action will also result in economic impacts to the livestock grazing community. As described in Issue 4, the proposed action has the potential to impact 25 grazing allotments in the O'Neil PPA. As adaptive management requires flexibility, monitoring, and adjustment, a quantitative analysis of proposed action economic impact to livestock producers is impractical. However, there is a high likelihood that operators will incur some additional workload and cost. Operators will potentially need to move livestock off rangelands or to different locations if monitoring and site conditions call for removal. Frequent livestock movement may require additional riders and/or hauling. The installation, maintenance, and movement of temporary fencing, salt and mineral supplements, and/or water sources may be needed to protect restoration areas and could add to workload and cost. Under the proposed action, temporary fencing, livestock grazing closures, and permitted use reductions would occur on the 18 Mile, 21 Mile, and Bell Canyon fire restoration units (Salmon River, HD, and Gamble Individual allotments). Livestock permittees in these allotments might feel the biggest impact as closures and reductions would occur until treatment areas met identified rehabilitation thresholds. The conifer reduction program and fuel break programs would also potentially impact livestock grazing economies. Phase II of the conifer reduction program may require reseeding; fencing, grazing closures, and permitted use reductions would only be implemented if necessary. Similar restrictions may be placed, if necessary, on grazing allotments that coincide with planned fuel break treatments.

Long-term socioeconomic indirect and induced impacts would be generated through successful ecosystem rehabilitation. Invasive species control will reduce the potential for catastrophic wildfire and promote productive non-market ecosystem services. Resilient grazing landscapes are also resilient wildlife habitat, and the proposed action will support recreational activities that are dependent on wildlife. Moreover, grazing landscapes that are supported by resilient ecosystem services and vegetation diversity provide social and economic stability.

3.10.2.2 No Action Alternative

Under the No Action Alternative, the Bureau of Land Management would not authorize, nor would they proceed with adaptive management strategies in the O’Neil PPA. The O’Neil PPA would not undergo adaptive ecosystem restoration. There would be no temporary and/or short-term direct, indirect, and induced economic impacts connected to contracted restoration activities. Under the No Action Alternative there would be no livestock grazing closures or temporary permitted use reductions associated with any project implementation. Forest encroachment would continue and eventually reduce the amount of potential forage for livestock operators. Wildfires would occur in a non-prescriptive manner, further limiting the PPA’s market and non-market economic output potential. Resting burned-over areas from livestock grazing would have short-term socioeconomic effects and increase operational costs for permitted ranchers. Invasive species would continue to impact the sagebrush steppe ecosystem.

3.10.2.3 Cumulative Impacts

The O’Neil socioeconomic CESA has a long history of agricultural and livestock production. These social and economic practices continue to the present day and greatly contribute to the study area’s sense of place, identity, and economic diversity. Historic and current livestock grazing practices, impacts from climate change, invasive species, wildfire, and other development and resource pressures have substantially impacted the study area’s rangeland market and non-market ecosystem health. It is reasonably foreseeable that these pressures will continue and potentially grow in the future. Public land managers have sought to mitigate these impacts through improved water availability, seasonal rotation systems, and better livestock distribution. However, without adaptive and thoughtfully managed restoration activities, large scale habitat fragmentation and wildfire frequency and intensity will continue to grow. It is reasonable to foresee continued invasive species and conifer encroachment and a resulting short- and long-term reduction in forage potential.

CONSULTATION AND COORDINATION

4.1 Native American Consultation

Table 21. Summary of Information Sharing with Potentially Affected Native American Tribes Consultation

Name	Date and Type of Communication
Shoshone-Paiute Tribe of the Duck Valley Indian Reservation	February 26, 2016, Letter Mailing; January 13, 2022, project update at in-person meeting with Tribal Council; no concerns noted
Te-Moak Tribe of Western Shoshone Indians of Nevada and the four constituent Bands (Battle Mountain, Elko, South Fork, and Wells)	February 26, 2016, Letter Mailing; informal information sharing (due to Tribal election matters project updates were made to the constituent Band Councils)
Battle Mountain Band of the Te-Moak Tribe of Western Shoshone Indians of Nevada	February 26, 2016, Letter Mailing; September 30, 2021, project updated at in-person meeting with Tribal Council; no concerns noted
Elko Band of the Te-Moak Tribe of Western Shoshone Indians of Nevada	February 26, 2016, Letter Mailing; November 23, 2021, project update at in-person meeting with Tribal Council; no concerns noted
South Fork Band of the Te-Moak Tribe of Western Shoshone Indians of Nevada	February 26, 2016, Letter Mailing; September 14, 2021, project update at in-person meeting with Tribal Council; July 6, 2022, project update at in-person meeting with Tribal Council; no concerns noted
Wells Band of the Te-Moak Tribe of Western Shoshone Indians of Nevada	February 26, 2016, Letter Mailing; May 9, 2022, project update provided to Council via email; no concerns noted
Ely Shoshone Tribe	February 26, 2016, Letter Mailing; January 11, 2022, project update at in-person meeting with Tribal Council; no concerns noted
Confederated Tribes of Goshute Indian Reservation	February 26, 2016, Letter Mailing; February 5, 2021, project update at in-person meeting with Tribal Council; October 18, 2021, project update at in-person meeting with Tribal Council; January 7, 2022, project update at in-person meeting with Tribal Council; no concerns noted
Shoshone-Bannock Tribes of the Fort Hall Reservation	February 26, 2016, Letter Mailing

4.2 Individual, Organization or Agency Coordination

Table 22. Summary of Individual, Organization or Agency Coordination

Name	Discussion/Outcome
Kari Huebner, Nevada Department of Wildlife	Scope of treatments to benefit wildlife habitat.
Matt Glenn, Nevada Department of Wildlife	Scope of treatments to benefit wildlife habitat.
Gerald Miller, Nevada Conservation Districts Programs	Support the proposed vegetation treatments to improve, protect and restore habitat.
Leana L Carey	Fuel Breaks, More seeding of Crested Wheatgrass, dead tree removal.
Steve Abele, U.S. Fish and Wildlife Service	The benefits of Linear Fuel Breaks.
Marley Vaughn, Y2 Consultants	Proposed Treatment Locations.
Katie Fite, Wildlands Defense	Potential Effects from Treatments, Weeds, Climate Change, the Problems with Livestock Grazing, and FIAT.
Jill Jenson, National Trails Intermountain Region National Park Service	Potential Effects to California National Historic Trail.
Darcy Helmick, Simplot	Confirmed alignment of fuel break across Gully Allotment.
Kelly Michelsen, Long Canyon Wildlife Working Group, BLM	Proposed additional treatments.
Ken Cole, Western Watersheds Project	Potential Effects to Wildlife, Cultural Resources, Vegetation, Weeds and Fire. Impacts of Livestock Grazing, Treatments and Cost.
Karen Klitz	Impacts of Livestock Grazing and Treatments. Potential Effects to Wildlife, Vegetation, Weeds and Fire.
John & Cheri Howell	Supported the overall goals and Objectives of the project.
SANE Group	Fuel Breaks Location.
Shannon Scott, Backcountry Hunters and Anglers	Concerns about Fuels Reduction, Restoration, Conifer Reduction, Post Fire Rehabilitation and Liner Fuel Breaks.
James Rogers, Winecup Gamble, Inc.	Support the proposed vegetation treatments to improve, protect and restore habitat for wildlife.

4.3 List of BLM Preparers

Table 23. List of BLM Preparers

Name	Title	Area of Responsibility
Frank Giles	Physical Scientist	Air Quality
Matthew Fockler	Socioeconomic Specialist	Socioeconomics
Lucinda Dockstader	Archaeologist	Historic Properties (Cultural Resources)
Katie Maikis	Aquatics Ecologist	Aquatic Species, Wetlands / Riparian Zones
Aili Gordon	Geologist	Energy (Gas / Oil / Wind), Mining / Minerals
Terri Dobis, Kelly Michelsen	Planning & Environmental Coordinator	Land Use Plan Conformance, NEPA Compliance

Name	Title	Area of Responsibility
Jessica Montcalm	Native American Tribal Liaison	Native American Concerns
Jeff Moore	Rangeland Management Specialist	Livestock Grazing / Rangelands
Karen Uhri	Reality Specialist	Realty - Land Use
Lea Garcia	Outdoor Recreation Planner	Wilderness, Recreation, Visual Resources
Jason Dobis	Natural Resource Specialist-Fuels	Vegetation, Forestry, Fire Management
John Daniel	Hydrologist	Floodplains, Water Quality, Soils
Sam Cisney	Weeds Specialist	Non-Native Invasive and Noxious Species
Cam Collins	Wildlife Biologist	Migratory Birds, Threatened and Endangered Species, Sensitive Species, Wildlife
Tyson Gripp	Fuels Program Manager	Purpose and Need, Alternatives
Casey Addy	Supervisory Natural Resource Specialist-ES&R	Monitoring, Human Health and Safety
Matt Murphy	Fire Management Officer	Purpose and Need, Alternatives

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Appendix A. 2015 ARMPA Table 2-2 Habitat Objectives for GRSG

(as updated by the 2022 Plan Maintenance Action #5 (DOI-BLM-NV-0000-2022-0006-CX))

Table 2-2

Items that have been ~~stricken~~ are deletions, items shaded in gray reflect changes or additions to pre-maintenance table.

Attribute	Indicators	Desired Condition (Habitat Objectives)	Reference
GENERAL/LANDSCAPE-LEVEL[1]			
All life stages	Rangeland health assessments	Meeting all standards[2]	
Cover (nesting)	Seasonal habitat needed	>65% of the landscape in sagebrush cover	Aldridge and Boyce 2007
	Annual grasses	<%5	Blomberg et al. 2012
Security (nesting)	Conifer encroachment	<3% phase I (>0 to <25% cover) No phase II (25 to 50% cover) No phase III (>50% cover)	Casazza et al. 2011 Coates et al. 2016
Cover and food (winter)	Conifer encroachment	<5% phase I (>0 to <25% cover) No phase II (25 to 50% cover) No phase III (>50%)	Coates et al. 2016
	Sagebrush extent	>85% sagebrush land cover	~~USGS (in prep A)~~ Doherty et al. 2008
LEK (Seasonal Use Period: March 1 to May 15)[1]			
Cover	Availability of sagebrush cover	~~Has~~ Adjacent sagebrush provides escape cover	Blomberg et al. 2012 Connelly et al. 2000 Stiver et al. 2015 ~~(in press)~~ ~~HAF~~
Security[3]	Pinyon or juniper cover	~~<3%~~ <2% landscape cover within .6 mile of leks	Connelly et al. 2000 (modified) Stiver et al. 2015 ~~(in press)~~ ~~HAF~~ Baruch-Mordo et al. 2013 Coates et al. 2017a ~~Coates et al. 2013~~ ~~Manier et al. 2014~~
	~~Proximity of tall structures~~[4]	~~Use Manier et al. 2014-Conservation Buffer Distance Estimates for GRSG-A Review; preference is 3 miles~~	
	Proximity of Linear Features	>3.1 miles	Manier et al. 2014
	Proximity of Surface Disturbance	>3.1 miles	Manier et al. 2014

Attribute	Indicators	Desired Condition (Habitat Objectives)	Reference
	Proximity of Tall Structures	>2 miles	Coates et al. 2013 Mainer et al. 2014 Mainer et al. 2014
	Proximity of Low Structures	>1.2 miles	
NESTING (Seasonal Use Period: April 1 to June 30)[1]			
Cover	Sagebrush cover	Arid[8]: >20% Mesic[8]: >20%	Kolada et al. 2009a, 2009b Coates et al. 2017
	Residual and live perennial grass cover (such as native bunchgrasses)	~~>10% if shrub cover is <25%~~[5] Arid[8]: >7% if shrub cover is >20%[5] Mesic[8]: >13% if shrub cover is >20%[5]	Coates et al. 2013; 2017 Coates and Delehanty 2010 Kolada et al. 2009a, 2009b
	Annual grass cover	~~<5%~~ Arid[8]: <3% Mesic[8]: <3%	~~Lockyer et al. (in press)~~ Coates et al. 2017
	Total shrub cover	~~>30%~~ Arid[8]: >28% Mesic[8]: >26%	Coates and Delehanty 2010 Kolada et al. 2009a ~~Lockyer et al. (in press)~~ Coates et al. 2017
	Perennial grass height (includes residual grasses)	~~Provide overhead and lateral concealment from predators~~ Arid[8]: 12cm Mesic[8]: 18cm	Connelly et al. 2000, 2003 Hagen et al. 2007; Stiver et. al. 2015 ~~(in press) HAF~~ Coates et al. 2017
Security[2]	Proximity of tall structures[4] (3 feet [1 meter] above shrub height)	Use Manier et al. 2014, Conservation Buffer Distance Estimates for GRSG-A Review; preference is 3 miles	Coates et al. 2013 Gibson et al. 2013 Manier et al. 2014
	Pinyon or juniper cover	<3% within 800 meters	Severson et al. 2017
BROOD-REARING/SUMMER (Seasonal Use Period: May 15 to September 15; Early: May 15 to June 15; Late: June 15 to September 15)[1]			
UPLAND HABITATS			
Cover	Sagebrush cover	~~10 to 25%~~ Arid[8]: >20% Mesic[8]: >15%	Connelly et al. 2000 Coates et al. 2017
	Perennial grass and forb cover ~~and forbs~~	~~>15% combined perennial grass and forb cover~~ Arid[8]: >19% Mesic[8]: >25%	Connelly et al. 2000 Hagen et al. 2007 Coates et al. 2017
	Deep rooted perennial bunchgrass (within 522	~~7 inches~~[6, 7] Arid[8]: 12cm[7]	Hagen et al. 2007 Casazza et al. 2011

Attribute	Indicators	Desired Condition (Habitat Objectives)	Reference
	feet [200 meters] of riparian areas and wet meadows)	Mesic[8]: 14cm[7]	Coates et al. 2017
Cover and food	Perennial forb cover	~~≥5% arid~~ ~~≥15% mesic~~ Arid[8]: >5% Mesic[8]: >9%	Casazza et al. 2011 Lockyer et al. 2015 ~~in press~~ Coates et al. 2017
RIPARIAN/MEADOW HABITATS[1]			
Cover and food	Riparian areas/meadows	PFC	Dickard et al. 2014 Prichard et al. 1998, 1999 Stiver et al. 2015 ~~(in press)~~ ~~HAF~~
Security[6]	Upland and riparian perennial forb availability and understory species richness	Preferred forbs are common with several species present and high species richness (all plants)	Stiver et al. 2015 ~~(in press)~~ ~~HAF~~
	Riparian area/meadow interspersion with adjacent sagebrush	Has adjacent sagebrush cover within 200 meters	Casazza et al. 2011 Stiver et al. 2015 ~~HAF~~
WINTER (Seasonal Use Period: November 1 to February 28)[1]			
Cover and Food	Sagebrush cover	≥10% ~~above snow depth~~	Connelly et al. 2000 Stiver et al. 2015 ~~USGS (in prep C)~~
	Sagebrush height	> ~~9.8 inches~~ 25cm above snow depth	Connelly et al. 2000 Stiver et al. 2015 ~~USGS (in prep C)~~

[1]Any one single habitat indicator does not define whether the habitat objective is or is not met. Instead, the preponderance of evidence from all indicators within that seasonal habitat period must be considered when assessing GRSG habitat objectives.

[2] Upland standards are based on indicators for cover, including litter, live vegetation, and rock, appropriate to the ecological potential of the site.

[3] Applicable to Phase I and Phase II pinyon and/or juniper.

[4]Does not include fences.

[5]In addition, if upland rangeland health standards are being met.

~~[6] Relative to ecological site potential.~~

[6] Ecological site potential to meet habitat objectives should be considered when determining if objectives are feasible for the site. See discussion below Table 2-2.

[7]In drought years, 4-inch perennial bunchgrass height with greater than 20 percent measurements exceeding 5 inches in dry years.

[8] Arid is defined as areas that received >35.0 cm of average annual precipitation.
Mesic is defined as areas that received ≤35.0 cm of average annual precipitation.

Table 2-2 will be implemented following this guidance: The habitat objectives are desired habitat conditions that are broad goals based on GRSG habitat selection that may not be achievable in all areas.

The ability of a site to achieve habitat objectives shall be based on the ecological site potential and BLM should use high quality local or site-specific information, such as ecological site descriptions and state-and-transition models, if available, to determine if objectives are achievable. Attempting to manage sites, particularly large landscapes, to meet the vegetation objectives may not always be ecologically possible or may result in an unwanted site transition. In some cases, suitable habitat may only be found as small inclusions within the landscape, which could meet the habitat objectives.

Table 2-2 includes a list of indicators, characteristics, and values that describe GRSG seasonal habitat use areas. The BLM used indicator values derived from a synthesis of local and regional GRSG habitat research and data to describe the typical vegetation communities that GRSG select. While the habitat objectives are not attainable on every site or every acre within GRSG HMAs, the values reflect a range of habitat conditions that generally lead to greater survival of individuals within a population. When permitting land use activities, BLM shall consider the ecological site potential within GRSG HMAs to validate the habitat conditions achievable for a specific site. The seasonal habitat descriptions in **Table 2-2** vary across the range of GRSG, within a subregion, and between sites. They are not land health standards but are quantitative measures that inform the Special Status Species Habitat Land Health Standard for GRSG. These measurable values reflect ecological potential and may be adjusted based on local factors influencing GRSG local data or if new science indicates that GRSG select for vegetation structure and composition in seasonal habitats not characterized by the values in **Table 2-2**. In these cases, it may be appropriate to adjust the values. Habitat objectives shall be evaluated in the context of annual variability in ecological conditions and shall not be used singly to determine habitat suitability for GRSG. They may be used to demonstrate trends over time, during plan evaluations for effectiveness of GRSG conservation, or when identifying limiting habitat characteristics for a given area.

The indicators, characteristics, values, and desired seasonal habitat conditions in **Table 2-2** are to be incorporated into the Sage-Grouse Habitat Assessment Framework (Stiver et al. 2015; HAF) Site-Scale forms (4th Order) and are meant to inform the wildlife habitat component of the Land Health Standards (LHS) evaluation process (LHS, 43 CFR 4180.2), but do not replace rangeland health assessments. Results from the LHS evaluation shall be used to support BLM in land use authorization processes and during development of objectives for management actions such as vegetation treatments. BLM land use authorizations will contain terms and conditions regarding the actions needed to achieve or make progress toward achieving habitat objectives and LHS.

Table 2-2 will be periodically revised to incorporate the best available science in coordination with the SETT, USFWS, NDOW, CDFW, USGS and other partners. The team will periodically review and incorporate the best available science and will recommend adjustments based on locally derived data. As **Table 2-2** is updated, adjustments will be made by the BLM through plan maintenance or amendment, as appropriate.

Appendix B. Figures

Figure 1. O'Neil PPA Project Area Location.

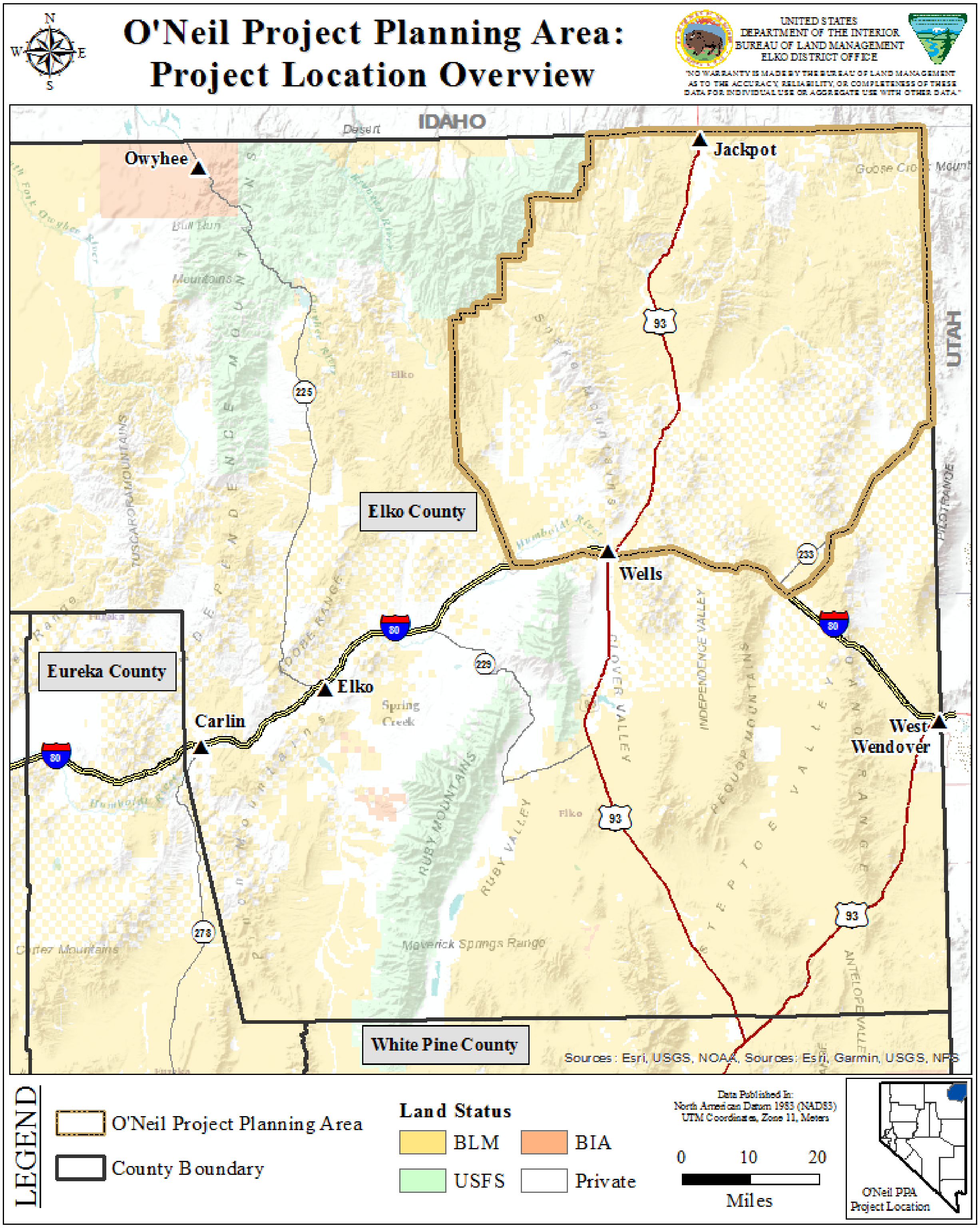


Figure 2. O’Neil PPA Mapping Quadrants and Proposed Treatments.

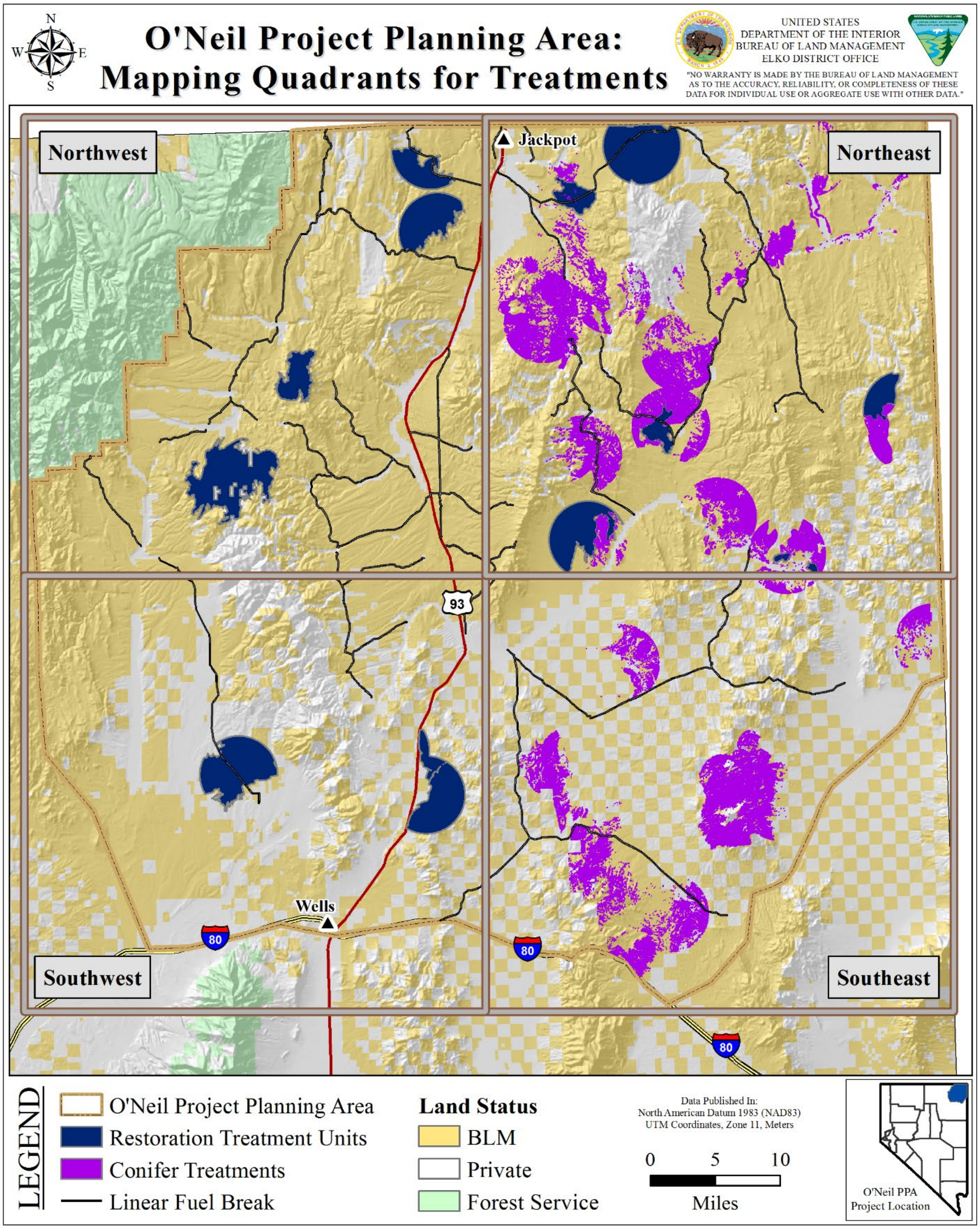


Figure 3. O'Neil PPA Treatments in Northwest Quadrant.

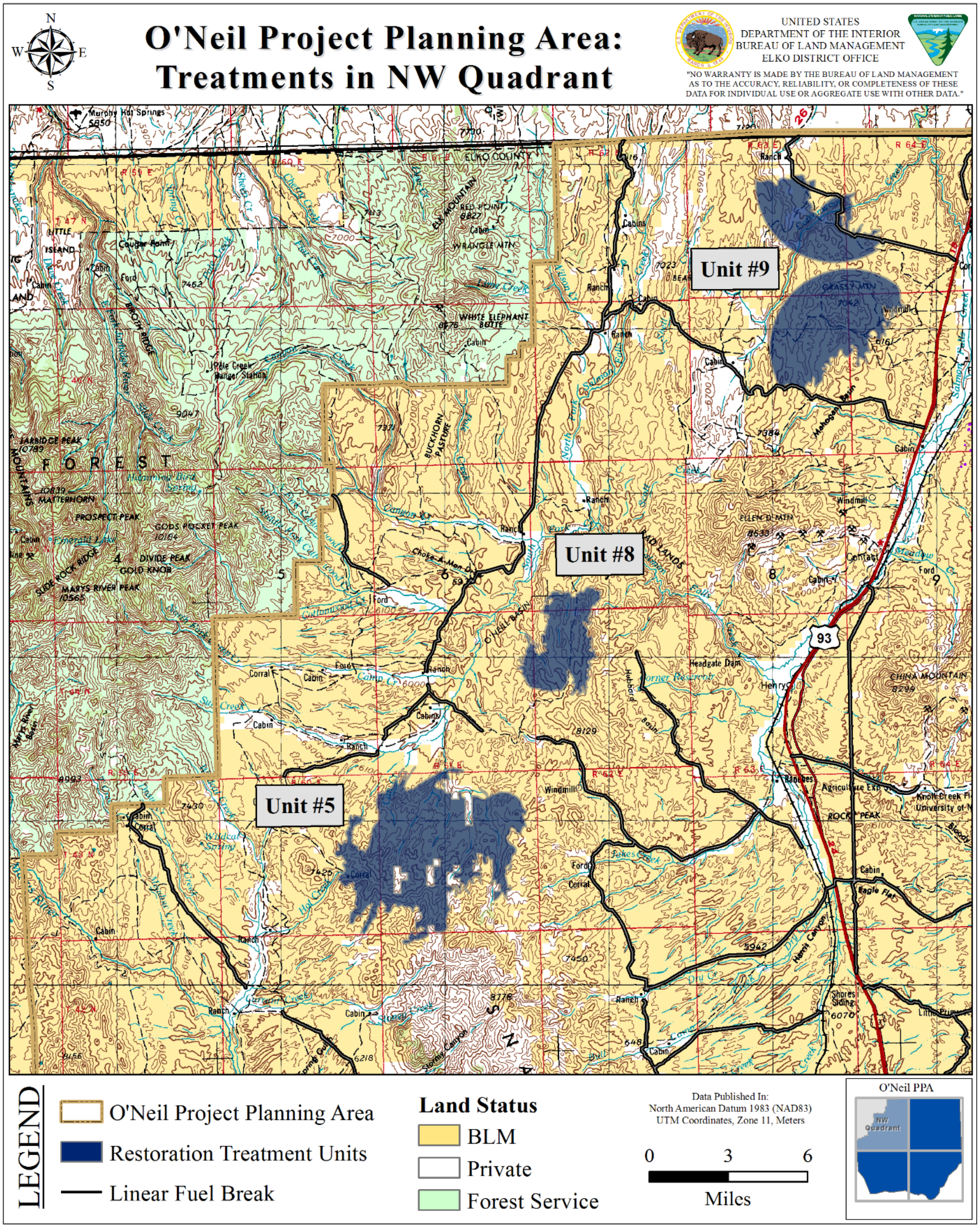


Figure 4. O'Neil PPA Restoration Treatments & Fuel Breaks in Northeast Quadrant.

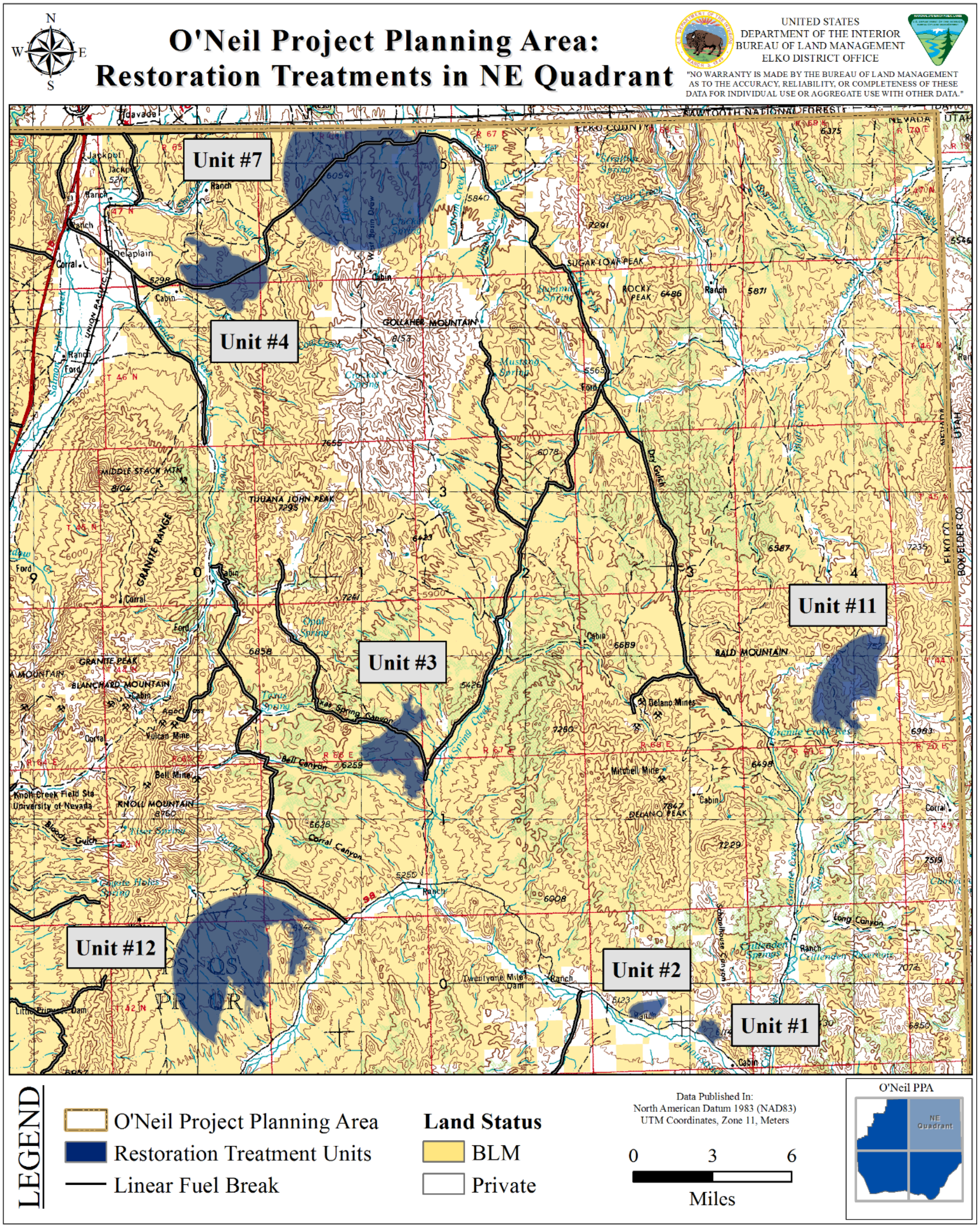


Figure 5. O'Neil PPA Conifer Treatments & Fuel Breaks in Northeast Quadrant.

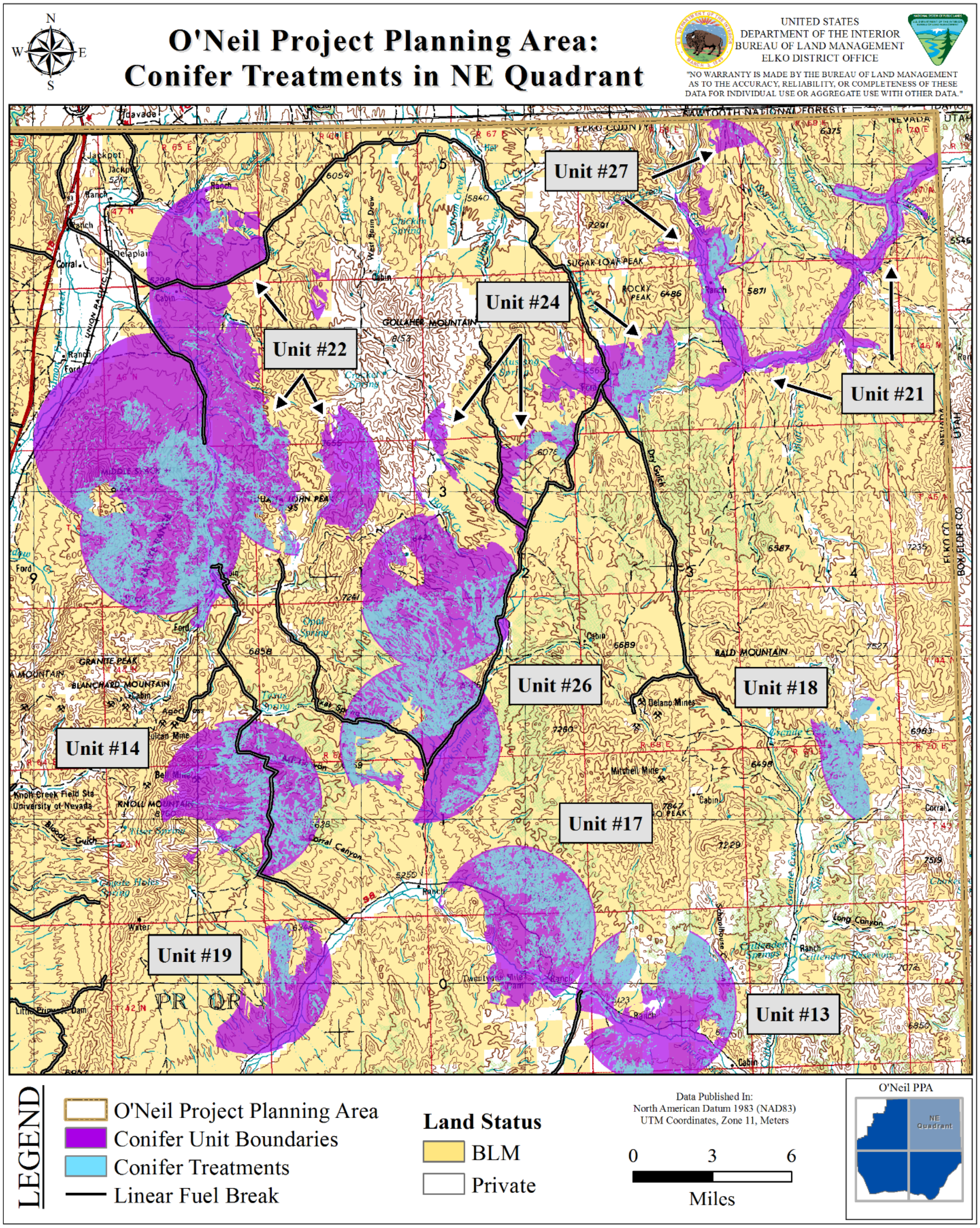


Figure 6. O'Neil PPA Conifer Treatments & Fuel Breaks in Southeast Quadrant.

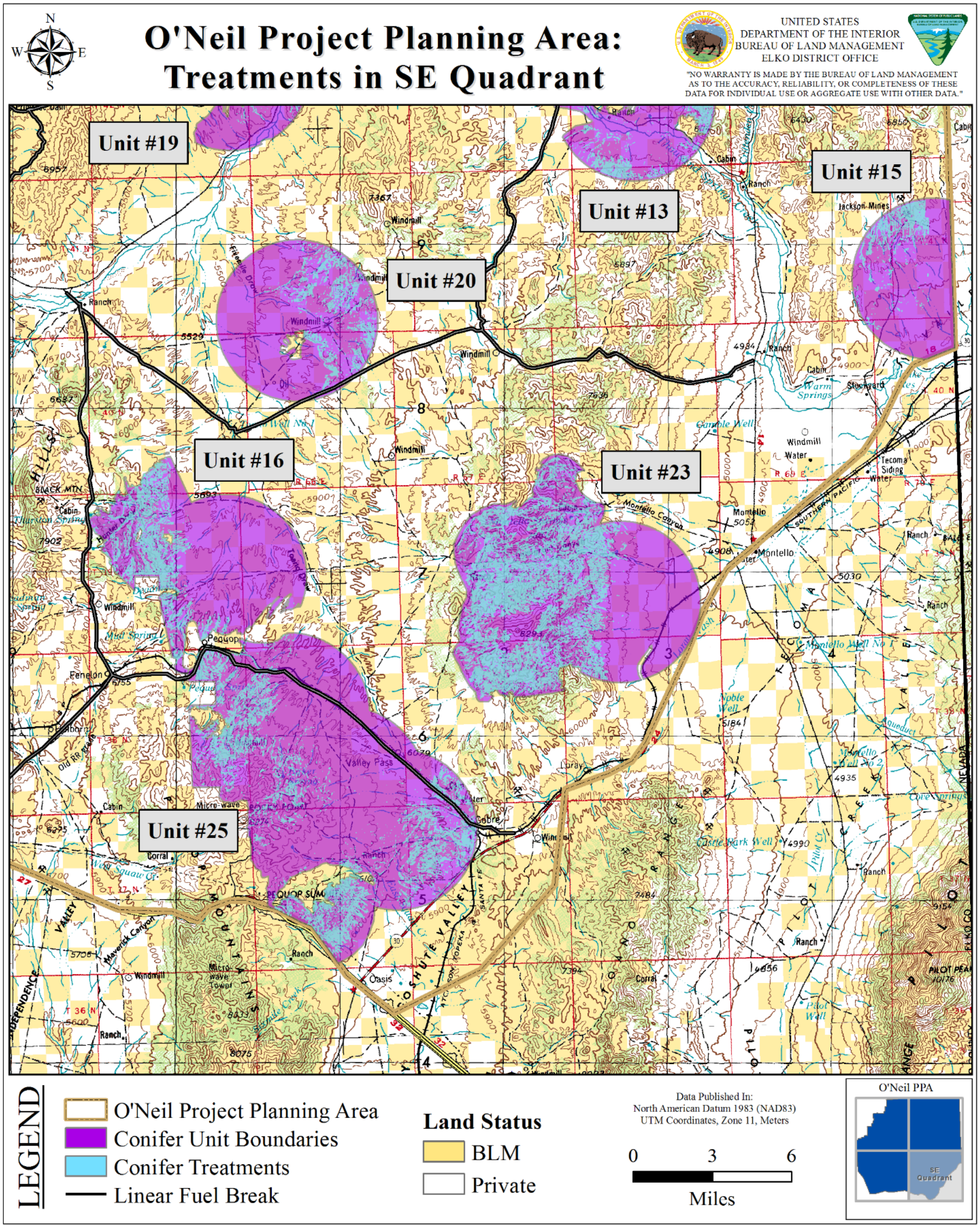


Figure 7. O'Neil PPA Treatments in Southwest Quadrant.

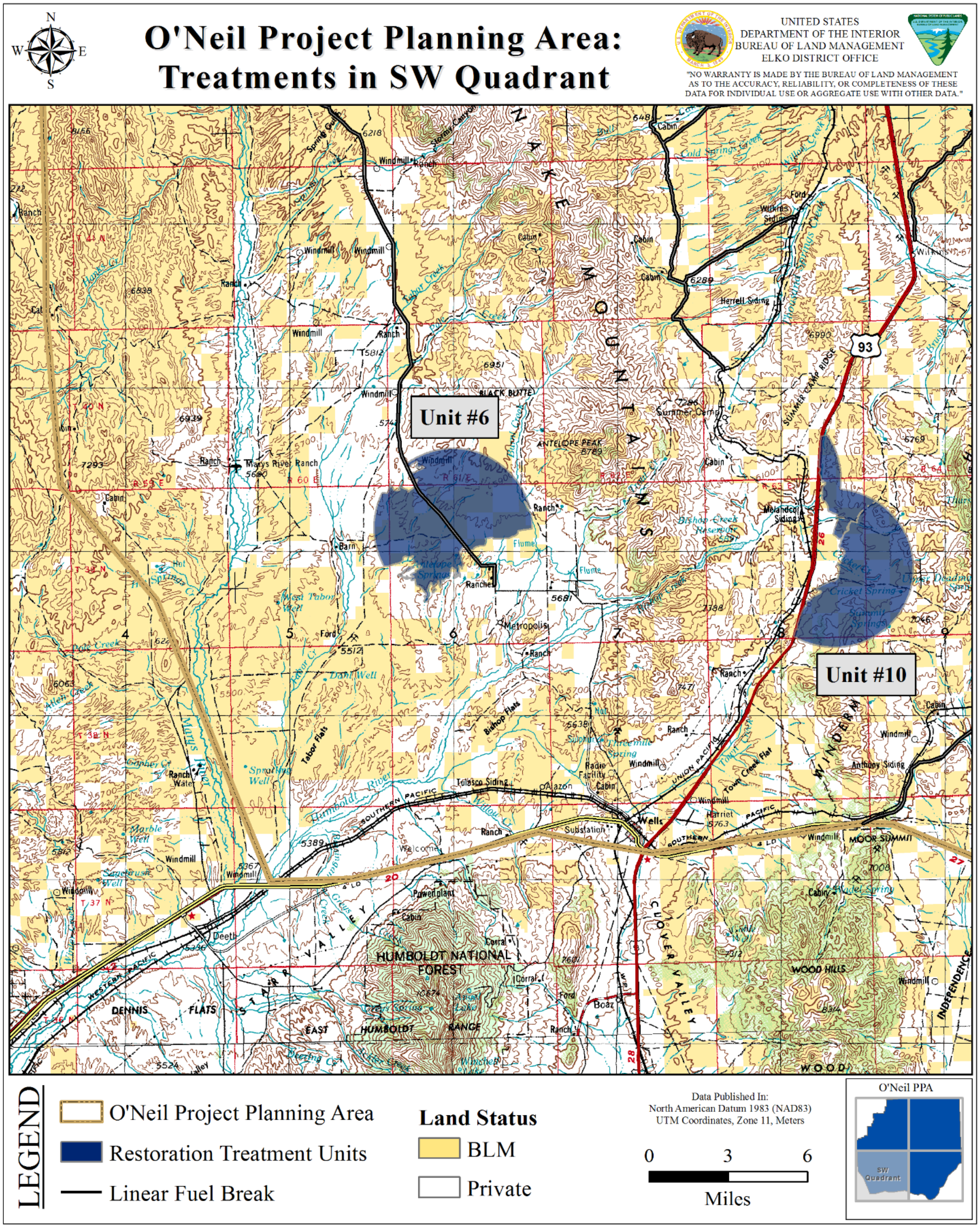


Figure 8. Historical Vegetation Types in O'Neil PPA.

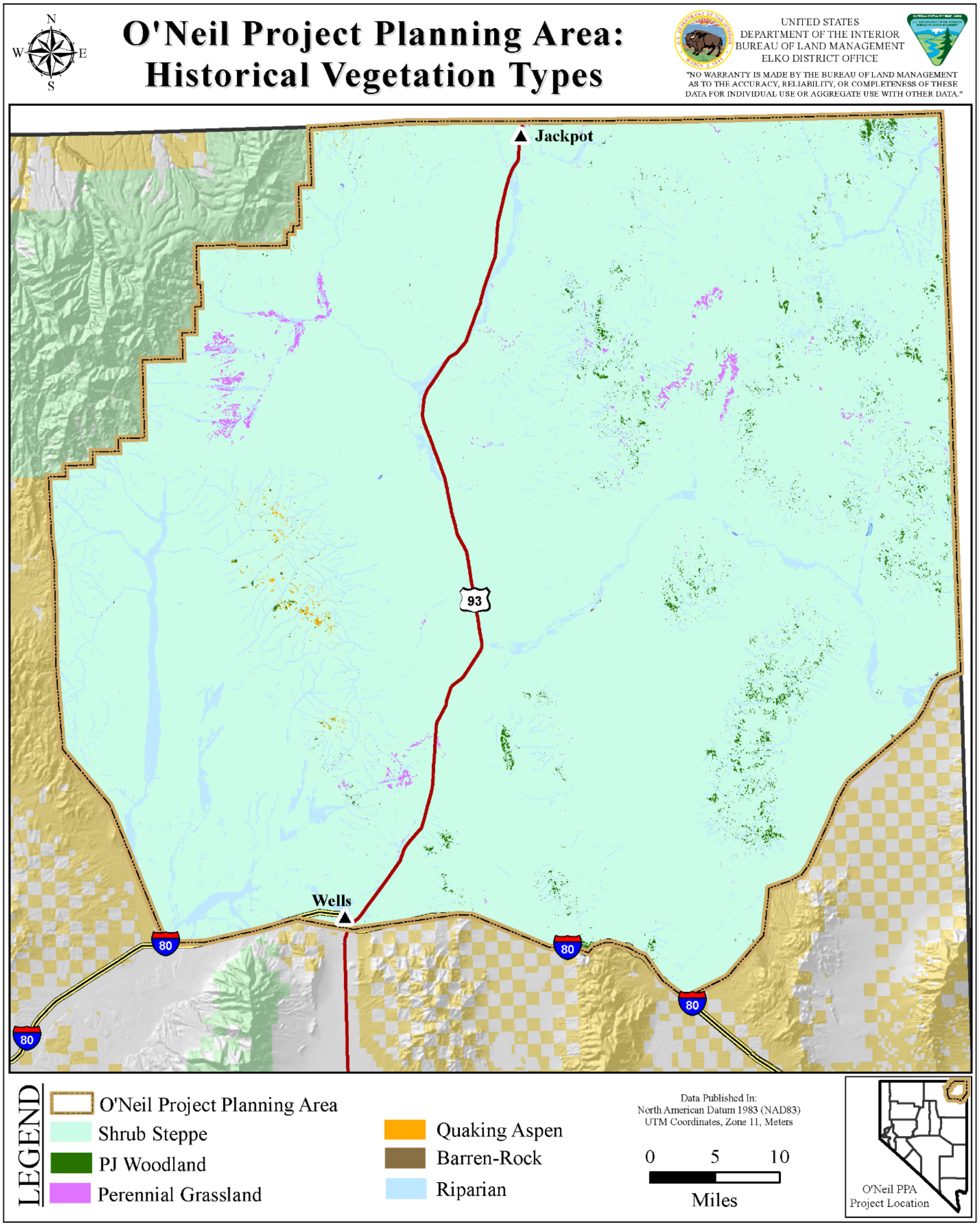


Figure 9. Existing Vegetation Types in O'Neil PPA.

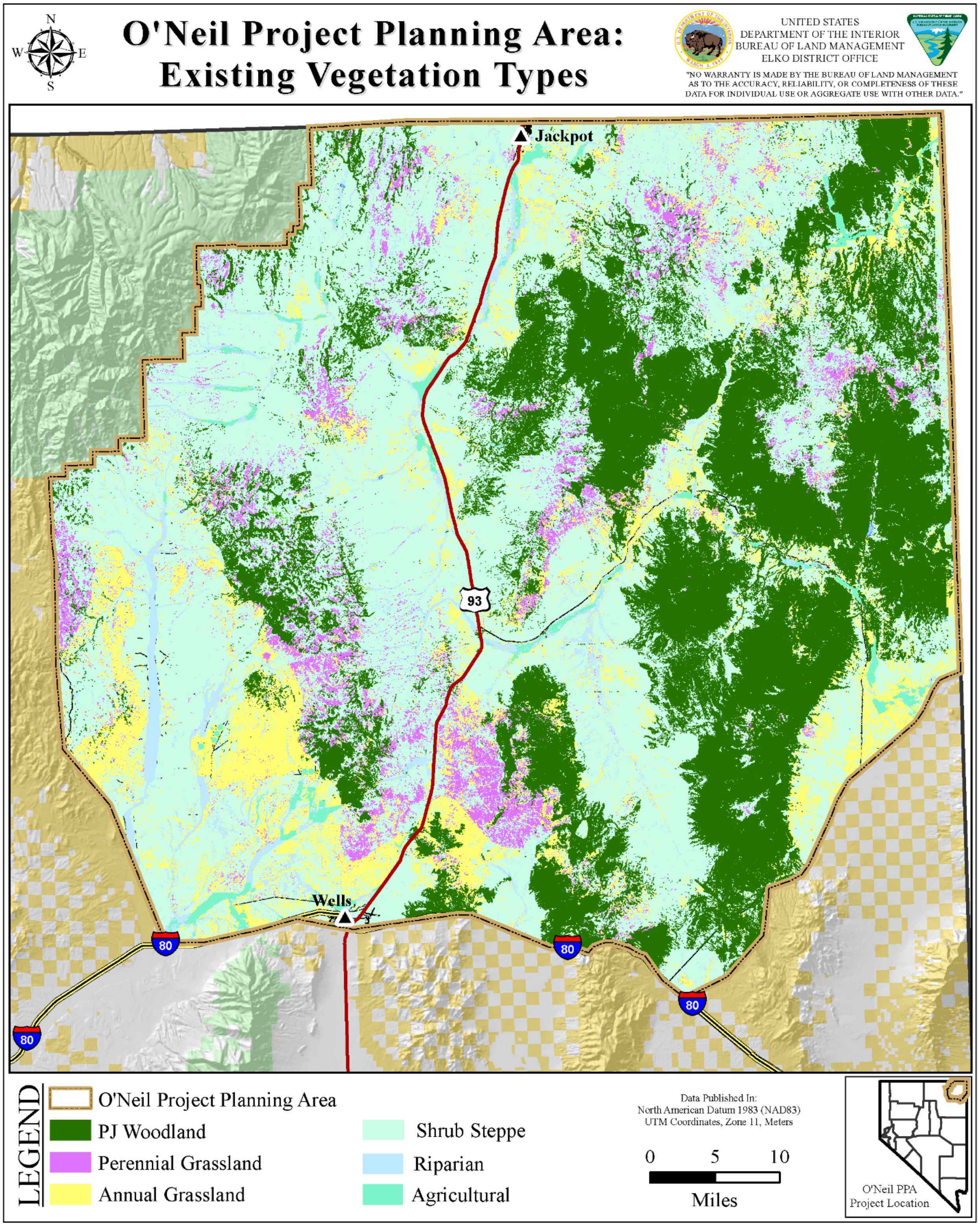


Figure 10. Current Vegetation Types in Northwest Quadrant of O'Neil PPA.

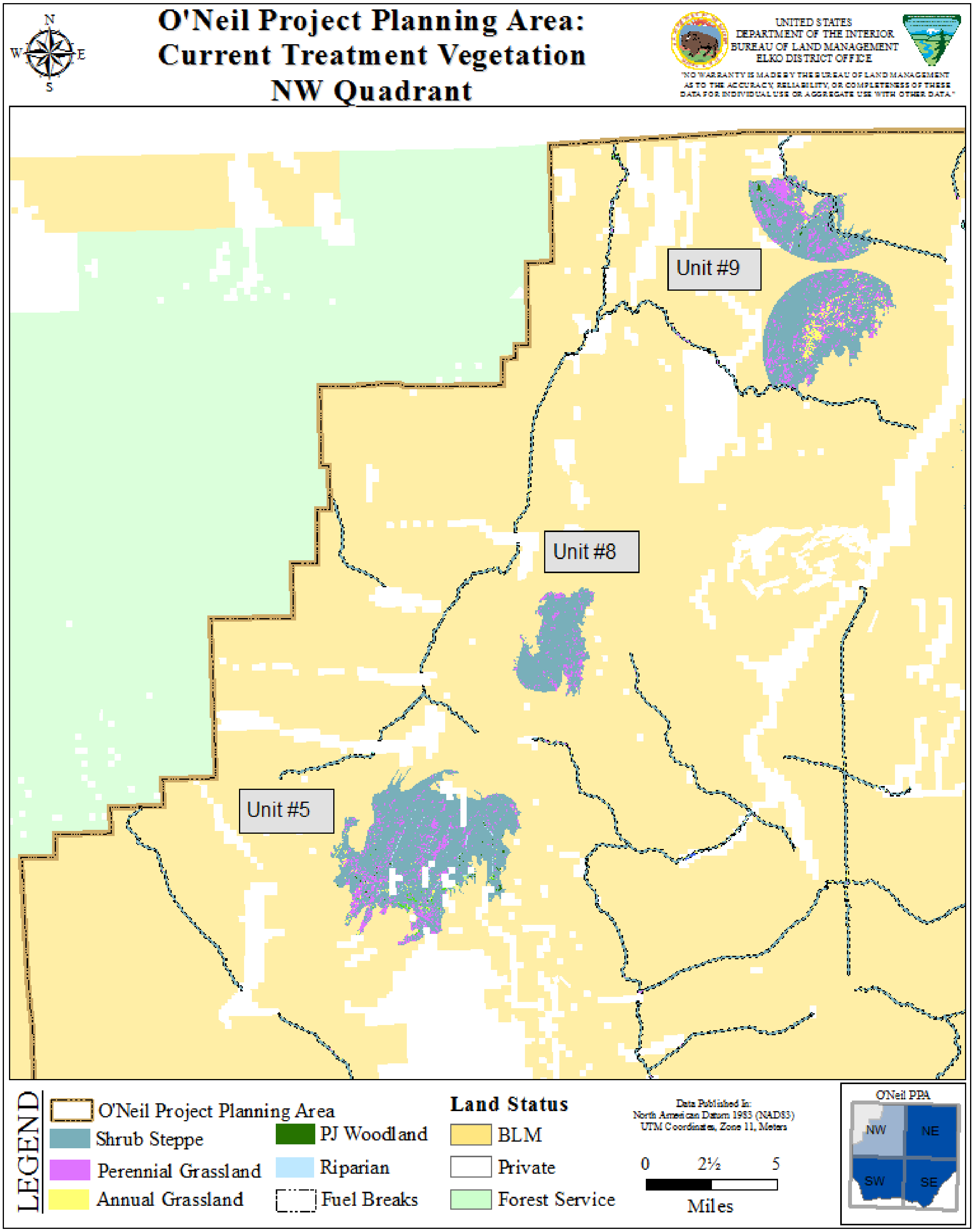


Figure 11. Current Vegetation Types in Northeast Quadrant of O'Neil PPA.

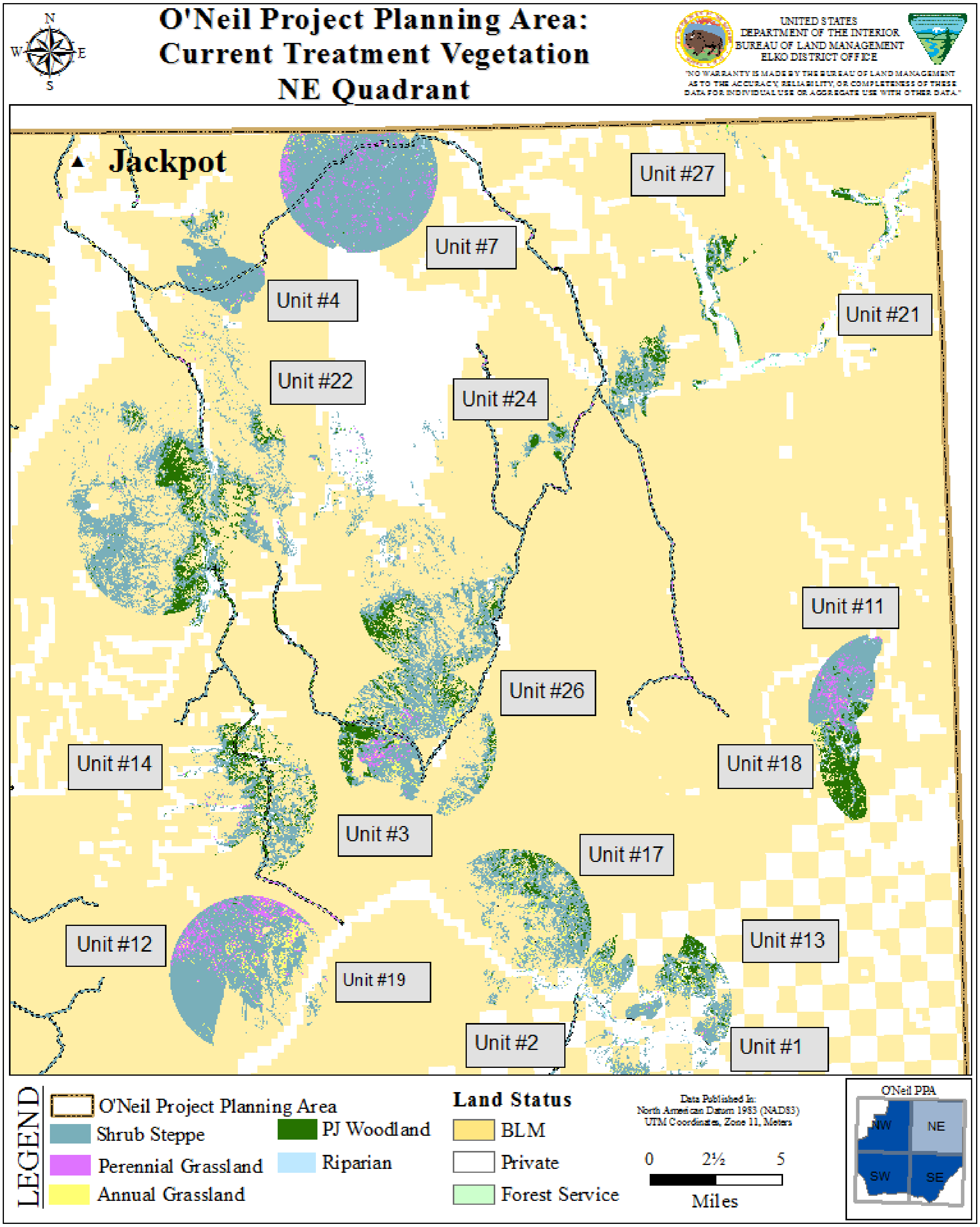


Figure 12. Current Vegetation Types in Southeast Quadrant of O'Neil PPA.

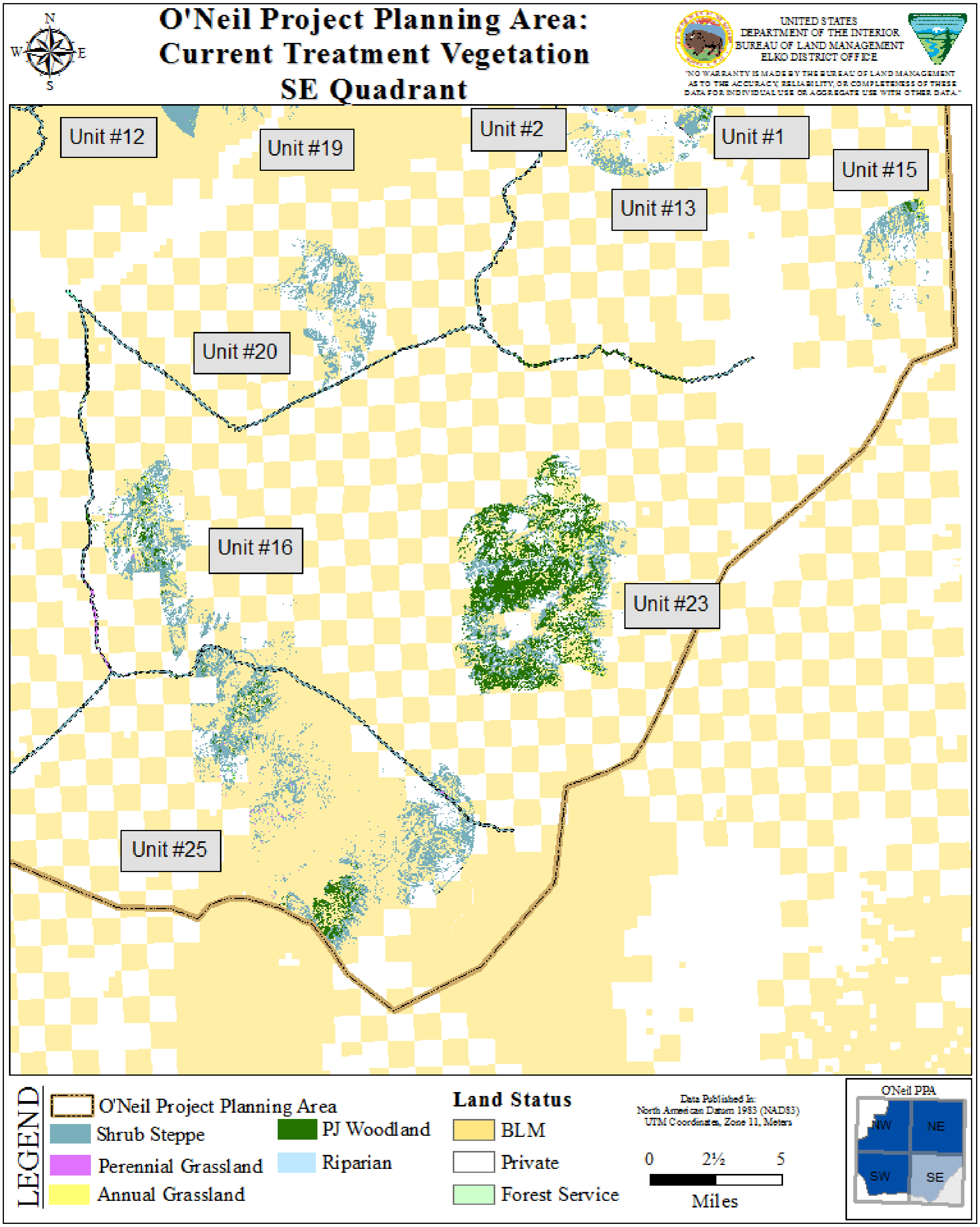


Figure 13. Current Vegetation Types in Southwest Quadrant of O'Neil PPA.

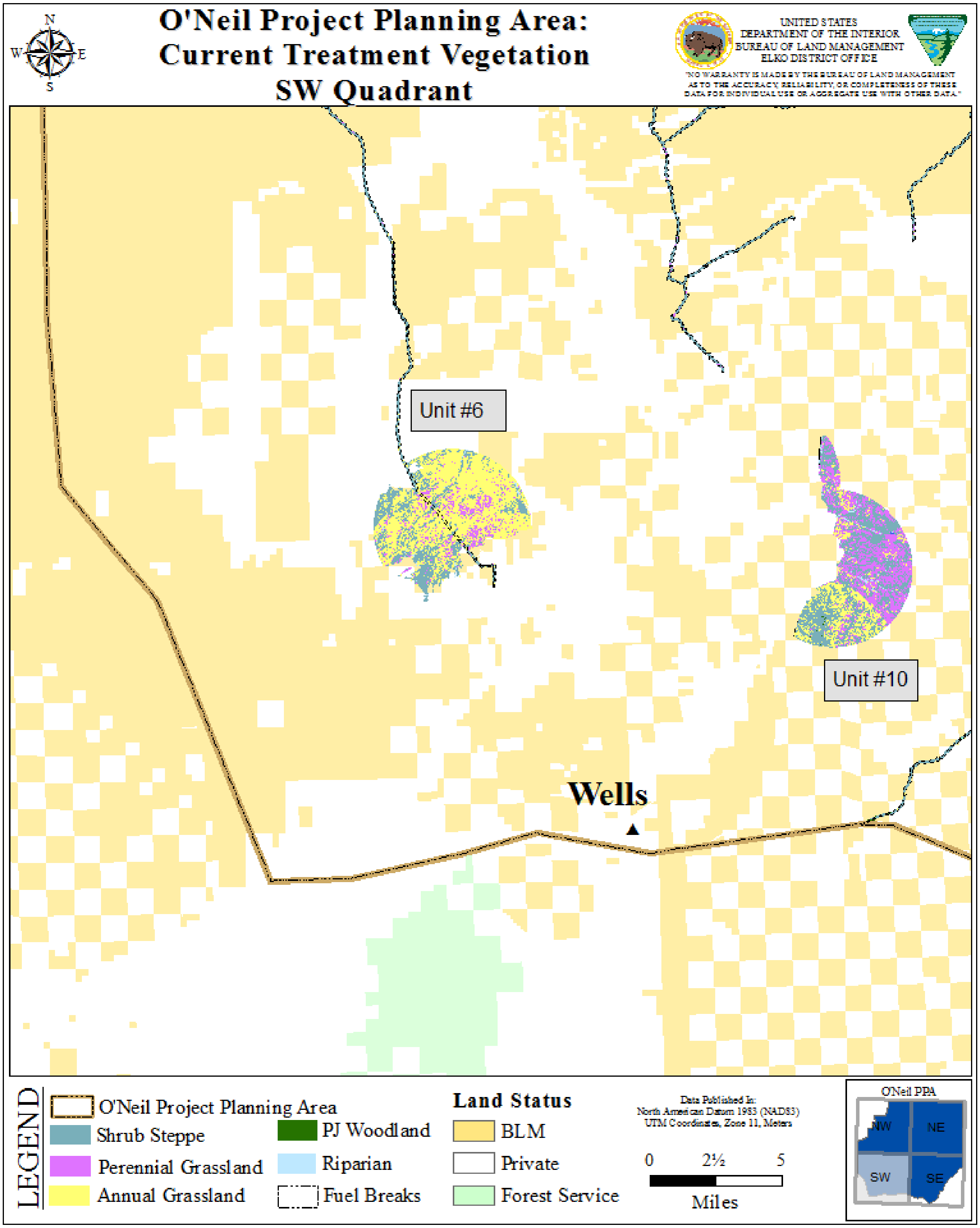


Figure 14. Current Versus Historical Pinyon-Juniper Woodlands in O'Neil PPA.

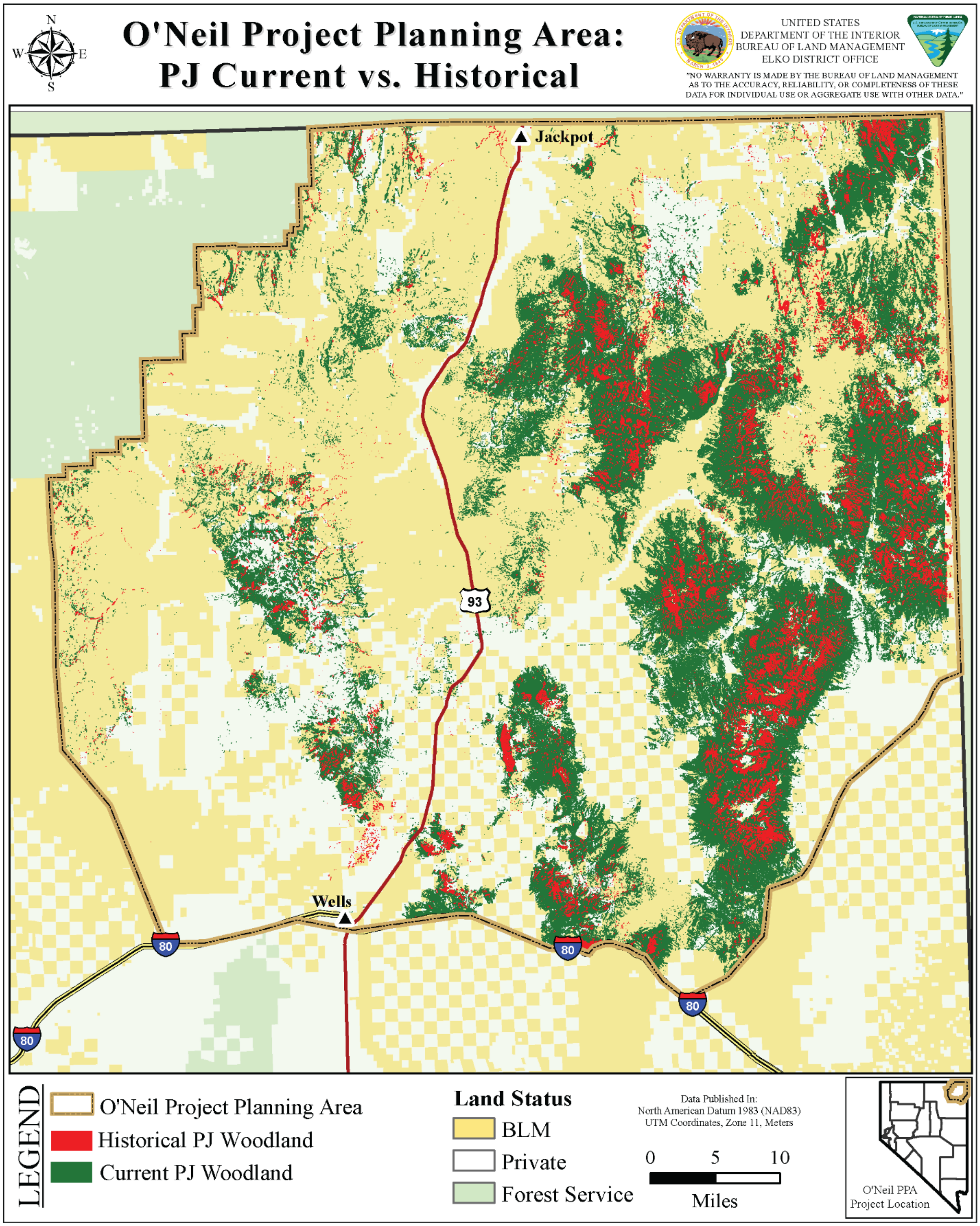


Figure 15. O’Neil PPA SO3362 Habitats.

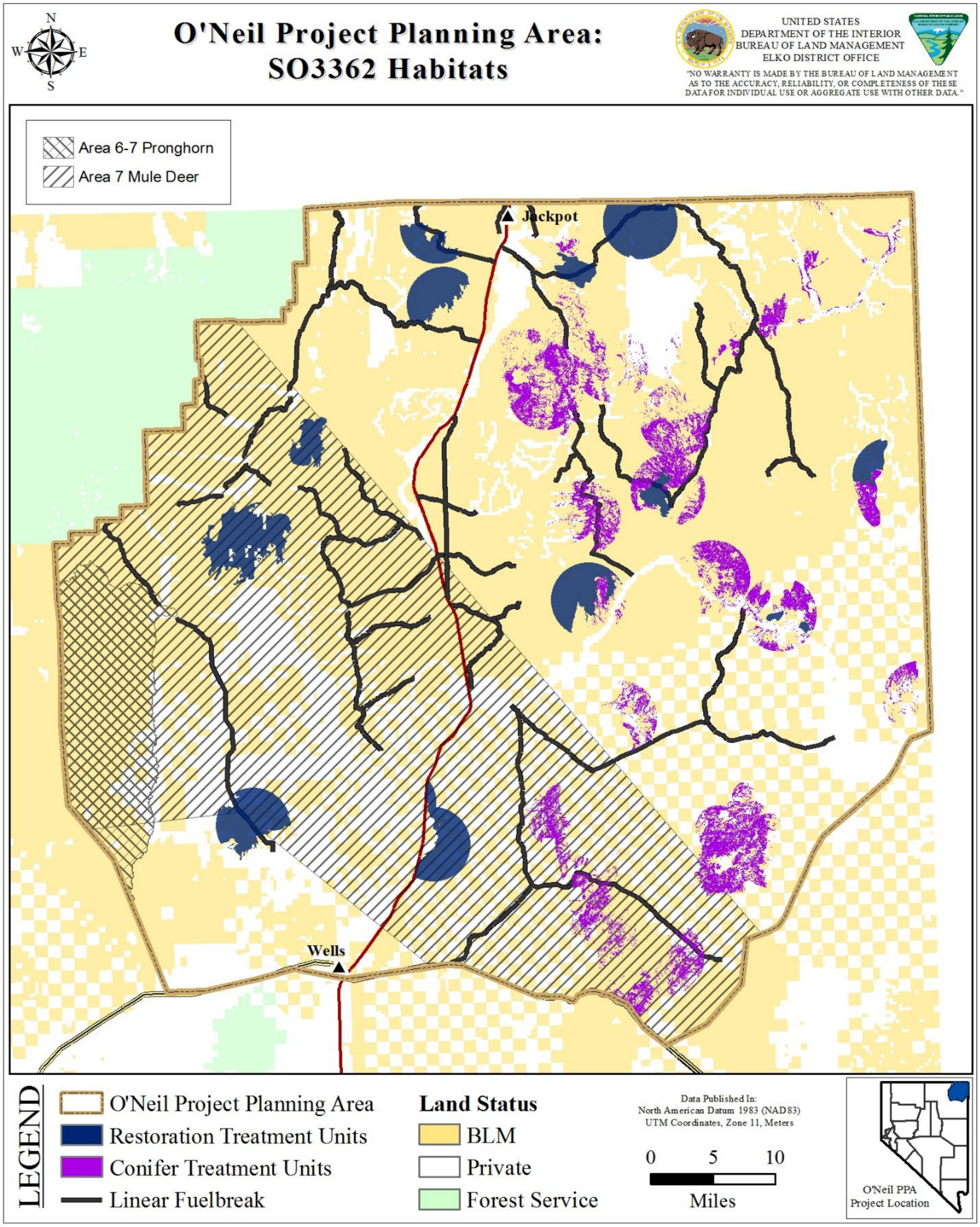


Figure 16. O'Neil PPA Mule Deer Seasonal Habitats.

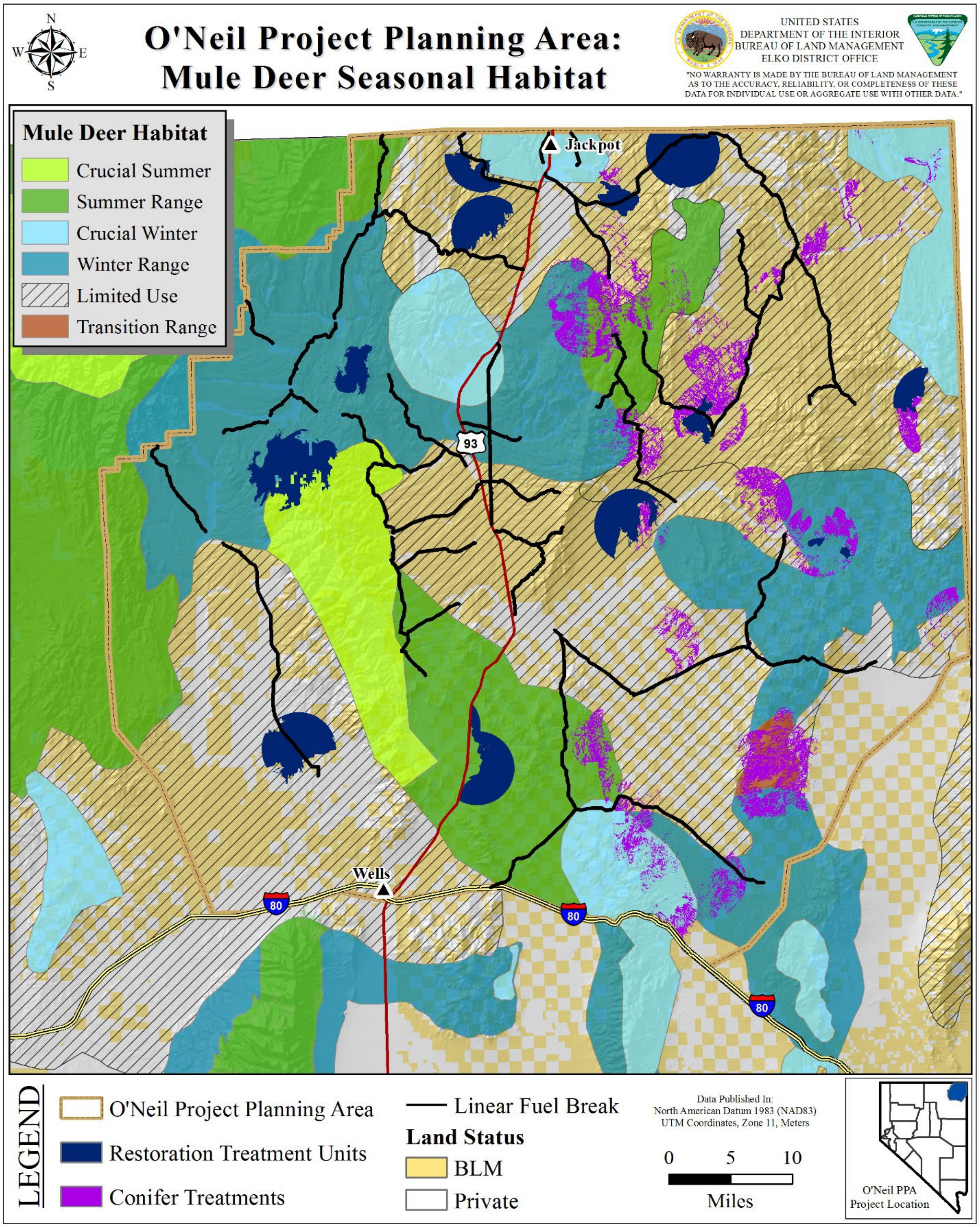


Figure 17. O'Neil PPA Pronghorn Antelope Seasonal Habitats.

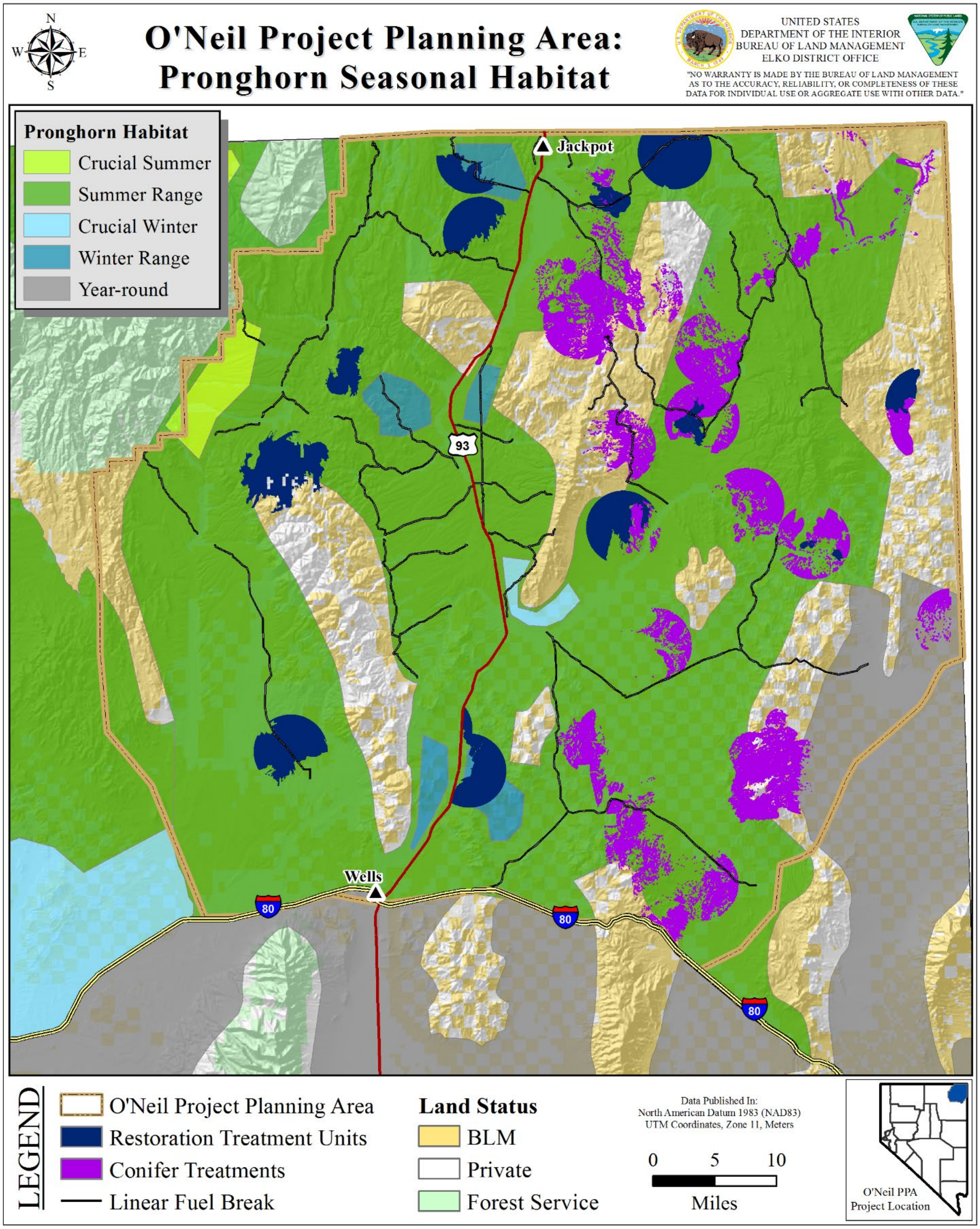


Figure 18. O’Neil PPA Seasonal Elk Habitats.

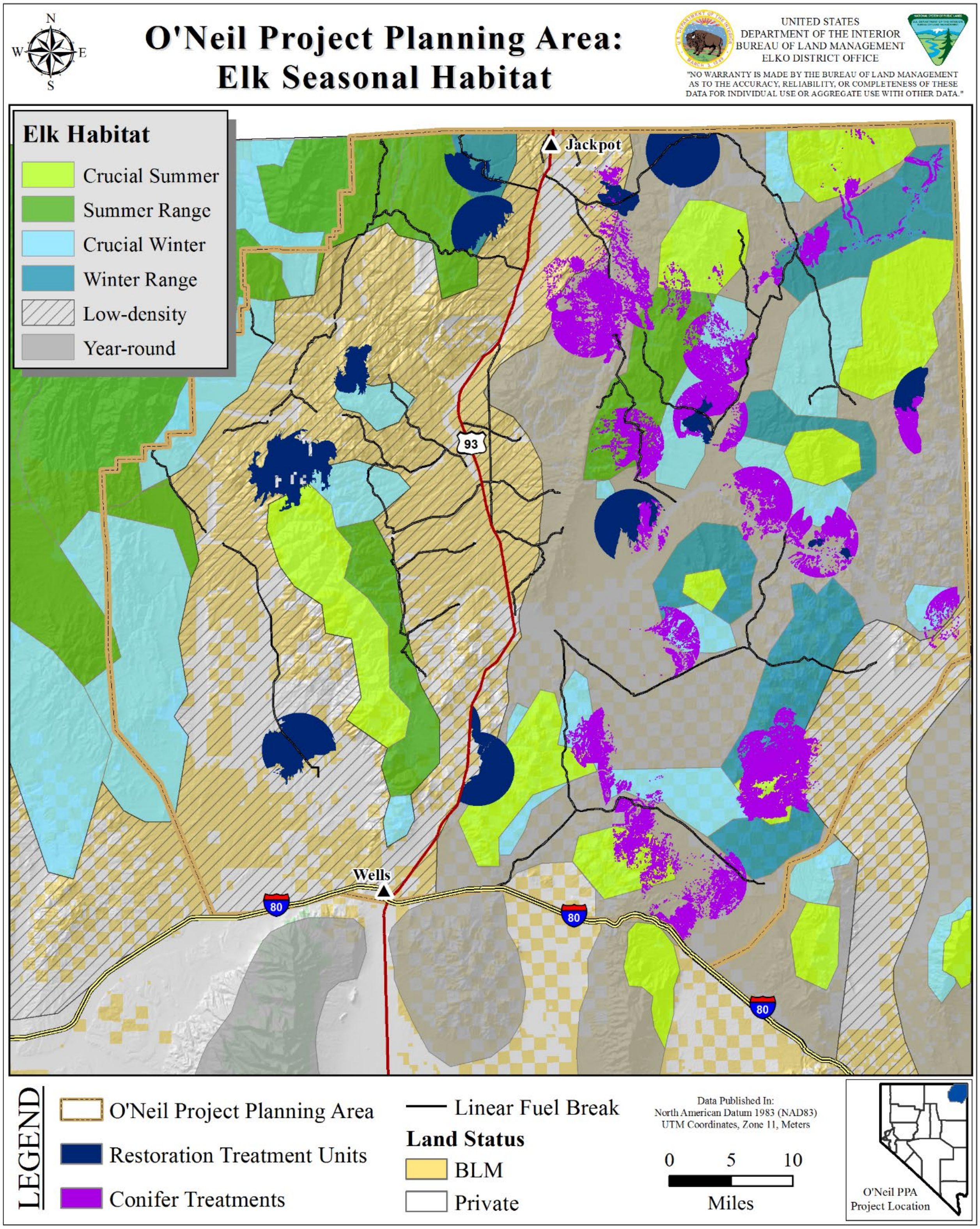


Figure 19. O'Neil PPA Bighorn Sheep Seasonal Habitats.

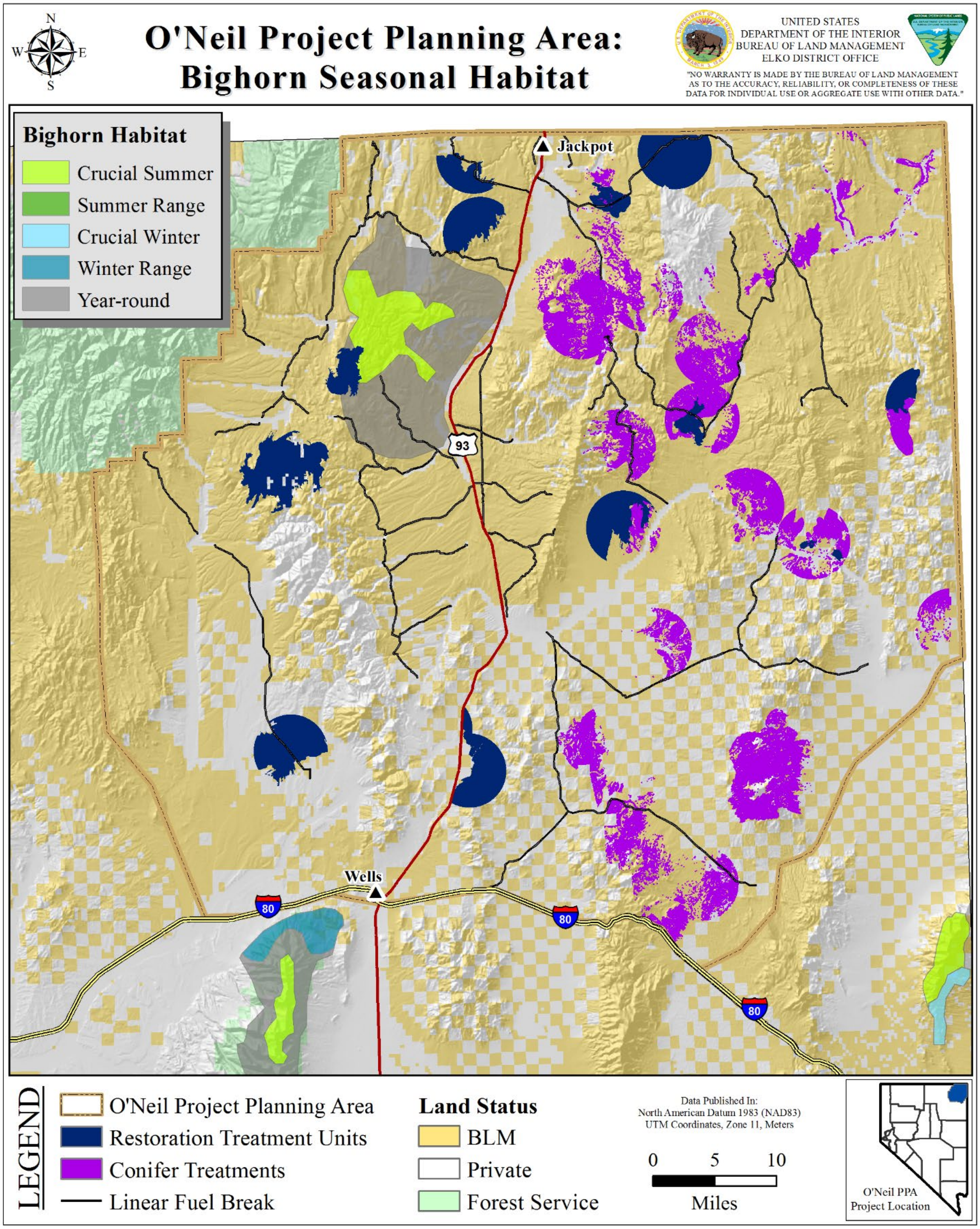


Figure 20. O’Neil PPA Sage-Grouse Habitat Management Areas (2015 ARMPA).

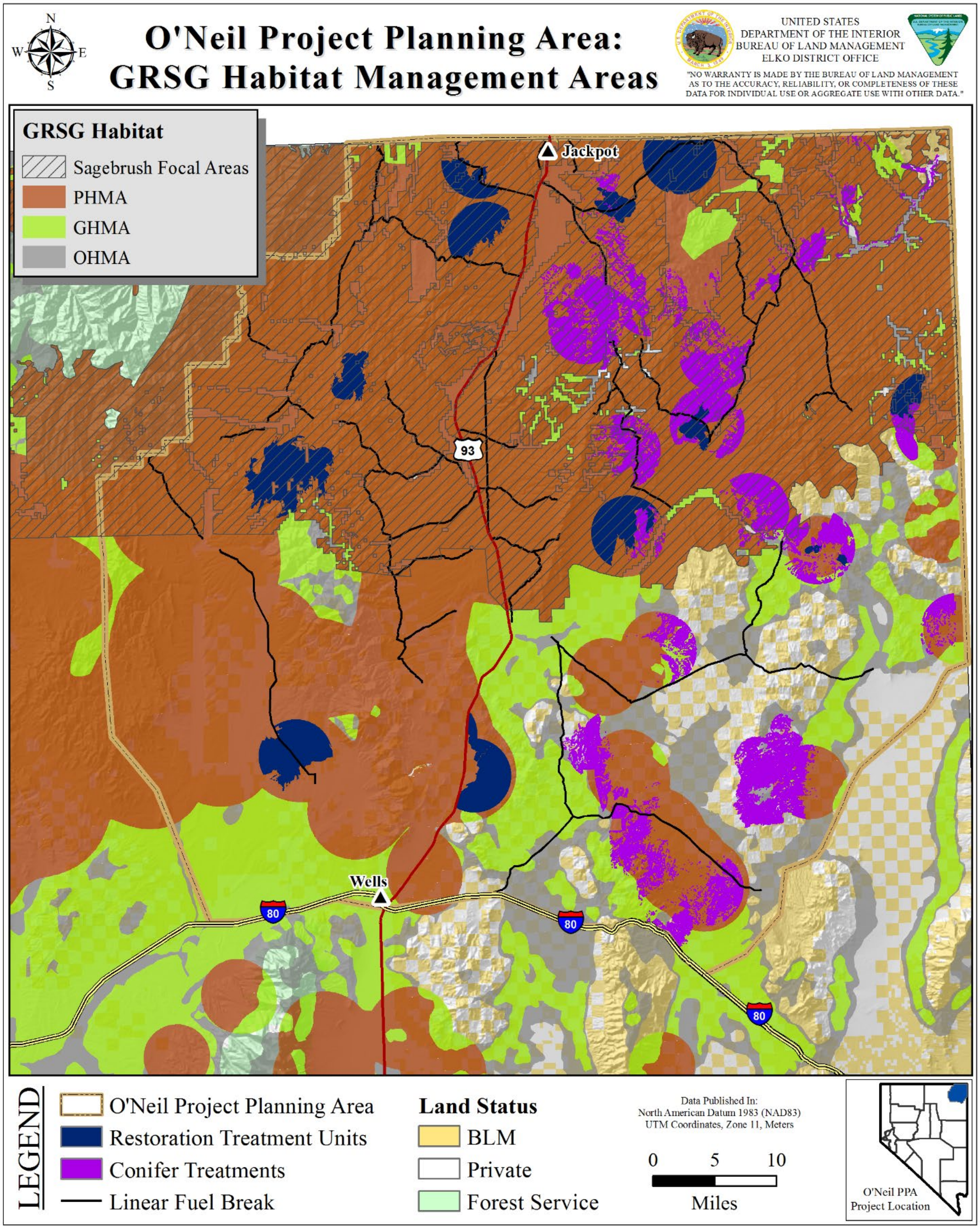


Figure 21. O'Neil PPA Sage-Grouse Habitat Management Areas as updated by the 2022 ARMPA Plan Maintenance Action #5, using updated habitat modeling completed by the USGS in 2021.

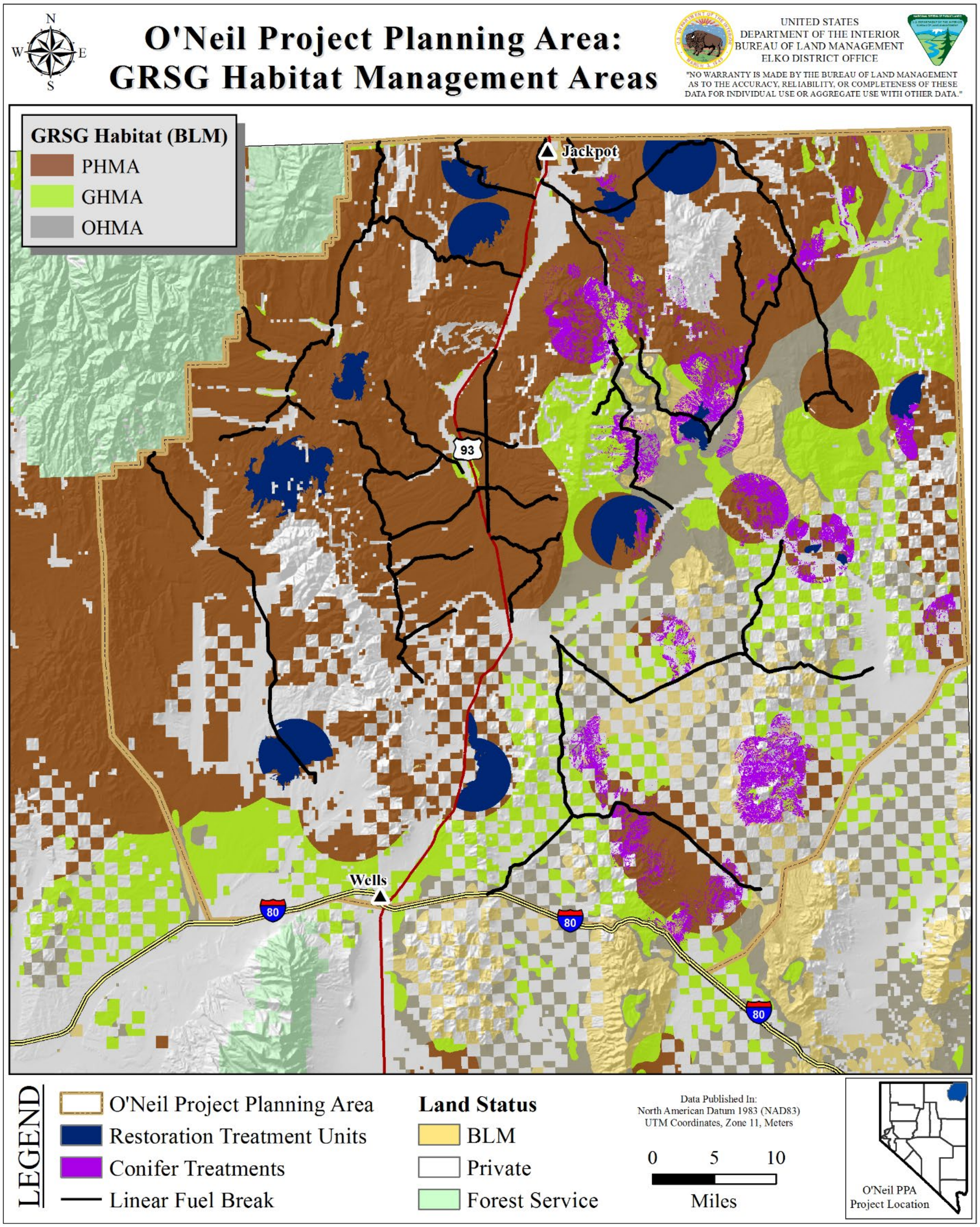


Figure 22. Greater Sage-Grouse nesting/early brood-rearing habitat (spring habitat).

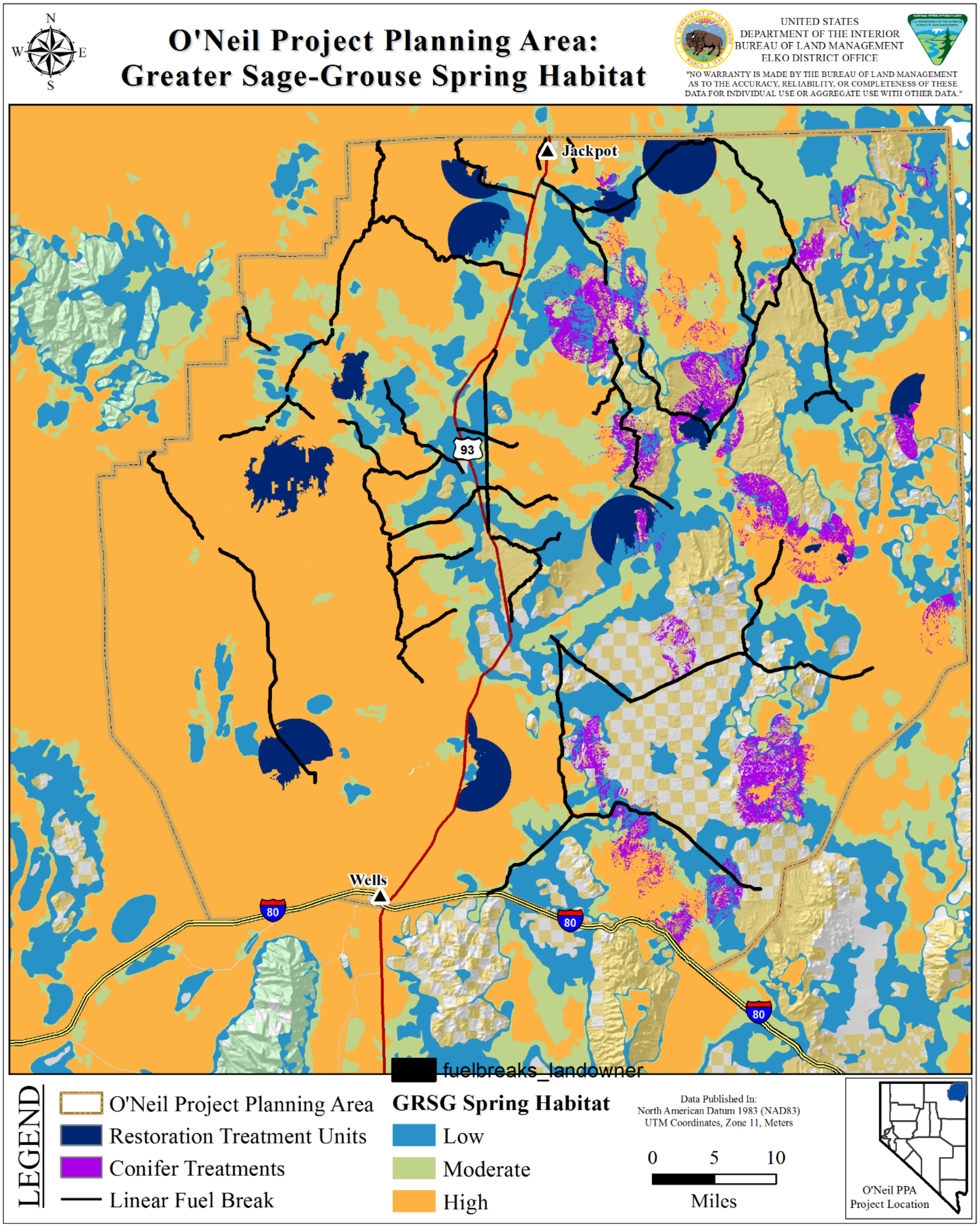


Figure 23. Greater Sage-Grouse late-brood-rearing habitat (summer habitat).

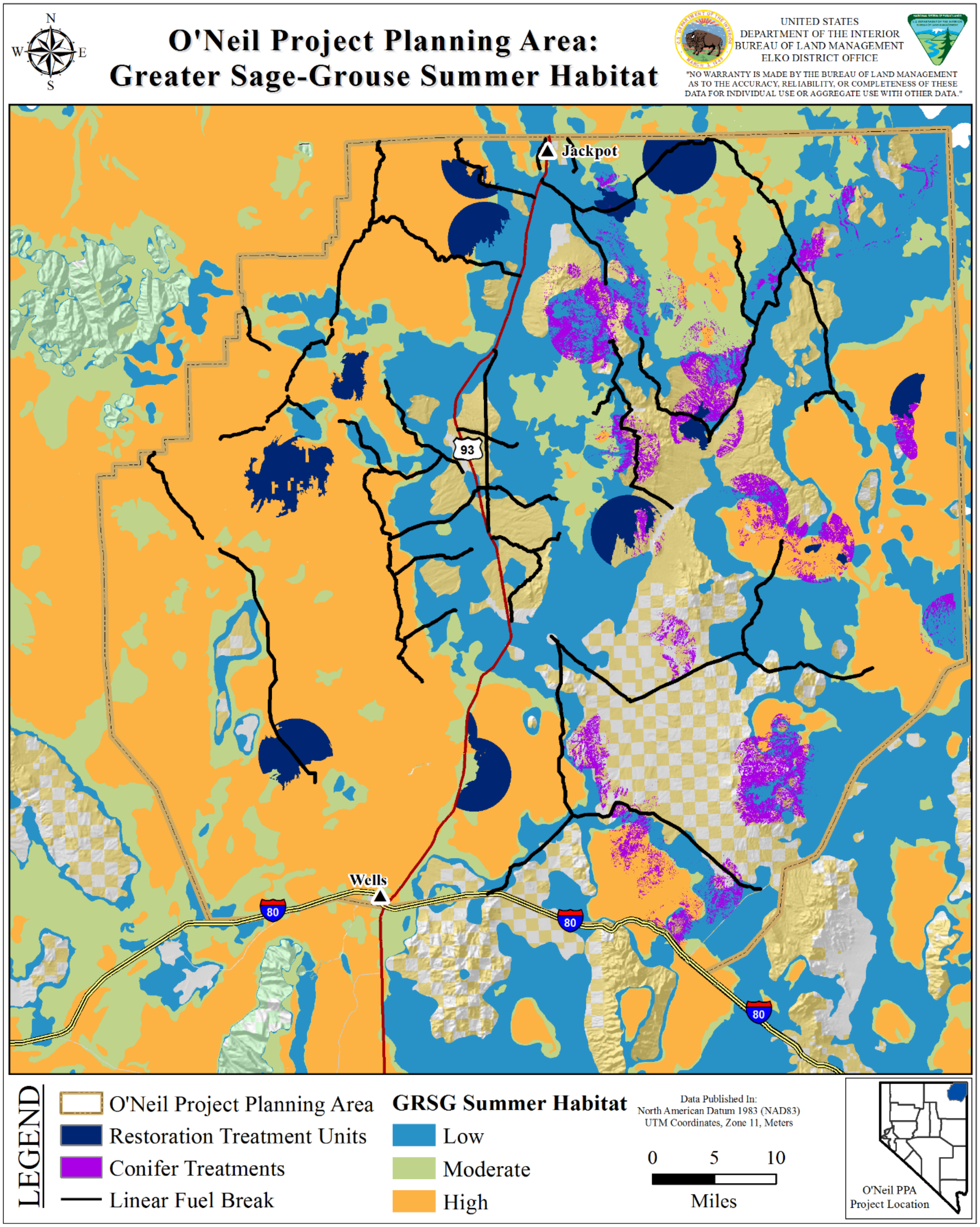


Figure 24. Greater Sage-Grouse winter habitat.

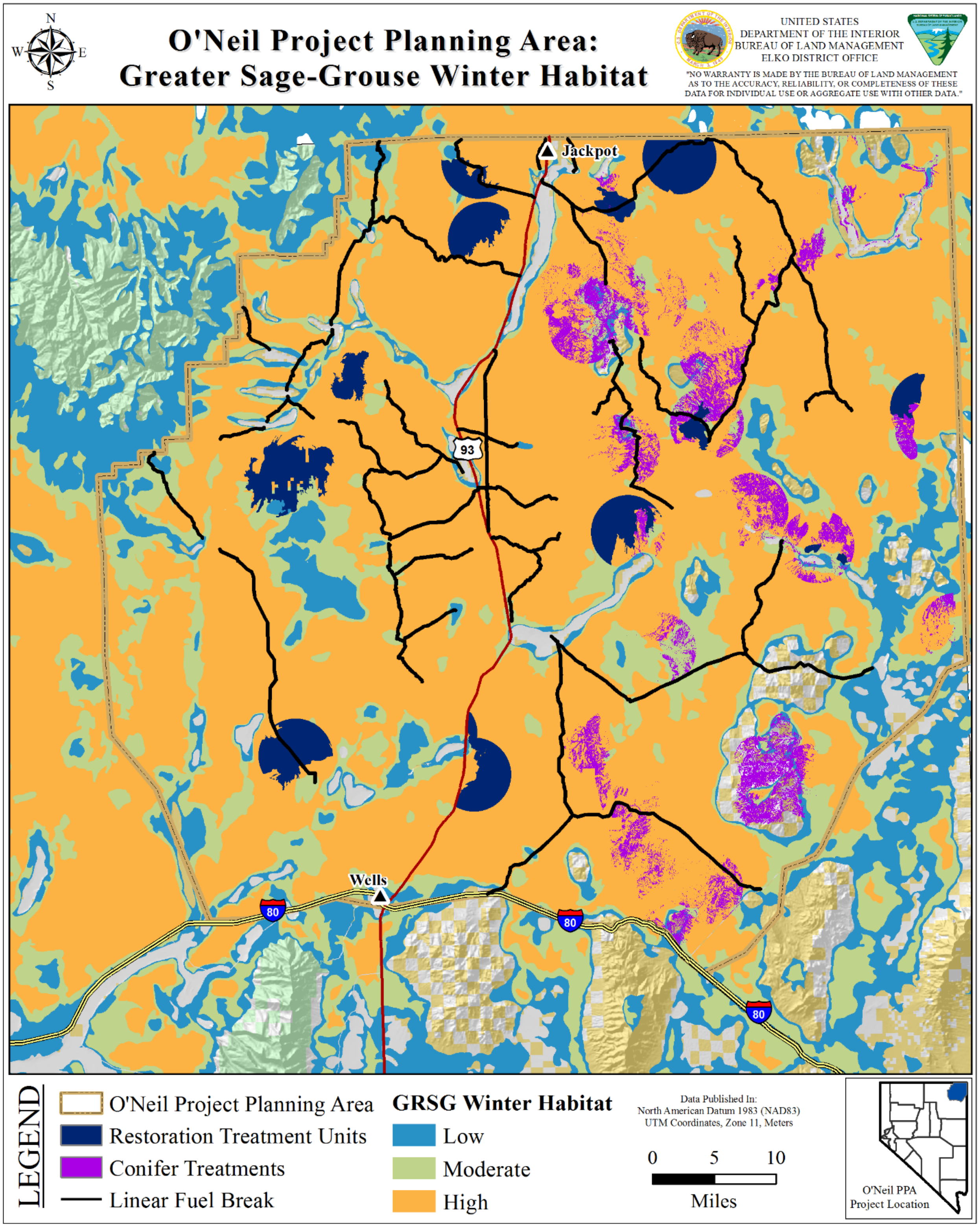


Figure 25. Distribution of single leaf pinyon (*Pinus monophylla*) within the O'Neil PPA.

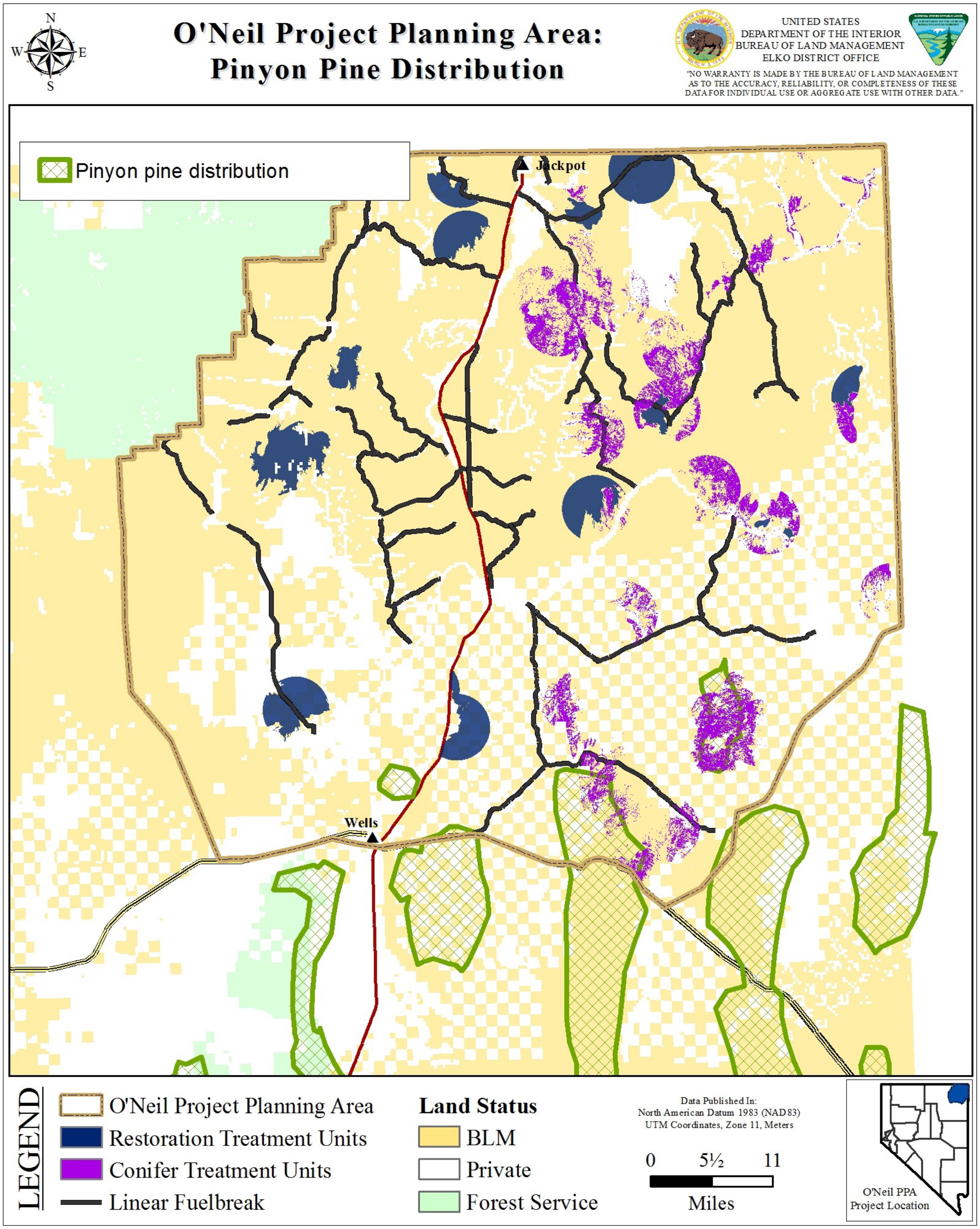


Figure 26. Distribution of the pinyon jay, pinyon pine and juniper. Areas with both pinyon and juniper are darker in color than either alone. From Boone et al. (2021).

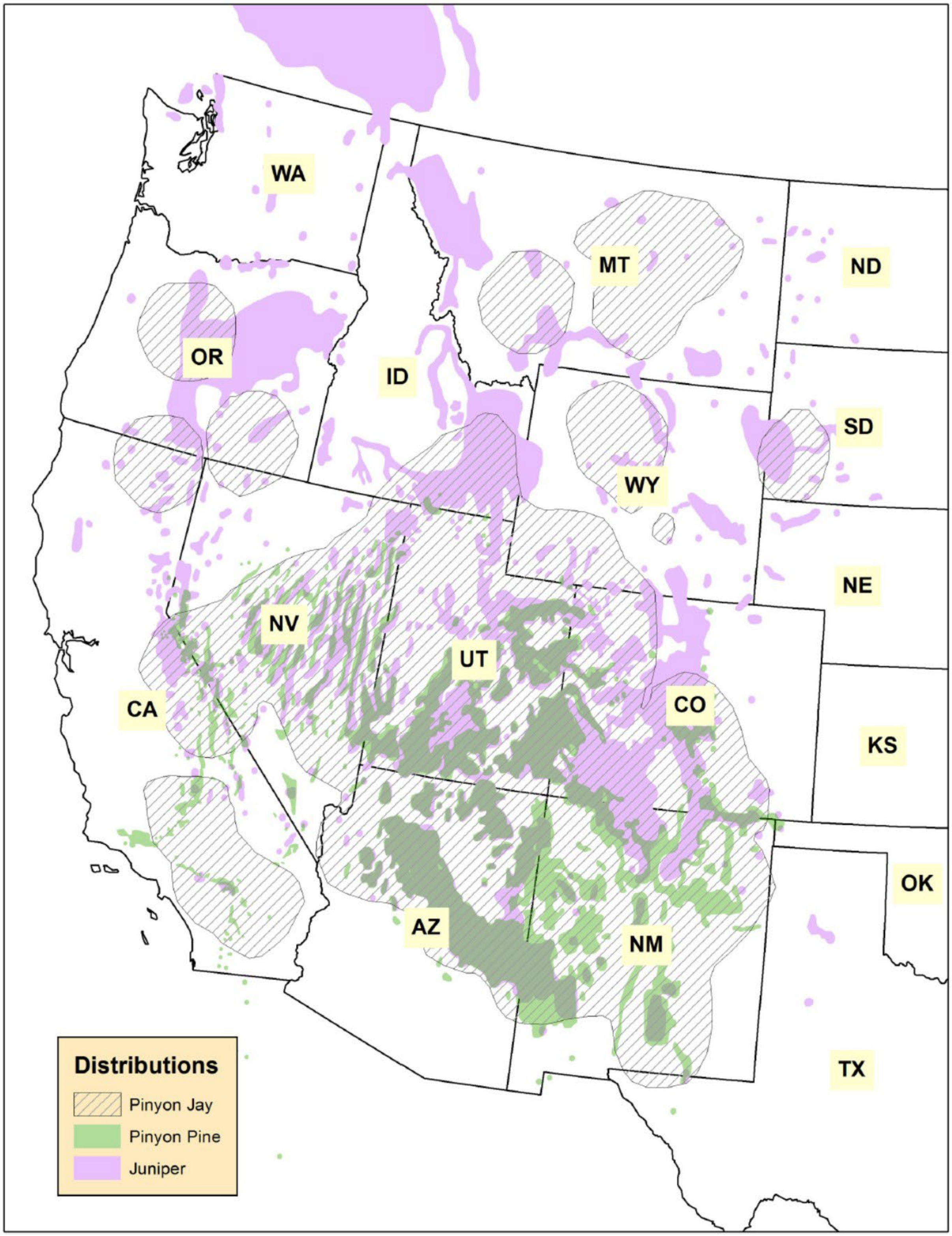


Figure 27. Goose Creek Milkvetch in Dry Canyon Area of O'Neil PPA.

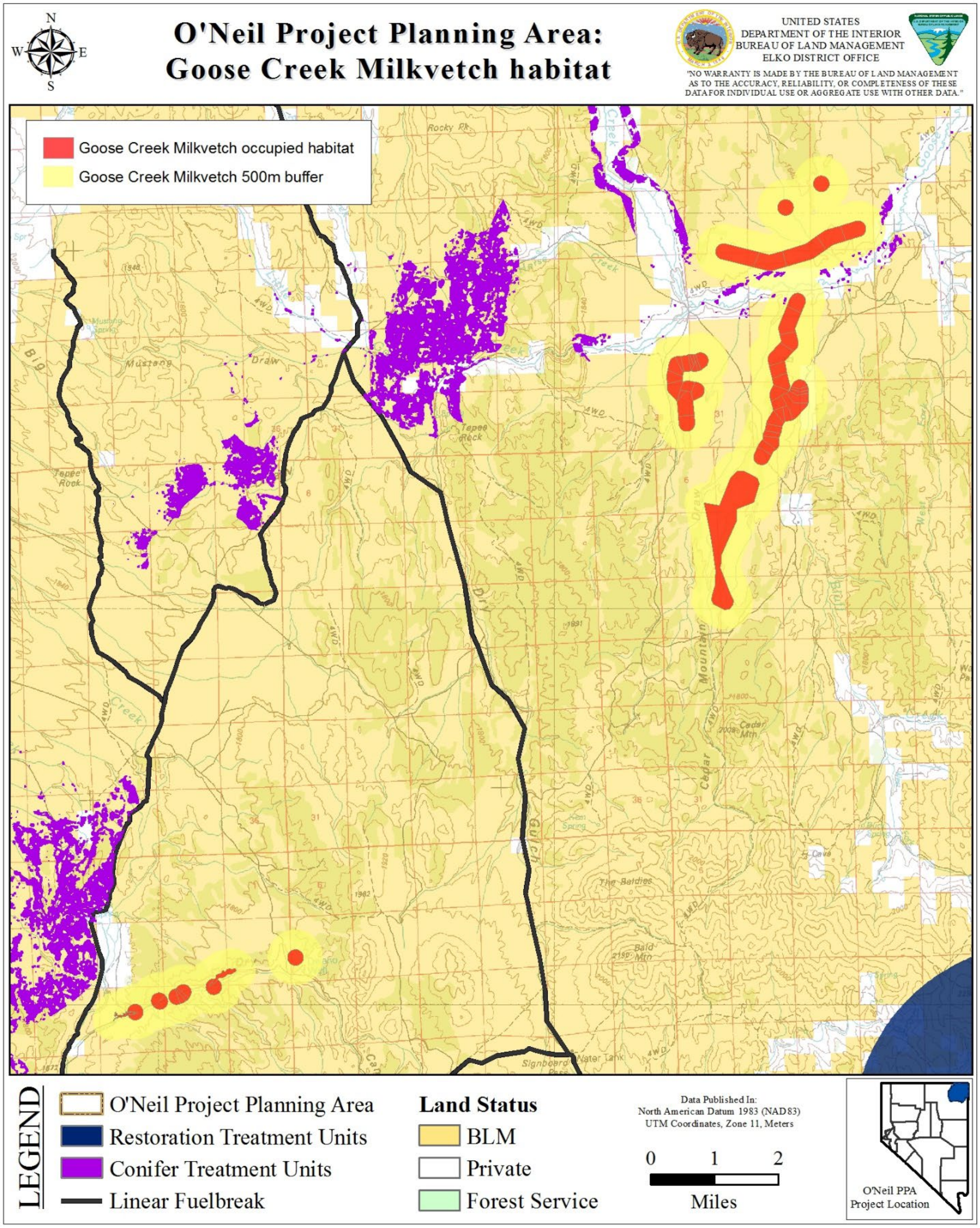


Figure 28. CESA for Special Status Species.

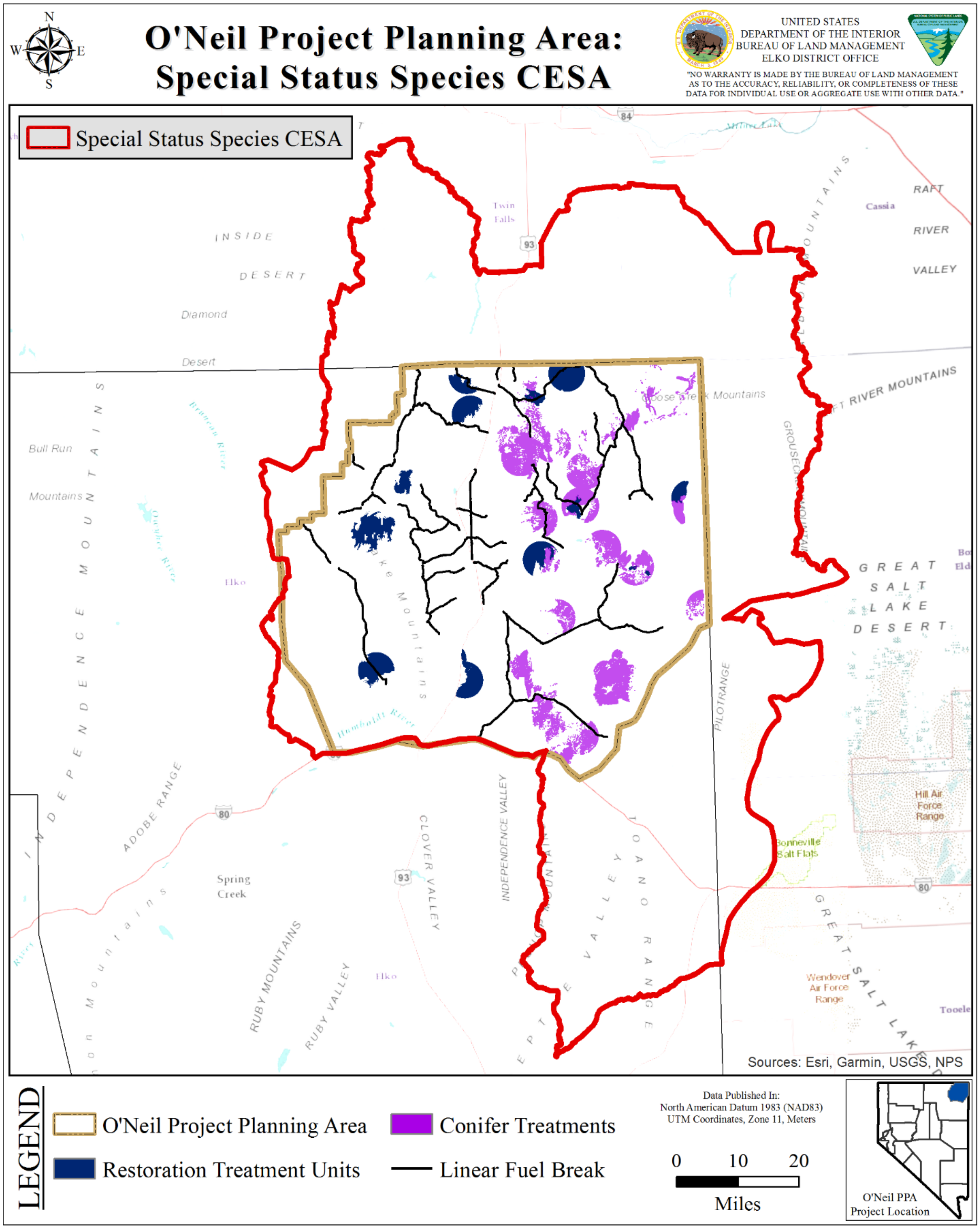
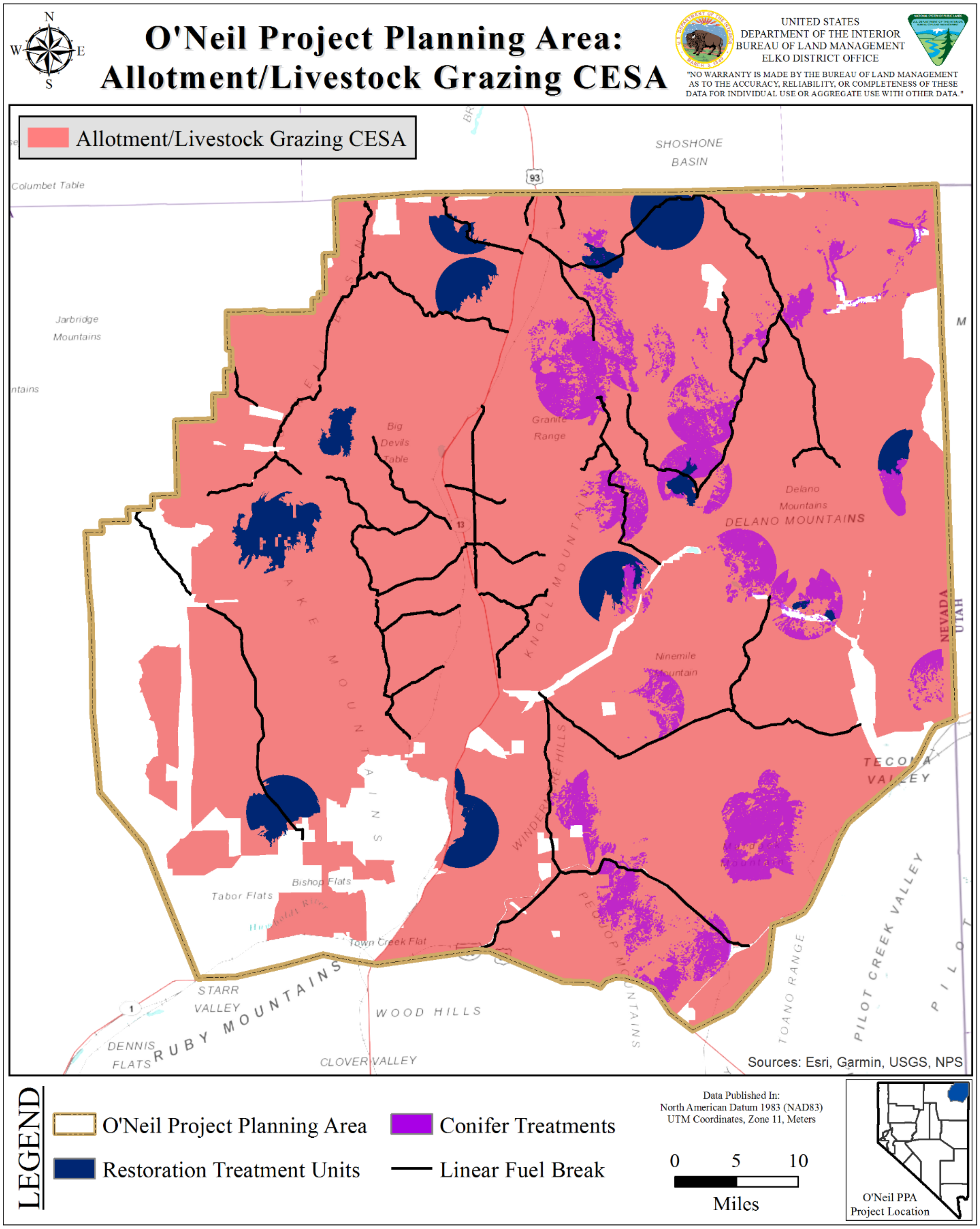


Figure 29. CESA for Livestock Grazing.



Appendix C. Issues not Identified for In-depth Analysis and Resources Eliminated from Analysis

C1. Issues not Identified for In-depth Analysis

How would proposed vegetation treatments impact Historic Properties?

The National Historic Preservation Act (NHPA) requires that federal agencies make a good faith effort to identify significant cultural properties (i.e., historic properties). The Nevada State Historic Preservation Office (SHPO)/BLM Protocol Agreement (BLM and SHPO, 2014), as a programmatic agreement under NHPA, specifies how the Nevada BLM will meet its responsibilities under Section 106 of the NHPA. The BLM-SHPO Protocol (2014) streamlines the Section 106 process by reducing consultations with SHPO on undertakings, such as the Proposed Action, that culminate in no effect or no adverse effect determinations. In compliance with Section 106 of the NHPA and pursuant to the Protocol (BLM and SHPO, 2014, pp. 16-17), the Elko BLM would conduct cultural inventories (Class II or Class III) for any treatment under the Proposed Action that does not meet the criteria for an Exemption from Inventory Requirement (BLM and SHPO, 2014, Appendix A). The BLM will avoid any adverse impacts to historic properties (i.e., cultural resources eligible for the National Register of Historic Places) by implementing standard measures outlined in the Protocol Part V.D-E. The standard measures that may be utilized to avoid adverse impacts to historic properties during project implementation are site avoidance, project redesign, use of buffer zones for protection, site monitoring, or data recovery (BLM and SHPO, 2014, pp. 22-24). Because the BLM will avoid adverse impacts to historic properties through standard measures, the Proposed Action would be a "No Adverse Effect" undertaking. Therefore, Historic Properties (significant cultural resources), is eliminated from detailed analysis.

How would proposed vegetation treatments impact Air Quality?

Air pollutant emissions related to the proposed vegetation treatments would consist of combustion emissions from pile burning, fueled equipment, vehicles and aircraft; and VOC emissions related to herbicide application.

The EPA has set national standards, National Ambient Air Quality Standards (NAAQS), for six classes of criteria air pollutants considered to be key indicators of air quality (Stone, Anderko, Berger, Butler, & Cascio, 2019): carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, lead, particulate matter 10 microns or smaller (PM10) and particulate matter 2.5 microns or smaller (PM2.5). Although several pollutants listed as criteria air pollutants can be found in smoke, particulate matter is typically of most concern from a health and visibility standpoint and is a primary pollutant resulting from the combustion of fuels during wildfires and prescribed fires. Studies indicate that about 90 percent of smoke particles emitted during wildland fires are less than 10 microns in diameter (PM10) and about 90 percent of the PM10 is less than 2.5 microns in diameter (PM2.5) (NWCG, 2020).

PM2.5 is the most significant of the regulated pollutants in relation to fire and the pollutant of most concern for fire managers (NWCG, 2020). PM2.5 poses the greater risk to human health because the small size of the particles can cause respiratory and heart problems, particularly in sensitive populations (Stone, Anderko, Berger, Butler, & Cascio, 2019). Notably, PM2.5 is directly emitted into the atmosphere from combustion sources such as wildfire. The larger particles in PM10 are of less concern to human health, but they can be a localized source of reduced visibility in the form of windblown dust.

All treatment methods would have direct impacts on air quality from vehicle- and equipment-related exhaust emissions. Ground vehicles used to access treatment locations and powered equipment used to perform the treatments would emit criteria pollutants and small amounts of hazardous air pollutants through combustion of fossil fuels, such as diesel fuels and gasoline. Because these emissions would be temporary and intermittent, they would not affect local or regional air quality conditions.

Travel on unpaved roadways to access treatment areas would be direct sources of particulate matter in the form of fugitive dust. Emissions would be localized to the area surrounding the roadway and would cease when that activity ends and the entrained dust settles. It is not anticipated that localized increases in particulate matter would substantially increase levels of particulate matter, as described in the BLM *Vegetation Treatments Using Herbicides Final Programmatic EIS* (BLM, 2007a, pp. 4-7 and 4-8). Although there may be increased travel on unpaved roads due to additional treatment methods other than those analyzed, it is not anticipated to significantly increase emissions beyond levels in 2007 PEIS.

The outcomes of vegetation management in pinyon-juniper, sagebrush, and invasive annual grassland vegetation communities would alter fire regimes in the ways described in Section 3.9 (Issue 5. Effects of Treatments on Fire Management). This would have indirect impacts on air quality in the project area by lengthening the fire return interval, reducing available fuels during fire season, restoring natural burn patterns, and changing and reducing acres burned, thereby reducing annual wildfire-related emissions.

Design Features and Protective Measures in Section 2.1.5.4 Pile Burning, would avoid or minimize any potential adverse effects from burning. Furthermore, mitigation measures described in Appendix H. Standard Operating Procedures (SOPs) and Mitigation Measures for Applying Pesticides should reduce the air quality impact of herbicide application. Therefore, Air Quality is eliminated from in-depth analysis.

How would the project impact greenhouse gas (GHG) emissions and subsequently Climate Change?
Unlike criteria air pollutants and toxic air contaminants, which are of regional and local concern, GHGs are global pollutants. They have the ability to affect global temperatures due to their heat trapping ability and are therefore often discussed from a global perspective.

Greenhouse gas (GHG) emissions related to the proposed vegetation treatments would consist of combustion emissions from pile burning, fueled equipment, vehicles and aircraft. Emissions from this project are expected to remain well below thresholds requiring reporting or other regulation, and therefore are not expected to significantly increase climate impacts. The equipment, vehicles and aircraft that will be used for this project are general-purpose designs which are in regular use in the area.

Over the long term, any reduction in size of wildfires or total acres burned as an indirect result of restoration treatments would reduce or prevent additional carbon release and maintain the carbon sequestration ability of the vegetative community that, through such treatments, has gained improved structure and function. Potential climate impacts from vegetative treatments are analyzed in a programmatic EIS entitled *Final PEIS for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and*

Rimsulfuron on BLM Lands in 17 Western States (BLM, 2016a), Section 4-8. Smoke from wildfires is a biogenic source of GHG emissions, and wildfires can be exacerbated by certain invasive plants, such as cheatgrass and other annual grasses. Because many factors contribute to wildfire risk, it is not possible to quantify the contribution to net reductions in GHG emissions of the proposed herbicide treatments. However, the reduction in wildfire risk from successful vegetation treatments would be expected to have long-term beneficial effects over many years (BLM, 2016a). Given the relatively low amount of GHG emissions associated with herbicide treatments, and their role in larger BLM efforts to reduce the frequency, extent, and severity of wildfire, herbicide use is expected to not have a significant adverse effect on GHG emissions or climate change. Furthermore, some of the treatments are designed to reduce wildfire risk, and if successful may not represent a net long-term increase in GHG emissions. Therefore, GHG emissions and Climate Change are eliminated from in-depth analysis.

How would proposed vegetation treatments impact invasives and/or noxious weeds?
In the short-term vegetation treatments will cause unavoidable disturbances to the landscape. These disturbances will likely lead to the colonization of invasive and/or noxious weeds at the treatment sites. Annual meetings and annual monitoring of these treatment sites are required to help mitigate the colonization of invasive and noxious weeds. Selecting ecologically appropriate seeds will also help to reduce the colonization of invasive and noxious weeds as the treatment area transitions to a desirable ecological community (BLM, 2007a, pp. 4-47 and 4-48). In order to avoid or minimize any potential adverse effects from vegetation treatments on the spread or colonization of invasive and noxious weeds DFMPs were added in Section 2.1.5.1 (1, 3, 22, 23-28, 30), Section 2.5.1.4 (1, 2, 7) and Section 2.1.5.5 (1). In the long term the proposed action should greatly reduce the negative impacts of the proposed vegetation treatments on noxious and invasive weeds. Therefore, this issue is eliminated from further analysis.

How would proposed vegetation treatments impact Aquatic Species?
Wetland and riparian zones where aquatic species live make up less than 1% of the habitat acres located within the treatment areas. Impacts are addressed in required design features, stipulations, and required riparian buffers that limit treatments near riparian habitats. Buffer distances in the stipulations (DFPM 8, Section 2.1.5.1) dictate that treatments will remain outside of all stream channels, riparian areas, wetlands, and wet meadows, so there are no expected direct impacts to habitat for aquatic species. It would be expected that some treatments such as tree removal and fuels reductions in the uplands would provide indirect beneficial impacts to aquatic species habitat such as increased water availability and decreasing the likelihood of a riparian area burning during a wildfire. Soil erosion from upland sites can have short-term adverse impacts through sediment transport to wetland/riparian zones but those are addressed through Riparian and Soils DFPMs (DFPM 8, 9, 10, 11, 12, 27, 28, 29, Section 2.1.5.1) that minimize that sediment transport. All manufacturer labels will be followed for any herbicide use, including limiting use of any with aquatic impacts from wetland and riparian areas. Minimization measures designed reduce impacts to negligible for herbicide use in an aquatic environment are included in Appendix H from the two Final PEIS Vegetation Treatments (BLM, 2016a and BLM, 2007a). This leaves no potential for significant impacts. Therefore, this issue is eliminated from further analysis.

How would the project impact Forestry and woodland products?

The adoption of the proposed action would improve diversity of forest stand structure on the landscape by reducing overstory and/or understory densities to levels and patch sizes which would be more representative of conditions that were on the landscape prior to the 1900's. Most ladder fuels in treated areas would be reduced or removed, and in all but the most severe weather conditions, it is likely that wildfire behavior would create desirable fire effects in treated areas by burning on the surface with lower intensities with occasional tree torching.

Other vegetation settings such as meadows could be disturbed or trampled by operations, especially where PJ are targeted for removal or where trails or fueling sites are used. Following the General and Treatment specific DFPM's would greatly reduce the potential for resource damage. There are specific restrictions for riparian areas (DFPM 8, 9, 10, 11, 12, 27, 28, 29), which can be found in section 2.1.5 of this document. The treatments are designed to restore meadows and sagebrush steppe, so the overall effects of the treatments would be beneficial.

The treatments could create conditions that resemble pre-fire-suppression conditions, that is, sagebrush steppe and PJ woodlands would occur in the treated areas and be better represented on the landscape. Aspen and deciduous shrub stands would likely increase in size or vigor in the treated areas and improve landscape diversity. Insect and disease pests, and wildfire disturbances would occur in smaller patches in the treated areas, and with desirable microsite effects. The treatments could be effective for up to two decades.

The proposed action would benefit woodland products by increasing their availability to the public. The increased availability of fuelwood, posts, stays and the increase of native seed production (see Section 3.5.2.1 Conifer Reduction Treatments) would have long lasting benefits to the program. The provisions required by the CONTRACT FOR THE SALE OF VEGETATIVE RESOURCES (Form 5450-1) are designed to help reduce the impact from public and commercial collection of woodland products.

Impacts are mitigated in application of required design features, stipulations, and SOPs, including annual monitoring requirements, leaving no potential for significant impacts (see Section 2.1.5. and 2.1.7.). The treatments would benefit Forestry and woodland products, therefor it has been eliminated from further analysis.

How would proposed vegetation treatments impact Human Health and Safety?

Wildfires within the Elko District burn forests, grasslands, shrub steppe, riparian areas, and/or a combination of vegetation types and ecosystems. Wildfires frequently burn into and around rural communities causing severe damage, including loss of homes, buildings, pets, livestock, and human life. High amounts of vegetation (fuels) overgrown by fire suppression and other land use practices, leads to increased size of flame length, which equates to higher rates of spread and more acres burned by wildfire. High fuel loading also leads to increased fires from humans and natural causes and increased amounts of smoke emitted into the atmosphere. All the effects from high fuel loading can and does have impacts to human health and increases the chances of causing harm or death.

The reduction of fuels in areas with high fuel loading through vegetation treatments would protect human life and safety through the ability to extinguish wildfires before they become large and uncontrollable. Keeping fires small would reduce the amount of smoke in the atmosphere and would help people who suffer from lung and breathing issues. Fuels reductions would also decrease the likelihood of injuries to fire fighters during wildfire suppression activities. Recreationists would also be safer due to less smoke and the ability to vacate an area with more time due to slower rates of spread. Homeowners who live in the wildland areas of the Elko District would also have increased safety due to less fuel loading; fires would move slower and flame length would be decreased giving them more time to evacuate if needed.

The proposed treatments would increase the amount of human presence on the landscape during the treatment and monitoring phases. With increased human presence and the use of machinery, there is a chance that someone could be injured or killed. There is also a chance treatment projects could start fires, though unlikely due to timing of projects, spark arrestor requirements, and seasonal restrictions. If the Project Design Features and Protective Measures (DFPM's) listed in section 2.1.5.1 (1, 21, 25 - 36), the chance of someone getting hurt or killed during the treatment and monitoring phases would be minimal. The use of herbicide also increases the chance of human exposure to chemicals that may contain carcinogens or other harmful substances. If herbicide application practices are followed as listed in the DFPM's and Standard Operating Procedures (SOPs) in Sections 2.1.5, 2.1.5.1 (9, 22), and 2.1.5.2 (1-8), the risk to human health and safety would be minimal.

How would proposed vegetation treatments impact Lands/Realty?

ROW's are located within the areas proposed for treatment. In order to minimize conflicts, DFPM (Section 2.1.5.1, number 34) was added to notify Permittees and ROW holders, to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment. Due to the addition of this DFPM, this issue has been eliminated from detailed analysis.

How would the use of mechanized equipment impact mining claim monuments and other legal monuments?

Mining claim monuments are regulated by the State of Nevada and are considered a legal monument under Nevada Revised Statute (NRS) 517.030, in addition to other legal monuments such as survey monuments. A design and resource protection feature (Section 2.1.5.1, number 35 and 37) was added to the Proposed Action for mechanized equipment to avoid the removal, alteration or destruction of any legal monuments. Due to the addition of the design feature, this issue has been eliminated from detailed analysis.

How would proposed vegetation treatments impact Soils?
Dominant soil orders in the proposed study area are Inceptisols (minimal horizon development), Mollisols (deep, high organic matter, nutrient-enriched surface soil) and Aridisols (dry most of the year and limited leaching). Rainfall droplets can result in soil particle detachment on the bare ground surface which can result to erosion and sediment transport. Any type of DFPM that promotes a covering on a bare ground surface can be utilized to reduce the force of impact of rain droplets, and subsequently, reduce soil erosion and herbicide transport. Herbicide applications will eliminate weeds and expose new vegetation to sunlight and promote new growth which will reduce erosion and sediment transport. Potential impacts from herbicides and protection measures are also addressed in the *Final PEIS Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Lands in 17 Western States* (BLM, 2016a), which is incorporated by reference. Seeding, planting, and other vegetation treatments would promote new vegetative growth. Mechanical techniques of vegetation mastication and material spreading will cover the ground surface with a protective layer of litter, while mowing, firewood cutting and selective cutting will expose new vegetation to sunlight and promote new growth, reducing erosion and sediment transport. Pile burning will produce bare ground, but the resulting burned areas are relatively small in aerial extent and the ashes from the burn will provide nutrients for new growth. A stipulation of correctly following the manufacturer's instructions for herbicide application which come with the product when purchased, must be followed correctly for the elimination of herbicide transport in the natural environment. The proposed DFPMs in Section 2.1.5 and the Final PEISs for vegetation treatments would prevent or reduce erosion and sediment movement and promote regrowth of vegetation which restricts erosion and sediment movement; therefore, this issue is eliminated from further analysis.

How would proposed vegetation treatments impact Threatened or Endangered Species?
The only species listed as threatened or endangered under the Endangered Species Act within the treatments areas is the threatened Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*). No treatments will take place in or near Lahontan cutthroat (LCT) habitat. Given that no direct impacts will be present, some of the most likely impacts to LCT from treatments would be indirect effects from soil erosion causing increased sediment transport or shade reduction within riparian habitat due to tree removal in the uplands. These impacts are mitigated through use of appropriate use of buffer zones dependent on riparian stream type, listed in the Riparian DFPMs (DFPM 8, Section 2.1.5.1). The Biological Assessments for the Final PEIS Vegetation Treatments (BLM, 2016a and BLM, 2007a) analyzed impacts from herbicides and other treatments on listed aquatics species and determined that if the provided Mitigation Measures (Appendix H) are followed than impacts to LCT are not significant (BLM, 2007c, pp. 5-76). Therefore, this issue is eliminated from further analysis.

How would proposed vegetation treatments impact Water Quality (Surface/Ground)?
Using proposed DFPM actions in Section 2.1.5 (herbicide application, mechanical techniques, seeding and planting, and vegetation treatments), will assist in providing a vegetation ground cover, either as dead litter or as live growth, to reduce or eliminate bare ground surface area. A vegetation cover (dead or alive) on the ground surface allows a chance for water to infiltrate into the soil. Increased infiltration promotes regrowth and less surface runoff. Pile burning produces a bare ground surface but with the vegetation regrowth it would not remain a bare surface very long due to added nutrients and regrowth of vegetation. DFPMs which utilize herbicides either have herbicides attach to soil particles and transported to streams

and channels as soil erosion or be carried in solution. To reduce the environmental impacts of herbicides, following manufacturer's safety application instructions, stipulations, and required riparian buffers, treatments are shown to restrict the transport of chemicals and sediment into stream drainages by restricting erosion or leaching in the soil horizons. Restricting surface runoff and sediment transport reduces the potential for significant environmental impacts to water quality and has the possibility of enhancing water quality. Therefore, this issue is eliminated from further analysis.

How would proposed vegetation treatments impact Wetlands/Riparian?

Wetland and riparian zones make up less than 1% of the habitat acres located within the treatment areas. The majority of treatments will not take place within any riparian or wetland areas. Almost all of the proposed treatments will result in removal of vegetation, which has the potential for negative impacts in riparian and wetland areas. Buffer distances in the stipulations (DFPM 8, Section 2.1.5.1) dictate that treatments will remain outside of all stream channels, riparian areas, wetlands, and wet meadows, which minimizes impacts from vegetation removal via mechanical, chemical, or other described treatments. Short-term impacts may be present in the form of soil erosion and some removal of desired vegetation communities. Soil erosion from upland sites can have short-term adverse impacts through sediment transport to wetland/riparian zones but those are addressed through Riparian and Soils DFPMs (DFPM 8, 9, 10, 11, 12, 27, 28, 29 in Section 2.1.5.1) and minimize that sediment transport. It would be expected that some treatments outside of riparian areas such as tree removal and fuels reductions in the uplands would provide indirect beneficial impacts to riparian areas such as increased water availability and decreasing the likelihood of a riparian area burning during a wildfire. All manufacturer labels will be followed for any herbicide use, including limiting use of any with aquatic impacts from wetland and riparian areas. Minimization measures designed reduce impacts to negligible for herbicide use are included in Appendix H from the two Final PEIS Vegetation Treatments (BLM, 2016a; BLM, 2007a). This leaves no potential for significant impacts. Therefore, this issue is eliminated from further analysis.

C2.Resources Eliminated from Analysis and Rationale

Table 24. Resources Eliminated from Analysis and Rationale

Resources	Elimination Rationale
Access	Road or area closures or changes to public access are not proposed. Therefore, Access is eliminated from detailed analysis.
Environmental Justice (EJ)	EJ populations are present, however disproportionate negative impacts are not expected as the project is designed to improve the condition of public lands. Therefore, EJ is eliminated from detailed analysis.
Mining	Although existing and potential future mineral uses are present in the analysis area varying from oil and gas leases, exploration notices, mining plan of operations, mineral materials, and geothermal, none of the alternatives considered for this project would have an impact on any present or future mineral uses in the area. The lands would remain open to all mineral uses and active and ongoing mineral operations would not be impacted or interfered with due to a design and resource protection feature (Section 2.1.5.1, number 36). Therefore, this issue has been eliminated from detailed analysis.
Native American Concerns	Consultation with potentially affected Native American Tribes has been an on-going process throughout the life of the project. By and large, efforts to restore landscape and habitat are supported by local Tribes, and when presented at Tribal Council meetings work proposed under the PPA has not resulted in any immediate concerns or areas of specific issue. On an annual basis, additional outreach and information sharing will take place and site-specific or implementation-specific questions, concerns, or issues can be addressed at that time.
Recreation	Size of treatments is small enough that it would not substantively change recreational opportunity and no access would be changed. Long-term improvements to vegetation community would enhance the recreation experience.
Visual Resources	Visual resources already impacted by development; treatments would be less visually obtrusive, avoid visually sensitive areas (WSA, and California Trail, etc.) Class IV is prevalent throughout the O'Neil PPA.DFPM's are also included to mitigate any impacts to visual resources in Section 2.1.5.1 #2, and Section 2.1.5.3 #11.
Lands with Wilderness Characteristics (LWC)	Vegetation treatments would not impact naturalness of LWC units as per handbook 6310, The treatments would be temporary and not obtrusive to the casual observer.

Appendix D. Elko District BLM Special Status Species

Table 25. Elko District BLM Special Status Species.

GROUP	SCIENTIFIC NAME	COMMON NAME	STATUS
Amphibians (3)	*Anaxyrus boreas boreas*	boreal toad	BLM Sensitive
	Rana luteiventris	Columbia spotted frog	BLM Sensitive
	Rana pipiens	northern leopard frog	BLM Sensitive
Arachnids (1)	*Thermacarus nevadensis*	Nevada water mite	BLM Sensitive
Birds (23)	*Haliaeetus leucocephalus*	bald eagle	BLM Sensitive
	Leucosticte atrata	black rosy-finch	BLM Sensitive
	Spizella breweri	Brewer's sparrow	BLM Sensitive
	Tympanuchus phasianellus	Columbian sharp-tailed grouse	BLM Sensitive
	Buteo regalis	ferruginous hawk	BLM Sensitive
	Psiloscops flammeolus	flammulated owl	BLM Sensitive
	Aquila chrysaetos	golden eagle	BLM Sensitive
	Leucosticte tephrocotis	gray-crowned rosy-finch	BLM Sensitive
	Empidonax traillii adastus	Great Basin willow flycatcher	BLM Sensitive
	Centrocercus urophasianus	greater sage-grouse	BLM Sensitive
	Melanerpes lewis	Lewis's woodpecker	BLM Sensitive
	Lanius ludovicianus	loggerhead shrike	BLM Sensitive
	Numenius americanus	long-billed curlew	BLM Sensitive
	Oreortyx pictus	mountain quail	BLM Sensitive
	Accipiter gentilis	northern goshawk	BLM Sensitive
	Falco peregrinus	peregrine falcon	BLM Sensitive
	Gymnorhinus cyanocephalus	pinyon jay	BLM Sensitive
	Oreoscoptes montanus	sage thrasher	BLM Sensitive
	Antigone canadensis	Sandhill crane	BLM Sensitive
	Asio flammeus	short-eared owl	BLM Sensitive
	Buteo swainsoni	Swainson's hawk	BLM Sensitive
	Athene cunicularia hypugaea	western burrowing owl	BLM Sensitive
	Charadrius alexandrinus nivosus	western snowy plover	BLM Sensitive
Fish (10)	*Salvelinus confluentus*	bull trout (Jarbidge River Basin)	Threatened
	Rhinichthys osculus oligoporus	Clover Valley speckled dace	Endangered
	Rhinichthys osculus lethoporus	Independence Valley speckled dace	Endangered
	Gila bicolor isolata	Independence Valley tui chub	BLM Sensitive
	Oncorhynchus clarkii henshawi	Lahontan cutthroat trout	Threatened
	Prosopium williamsoni	mountain whitefish	BLM Sensitive
	Lepidomeda copei	northern leatherside chub	BLM Sensitive

GROUP	SCIENTIFIC NAME	COMMON NAME	STATUS
	Oncorhynchus mykiss gairdneri	redband trout, inland Columbia Basin	BLM Sensitive
	Relictus solitarius	relict dace	BLM Sensitive
	Oncorhynchus clarkii bouvieri	Yellowstone cutthroat trout	BLM Sensitive
Invertebrates (3)	*Euphilotes pallescens mattonii*	Mattoni's blue	BLM Sensitive
	Danaus plexippus	monarch butterfly	BLM Sensitive
	Limenitis archippus lahontani	Nevada viceroy	BLM Sensitive
Mammals (23)	*Sorex palustris*	American water shrew	BLM Sensitive
	Eptesicus fuscus	big brown bat	BLM Sensitive
	Ovis canadensis	bighorn sheep	BLM Sensitive
	Tadarida brasiliensis	Brazilian free-tailed bat	BLM Sensitive
	Myotis californicus	California myotis	BLM Sensitive
	Parastrellus hesperus	canyon bat	BLM Sensitive
	Microdipodops megacephalus	dark kangaroo mouse	BLM Sensitive
	Myotis thysanodes	fringed myotis	BLM Sensitive
	Lasiurus cinereus	hoary bat	BLM Sensitive
	Myotis lucifugus	little brown bat	BLM Sensitive
	Myotis evotis	long-eared myotis	BLM Sensitive
	Myotis volans	long-legged myotis	BLM Sensitive
	Sorex merriami	Merriam’s shrew	BLM Sensitive
	Lontra canadensis	northern river otter	BLM Sensitive
	Antrozous pallidus	pallid bat	BLM Sensitive
	Sorex preblei	Preble's shrew	BLM Sensitive
	Brachylagus idahoensis	pygmy rabbit	BLM Sensitive
	Lasionycteris noctivagans	silver-haired bat	BLM Sensitive
	Euderma maculatum	spotted bat	BLM Sensitive
	Corynorhinus townsendii	Townsend's big-eared bat	BLM Sensitive
	Lasiurus blossevillii	western red bat	BLM Sensitive
	Myotis ciliolabrum	western small-footed myotis	BLM Sensitive
	Myotis yumanensis	Yuma myotis	BLM Sensitive
Mollusks (8)	*Anodonta californiensis*	California floater	BLM Sensitive
	Oreohelix laisae	Goshute Mountain snail	BLM Sensitive
	Pyrgulopsis humboldtensis	Humboldt pyrg	BLM Sensitive
	Pyrgulopsis sadai	Sada’s pyrg	BLM Sensitive
	Pyrgulopsis vinyardi	Vinyards pyrg	BLM Sensitive
	Pyrgulopsis bryantwalkeri	Cortez hills pebblesnail	Elko BLM Sensitive

GROUP	SCIENTIFIC NAME	COMMON NAME	STATUS
	Margratifera falcata	Western pearlshell	Elko BLM Sensitive
	Gonidea angulata	western ridged mussel	BLM Sensitive
Reptiles (5)	*Phrynosoma platyrhinos*	desert horned lizard	BLM Sensitive
	Crotaphytus bicinctores	Great Basin collared lizard	BLM Sensitive
	Phrynosoma hernandesi	greater short-horned lizard	BLM Sensitive
	Gambelia wislizenii	long-nosed leopard lizard	BLM Sensitive
	Charina bottae	northern rubber boa	BLM Sensitive
Plants (21)	*Collomia renacta*	Barren Valley collomia	BLM Sensitive
	Eriogonum rosense var. *beatleyae*	Beatley buckwheat	BLM Sensitive
	Erigeron latus	broad fleabane	BLM Sensitive
	Potentilla cottamii	Cottam cinquefoil	BLM Sensitive
	Lepidium davisii	Davis peppergrass	BLM Sensitive
	Eriogonum nutans var. *glabratum*	Deeth buckwheat	BLM Sensitive
	Boechera falcifructa	Elko rockcress	BLM Sensitive
	Atragalus anserinus	Goose Creek milkvetch	BLM Sensitive
	Lathyrus grimesii	Grimes vetchling	BLM Sensitive
	Ivesia rhypara rhypara	grimy mousetails	BLM Sensitive
	Penstemon idahoensis	Idaho beardtongue	BLM Sensitive
	Phacelia minutissima	least phacelia	BLM Sensitive
	Eriogonum lewisii	Lewis buckwheat	BLM Sensitive
	Antennaria arcuata	meadow pussytoes	BLM Sensitive
	Silene nachlingerae	Nachlinger catchfly	BLM Sensitive
	Ranunculus triternatus	obscure buttercup	BLM Sensitive
	Astragalus calycosus monophyllidus	one-leaflet Torrey milkvetch	BLM Sensitive
	Leptodactylon glabrum	Owyhee prickly phlox	BLM Sensitive
	Viola lithion	rock violet	BLM Sensitive
	Mentzelia tiehmii	Tiehm blazingstar	BLM Sensitive
	Pinus albicaulis	whitebark pine	BLM Sensitive

Appendix E. Wildlife Species That May Occur in Northeastern Nevada

Birds

Order: *Gaviiformes* (Diver/Swimmers)

Family: *Gaviidae* (Loons)

Common Loon	*Gavia immer*

Order: *Podicipediformes* (Flat-toed Divers)

Family: *Podicipedidae* (Grebes)

Pied-billed Grebe	*Podilymbus podiceps*
Horned Grebe	*Podiceps auritus*
Eared Grebe	*Podiceps nigricollis*
Western Grebe	*Aechmophorus occidentalis*
Clark's Grebe	*Aechmophorus clarkii*

Order: *Pelecaniformes* (Four-toed Fisheaters)

Family: *Pelecanidae* (Pelicans)

American White Pelican	*Pelecanus erythrorhynchos*

Family: *Phalacrocoracidae* (Cormorants)

Double-crested Cormorant	*Phalacrocorax auritus*

Order: *Ciconiiformes* (Long-legged Waders)

Family: *Ardeidae* (Bitterns, Herons, Egrets)

American Bittern	*Botaurus lentiginosus*
Least Bittern	*Ixobrychus exilis*
Great Blue Heron	*Ardea herodias*
Great Egret	*Ardea alba*
Snowy Egret	*Egretta thula*
Cattle Egret	*Bubulcus ibis*
Green Heron	*Butorides virescens*
Black-crowned Night Heron	*Nycticorax nycticorax*

Family: *Threskiornithidae* (Ibises)

White-faced Ibis	*Plegadis chihi*

Family: *Cathartidae* (New World Vultures)

Turkey Vulture	*Cathartes aura*
California Condor	*Gymnogyps californianus(loc.ex)*

Order: *Anseriformes* (Waterfowl)

Family: *Anatidae* (Ducks, Geese, Swans)

Greater White-fronted Goose	*Anser albifrons*
Snow Goose	*Chen caerulescens*
Canada Goose	*Branta canadensis*
Tundra Swan	*Cygnus columbianus*
Trumpeter Swan	*Cygnus buccinator*
Wood Duck	*Aix sponsa*
Gadwall	*Anus strepera*
American Widgeon	*Anus americana*
Mallard	*Anus platyrhynchos*
Blue-winged Teal	*Anas discors*
Cinnamon Teal	*Anas cyanoptera*
Northern Shoveler	*Anas clypeata*
Northern Pintail	*Anas acuta*
Green-winged Teal	*Anas crecca*
Canvasback	*Aythya valisinaria*
Redhead	*Aythya americana*
Ring-necked Duck	*Aythya collaris*
Lesser Scaup	*Aythya affinis*
Bufflehead	*Bucephala albeola*
Common Goldeneye	*Bucephala clangula*
Barrow's Goldeneye	*Bucephala islandica*
Hooded Merganser	*Lophodytes cucullatus*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
Ruddy Duck	*Oxyura jamaicensis*

Order: *Falconiformes* (Diurnal Flesh Eaters)

Family: *Accipitridae* (Hawks, Eagles, Osprey)

Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaeetus leucocephalus*
Northern Harrier	*Circus cyaneus*
Sharp-shinned Hawk	*Accipiter striatus*
Cooper's Hawk	*Accipiter cooperii*
Northern Goshawk	*Accipiter gentilis*
Red-shouldered Hawk	*Buteo lineatus*
Broad-winged Hawk	*Buteo platypterus*
Swainson's Hawk	*Buteo swainsoni*
Red-tailed Hawk	*Buteo jamaicensis*
Ferruginous Hawk	*Buteo regalis*
Rough-legged Hawk	*Buteo lagopus*
Golden Eagle	*Aquila chrysaetos*

Family: *Falconidae* (Falcons)

American Kestrel	*Falco sparverius*
Merlin	*Falco columbarius*
Gyrfalcon	*Falco rusticolus*
American Peregrine Falcon	*Falco peregrinus*
Prairie Falcon	*Falco mexicanus*

Order: *Galliformes* (Chicken Relatives)

Family: *Phasianidae* (Grouse, Partridge)

Chukar	*Alectoris chukar*
Himalayan Snowcock	*Tetraogallus himalayensis*
Gray Partridge	*Perdix perdix*
Ruffed Grouse	*Bonasa umbellus*
Greater Sage-Grouse	*Centrocercus urophasianus*
Blue Grouse	*Dendragapus obscurus*
C. Sharp-tailed Grouse	*Tympanuchus phasianellus columbianus*
Wild Turkey	*Meleagris gallopavo*

Family: *Odontophoridae* (New World Quail)

California Quail	*Callipepla californica*
Mountain Quail	*Oreortyx pictus*

Order: *Gruiformes* (Cranes and Allies)

Family: *Rallidae* (Rails, Coots)

Virginia Rail	*Rallus limicola*
Sora	*Porzana carolina*
Common Moorhen	*Gallinula chloropus*
American Coot	*Fulica americana*

Family: *Gruidae* (Cranes)

Greater Sandhill Crane	*Grus canadansis tabida*

Order: *Charadriiformes* (Wading Birds)

Family: *Charadriidae* (Plovers)

Black-bellied Plover	*Pluvialis squatarola*
Snowy Plover	*Charadrius alexandrinus*
Semi-palmated Plover	*Charadrius semipalmatus*

Killdeer	*Charadrius vociferus*
Mountain Plover	*Charadrius montanus*

Family: *Recurvirostridae* (Avocets)

Black-necked Stilt	*Himantopus mexicanus*
American Avocet	*Recurvirostra americana*

Family: *Scolopacidae* (Sandpipers, Phalaropes)

Greater Yellowlegs	*Tringa melanoleuca*
Lesser Yellowlegs	*Tringa flavipes*
Solitary Sandpiper	*Tringa solitaria*
Willet	*Catoptrophorus semipalmatus*
Spotted Sandpiper	*Actitus macularia*
Long-billed Curlew	*Numenius americanus*
Marbled Godwit	*Limosa fedoa*
Western Sandpiper	*Calidris mauri*
Least Sandpiper	*Calidris minutilla*
Baird's Sandpiper	*Calidris bairdii*
Long-billed Dowitcher	*Limnodromnus scolopaceus*
Wilson's Snipe	*Gallinago delicata*
Wilson's Phalarope	*Phalaropus tricolor*
Red-necked Phalarope	*Phalaropus lobatus*

Family: *Laridae* (Gulls, Terns)

Franklin's Gull	*Larus pipixcan*
Bonaparte's Gull	*Larus philadelphia*
Ring-billed Gull	*Larus delawarensis*
California Gull	*Larus californicus*
Herring Gull	*Larus argentatus*
Caspian Tern	*Sterna caspia*
Forster's Tern	*Sterna forsteri*
Black Tern	*Chlidonias niger*

Order: *Columbiformes* (Pigeons and Allies)

Family: *Columbidae* (Doves)

Rock Dove	*Columba livia*
White-winged Dove	*Zenaida asiatica*
Mourning Dove	*Zenaida macroura*
Eurasian Collared Dove	*Streptopelia decaocto*

Order: *Cuculiformes* (Cuckoos and Allies)

Family: *Cuculidae* (Cuckoos andRoadrunners)

Yellow-billed Cuckoo	*Coccyzus americanus*
Greater Roadrunner	*Geococcyx californianus*

Order: *Strigiformes* (Nocturnal Flesh Eaters)

Family: *Tytonidae* (Barn Owls)

Barn Owl	*Tyto alba*

Family: *Strigidae* (Owls)

Flammulated Owl	*Otus flammeolus*
Western Screech-Owl	*Megascops kennicottii*
Great Horned Owl	*Bubo virginianus*
Burrowing Owl	*Athene cunicularia*
Long-eared Owl	*Asio otus*
Short-eared Owl	*Asio flammeus*
Northern Saw-whet Owl	*Aegolius acadicus*
Northern Pygmy-Owl	*Glaucidium gnoma*

Order: *Caprimulgiformes* (Night Jars)

Family: *Caprimulgidae* (Goatsuckers)

Common Nighthawk	*Chordeiles minor*
Common Poorwill	*Phalaenoptilus nuttallii*

Order: *Apodiformes* (Small Fast Fliers)

Family: *Apodidae* (Swifts)

White-throated Swift	*Aeronautes saxatalis*

Family: *Trochilidae* (Hummingbirds)

Black-chinned Hummingbird	*Archilochus alexandri*
Calliope Hummingbird	*Stellula calliope*
Broad-tailed Hummingbird	*Selasphorus platycercus*
Rufous Hummingbird	*Selasphorus rufus*

Order: *Coraciiformes* (Cavity Nesters)

Family: *Alcedinidae* (Kingfishers)

Belted Kingfisher	*Ceryle alcyon*

Order: *Piciformes* (Cavity Builders)

Family: *Picidae* (Woodpeckers)

Lewis' Woodpecker	*Melanerpes lewis*
Williamson's Sapsucker	*Sphyrapicus thyroideus*
Red-naped Sapsucker	*Sphyrapicus nuchalis*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Three-toed Woodpecker	*Picoides tridactylus*
Northern Flicker	*Colaptes auratus*

Order: *Passeriformes* (Perching Birds)

Family: *Tyrannidae* (Flycatchers)

Olive-sided Flycatcher	*Contopus cooperi*
Western Wood-Pewee	*Contopus sordidulus*
Willow Flycatcher	*Epidonax traillii*
Hammond's Flycatcher	*Epidonax hammondii*
Gray Flycatcher	*Epidonax wrightii*
Dusky Flycatcher	*Epidonax oberholseri*
Cordilleran Flycatcher	*Epidonax occidentalis*
Black Phoebe	*Sayornis nigricans*
Say's Phoebe	*Sayornis saya*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Western Kingbird	*Tyrannus verticalis*
Eastern Kingbird	*Tyrannus tyrannus*

Family: *Laniidae* (Shrikes)

Loggerhead Shrike	*Lanius ludovicianus*
Northern Shrike	*Lanius excubitor*

Family: *Vireonidae* (Vireos)

Plumbeous Vireo	*Vireo plumbeus*
Warbling Vireo	*Vireo gilvus*

Family: *Corvidae* (Jays)

Western Scrub-Jay	*Aphelocoma californica*
Pinyon Jay	*Gymnorhinus cyanocephalus*
Clark's Nutcracker	*Nucifraga columbiana*
Black-billed Magpie	*Pica pica*
American Crow	*Corvus brachyrhynchos*
Common Raven	*Corvus corax*

Family: *Alaudidae* (Larks)

Horned Lark	*Eremophila alpestris*

Family: *Hirundinidae* (Swallows)

Tree Swallow	*Tachycineta bicolor*
Violet-green Swallow	*Tachycineta thalassina*
Bank Swallow	*Riparia riparia*
N. Rough-winged Swallow	*Stelgidopteryx serripennis*
Cliff Swallow	*Petrochelidon pyrrhonota*

Barn Swallow	*Hirundo rustica*
Family: *Paridae* (Chickadees, Titmice)	
Black-capped Chickadee	*Poecile atricapillus*
Mountain Chickadee	*Poecile gambeli*
Juniper Titmouse	*Baeolophus griseus*
Family: *Aegithalidae* (Bushtits)	
Bushtit	*Psaltriparus minimus*
Family: *Sittidae* (Nuthatches)	
Red-breasted Nuthatch	*Sitta canadensis*
White-breasted Nuthatch	*Sitta carolinensis*
Pygmy Nuthatch	*Sitta pygmaea*
Family: *Certhiidae* (Creepers)	
Brown Creeper	*Certhia americana*
Family: *Troglodytidae* (Wrens)	
Rock Wren	*Salpinctes obsoletus*
Canyon Wren	*Catherpes mexicanus*
Bewick's Wren	*Thyromanes bewickii*
House Wren	*Troglodytes aedon*
Winter Wren	*Troglodytes troglodytes*
Marsh Wren	*Cistothorus palustris*
Family: *Cinclidae* (Dippers)	
American Dipper	*Cinclus mexicanus*
Family: *Regulidae* (Kinglets)	
Golden-crowned Kinglet	*Regulus satrapa*
Ruby-crowned Kinglet	*Redulus calendula*
Family: *Sylviidae* (Gnatcatchers)	
Blue-gray Gnatcatcher	*Polioptila caerulea*
Family: *Turdidae* (Thrushes)	
Western Bluebird	*Sialia mexicana*
Mountain Bluebird	*Sialia currucoides*
Townsend's Solitaire	*Myadestes townsendi*
Veery	*Catharus fuscescens*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
Family: *Turdidae* (Thrushes) (continued)	
American Robin	*Turdus migratorius*
Varied Thrush	*Ixoreus naevius*
Family: *Mimidae* (Thrashers, Mockingbirds)	
Northern Mockingbird	*Mimus polyglottos*
Sage Thrasher	*Oreoscoptes montanus*
Family: *Sturnidae* (Starlings)	
European Starling	*Sturnus vulgaris*
Family: *Motacillidae* (Pipits)	
American Pipit	*Anthus rubescens*
Family: *Bombycillidae* (Waxwings)	
Bohemian Waxwing	*Bombycilla garrulus*
Cedar Waxwing	*Bombycilla cedrorum*
Family: *Parulidae* (Wood-Warblers)	
Orange-crowned Warbler	*Vermivora celata*
Nashville Warbler	*Vermivora ruficapilla*
Virginia's Warbler	*Vermivora virginae*
Yellow Warbler	*Dendroica petechia*
Yellow-rumped Warbler	*Dendroica coronata*
Black-throated Gray Warbler	*Dendroica nigrescens*
Townsend's Warbler	*Dendroica townsendi*
MacGillivray's Warbler	*Oporornis tolmiei*
Common Yellowthroat	*Geothlypis trichas*
Wilson's Warbler	*Wilsonia pusilla*
Yellow-breasted Chat	*Icteria virens*
Family: *Thraupidae* (Tanagers)	
Western Tanager	*Piranga ludoviciana*
Family: *Emberizidae* (Sparrows, Towhees, Juncos)	
Green-tailed Towhee	*Pipilo chlorurus*
Spotted Towhee	*Pipilo maculatus*
American Tree Sparrow	*Spizella arborea*
Chipping Sparrow	*Spizella passerina*
Brewer's Sparrow	*Spizella breweri*
Vesper Sparrow	*Pooecetes gramineus*
Lark Sparrow	*Chondestes grammacus*
Black-throated Sparrow	*Amphispiza bileneata*
Sage Sparrow	*Amphispiza belli*
Savannah Sparrow	*Passerculus sandwichensis*
Grasshopper Sparrow	*Ammodramus bairdii*
Fox Sparrow	*Passerella iliaca schistacea*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
White-throated Sparrow	*Zonotrichia albicollis*
Harris's Sparrow	*Zonotrichia querula*
Gambel'sWhite-crownedSparrow	*Zonotrichia leucophrys gambelii*
Mountain W-crowned Sparrow	*Zonotrichia leucophrys oriantha*
Golden-crowned Sparrow	*Zonotrichia atricapilla*
Dark-eyed Junco*(Oregon)*	*Junco hyemalis therburi*
Dark-eyed Junco(*Gray-headed*)	*Junco hyemalis caniceps*
Lapland Longspur	*Calcarius lapponicus*
Family: *Cardinalidae* (Grosbeaks, Buntings)	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Blue Grosbeak	I*raca caerulea*
Lazuli Bunting	*Passerina amoena*
Indigo Bunting	*Passerina cyanea*
Family: *Icteridae* (Blackbirds, Orioles)	
Bobolink	*Dolichonyx oryzivorus*
Red-winged Blackbird	*Agelaius phoeniceus*
Western Meadowlark	*Sturnella neglecta*
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
Brewer's Blackbird	*Euphagus cyanocephalus*
Great-tailed Grackle	*Quiscalus mexicanus*
Brown-headed Cowbird	*Molothrus ater*
Family: *Icteridae* (Blackbirds, Orioles continued)	
Bullock's Oriole	*Icterus bullockii*
Scott's Oriole	*Icterus parisorum*
Family: *Fringillidae* (Finches, Grosbeaks)	
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*
Black Rosy-Finch	*Leucosticte atrata*
Pine Grosbeak	*Pinicola enucleator*
Purple Finch	*Carpodacus purpureus*
Cassin's Finch	*Carpodacus cassinii*
House Finch	*Carpodacus mexicanus*
Red Crossbill	*Loxia curvirostra*
Common Redpoll	*Carduelis flammea*
Pine Siskin	*Carduelis pinus*
Lesser Goldfinch	*Carduelis psaltria*
American Goldfinch	*Carduelis tristis*
Evening Grosbeak	*Coccothraustes vespertinus*
Family: *Passeridae* (Old World Sparrows)	
House Sparrow	*Passer domesticus*

Mammals

Order: *Insectivora* (Insect Eaters)

Family: *Soricidae* (Shrews)

Merriam's Shrew	*Sorex meriammi*
Dusky Shrew	*Sorex monticolus*
Vagrant Shrew	*Sorex vagrans*
Water Shrew	*Sorex palustris*
Preble's Shrew	*Sorex preblei*

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Plainnose Bats)

California Myotis	*Myotis californicus*
Small-footed Myotis	*Myotis ciliolabrum*
Long-eared Myotis	*Myotis evotis*
Little Brown Bat	*Myotis lucifugus*
Fringed Myotis	*Myotis thysanodes*
Long-legged Myotis	*Myotis volans*
Yuma Myotis	*Myotis yumanensis*
Western Red Bat	*Lasiurus blossvellii*
Hoary Bat	*Lasiurus cinereus*
Silver-haired Bat	*Lasionycteris noctivagans*
Western Pipistrelle	*Pipistrellus hesperus*
Big Brown Bat	*Eptesicus fuscus*
Townsend's Big-eared Bat	*Corynorhinus townsendii*
Spotted Bat	*Euderma maculata*
Pallid Bat	*Antrozous pallidus*

Family: *Molossidae* (Freetail Bats)

Brazilian Free-tailed Bat	*Tadarida brasiliensis*

Order: *Lagomorpha* (Pikas, Hares, Rabbits)

Family: Ochotonidae (Pikas)

Pika	*Ochotona princeps*

Family: *Leporidae* (Hares, Rabbits)

White-tailed Jackrabbit	*Lepus townsendi*
Snowshoe Hare	*Lepus americanus*
Black-tailed Jackrabbit	*Lepus californicus*
Mountain Cottontail	*Sylvilagus nuttalli*
Pygmy Rabbit	*Brachylagus idahoensis*

Order: *Rodentia* (Rodents)

Family: *Sciuridae* (Squirrels)

Least Chipmunk	*Tamias minimus*
Cliff Chipmunk	*Tamias dorsalis*
Uinta Chipmunk	*Tamias umbrinus*
Yellow-bellied Marmot	*Marmota flaviventris*
White-tailed Antelope Squirrel	*Ammospermophilus leucurus*
Townsend Ground Squirrel	*Spermophilus townsendii*
Belding Ground Squirrel	*Spermophilus beldingi*

Family: *Geomyidae* (Gophers)

Botta's Pocket Gopher	*Thomomys bottae*
Northern Pocket Gopher	*Thomomys talpoides*
Southern Pocket Gopher	*Thomomys umbrinus*

Family: *Heteromyidae* (Kangaroo Rodents)

Little Pocket Mouse	*Perognathus longimembris*
Great Basin Pocket Mouse	*Perognathus parvus*
Dark Kangaroo Mouse	*Microdipodops megacephalus*
Ord Kangaroo Rat	*Dipodomys ordii*
Chisel-toothed Kangaroo Rat	*Dipodomys microps*

Family: *Castoridae* (Beavers)

Beaver	*Castor canadensis*

Family: *Cricetidae* (Mice, Rats, Voles)

Western Harvest Mouse	*Reithrodontomys megalotis*
Canyon Mouse	*Peromyscus crinitus*
Deer Mouse	*Peromyscus maniculatus*
Pinyon Mouse	*Peromyscus truei*
Northern Grasshopper Mouse	*Onychomys leucogaster*
Desert Woodrat	*Neotoma lepida*
Bushy-tailed Woodrat	*Neotoma cinerea*
Mountain Vole	*Microtus montanus*
Long-tailed Vole	*Microtus longicaudus*
Sagebrush Vole	*Lemmiscus curtatus*
Muskrat	*Ondatra zibethica*

Family: *Zapodidae* (Jumping Mice)

Western Jumping Mouse	*Zapus princeps*

Family: *Erethizontidae* (New World Porcupines)

Porcupine	*Erethizon dorsatum*

Order: *Carnivora* (Flesh-Eaters)

Family: *Canidae* (Dogs, Wolves, Foxes)

Coyote	*Canis latrans*
Gray Wolf	*Canis lupus* (*locally extirpated*)
Gray Fox	*Urocyon cinereoargenteus*
Kit Fox	*Vulpes macrotus*
Red Fox	*Vulpes vulpes*

Family: *Procyonidae* (Racoons and Allies)

Raccoon	*Procyon lotor*

Family: *Mustelidae* (Weasels and Allies)

Short-tailed Weasel	*Mustela erminae*
Long-tailed Weasel	*Mustela frenata*

Family: *Mustelidae* (Weasels and Allies) (cont.)

Mink	*Mustela vison*
American Marten	*Martes americana (l. extirpated)*
Wolverine	*Gulo gulo (locally extirpated)*
River Otter	*Lutra canadensis*
American Badger	*Taxidea taxus*
Striped Skunk	*Mephitis mephitis*
Western Spotted Skunk	*Spilogale gracilis*

Family: *Felidae* (Cats)

Mountain Lion	*Felix concolor*
Lynx	*Lynx lynx (locally extirpated)*
Bobcat	*Lynx rufus*

Order: *Artiodactyla* (Hoofed Mammals)

Family: *Cervidae* (Deer)

Rocky Mountain Elk	*Cervus canadensis*
Mule Deer	*Odocoileus hemionus*

Family: *Antilocapridae* (Pronghorn)

Pronghorn	*Antilocapra americana*

Family: *Bovidae* (Bison, Sheep, Goats)

Bison	*Bison bison (locally extirpated)*
Mountain Goat	*Oreamnos americanus*
Bighorn Sheep	*Ovis canadensis*

Reptiles

Order: *Squamata* (Lizards, Snakes)

Family: *Iguanidae* (Iguanas and Allies)

Western Fence Lizard	*Sceloporus occidentalis*
Sagebrush Lizard	*Sceloporus graciosus*
Side-blotched Lizard	*Uta stansburiana*
Pigmy Short-horned Lizard	*Phrynosoma douglassii*
Greater Short-horned Lizard	*Phrynosoma hernadesi*
Desert Horned Lizard	*Phrynosoma platyrhinos*

Family: *Scincidae* (Skinks)

Western Skink	*Eumeces skiltonianus*

Family: *Teiidae* (Whiptails)

Western Whiptail	*Cnemidophorus tigrus*

Family: *Boidae* (Boas, Pythons)

Rubber Boa	*Charina bottae*

Family: *Colubridae* (Solid-toothed Snakes)

Ringneck Snake	*Diadophis punctatus*
Striped Whipsnake	*Masticophis taeniatus*
Great Basin Gopher Snake	*Pituophis cantenifer deserticola*
Common Kingsnake	*Lampropeltis getulus*
Sonoran Mountain Kingsnake	*Lampropeltis pyromelana*
Long-nosed Snake	*Rhinocheilus lecontei*
Western Terrestrial Garter	*Thamnophis elegans*
Ground Snake	*Sonora semiannulata*
Night Snake	*Hypsiglena torquata*

Family: *Viperidae* (Vipers)

Great Basin Rattlesnake	*Crotalus viridis lutosus*

Amphibians

Order: *Anura* (Frogs and Toads)

Family: *Pelobatidae* (Spadefoots)

Great Basin Spadefoot Toad	*Scaphiopus intermontanus*

Family: *Ranidae* (True Frogs)

Columbia Spotted Frog	*Rana luteiventris*
Northern Leopard Frog	*Rana pipiens*
Bullfrog	*Rana catesbeiana*

Family: *Bufonidae* (Toads)

Western Toad	*Bufo boreas*

Family: *Hylidae* (Treefrogs)

Pacific Treefrog	*Hyla regilla*

Note: This list is a combination of wildlife sight record data and our best effort to predict what wildlife species live in this area in all seasons and under optimum habitat conditions.

*With the exception of the European Starling, House Sparrow, Eurasian Collared Dove, and Rock Dove, all birds are protected in Nevada by either the International Migratory Bird Treaty Act or as game species. Several mammal and one amphibian species are also protected as game species.
Updated: 4/2005 - Peter V. Bradley - Nevada Department of Wildlife - Elko, Nevada.

Appendix F. Elko District List of Noxious Weeds and Non-Native Species

Table 26. Elko District List of Noxious Weeds and Non-Native Species.

Common Name	Scientific Name	Plant Family	Noxious Weed Classification[1]	Growth Form	Duration/ Life Cycle[2]	Present in Elko District BLM[3]
Absinth wormwood	*Artemisia absinthium*	Asteraceae (Sunflower)	NL	Broadleaf/Sub-Shrub	P	No
African (Asian) mustard	*Brassica tournefortii*	Brassicaceae (Mustard)	B	Broadleaf	A	No
African mustard	*Strigosella africana* (formerly *Malcolmia africana)*	Brassicaceae (Mustard)	NL	Broadleaf	A	Yes
African rue	*Peganum harmala*	Nitrariaceae (Nitaria)	A	Broadleaf	CP	No
Annual kochia	*Bassia scoparia*	Chenopodiacease (Goosefoot)	NL	Broadleaf	A	Yes
Austrian fieldcress	*Rorippa austriaca*	Brassicaceae (Mustard)	A	Broadleaf	CP	Yes
Barbed goatgrass	*Aegilops triuncialis*	Poaceae (Grass)	A	Grass	A	No
Barnyard grass	*Echinochloa crus-galli*	Poaceae (Grass)	NL	Grass	A	Yes
Black henbane	*Hyoscyamus niger*	Solonaceae (Nightshade)	B	Broadleaf	A, B	Yes
Blue mustard	*Chorispora tenella*	Brassicaceae (Mustard)	NL	Broadleaf	A	Yes
Bouncing bet	*Saponaria officinalis*	Caryophyllaceae (Pink)	NL	Broadleaf	CP	Yes
Brome fescue	*Vulpia bromoides*	Poaceae (Grass)	NL	Grass	A	Yes
Buffalobur	*Solanum rostratum*	Solonaceae (Nightshade)	NL	Broadleaf	A	No
Bufflegrass	*Pennisetum ciliare*	Poaceae (Grass)	A	Grass	CP	No
Bulbous barley	*Hordeum murinum*	Poaceae (Grass)	NL	Grass	A	Yes
Bull thistle	*Cirsium vulgare*	Asteraceae (Sunflower)	NL	Broadleaf	A, B, SLP	Yes
Bur buttercup	*Ceratocephala testiculata*	Ranunculaceae (Buttercup)	NL	Broadleaf	A	Yes

Common Name	Scientific Name	Plant Family	Noxious Weed Classification[1]	Growth Form	Duration/ Life Cycle[2]	Present in Elko District BLM[3]
Camelthorn	*Alhagi maurorum*	Fabaceae (Pea)	A	Broadleaf	CP	No
Canada thistle	*Cirsium arvense*	Asteraceae (Sunflower)	C	Broadleaf	CP	Yes
Caucasion bluestem	*Bothriochloa bladhii*	Poaceae (Grass)	NL	Grass	P	No
Cheatgrass	*Bromus tectorum*	Poaceae (Grass)	NL	Grass	A	Yes
Clasping pepperweed	*Lepidium perfoliatum*	Brassicaceae (Mustard)	NL	Broadleaf	A, B	Yes
Common burdock	*Arctium minus*	Asteraceae (Sunflower)	NL	Broadleaf	B	Yes
Common crupina	*Crupina vulgaris*	Asteraceae (Sunflower)	A	Broadleaf	A	No
Common mullein	*Verbascum thapsus*	Scrophulariaceae (Figwort)	NL	Broadleaf	A, B, SLP	Yes
Common St. Johnwort	*Hypericum perforatum*	Hypericaceae (St. John's Wort)	A	Broadleaf	CP	Yes
Common tansy	*Tanacetum vulgare*	Asteraceae (Sunflower)	NL	Broadleaf	CP	Yes
Common teasel	*Dipsacus fullonum*	Dipsacaceae (Teasel)	NL	Broadleaf	B, SLP	Yes
Creeping bentgrass	*Agrostis stolonifera*	Poaceae (Grass)	NL	Grass	CP	Yes
Crimson fountain grass	*Pennisetum setaceum*	Poaceae (Grass)	A	Grass	P	No
Curly dock	*Rumex crispus*	Polygonaceace (Buckwheat)	NL	Broadleaf	P	Yes
Curlyleaf pondweed	*Potamogeton crispus*	Potamogetonaceae (Pondweed)	A	Broadleaf	Perennial, submerged aquatic	Yes
Cutleaf teasel	*Dipsacus laciniatus*	Dipsacaceae (Teasel)	NL	Broadleaf	B	No
Cutleaf vipergrass	*Scorzonera laciniata*	Asteraceae (Sunflower)	NL	Broadleaf	P	Yes
Dalmation toadflax	*Linaria dalmatica*	Plantaginaceae (Plantain)	B	Broadleaf	CP	Yes
Dame's rocket	*Hesperis matronalis*	Brassicaceae (Mustard)	NL	Broadleaf	B, P	No

Common Name	Scientific Name	Plant Family	Noxious Weed Classification[1]	Growth Form	Duration/ Life Cycle[2]	Present in Elko District BLM[3]
Dense silkybent	*Apera interrupta*	Poaceae (Grass)	NL	Grass	A	Yes
Desert knapweed	*Volutaria tubuliflora*	Asteraceae (Sunflower)	A	Broadleaf	A	No
Diffuse knapweed	*Centaurea diffusa*	Asteraceae (Sunflower)	B	Broadleaf	A, B, SLP	Yes
Dyer's woad	*Isatis tinctoria*	Brassicaceae (Mustard)	A	Broadleaf	A, B, SLP	Yes
Eurasian watermilfoil	*Myriophyllum spicatum*	Halorgaceae (Watermilfoil)	A	Broadleaf	Perennial, submerged aquatic	No
False annual wheatgrass	*Eremopyrum triticeum*	Poaceae (Grass)	NL	Grass	A	Yes
Field bindweed	*Convolvulus arvensis*	Convolvulaceae (Morning-glories)	NL	Broadleaf	CP	Yes
Field brome	*Bromus arvensis*	Poaceae (Grass)	NL	Grass	A	Yes
Field pennycress	*Thlaspi arvense*	Brassicaceae (Mustard)	NL	Broadleaf	A	Yes
Field scabious	*Knautia arvensis*	Caprifoliaceae (Honeysuckle)	NL	Broadleaf	P	No
Flixweed	*Descurainia sophia*	Brassicaceae (Mustard)	NL	Broadleaf	A, B	Yes
Flowering rush	*Butomus umbellatus*	Butomaceae (Flowering-rush)	A	Grass	P	No
Giant reed	*Arundo donax*	Poaceae (Grass)	B	Grass	CP	No
Giant salvinia	*Salvinia molesta*	Salvineaceae (Floating fern)	A	Broadleaf	Perennial, floating aquatic	No
Goatsrue	*Galega officinalis*	Fabaceae (Pea)	A	Broadleaf	P	No
Hairy whitetop	*Cardaria pubescens*	Brassicaceae (Mustard)	NL	Broadleaf	CP	Yes
Halogeton	*Halogeton glomeratus*	Chenopodiacease (Goosefoot)	NL	Broadleaf	A	Yes

Common Name	Scientific Name	Plant Family	Noxious Weed Classification[1]	Growth Form	Duration/ Life Cycle[2]	Present in Elko District BLM[3]
Hoary alyssum	*Berteroa incana*	Brassicaceae (Mustard)	NL	Broadleaf	A, P	Yes
Hoary cress	*Cardaria draba*	Brassicaceae (Mustard)	C	Broadleaf	CP	Yes
Horsenettle	*Solanum carolinense*	Solonaceae (Nightshade)	B	Broadleaf	CP	No
Houndstongue	*Cynoglossum officinale*	Boraginaceae (Borage)	A	Broadleaf	A, B, SLP	Yes
Hydrilla	*Hydrilla verticillata*	Hydrocharitaceae (Frog-bit)	A	Broadleaf	Perennial, submerged aquatic	No
Iberian starthistle	*Centaurea iberica*	Asteraceae (Sunflower)	A	Broadleaf	A, B, SLP	No
Johnsongrass	*Sorghum halepense*	Poaceae (Grass)	C	Grass	CP	No
Jointed goatgrass	*Aegilops cylindria*	Poaceae (Grass)	A	Grass	A	Yes
Lambsquarters	*Chenopodium album*	Chenopodiacease (Goosefoot)		Broadleaf	A	Yes
Leafy spurge	*Euphorbia esula*	Euphorbiaceae (Spurge)	B	Broadleaf	CP	Yes
Lenspod whitetop	*Cardaria chalepensis*	Brassicaceae (Mustard)	NL	Broadleaf	CP	Yes
Malta starthistle	*Centaurea melitensis*	Asteraceae (Sunflower)	A	Broadleaf	A	No
Mayweed chamomile	*Anthemis cotula*	Asteraceae (Sunflower)	B	Broadleaf	A	Yes
Meadow knapweed	*Centaurea debeauxii*	Asteraceae (Sunflower)	NL	Broadleaf	P	No
Mediterranean barley	*Hordeum marinum ssp. gussoneanum*	Poaceae (Grass)	NL	Grass	A	Yes
Mediterranean sage	*Salvia aethiopis*	Lamiaceae (Mint)	A	Broadleaf	B, SLP	No
Medusahead	*Taeniatherum caput-medusae*	Poaceae (Grass)	B	Grass	A	Yes
Musk thistle	*Carduus nutans*	Asteraceae (Sunflower)	C	Broadleaf	A, B	Yes
Myrtle spurge	*Euphorbia myrsinites*	Euphorbiaceae (Spurge)	NL	Broadleaf	P	Yes

Common Name	Scientific Name	Plant Family	Noxious Weed Classification[1]	Growth Form	Duration/ Life Cycle[2]	Present in Elko District BLM[3]
Orange hawkweed	*Hieracium aurantiacum*	Asteraceae (Sunflower)	NL	Broadleaf	CP	No
Oxeye daisy	*Leucanthemum vulgare*	Asteraceae (Sunflower)	NL	Broadleaf	CP	No
Perennial pepperweed	*Lepidium latifolium*	Brassicaceae (Mustard)	C	Broadleaf	CP	Yes
Perennial sowthistle	*Sonchus arvensis*	Asteraceae (Sunflower)	B	Broadleaf	CP	Yes
Phragmites	*Phragmites australis*	Poaceae (Grass)	NL	Grass	CP	Yes
Plumeless thistle	*Carduus acanthoides*	Asteraceae (Sunflower)	NL	Broadleaf	A, B	No
Poison-hemlock	*Conium maculatum*	Apiaceae (Parsley)	C	Broadleaf	A, B, SLP	Yes
Prickly lettuce	*Lactuca serriola*	Asteraceae (Sunflower)	NL	Broadleaf	A, B	Yes
Puncturevine	*Tribulus terrestris*	Zygophyllaceae (Caltrop)	C	Broadleaf	A	Yes
Purple loosestrife	*Lythrum salicaria & culivars*	Lythraceae (Loosestrife)	A	Broadleaf	P	No
Purple starthistle	*Centaurea calcitrapa*	Asteraceae (Sunflower)	A	Broadleaf	A, B, SLP	Yes
Quackgrass	*Elymus repens*	Poaceae (Grass)	NL	Grass	CP	Yes
Rat-tail fescue	*Vulpia myuros*	Poaceae (Grass)	NL	Grass	A	Yes
Rush skeletonweed	*Chondrilla juncea*	Asteraceae (Sunflower)	A	Broadleaf	CP	No
Russian knapweed	*Rhaponticum repens* (formerly *Acroptilon repens*)	Asteraceae (Sunflower)	C	Broadleaf	CP	Yes
Russian Olive	*Elaeagnus angustifolia*	Elaeagnaceae (Oleaster)	NL	Shrub/Tree	P	Yes
Russian thislte	*Salsola tragus*	Chenopodiacease (Goosefoot)	NL	Broadleaf	A	Yes
Salt cedar	*Tamarix spp.*	Tarmaricaceae (Tamarisk)	C	Shrub/Tree	P	Yes
Scentless chamomille	*Tripleurospermum inodorum*	Asteraceae (Sunflower)	NL	Broadleaf	A, B, P	Yes

Common Name	Scientific Name	Plant Family	Noxious Weed Classification[1]	Growth Form	Duration/ Life Cycle[2]	Present in Elko District BLM[3]
Scotch thistle	*Onopordum acanthium*	Asteraceae (Sunflower)	C	Broadleaf	A, B, SLP	Yes
Sericea lespedeza	*Lespedeza cuneata*	Fabaceae (Pea)	NL	Broadleaf	P	No
Silverleaf nightshade	*Solanum elaeagnifolium*	Solonaceae (Nightshade)	B	Broadleaf	CP	No
Soft brome	*Bromus hordeaceus*	Poaceae (Grass)	NL	Grass	A	Yes
Spotted knapweed	*Centaurea maculosa*	Asteraceae (Sunflower)	B	Broadleaf	B, SLP	Yes
Spotted waterhemlock	*Cicuta maculata*	Apiaceae (Parsley)	C	Broadleaf	P	Yes
Squarrose knapweed	*Centaurea virgata*	Asteraceae (Sunflower)	A	Broadleaf	P	Yes
Stink grass	*Eragrostis cilianensis*	Poaceae (Grass)	NL	Grass	A	Yes
Sulfur cinquefoil	*Potentilla recta*	Rosaceae (Rose)	A	Broadleaf	P	Yes
Swainsonpea	*Sphaerophysa salsula*	Fabaceae (Pea)	A	Broadleaf	CP	No
Syrian bean caper	*Zygophyllum fabago*	Zygophyllaceae (Caltrop)	A	Broadleaf	CP	No
Tall buttercup	*Ranunculus acris*	Ranunculaceae (Buttercup)	NL	Broadleaf	P	No
Tansy ragwort	*Senecio jacobaea*	Asteraceae (Sunflower)	NL	Broadleaf	A, B, P	No
Tumble mustard	*Sisymbrium altissimum*	Brassicaceae (Mustard)	NL	Broadleaf	A, B	Yes
Ventenata	*Ventenata dubia*	Poaceae (Grass)	A	Grass	A	Yes
Viper's bugloss	*Echium vulgare*	Boraginaceae (Borage)	NL	Broadleaf	B	No
White horehound	*Marrubium vulgare*	Lamiaceae (Mint)	NL	Broadleaf	P	Yes
Wild oat	*Avena fatua*	Poaceae (Grass)	NL	Grass	A	No
Wild proso millet	*Panicum miliaceum*	Poaceae (Grass)	NL	Grass	A	No
Yellow bluestem	*Bothriochloa ischaemum*	Poaceae (Grass)	NL	Grass	P	No

Common Name	Scientific Name	Plant Family	Noxious Weed Classification[1]	Growth Form	Duration/ Life Cycle[2]	Present in Elko District BLM[3]
Yellow hawkweed	*Hieracium caespitosum*	Asteraceae (Sunflower)	NL	Broadleaf	CP	No
Yellow salify	*Tragopogon dubius*	Asteraceae (Sunflower)	NL	Broadleaf	A, B	Yes
Yellow starthistle	*Centaurea solstitalus*	Asteraceae (Sunflower)	A	Broadleaf	A, B	Yes
Yellow toadflax	*Linaria vulgaris*	Plantaginaceae (Plantain)	A	Broadleaf	CP	Yes

1. Noxious weeds are classified by the Nevada Department of Agriculture (NDA) for the purpose of prioritizing and implementing noxious weed control projects (Nevada Revised Statute 555 and Nevada Administrative Code 555). NDA Noxious Weed Classification include three categories (A,B, and C) and are defined as follows:

A. Weeds that are generally not found or that are limited in distribution throughout the State. Such weeds are subject to active exclusion from the State, active eradication wherever found, and active eradication from the premises of a dealer of nursery stock.

B. Weeds that are generally established in scattered populations in some counties of the State. Such weeds are subject to: active exclusion where possible and active eradication from the premises of a dealer of nursery stock.

C. Weeds that are generally established and generally widespread in many counties of the State. Such weeds are subject to active eradication from the premises of a dealer of nursery stock.

NL: Not listed as a noxious weed by the NDA. These species are still managed based on Elko District priorities and under Executive Order 13112 (February 1999) which requires Federal agencies to "(i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; [and] (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded…"

2. A = annual, B = biennial, P = perennial, CP = perennial with creeping roots; SLP = short-lived perennial. Several factors including, but limited to: precipitation, soil moisture, soil type, and temperature will influence plant life cycle/duration.

3. Presences/Absence in Elko District is based on existing GIS data, herbarium records, and specialist observations.

Appendix G. Approved BLM Herbicide Formulations for Aminopyralid, Fluroxypyr, Imazapic and Rimsulfuron

Table 27. Approved BLM Herbicide Formulations for Aminopyralid, Fluroxypyr, Imazapic and Rimsulfuron.

Common Name	Trade Name	Manufacturer Name	EPA Reg. Number	Concentration	Units of Concentration	WSSA Herbicide Resistance Code	Formulation Type
Aminopyralid	Milestone	Dow AgroSciences	62719-519	2.0	Pounds Acid Equivalent Per Gallon	Group 4	Liquid
Aminopyralid	Milestone	Corteva Agriscience	62719-519	2.0	Pounds Acid Equivalent Per Gallon	Group 4	Liquid
Aminopyralid + 2,4-D	ForeFront HL	Corteva AgriScience	62719-630	0.41 + 3.33	Pounds Acid Equivalent Per Gallon, Respectively	Group 4	Liquid
Aminopyralid + 2,4-D	ForeFront HL	Dow AgroSciences	62719-630	0.41 + 3.33	Pounds Acid Equivalent Per Gallon, Respectively	Group 4	Liquid
Aminopyralid + 2,4-D	GrazonNext HL	Corteva AgriScience	62719-628	0.41 + 3.33	Pounds Acid Equivalent Per Gallon, Respectively	Group 4	Liquid
Aminopyralid + 2,4-D	GrazonNext HL	Dow AgroSciences	62719-628	0.41 + 3.33	Pounds Acid Equivalent Per Gallon, Respectively	Group 4	Liquid
Aminopyralid + Clopyralid	Sendero	Corteva AgriScience	62719-645	0.5 + 2.3	Pounds Acid Equivalent Per Gallon, Respectively	Group 4	Liquid
Aminopyralid + Clopyralid	Sendero	Dow AgroSciences	62719-645	0.5 + 2.3	Pounds Acid Equivalent Per Gallon, Respectively	Group 4	Liquid
Aminopyralid + Metsulfuron methyl	Chaparral	Corteva AgriScience	62719-597	52.5 + 9.45	Percent Acid Equivalent + Percent Active Ingredient, Respectively	Groups 4 + 2	Dry
Aminopyralid + Metsulfuron methyl	Chaparral	Dow AgroSciences	62719-597	52.5 + 9.45	Percent Acid Equivalent + Percent Active Ingredient, Respectively	Groups 4 + 2	Dry
Aminopyralid + Metsulfuron methyl	Opensight	Corteva AgriScience	62719-597	52.5 + 9.45	Percent Acid Equivalent + Percent Active Ingredient, Respectively	Groups 4 + 2	Dry
Aminopyralid + Metsulfuron methyl	Opensight	Dow AgroSciences	62719-597	52.5 + 9.45	Percent Acid Equivalent + Percent Active Ingredient, Respectively	Groups 4 + 2	Dry
Aminopyralid + Triclopyr	Capstone	Corteva AgriScience	62719-572	0.1 + 1.0	Pounds Acid Equivalent Per Gallon, Respectively	Group 4	Liquid
Aminopyralid + Triclopyr	Capstone	Dow AgroSciences	62719-572	0.1 + 1.0	Pounds Acid Equivalent Per Gallon, Respectively	Group 4	Liquid
Fluroxypyr	Alligare Flagstaff	Alligare, LLC	81927-61	2.8	Pounds Acid Equivalent	Group 4	Liquid
Fluroxypyr	Alligare Fluroxypyr	Alligare, LLC	66330-385-81927	2.8	Pounds Acid Equivalent	Group 4	Liquid
Fluroxypyr	Comet Selective	Nufarm Americas Inc.	71368-87	1.5	Pounds Acid Equivalent	Group 4	Liquid
Fluroxypyr	Vista XRT	Corteva AgriScience	62719-586	2.8	Pounds Acid Equivalent	Group 4	Liquid
Fluroxypyr	Vista XRT	Dow AgroSciences	62719-586	2.8	Pounds Acid Equivalent	Group 4	Liquid
Fluroxypyr + 2,4-D + Dicamba	E-2 Herbicide	Nufarm Americas Inc.	228-442	0.4 + 3.2 + 0.4	Pounds Acid Equivalent, Respectively	Groups 4 + 4 + 4	Liquid
Fluroxypyr + Clopyralid	Truslate Selective Herbicide	Nufarm Americas Inc.	71368-86	0.75 + 0.75	Pounds Acid Equivalent, Respectively	Groups 4 + 4	Liquid

Common Name	Trade Name	Manufacturer Name	EPA Reg. Number	Concentration	Units of Concentration	WSSA Herbicide Resistance Code	Formulation Type
Fluroxypyr + Picloram	Alligare Triumph XTR	Alligare , LLC	81927-64	0.67 + 0.67	Pounds Acid Equivalent, Respectively	Groups 4 + 4	Liquid
Fluroxypyr + Picloram	Surmount	Corteva AgriScience	62719-480	0.67 + 0.67	Pounds Acid Equivalent, Respectively	Groups 4 + 4	Liquid
Fluroxypyr + Picloram	Surmount	Dow AgroSciences	62719-480	0.67 + 0.67	Pounds Acid Equivalent, Respectively	Groups 4 + 4	Liquid
Fluroxypyr + Picloram	Trooper Pro	Nufarm Americas Inc.	228-599	1.0 + 1.0	Pounds Acid Equivalent, Respectively	Groups 4 + 4	Liquid
Fluroxypyr + Triclopyr	Alligare Cleargraze Pasture Herbicide	Alligare, LLC	81927-65	1.0 + 3.0	Pounds Acid Equivalent, Respectively	Groups 4 + 4	Liquid
Fluroxypyr + Triclopyr	PastureGard	Corteva AgriScience	62719-637	1.0 + 3.0	Pounds Acid Equivalent, Respectively	Groups 4 + 4	Liquid
Fluroxypyr + Triclopyr	PastureGard	Dow AgroSciences	62719-637	1.0 + 3.0	Pounds Acid Equivalent, Respectively	Groups 4 + 4	Liquid
Imazapic	Alligare Panoramic 2SL	Alligare, LLC	66222-141-81927	2.0	Pounds Acid Equivalent Per Gallon	Group 2	Liquid
Imazapic	Nufarm Imazapic 2SL	Nufarm Americas Inc.	71368-99	2.0	Pounds Acid Equivalent Per Gallon	Group 2	Liquid
Imazapic	Open Range 10G	Wilbur-Ellis Co., LLC (Wilbur-Ellis Co.)	2935-557	0.89	Percent Acid Equivalent	Group 2	Dry
Imazapic	Plateau	BASF Corporation	241-365	2.0	Pounds Acid Equivalent Per Gallon	Group 2	Liquid
Rimsulfuron	Alligare Laramie 25DF	Alligare, LLC	81927-57	25	Percent Active Ingredient	Group 2	Dry
Rimsulfuron	Grapple	Nufarm Americas Inc.	71368-121	25	Percent Active Ingredient	Group 2	Dry
Rimsulfuron	Hinge	Rotam North America, Inc.	83100-40-83979	25	Percent Active Ingredient	Group 2	Dry
Rimsulfuron	Matrix SG	Dupont Crop Protection	352-768	25	Percent Active Ingredient	Group 2	Dry

Appendix H. Standard Operating Procedures (SOPs) and Mitigation Measures for Applying Pesticides

In this appendix, Standard Operating Procedures applicable to herbicide applications are listed first under each resource followed by Mitigation Measures and Conservation Measures (as appropriate).

Standard Operating Procedures have been identified to reduce adverse effects to environmental and human resources from vegetation treatment activities based on guidance in BLM manuals and handbooks, regulations, and standard BLM and industry practices. The list is not all encompassing but is designed to give an overview of practices that would be considered when designing and implementing a vegetation treatment project on public lands (BLM, 2007a). Effects described in this EA are predicated on application of the Standard Operating Procedures or equivalent, unless an on-site determination is made that their application is unnecessary to achieve their intended purpose or protection. For example, the Standard Operating Procedure to “use herbicides of low toxicity to wild horses and burros, where feasible” would not need to be applied to treatments where wild horses and burros are not expected to occur.

2007 PEIS Mitigation Measures (marked as MMs in the list below) were identified for all potential adverse effects identified for herbicide applications in the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (BLM, 2007a) and adopted by its Record of Decision (BLM, 2007b). In other words, NO potentially significant adverse effect identified in the 17 States analysis remained at the programmatic scale after the PEIS Mitigation Measures were adopted. Like the Standard Operating Procedures, application of the Mitigation Measures is assumed in the analysis in this EA, and on-site determinations can decide if their application is unnecessary to achieve the intended purpose or protection.

2016 PEIS Mitigation Measures (marked as 2016 MMs in the list below) were identified for all potential adverse effects identified for herbicide applications in the *Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron PEIS* (BLM 2016a), and adopted by its Record of Decision. In other words, NO potentially significant adverse effect identified in the analysis remained at the programmatic scale after the PEIS Mitigation Measures were adopted. Like the Standard Operating Procedures, application of the Mitigation Measures is assumed in the analysis in this EA, and on-site determinations can decide if their application is unnecessary to achieve the intended purpose or protection.

Conservation Measures specific to threatened and endangered species were identified in the Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessments” (BLM, 2007b). Lahontan cutthroat trout is the only listed species within the O’Neil PPA project area and is addressed under the Aquatic Animals Conservation Measures at the end of this appendix. Given the low toxicity of aminopyralid, fluroxypyr, and rimsulfuron to fauna (BLM 2015c), likely uses of the herbicides, and Standard Operating Procedures for minimizing the risk of spills, no new aquatic or terrestrial animal Conservation Measures have been developed for herbicide treatments using aminopyralid, fluroxypyr, or rimsulfuron.

Additional guidance, direction, orders, and protection measures can be found in numerous other BLM or Department of the Interior handbooks, manual, and management plans. Exclusion from this Appendix does not indicate that these additional measures are not also potentially applicable. BLM manuals and handbooks are available online at https://www.blm.gov/learn/blm-library/policy-resources.

General

See BLM Handbook H-9011-1 (Chemical Pest Control), and manuals 1112 (Safety), 9011 (Chemical Pest Control), 9015 (Integrated Weed Management), and 9220 (Integrated Pest Management).

- Prepare an operational and spill contingency plan in advance of treatment.
- Conduct a pretreatment survey before applying herbicides.
- Select the herbicide that is least damaging to the environment while providing the desired results.
- Select herbicide products carefully to minimize additional impacts from degradates, adjuvants, other ingredients, and tank mixtures.
- Apply the least amount of herbicide needed to achieve the desired result.
- Follow herbicide product label for use and storage.
- Have licensed applicators apply herbicide.
- Use only USEPA-approved herbicides and follow product label directions and "advisory" statements.
- Review, understand, and conform to the "Environmental Hazards" section on the herbicide product label. This section warns of known herbicide risks to the environment and provides practical ways to avoid harm to organisms or to the environment.
- Consider surrounding land use before assigning aerial spraying as a treatment method and avoid aerial spraying near agricultural or densely populated areas.
- Minimize the size of application area, when feasible.
- Comply with herbicide-free buffer zones to ensure that drift will not affect crops or nearby residents/ landowners.
- Post treated areas and specify reentry or rest times, if appropriate.
- Notify adjacent landowners prior to treatment, if appropriate.
- Keep a copy of Material Safety Data Sheets (MSDSs) at work sites. MSDSs are available for review at http:// www.cdms.net/.
- Keep records of each application, including the active ingredient, formulation, application rate, date, time, and location.
- Avoid accidental direct spray and spill conditions to minimize risks to resources.
- Consider surrounding land uses before aerial spraying.
- Avoid aerial spraying during periods of adverse weather conditions (snow or rain imminent, fog, or air turbulence).
- Make helicopter applications at a target airspeed of 40 to 50 miles per hour (mph), and at about 30 to 45 feet above ground.
- Take precautions to minimize drift by not applying herbicides when winds exceed >10 mph (>6 mph for aerial applications), or a serious rainfall event is imminent.
- Use drift control agents and low volatile formulations.
- Conduct pre-treatment surveys for sensitive habitat and Special Status species within or adjacent to proposed treatment areas.
- Consider site characteristics, environmental conditions, and application equipment in order to minimize damage to non-target vegetation.
- Use drift reduction agents, as appropriate, to reduce the drift hazard to non-target species.
- Turn off application equipment at the completion of spray runs and during turns to start another spray run.

- Refer to the herbicide product label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide.
- Clean OHVs to remove plant material.

Air Quality

See Manual 7000 (Soil, Water, and Air Management).

- Consider the effects of wind, humidity, temperature inversions, and heavy rainfall on herbicide effectiveness and risks.
- Apply herbicides in favorable weather conditions to minimize drift. For example, do not treat when winds exceed 10 mph (>6 mph for aerial applications) or rainfall is imminent.
- Use drift reduction agents, as appropriate, to reduce the drift hazard.
- Select proper application equipment (e.g., spray equipment that produces 200- to 800-micron diameter droplets [spray droplets of 100 microns and less are most prone to drift]).
- Select proper application methods (e.g., set maximum spray heights, use appropriate buffer distances between spray sites and non-target resources).

Soil Resources

See Manual 7000 (Soil, Water, and Air Management).

- Minimize treatments in areas where herbicide runoff is likely, such as steep slopes when heavy rainfall is expected.
- Minimize use of herbicides that have high soil mobility, particularly in areas where soil properties increase the potential for mobility.
- Do not apply granular herbicides on slopes of more than 15% where there is the possibility of runoff carrying the granules into non-target areas.

Water Resources

See Manual 7000 (Soil, Water, and Air Management).

- Consider climate, soil type, slope, and vegetation type when developing herbicide treatment programs.
- Select herbicide products to minimize impacts to water. This is especially important for application scenarios that involve risk from active ingredients in a particular herbicide, as predicted by risk assessments.
- Use local historical weather data to choose the month of treatment.
- Considering the phenology of target aquatic species, schedule treatments based on the condition of the water body and existing water quality conditions.
- Plan to treat between weather fronts (calms) and at appropriate time of day to avoid high winds that increase water movements, and to avoid potential stormwater runoff and water turbidity.

- Review hydrogeologic maps of proposed treatment areas. Note depths to groundwater and areas of shallow groundwater and areas of surface water and groundwater interaction. Minimize treating areas with high risk for groundwater contamination.
- Conduct mixing and loading operations in an area where an accidental spill would not contaminate an aquatic body.
- Do not rinse spray tanks in or near water bodies.
- Do not broadcast pellets where there is danger of contaminating water supplies.
- Maintain buffers between treatment areas and water bodies. Buffer widths should be developed based on herbicide- and site-specific criteria to minimize impacts to water bodies.
- Minimize the potential effects to surface water quality and quantity by stabilizing terrestrial areas as quickly as possible following treatment.
- Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths from water of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications.
- Establish appropriate (herbicide-specific) buffer zones for species/populations (see Appendix C of 2007 PEIS, Table C-16). (MM)
- Areas with potential for groundwater for domestic or municipal use shall be evaluated through the appropriate, validated model(s) to estimate vulnerability to potential groundwater contamination, and appropriate Mitigation Measures shall be developed if such an area requires the application of herbicides and cannot otherwise be treated with non-herbicide methods. (MM)

Wetlands and Riparian Areas

- Use a selective herbicide and a wick or backpack sprayer.
- Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths from water of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications.
- See mitigation for Water Resources and Vegetation. (MM)

Vegetation

See Handbook H-4410-1 (National Range Handbook), and manuals 5000 (Forest Management) and 9015 (Integrated Weed Management).

- Refer to the herbicide label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide.
- Use native or sterile plants for revegetation and restoration projects to compete with invasive plants until desired vegetation establishes.
- Use weed-free feed for horses and pack animals. Use weed-free straw and mulch for revegetation and other activities.
- Identify and implement any temporary domestic livestock grazing and/or supplemental feeding restrictions needed to enhance desirable vegetation recovery following treatment. Consider adjustments in the existing grazing permit, to maintain desirable vegetation on the treatment site.

- Minimize the use of terrestrial herbicides (especially sulfometuron methyl) in watersheds with downgradient ponds and streams if potential impacts to aquatic plants are identified. (MM)
- Establish appropriate (herbicide-specific) buffer zones (see Tables 4-12 and 4-14 in Chapter 4 of the 2007 Final PEIS and Table 4-8 in Chapter 4 of the 2016 Final PEIS) around downstream water bodies, habitats, and species/populations of interest. Consult the Risk Assessments prepared for the PEIS for more specific information on appropriate buffer distances under different soil, moisture, vegetation, and application scenarios. (MM, 2016 MM)
- Limit the aerial application of chlorsulfuron and metsulfuron methyl to areas with difficult land access, where no other means of application are possible. (MM)
- Do not apply sulfometuron methyl aerially. (MM)
- When necessary to protect special status plant species, implement all Conservation Measures for plants presented in the *2007 Vegetation Treatments on Bureau of Land Management Lands in 17 Western States and* 2016 *Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron Biological Assessments* (MM, 2016 MM)

Pollinators

- Complete vegetation treatments seasonally before pollinator foraging plants bloom.
- Time vegetation treatments to take place when foraging pollinators are least active both seasonally and daily.
- Design vegetation treatment projects so that nectar and pollen sources for important pollinators and resources are treated in patches rather than in one single treatment.
- Minimize herbicide application rates. Use typical rather than maximum rates where there are important pollinator resources.
- Maintain herbicide free buffer zones around patches of important pollinator nectar and pollen sources.
- Maintain herbicide free buffer zones around patches of important pollinator nesting habitat and hibernacula.
- Make special note of pollinators that have single host plant species and minimize herbicide spraying on those plants and in their habitats.

Fish and Other Aquatic Species

See Manuals 6500 (Wildlife and Fisheries Management) and 6780 (Habitat Management Plans).

- Use appropriate buffer zones based on label and risk assessment guidance.
- Minimize treatments near fish-bearing water bodies during periods when fish are in life stages most sensitive to the herbicide(s) used, and use spot rather than broadcast or aerial treatments.
- Use appropriate application equipment/method near water bodies if the potential for off-site drift exists.
- For treatment of aquatic vegetation, 1) treat only that portion of the aquatic system necessary to meet vegetation management objectives, 2) use the appropriate application method to minimize the potential for injury to desirable vegetation and aquatic organisms, and 3) follow water use restrictions presented on the herbicide label.
- Limit the use of diquat in water bodies that have native fish and aquatic organisms. (MM)

- Limit the use of terrestrial herbicides (especially diuron) in watersheds with characteristics suitable for potential surface runoff that have fish-bearing streams during periods when fish are in life stages most sensitive to the herbicide(s) used. (MM)
- To protect Special Status fish and other aquatic organisms, implement all Conservation Measures for aquatic animals presented in the *2007 Vegetation Treatments on Bureau of Land Management Lands in 17 Western States and* 2016 *Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron Biological Assessments* (see *Conservation Measures* later in this Appendix). (MM, 2016 MM)
- Establish appropriate herbicide-specific buffer zones for water bodies, habitats, or fish or other aquatic species of interest (see Appendix C of 2007 PEIS, Table C-16 and recommendations in individual ERAs). (MM)
- Consider the proximity of application areas to salmonid habitat and the possible effects of herbicides on riparian and aquatic vegetation. Maintain appropriate buffer zones around salmonid-bearing streams (see Appendix C of 2007 PEIS, Table C-16 and recommendations in individual ERAs). (MM)
- Avoid using the adjuvant R-11® in aquatic environments, and either avoid using glyphosate formulations containing polyoxyethyleneamine (POEA), or seek to use formulations with the least amount of POEA, to reduce the risk to aquatic organisms in aquatic habitats.
- At the local level, consider effects to Special Status fish and other aquatic organisms when designing treatment programs. (MM)

Wildlife Resources

See Manuals 6500 (Wildlife and Fisheries Management) and 6780 (Habitat Management Plans).

- Use herbicides of low toxicity to wildlife, where feasible.
- Use spot applications or low-boom broadcast operations where possible to limit the probability of contaminating non-target food and water sources, especially non-target vegetation over areas larger than the treatment area.
- Use timing restrictions (e.g., do not treat during critical wildlife breeding or staging periods) to minimize impacts to wildlife.
- To minimize risks to terrestrial wildlife, do not exceed the typical application rate for applications of dicamba, glyphosate, hexazinone, or triclopyr, where feasible. (MM)
- Minimize the size of application areas, where practical, when applying 2,4-D and Overdrive® to limit impacts to wildlife, particularly through contamination of food items. (MM)
- Where practical, limit glyphosate and hexazinone to spot applications in grazing land and wildlife habitat areas to avoid contamination of wildlife food items. (MM)
- Avoid using the adjuvant R-11® in aquatic environments, and either avoid using glyphosate formulations containing polyoxyethyleneamine (POEA), or seek to use formulations with the least amount of POEA, to reduce the risk to aquatic organisms in aquatic habitats.
- Do not apply bromacil or diuron in rangelands, and use appropriate buffer zones (see Tables 4-12 and 4-14 in Chapter 4 of the 2007 Final PEIS and Table 4-8 in Chapter 4 of the 2016 Final PEIS) to limit contamination of off-site vegetation, which may serve as forage for wildlife.
- Do not aerially apply diquat directly to wetlands or riparian areas. (MM)
- When necessary to protect Special Status wildlife species, implement Conservation Measures for terrestrial animals presented in the *2007 Vegetation Treatments on Bureau of Land*

Management Lands in 17 Western States and 2016 *Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron Biological Assessments*. (MM, 2016 MM)
- When conducting herbicide treatments in or near habitats used by special status and listed terrestrial arthropods, design treatments to avoid the use of fluroxypyr, where feasible. (2016 MM)

Threatened and Endangered Species

See Manual 6840 (Special Status Species), Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic Biological Assessment (BLM, 2007b), and 2016 Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron Biological Assessments (BLM 2015c).

- Provide clearances for Special Status species before treating an area as required by Special Status Species Program policy. Consider effects to Special Status species when designing herbicide treatment programs.
- Use a selective herbicide and a wick or backpack sprayer to minimize risks to Special Status plants.
- Avoid treating vegetation during time-sensitive periods (e.g., nesting and migration, sensitive life stages) for Special Status species in area to be treated.

Livestock

See Handbook H-4120-1 (Grazing Management).

- Notify permittees of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.
- Notify permittees of livestock grazing, feeding, or slaughter restrictions, if any.
- Provide alternative forage sites for livestock, if possible.
- Whenever possible and whenever needed, schedule treatments when livestock are not present in the treatment area. Design treatments to take advantage of normal livestock grazing rest periods, when possible.
- As directed by the herbicide product label, remove livestock from treatment sites prior to herbicide application, where applicable.
- Use herbicides of low toxicity to livestock, where feasible.
- Take into account the different types of application equipment and methods, where possible, to reduce the probability of contamination of non-target food and water sources.
- Avoid use of diquat in riparian pasture while pasture is being used by livestock.
- Minimize potential risks to livestock by applying glyphosate, hexazinone, or triclopyr at the typical application rate where feasible. (MM)
- Do not apply 2,4-D, dicamba, Overdrive®, picloram, or triclopyr across large application areas, where feasible, to limit impacts to livestock, particularly through contamination of food items. (MM)
- Where feasible, limit glyphosate and hexazinone to spot applications in rangeland. (MM)
- Do not aerially apply diquat directly to wetlands or riparian areas used by livestock. (MM)
- Do not apply bromacil or diuron in rangelands and use appropriate buffer zones (See Tables 4-12 and 4-14 in Chapter 4 of the 2007 Final EIS and Table 4-8 in Chapter 4 of the 2016 Final PEIS) to limit contamination of off-site rangeland vegetation. (MM)

Wild Horses and Burros

- Minimize using herbicides in areas grazed by wild horses and burros.
- Use herbicides of low toxicity to wild horses and burros, where feasible.
- Remove wild horses and burros from identified treatment areas prior to herbicide application, in accordance with herbicide product label directions for livestock.
- Take into account the different types of application equipment and methods, where possible, to reduce the probability of contaminating non-target food and water sources.
- Minimize potential risks to wild horses and burros by applying glyphosate, hexazinone, and triclopyr at the typical application rate, where feasible, in areas associated with wild horse and burro use. (MM)
- Consider the size of the application area when making applications of 2,4-D, dicamba, Overdrive®, picloram, and triclopyr in order to reduce potential impacts to wild horses and burros. (MM)
- Apply herbicide label grazing restrictions for livestock to herbicide treatment areas that support populations of wild horses and burros. (MM)
- Where practical, limit glyphosate and hexazinone to spot applications in rangeland. (MM)
- Do not apply bromacil or diuron in grazing lands within herd management areas (HMAs), and use appropriate buffer zones identified in Tables 4-12 and 4-14 in Chapter 4 of the 2007 Final PEIS and Table 4-8 in Chapter 4 of the 2016 Final PEIS to limit contamination of vegetation in off-site foraging areas.
- Do not apply 2,4-D, bromacil, or diuron in HMAs during the peak foaling season (March through June, and especially May through June), and do not exceed the typical application rate of Overdrive ® or hexazinone in HMAs during the peak foaling season in areas where foaling is known to take place. (MM)

Paleontological and Cultural Resources

See handbooks H-1780-1 (Improving and Sustaining BLM-Tribal Relations) and H-8270-1 (General Procedural Guidance for Paleontological Resource Management), and manuals 8100 (The Foundations for Managing Cultural Resources), 1780 (Tribal Relations), and 8270 (Paleontological Resource Management). See also: Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the *National Historic Preservation Act* (1997).

- Follow standard procedures for compliance Title 42 U.S.C. § 300101 et seq, commonly known as the *National Historic Preservation Act of 1966* and Title 54 U.S.C. § 306108, commonly known as Section 106 of the *National Historic Preservation Act of 1966* as implemented through the National Programmatic Agreement and state protocols or 36 CFR Part 800, including necessary consultations with the State Historic Preservation Officers and affected tribes.
- Follow BLM Handbook H-8270-1 to determine known Condition 1 and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or mitigate adverse impacts.

- Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected by herbicide treatments; work with tribes to minimize impacts to these resources.
- Follow guidance under Human Health and Safety in the PEIS in areas that may be visited by Native peoples after treatments.
- Do not exceed the typical application rate when applying 2,4-D, fluridone, hexazinone, and triclopyr in known traditional use areas. (MM)
- Avoid applying bromacil or tebuthiuron aerially to know traditional sites. (MM)
- Limit diquat applications to areas away from high residential and traditional use areas to reduce risk to Native Americans and Alaska Natives.

Visual Resources

See handbooks H-8410-1 (Visual Resource Inventory) and H-8431-1 (Visual Resource Contrast Rating), and Manual 8400 (Visual Resource Management).

- Minimize the use of broadcast foliar applications in sensitive watersheds to avoid creating large areas of browned vegetation.
- Consider the surrounding land use before assigning aerial spraying as an application method.
- Minimize off-site drift and mobility of herbicides (e.g., do not treat when winds exceed 10 mph; minimize treatment in areas where herbicide runoff is likely; establish appropriate buffer widths between treatment areas and residences) to contain visual changes to the intended treatment area.
- If the area is a Class I or II visual resource, ensure that the change to the characteristic landscape is low and does not attract attention (Class I), or if seen, does not attract the attention of the casual viewer (Class II).
- Lessen visual impacts by: 1) designing projects to blend in with topographic forms; 2) leaving some low growing trees or planting some low-growing tree seedlings adjacent to the treatment area to screen short-term effects; and 3) revegetating the site following treatment.
- When restoring treated areas, design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established Visual Resource Management (VRM) objectives.

Wilderness and Other Special Areas

See handbooks H-8550-1 (Management of Wilderness Study Areas (WSAs)), and H-8560-1 (Management of Designated Wilderness Study Areas), and Manual 8351 (Wild and Scenic Rivers).

- Encourage backcountry pack and saddle stock users to feed their livestock only weed-free feed for several days before entering a Wilderness Area, and to bring only weed-free hay and straw onto BLM lands.
- Encourage stock users to tie and/or hold stock in such a way as to minimize soil disturbance and loss of native vegetation.
- Revegetate disturbed sites with native species if there is no reasonable expectation of natural regeneration.

- Provide educational materials at trailheads and other Wilderness entry points to educate the public on the need to prevent the spread of weeds.
- Use the "minimum tool" to treat noxious and invasive vegetation, relying primarily on the use of ground-based tools, including backpack pumps, hand sprayers, and pumps mounted on pack and saddle stock.
- Use herbicides only when they are the minimum treatment method necessary to control weeds that are spreading within the Wilderness or threaten lands outside the wilderness.
- Give preference to herbicides that have the least impact on non-target species and the wilderness environment.
- Implement herbicide treatments during periods of low human use, where feasible.
- Address wilderness and special areas in management plans.
- Maintain adequate buffers for Wild and Scenic Rivers (1/4 mile on either side of river, ½ mile in Alaska).
- Mitigation Measures that may apply to Wilderness and other special area resources are associated with human and ecological health and recreation (see Mitigation Measures for Vegetation, Fish and Other Aquatic Species, Wildlife Resources, Recreation, and Human Health and Safety). (MM, 2016 MM)

Recreation

See Handbook H-1601-1 (Land Use Planning Handbook).

- Schedule treatments to avoid peak recreational use times, while taking into account the optimum management period for the targeted species.
- Notify the public of treatment methods, hazards, times, and nearby alternative recreation areas.
- Adhere to entry restrictions identified on the herbicide product label for public and worker access.
- Post signs noting exclusion areas and the duration of exclusion, if necessary.
- Use herbicides during periods of low human use, where feasible.
- Mitigation Measures that may apply to recreational resources are associated with human and ecological health (see Mitigation Measures for Vegetation, Fish and Other Aquatic Species, Wildlife Resources, and Human Health and Safety). (MM, 2016 MM)

Social and Economic Values

- Consider surrounding land use before selecting aerial spraying as a treatment method, and avoid aerial spraying near agricultural or densely-populated areas.
- Post treated areas and specify reentry or rest times, if appropriate.
- Notify grazing permittees of livestock feeding restrictions in treated areas, if necessary, as per herbicide product label instructions.
- Notify the public of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment.
- Control public access until potential treatment hazards no longer exist, per herbicide product label instructions.
- Observe restricted entry intervals specified by the herbicide product label.
- Notify local emergency personnel of proposed treatments.

- Use spot applications or low-boom broadcast applications where possible to limit the probability of contaminating non-target food and water sources, especially vegetation over areas larger than the treatment area.
- Consult with Native American tribes to locate any areas of vegetation that are of significance to the tribes and Native groups and that might be affected by herbicide treatments.
- To the degree possible within the law, hire local contractors and workers to assist with herbicide application projects and purchase materials and supplies for herbicide treatment projects (including the herbicides) through local suppliers.
- To minimize fears based on lack of information, provide public educational information on the need for vegetation treatments and the use of herbicides in an integrated vegetation management program for projects proposing local use of herbicides.

Rights-of-way

- Coordinate vegetation management activities where joint or multiple use of a ROW exists.
- Notify other public land users within or adjacent to the ROW proposed for treatment.
- Use only herbicides that are approved for use in ROW areas.

Human Health and Safety

- Establish a buffer between treatment areas and human residences based on guidance given in the HHRA, with a minimum buffer of ¼ mile for aerial applications and 100 feet for ground applications, unless a written waiver is granted.
- Use protective equipment as directed by the herbicide product label.
- Post treated areas with appropriate signs at common public access areas.
- Observe restricted entry intervals specified by the herbicide product label.
- Provide public notification in newspapers or other media where the potential exists for public exposure.
- Store herbicides in secure, herbicide-approved storage.
- Have a copy of MSDSs at work site.
- Notify local emergency personnel of proposed treatments.
- Contain and clean up spills and request help as needed.
- Secure containers during transport.
- Follow label directions for use and storage.
- Dispose of unwanted herbicides promptly and correctly.
- Use the typical application rate, where feasible, when applying 2,4-D, fluridone, hexazinone, and triclopyr to reduce risk to workers and the public. (MM)
- Avoid applying bromacil and diuron aerially. Do not apply sulfometuron methyl aerially. (MM)
- Limit application of chlorsulfuron via ground broadcast applications at the maximum application rate. (MM)
- Limit diquat application to ATV, truck spraying, and boat applications to reduce risks to occupational receptors; limit diquat applications to areas away from high residential and subsistence use to reduce the risks to public receptors. (MM)
- Evaluate diuron applications on a site-by-site basis to avoid risks to humans. There appear to be few scenarios where diuron can be applied without risk to occupational receptors. (MM)
- Do not apply hexazinone with an over-the-shoulder broadcast applicator (backpack sprayer). (MM)

Appendix I. Potential Seeding Species

Table 28. Potential species for seeding mixtures for treatments on the O'Neil PPA.

Common Name	Scientific Name	Native/Introduced	ESD
Sandberg's Bluegrass	*Poa secunda*	Native	Loamy 8-10" Saline Bottom Loamy 10-12"
Bluebunch Wheatgrass	*Pseudoroegnaria spicata*	Native	Loamy 10-12"
Thickspike Wheatgrass	*Elymus lanceolatus*	Native	Loamy 8-10" Loamy 10-12"
Western Wheatgrass	*Pascopyrum smithii*	Native	Loamy 8-10" Loamy 10-12"
Thurber's Needlegrass	*Achnatherum thurberianum*	Native	Loamy 8-10" Loamy 10-12"
Blue Wildrye	*Elymus glaucus*	Native	Loamy 8-10" Saline Bottom Loamy 10-12"
Basin Wildrye	*Leymus cinereus*	Native	Loamy 8-10" Saline Bottom Loamy 10-12"
Idaho Fescue	*Festuca idahoensis*	Native	Loamy 8-10" Loamy 10-12"
Snake River Wheatgrass (var. Discovery)	*Elymus wawawaiensis*	Introduced	Loamy 8-10" Loamy 10-12"
Snake River Wheatgrass (var. Secar)	*Elymus wawawaiensis*	Introduced	Loamy 8-10" Loamy 10-12"
Russian Wildrye	*Psathrostachy juncea*	Introduced	Loamy 8-10" Loamy 10-12"
Siberian Wheatgrass	*Agropyron fragile* ssp. *sibericum*	Introduced	Loamy 8-10" Loamy 10-12"
Crested Wheatgrass	*Agropyron cristatum*	Introduced	Loamy 8-10" Loamy 10-12"
Squirreltail	*Elymus elymoides*	Native	Loamy 8-10" Saline Bottom Loamy 10-12"
Indian Ricegrass	*Achnatherum hymenoides*	Native	Loamy 8-10" Loamy 10-12"
Fourwing Saltbush	*Atriplex canescens*	Native	Loamy 8-10" Loamy 10-12"
Wyoming Big Sagebrush	*Artemisia tridentata* ssp. *wyomingensis*	Native	Loamy 8-10" Loamy 10-12"
Basin Big Sagebrush	*Artemisia tridentata* ssp. *tridentata*	Native	Loamy 8-10" Loamy 10-12"
Black Sagebrush	*Artemisia nova*	Native	Loamy 8-10" Loamy 10-12"
Bitterbrush	*Purshia tridentata*	Native	Loamy 10-12"
Whitestem Rabbitbrush	*Tricamera nauseosa ssp. hololeuca*	Native	Loamy 8-10" Loamy 10-12"

Common Name	Scientific Name	Native/Introduced	ESD
Cliffrose	*Purshia stansburiana*	Native	Loamy 8-10"
Immigrant Forage Kochia	*Bassia prostrata* ssp. *vivescens*	Introduced	Loamy 8-10" Loamy 10-12"
Snowstorm Forage Kochia	*Bassia prostrata* ssp. *grisea*	Introduced	Loamy 8-10" Loamy 10-12"
Arrowleaf Balsamroot	*Balsamorhiza sagittata*	Native	Loamy 8-10" Loamy 10-12"
Lupine spp.	*Lupinus spp.*	Native	Loamy 8-10" Loamy 10-12"
Scarlet Globemallow	*Sphaeralcea coccinea*	Native	Loamy 8-10" Loamy 10-12"
Penstemon spp.	*Penstemon spp.*	Native	Loamy 8-10" Loamy 10-12"
Yellow Beeplant	*Cleome lutea*	Native	Loamy 8-10" Loamy 10-12"
Western Yarrow	*Achillea millefolium*	Native	Loamy 8-10" Loamy 10-12"
Lewis Flax	*Linum lewisii*	Native	Loamy 8-10" Loamy 10-12"
Sainfoin	*Onobrychis sativa*	Introduced	Loamy 8-10" Loamy 10-12"
Alfalfa Ladak 2	*Medicago sativa*	Introduced	Loamy 8-10" Loamy 10-12"
Small Burnett	*Sanguisorba minor*	Introduced	Loamy 8-10" Loamy 10-12"

Appendix J. State and Transition Models for Restoration Units

Unit 1: 18 Mile Fire Restoration

Shallow Calcareous Loam 10-14"024XY031NV

Reference State 1.0 Community Pathways:1.1a: Low severity fire resulting in a mosaic pattern.

1.1b: Time and lack of disturbance such as fire. Drought, herbivory, or combinations of these would reduce the perennial grasses in the understory.

1.2a: Time and lack of disturbance such as fire.

1.3a: Low severity fire or herbivory resulting in a mosaic pattern.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native plants. Current Potential State 2.0 Community Pathways:

2.1a: Fire or brush treatments (i.e. mowing) with minimal soil disturbance.

2.1b: Time and lack of disturbance such as fire. Drought, inappropriate grazing management, or combinations of these would reduce the perennial grasses in the understory. Trees may invade from neighboring sites

2.2a: Time and lack of disturbance such as fire, drought, inappropriate grazing management, or combinations of these.

2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance and/or grazing management that reduces shrubs would allow for an increase in perennial bunchgrasses.

2.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community. Transition

T2A: Time and lack of disturbance and/or inappropriate grazing management. Trees may invade from neighboring sites (to 3.1) or fire, soil disturbing brush treatments and/or inappropriate sheep grazing (3.2).

Transition T2B: Fire in at-risk community phase (from 2.3) may transition to annual state (4.0), soil disturbing treatments may also transition to an annual state.

Shrub State 3.0 Community Pathways:3.1a: Fire and/or sheep grazing management which reduces black sagebrush. Brush treatments (i.e. mowing) with minimal soil disturbance.

3.2a: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows for the shrub component to recover.

Transition T3A: Fire and/or soil disturbing treatments (i.e. failed restoration attempts) (to 4.0).

Transition T3B: Time and lack of disturbance allows for maturation of tree community, may be coupled with inappropriate grazing management (5.1).

Annual State 4.0 Community Pathways:4.1a: Time and lack of disturbance (unlikely to occur). 4.2a: Fire.

Tree State 5.0 Community Pathways:5.1a: Time and lack of disturbance allows for maturation of tree community. Transition

T5A: Catastrophic fire.

Narrative

024XY031NV

Current State: 2.2- Rabbitbrush increases. Perennial bunch grasses increase. Black sagebrush a minor component. Annual grasses present.

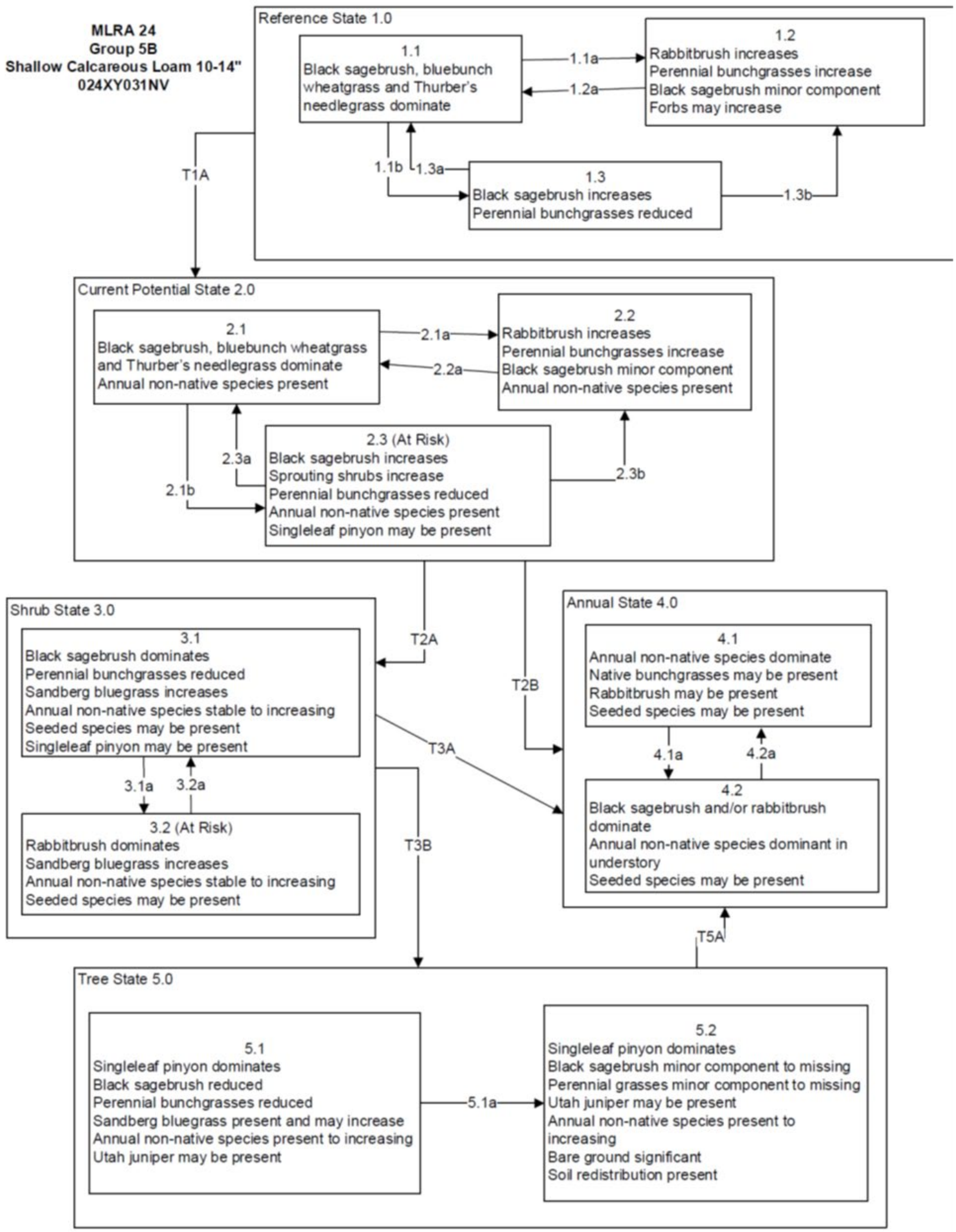
Desired State: 2.1- Black sagebrush, bluebunch wheatgrass and Thurber’s needlegrass dominate. Annual grasses present.

Potential Undesired State: 2.2-. Rabbitbrush increases. Perennial bunchgrass increases. Black sagebrush a minor component. Annual non-native species present.

Adaptive Management Procedures (AMP)

Post project implementation vegetation monitoring would be done to determine if objectives were being met. This may include but would not be limited to monitoring vegetation for community composition, diversity, vigor, productivity, and ground cover. If monitoring indicates a post implementation treatment site is moving toward an undesirable vegetation pathway or state, adaptive management procedures (Section 2.1.1. Adaptive Management) are in place and would be utilized to address the given situation on the specific project site. The adaptive management procedures may include but would not be limited to reseeding, pinyon-juniper removal, harrowing, seedling planting, the use of herbicide and fence construction to limit herbivore access to the site.

Shallow Calcareous Loam 10-14



Unit 2: 21 Mile Fire Restoration

Shallow Calcareous Loam 8-10"024XY030NV

Reference State 1.0 Community Pathways:

1.1a: Low severity fire resulting in a mosaic pattern.

1.1b: Time and lack of disturbance such as fire. Drought, herbivory, or combinations of these would reduce perennial grasses in the understory.

1.2a: Time and lack of disturbance such as fire.

1.3a: Low severity fire or herbivory resulting in a mosaic pattern.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community. Transition

T1A: Introduction of non-native plants. Current Potential State

2.0 Community Pathways:

2.1a: Fire or brush treatments (i.e. mowing) with minimal soil disturbance.

2.1b: Time and lack of disturbance such as fire. Drought, inappropriate grazing management, or combinations of these would reduce perennial grasses in the understory

.2.2a: Time and lack of disturbance such as fire, drought, inappropriate grazing management, or combinations of these.

2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance and/or grazing management that reduces shrubs would allow for an increase in perennial bunchgrasses.

2.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community. Transition

T2A: Time and lack of disturbance and/or inappropriate grazing management (to 3.1) or fire, soil disturbing brush treatments and/or inappropriate sheep grazing

(3.2).ransition T2B: Fire in at-risk community phase (from 2.3) may transition to annual state (4.0), soil disturbing treatments may also transition to an annual state. Shrub State 3.0

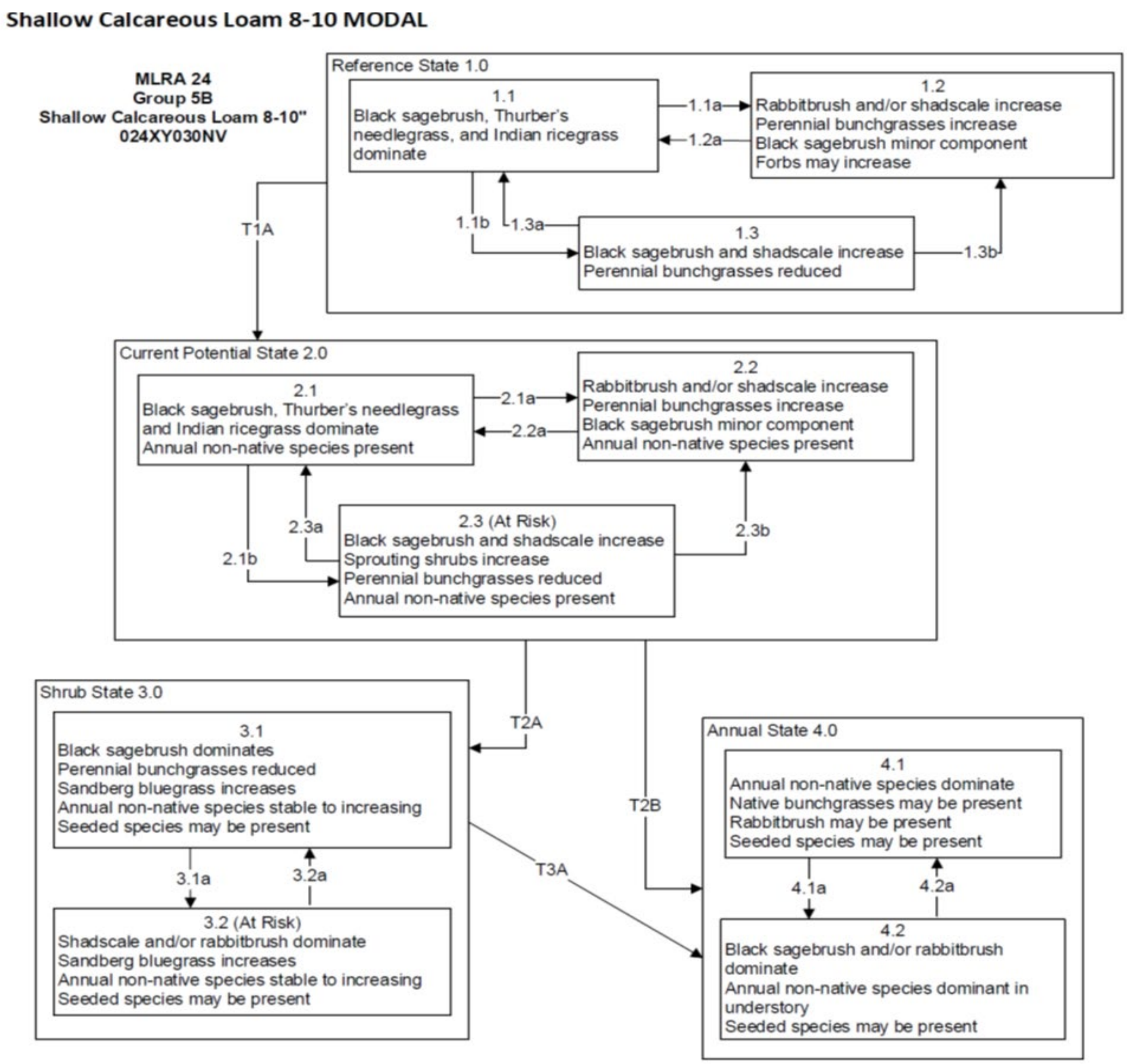
Community Pathways:3.1a: Fire and/or sheep grazing management which reduces black sagebrush. Brush treatments (i.e. mowing) with minimal soil disturbance.

3.2a: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows for the shrub component to recover. Transition

T3A: Fire and/or soil disturbing treatments (i.e. failed restoration attempts) (to 4.0).Annual State 4.0 Community Pathways:

4.1a: Time and lack of disturbance (unlikely to occur).

4.2a: Fire.



Shallow Calcareous Loam 10-14"024XY031NV

Reference State 1.0 Community Pathways:1.1a: Low severity fire resulting in a mosaic pattern.

1.1b: Time and lack of disturbance such as fire. Drought, herbivory, or combinations of these would reduce the perennial grasses in the understory.

1.2a: Time and lack of disturbance such as fire.

1.3a: Low severity fire or herbivory resulting in a mosaic pattern.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native plants. Current Potential State 2.0 Community Pathways:

2.1a: Fire or brush treatments (i.e. mowing) with minimal soil disturbance.

2.1b: Time and lack of disturbance such as fire. Drought, inappropriate grazing management, or combinations of these would reduce the perennial grasses in the understory. Trees may invade from neighboring sites

2.2a: Time and lack of disturbance such as fire, drought, inappropriate grazing management, or combinations of these.

2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance and/or grazing management that reduces shrubs would allow for an increase in perennial bunchgrasses.

2.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community. Transition

T2A: Time and lack of disturbance and/or inappropriate grazing management. Trees may invade from neighboring sites (to 3.1) or fire, soil disturbing brush treatments and/or inappropriate sheep grazing (3.2).

Transition T2B: Fire in at-risk community phase (from 2.3) may transition to annual state (4.0), soil disturbing treatments may also transition to an annual state.

Shrub State 3.0 Community Pathways:3.1a: Fire and/or sheep grazing management which reduces black sagebrush. Brush treatments (i.e. mowing) with minimal soil disturbance.

3.2a: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows for the shrub component to recover.

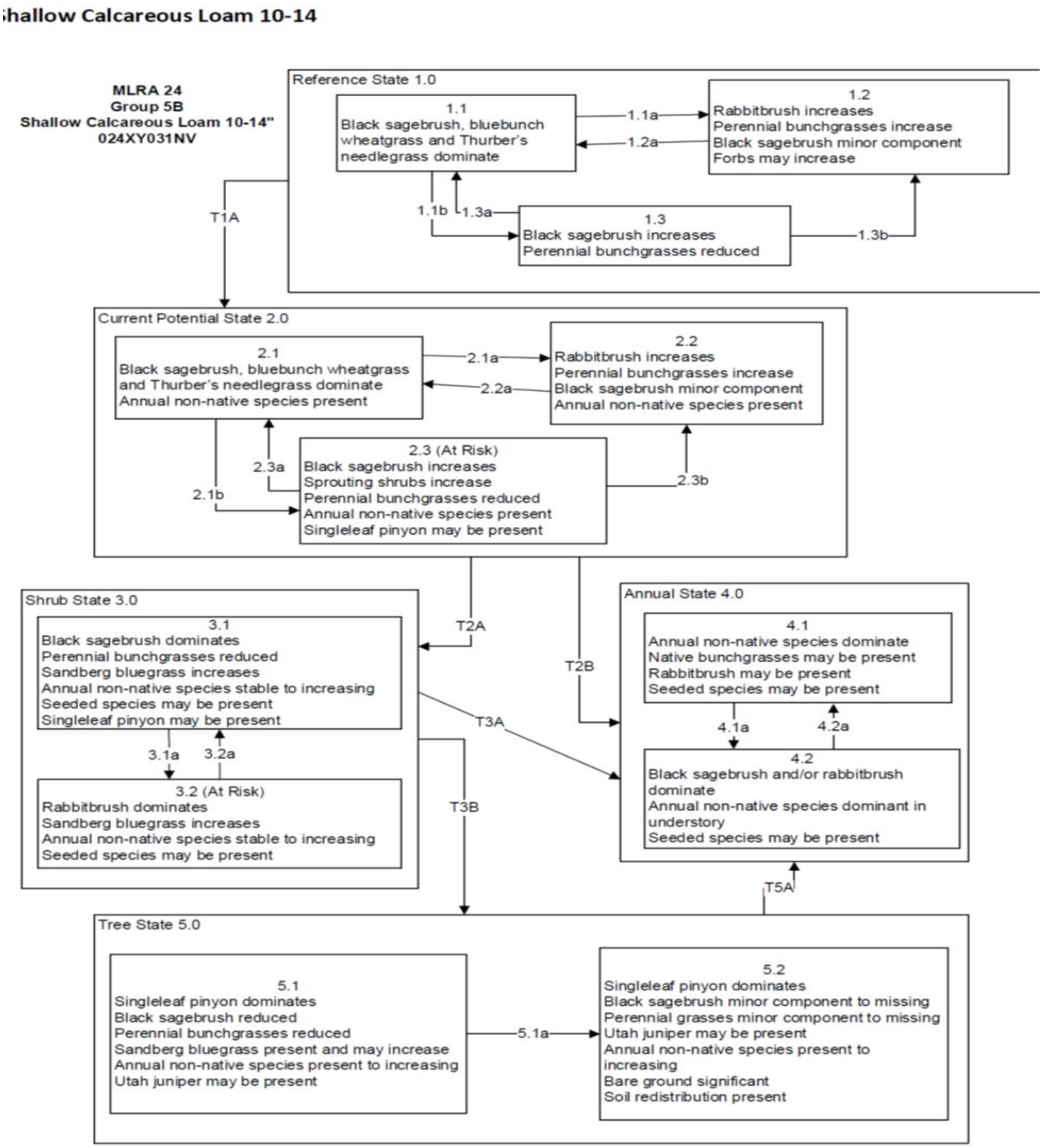
Transition T3A: Fire and/or soil disturbing treatments (i.e. failed restoration attempts) (to 4.0).

Transition T3B: Time and lack of disturbance allows for maturation of tree community, may be coupled with inappropriate grazing management (5.1).

Annual State 4.0 Community Pathways: 4.1a: Time and lack of disturbance (unlikely to occur). 4.2a: Fire.

Tree State 5.0 Community Pathways: 5.1a: Time and lack of disturbance allows for maturation of tree community. Transition

T5A: Catastrophic fire.



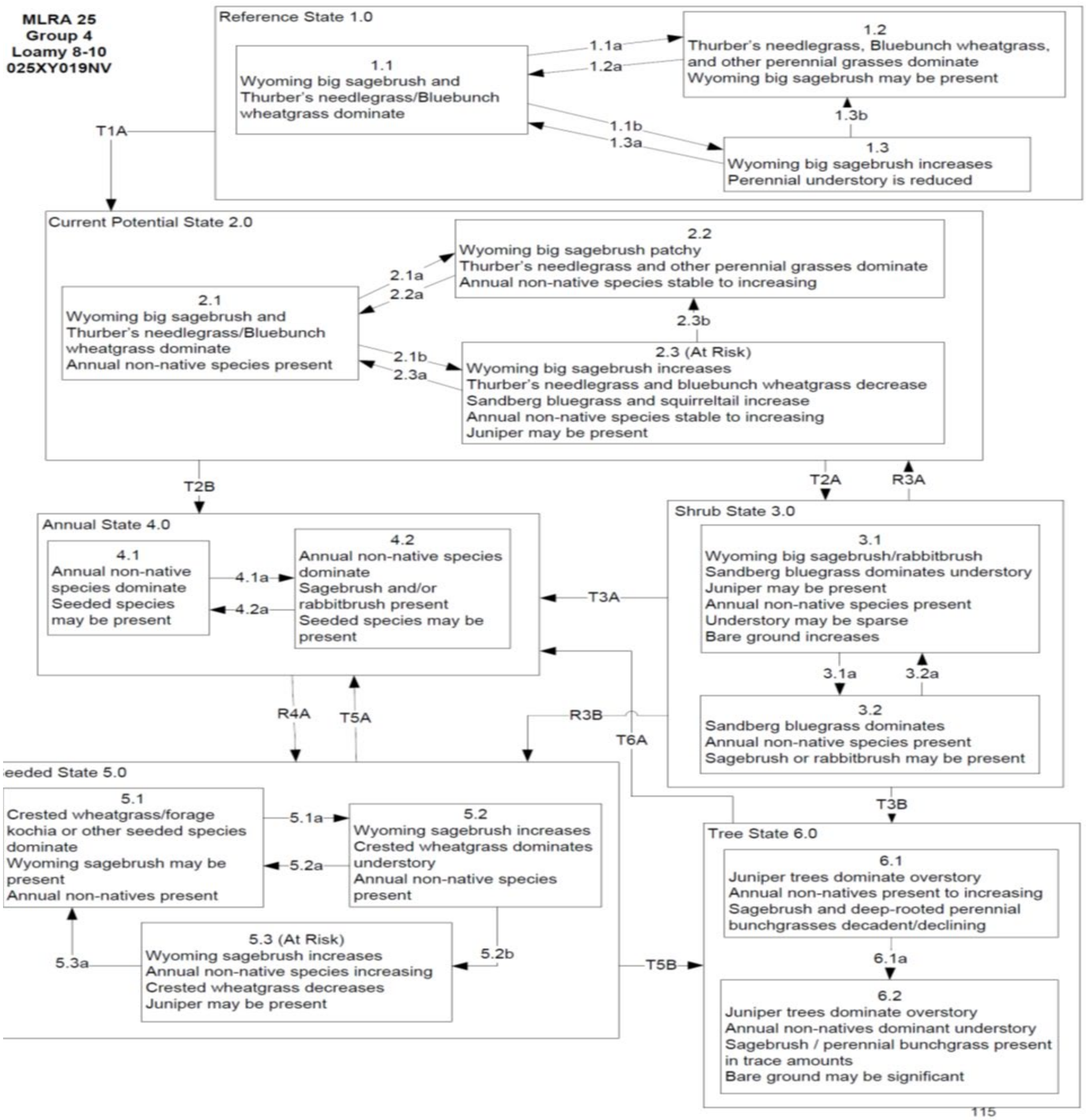
Loamy 8-10"025XY019NV

The Loamy 8-10" modal site occurs on low hills, fan remnants and partial ballenas on all exposures. Slopes range from 2 to 50 percent but slope gradients of 4 to 30 percent are most typical. Elevations are 4,500 to 6,000 feet. The soils of this site are typically moderately deep to deep. Soil depth is not important to the site concept; however, effective rooting depth is important. This site typically has an ochric epipedon, no abrupt horizon boundaries, no salinity, and typically has low available water capacity. Soil temperature regime is mesic and the moisture regime is aridic bordering on xeric. Many soils are modified with a high volume of gravels, cobbles or stones through their profile. The plant community is dominated by Thurber's needlegrass, bluebunch wheatgrass, and Wyoming big sagebrush. Production ranges from 400 to 800 lbs/acre.

Loamy 8-10" 025XY019NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs
1.1b:Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to early/mid-seral community. Transition T1A: Introduction of non-native species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to a early/mid-seral community.
Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses will lead to phase 3.1.
Soil disturbing treatments will lead to phase 3.2.
Transition T2B: Catastrophic fire (to 4.1); inappropriate cattle/horse grazing management that removes bunchgrasses, favors shrubs and
promotes the presence of non-native annual species (to 4.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
3.2a: Time and lack of disturbance.
Restoration R3A: Brush management and seeding of native deep rooted bunchgrasses (probability of success is low).
Restoration R3B: Brush management and seeding of crested wheatgrass and/or other non-native desirable species.
Transition T3A: Fire and/or soil disturbing treatments.
Transition T3B: Time and lack of disturbance such as fire favors an increase in tree dominance (from phase 3.1.)
Annual State 4.0 Community Phase Pathways

4.1a: Time and lack of disturbance. Big sagebrush is unlikely to reestablish and may take many years.
4.2a: High-severity fire.
Restoration R4A: Application of herbicide and seeding of desired species (probability of success best immediately following fire).
Seeded State 5.0 Community Phase Pathways
5.1a: Time without disturbance.
5.2a: Fire, brush management, or Aroga moth infestation reduces shrub component.
5.2b: Inappropriate grazing management decreases perennial bunchgrass understory.
5.3a: Fire, brush management, Aroga moth infestation.
Transition T5A: Catastrophic fire (coming from 5.3).
Transition T5B: Time and lack of disturbance allows trees to dominate site resources.
Tree State 6.0 Community Phase Pathways
6.1a: Time without disturbance.
Transition T6A: Catastrophic fire that kills trees. Inappropriate tree removal practices may also lead to dominance by non-native annuals.



Narrative

Shallow Calcareous Loam 8-10"024XY030NV

Current State: 4.1a- Annual and non-native species dominate. Native species may be present. Seeded species may be present.

Desired State: 2.1- Black sagebrush, indian ricegrass, and Thurber's needlegrass dominate. Few tree seedlings and saplings occur in understory. Annual non-native species present.

Potential Undesired State: Community could go to annual state 4.2 or remain in annual state 4.1.

Shallow Calcareous Loam 10-14"024XY031NV

Current State: 4.1a- Annual and non-native species dominate. Native species may be present. Seeded species may be present.

Desired State: 2.1- Black sagebrush, Indian ricegrass, and Thurber's needlegrass dominate. Few tree seedlings and saplings occur in understory. Annual non-native species present.

Potential Undesired State: Community could go to tree state 5.1 or 5.2.

Loamy 8-10" 025XY019NV

Current State: 4.1- Annual non-native species dominate. Seeded species may be present.

Desired State: 2.1- Wyoming big sagebrush and Thurber’s needlegrass/bluebunch wheatgrass dominates. Annual non-native species present.

Potential Undesired State: Community could go to annual state 4.2 or remain in annual state 4.1.

Adaptive Management Procedures (AMP)

Post project implementation vegetation monitoring would be done to determine if objectives were being met. This may include but would not be limited to monitoring vegetation for community composition, diversity, vigor, productivity, and ground cover. If monitoring indicates a post implementation treatment site is moving toward an undesirable vegetation pathway or state, adaptive management procedures (Section 2.1.1. Adaptive Management) are in place and would be utilized to address the given situation on the specific project site. The adaptive management procedures may include but would not be limited to reseeding, pinyon-juniper removal, harrowing, seedling planting, the use of herbicide and fence construction to limit herbivore access to the site.

Unit 3: 21 Bell Canyon Fire Restoration

Shallow Calcareous Loam 8-10"024XY030NV

Reference State 1.0 Community Pathways:

1.1a: Low severity fire resulting in a mosaic pattern.

1.1b: Time and lack of disturbance such as fire. Drought, herbivory, or combinations of these would reduce perennial grasses in the understory.

1.2a: Time and lack of disturbance such as fire.

1.3a: Low severity fire or herbivory resulting in a mosaic pattern.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community. Transition

T1A: Introduction of non-native plants. Current Potential State

2.0 Community Pathways:

2.1a: Fire or brush treatments (i.e., mowing) with minimal soil disturbance.

2.1b: Time and lack of disturbance such as fire. Drought, inappropriate grazing management, or combinations of these would reduce perennial grasses in the understory

.2.2a: Time and lack of disturbance such as fire, drought, inappropriate grazing management, or combinations of these.

2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance and/or grazing management that reduces shrubs would allow for an increase in perennial bunchgrasses.

2.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community. Transition

T2A: Time and lack of disturbance and/or inappropriate grazing management (to 3.1) or fire, soil disturbing brush treatments and/or inappropriate sheep grazing

(3.2). Transition T2B: Fire in at-risk community phase (from 2.3) may transition to annual state (4.0), soil disturbing treatments may also transition to an annual state. Shrub State 3.0

Community Pathways:3.1a: Fire and/or sheep grazing management which reduces black sagebrush. Brush treatments (i.e., mowing) with minimal soil disturbance.

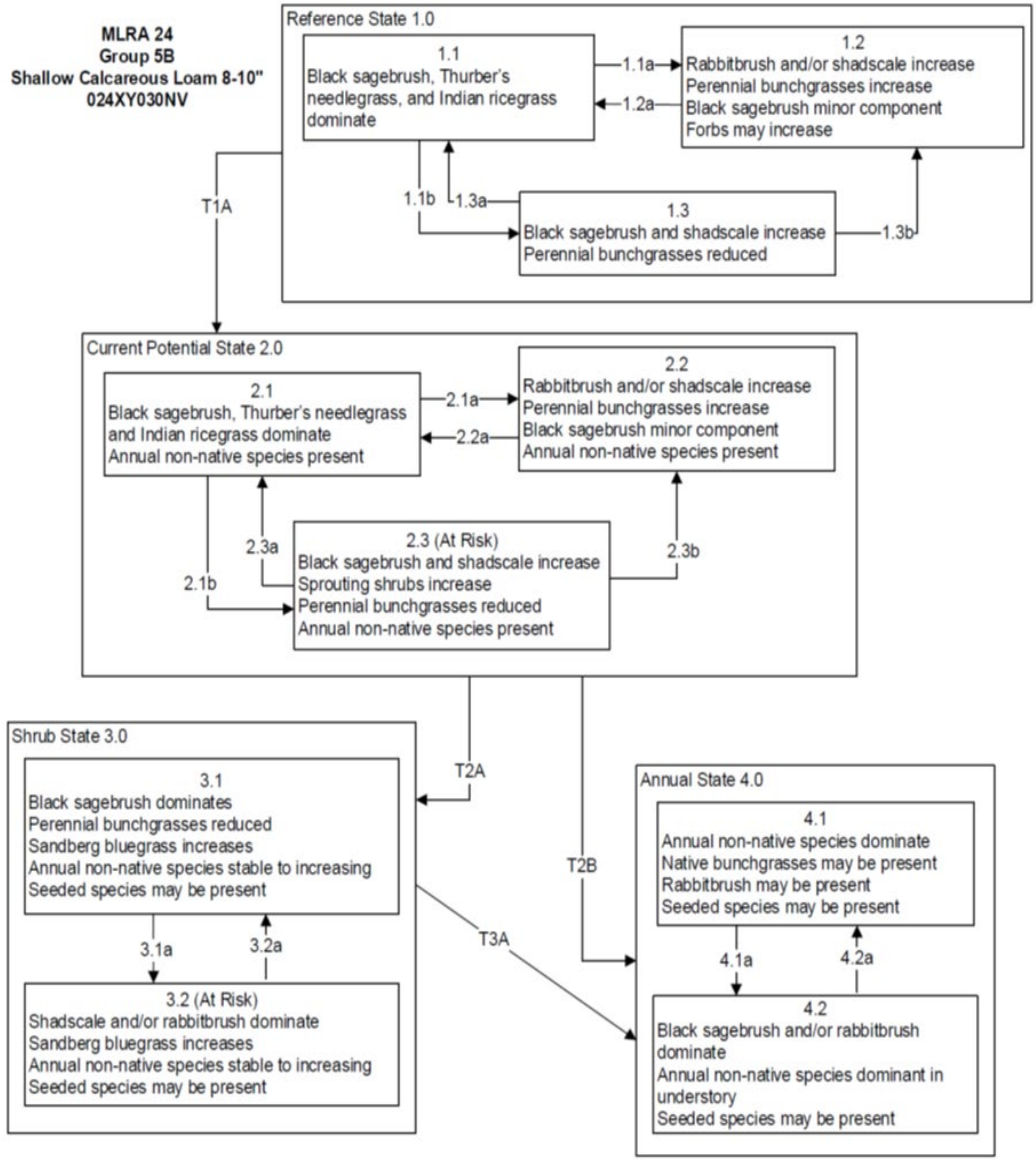
3.2a: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows for the shrub component to recover. Transition

T3A: Fire and/or soil disturbing treatments (i.e. failed restoration attempts) (to 4.0). Annual State 4.0 Community Pathways:

4.1a: Time and lack of disturbance (unlikely to occur).

4.2a: Fire.

Shallow Calcareous Loam 8-10 MODAL



Shallow Calcareous Loam 10-14"024XY031NV

Reference State 1.0 Community Pathways:1.1a: Low severity fire resulting in a mosaic pattern.

1.1b: Time and lack of disturbance such as fire. Drought, herbivory, or combinations of these would reduce the perennial grasses in the understory.

1.2a: Time and lack of disturbance such as fire.

1.3a: Low severity fire or herbivory resulting in a mosaic pattern.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native plants. Current Potential State 2.0 Community Pathways:

2.1a: Fire or brush treatments (i.e. mowing) with minimal soil disturbance.

2.1b: Time and lack of disturbance such as fire. Drought, inappropriate grazing management, or combinations of these would reduce the perennial grasses in the understory. Trees may invade from neighboring sites

2.2a: Time and lack of disturbance such as fire, drought, inappropriate grazing management, or combinations of these.

2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance and/or grazing management that reduces shrubs would allow for an increase in perennial bunchgrasses.

2.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community. Transition

T2A: Time and lack of disturbance and/or inappropriate grazing management. Trees may invade from neighboring sites (to 3.1) or fire, soil disturbing brush treatments and/or inappropriate sheep grazing (3.2).

Transition T2B: Fire in at-risk community phase (from 2.3) may transition to annual state (4.0), soil disturbing treatments may also transition to an annual state.

Shrub State 3.0 Community Pathways:3.1a: Fire and/or sheep grazing management which reduces black sagebrush. Brush treatments (i.e. mowing) with minimal soil disturbance.

3.2a: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows for the shrub component to recover.

Transition T3A: Fire and/or soil disturbing treatments (i.e. failed restoration attempts) (to 4.0).

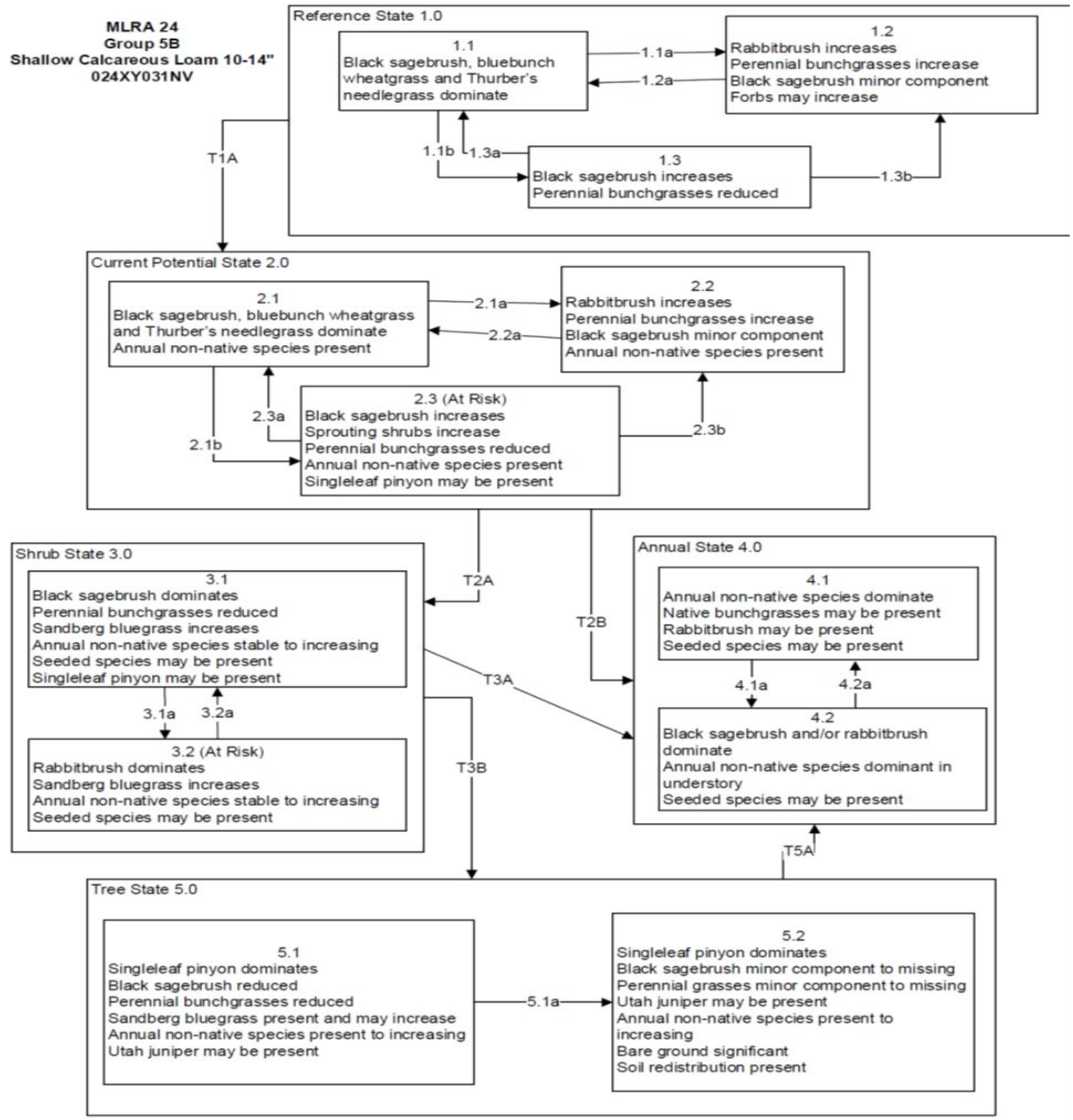
Transition T3B: Time and lack of disturbance allows for maturation of tree community, may be coupled with inappropriate grazing management (5.1).

Annual State 4.0 Community Pathways:4.1a: Time and lack of disturbance (unlikely to occur). 4.2a: Fire.

Tree State 5.0 Community Pathways:5.1a: Time and lack of disturbance allows for maturation of tree community. Transition

T5A: Catastrophic fire.

Shallow Calcareous Loam 10-14



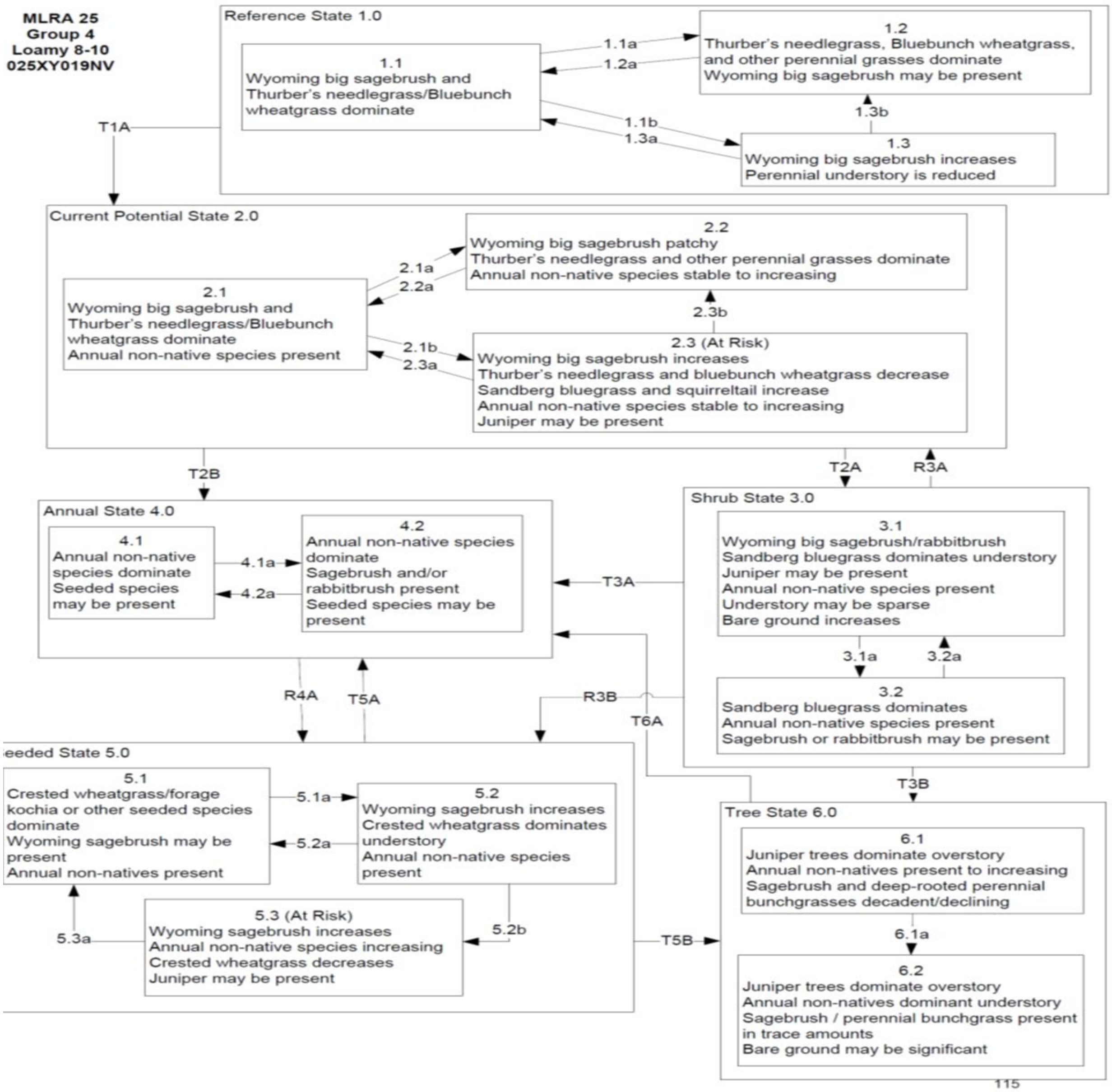
Loamy 8-10"025XY019NV

The Loamy 8-10" modal site occurs on low hills, fan remnants and partial ballenas on all exposures. Slopes range from 2 to 50 percent but slope gradients of 4 to 30 percent are most typical. Elevations are 4,500 to 6,000 feet. The soils of this site are typically moderately deep to deep. Soil depth is not important to the site concept; however, effective rooting depth is important. This site typically has an ochric epipedon, no abrupt horizon boundaries, no salinity, and typically has low available water capacity. Soil temperature regime is mesic and the moisture regime is aridic bordering on xeric. Many soils are modified with a high volume of gravels, cobbles or stones through their profile. The plant community is dominated by Thurber's needlegrass, bluebunch wheatgrass, and Wyoming big sagebrush. Production ranges from 400 to 800 lbs./acre.

Loamy 8-10" 025XY019NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs
1.1b:Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to early/mid-seral community. Transition T1A: Introduction of non-native species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to a early/mid-seral community.
Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses will lead to phase 3.1.
Soil disturbing treatments will lead to phase 3.2.
Transition T2B: Catastrophic fire (to 4.1); inappropriate cattle/horse grazing management that removes bunchgrasses, favors shrubs and
promotes the presence of non-native annual species (to 4.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
3.2a: Time and lack of disturbance.
Restoration R3A: Brush management and seeding of native deep-rooted bunchgrasses (probability of success is low).
Restoration R3B: Brush management and seeding of crested wheatgrass and/or other non-native desirable species.
Transition T3A: Fire and/or soil disturbing treatments.
Transition T3B: Time and lack of disturbance such as fire favors an increase in tree dominance (from phase 3.1.)
Annual State 4.0 Community Phase Pathways

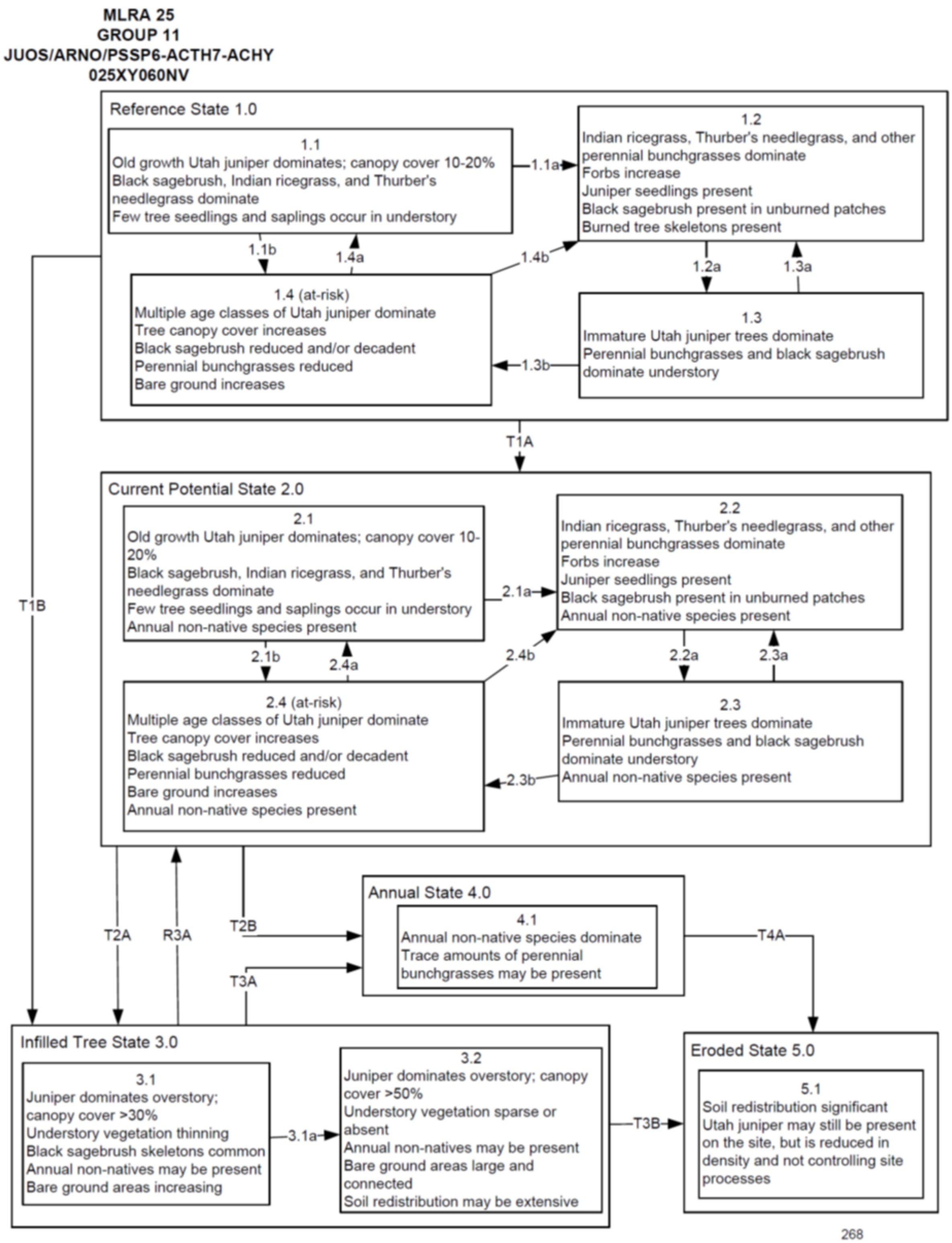
4.1a: Time and lack of disturbance. Big sagebrush is unlikely to reestablish and may take many years.
4.2a: High-severity fire.
Restoration R4A: Application of herbicide and seeding of desired species (probability of success best immediately following fire).
Seeded State 5.0 Community Phase Pathways
5.1a: Time without disturbance.
5.2a: Fire, brush management, or Aroga moth infestation reduces shrub component.
5.2b: Inappropriate grazing management decreases perennial bunchgrass understory.
5.3a: Fire, brush management, Aroga moth infestation.
Transition T5A: Catastrophic fire (coming from 5.3).
Transition T5B: Time and lack of disturbance allows trees to dominate site resources.
Tree State 6.0 Community Phase Pathways
6.1a: Time without disturbance.
Transition T6A: Catastrophic fire that kills trees. Inappropriate tree removal practices may also lead to dominance by non-native annuals.



JUOS/ARNO/PSSP6-ACTH7-ACHY 025XY060NV

Reference State 1.0 Community Pathways
1.1a: High severity crown fire reduces or eliminates tree cover.
1.1b: Time and lack of disturbance such as fire, disease, or drought allows younger trees to infill.
1.2a: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial grass understory.
1.3a: Fire.
1.3b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial grass understory.
1.4a: Low severity fire, insect infestation, or disease removes individual trees and reduces total tree cover.

1.4b: High severity crown fire reduces or eliminates tree cover.
Transition T1A: Introduction of non-native annual species.
Transition T1B: Time and a lack of disturbance allows for trees to dominate site resources; may be coupled with inappropriate grazing
management that favors shrub and tree dominance.
Current Potential State 1.0 Community Pathways
2.1a: High severity crown fire reduces or eliminates tree cover.
2.1b: Time and lack of disturbance such as fire, disease, or drought allows younger trees to infill.
2.2a: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial grass understory.
2.3a: Fire.
2.3b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial grass understory.
2.4a: Low severity fire, insect infestation, or disease removes individual trees and reduces total tree cover.
2.4b: High severity crown fire reduces or eliminates tree cover.
Transition T2A: Time and a lack of disturbance allows for trees to dominate site resources; may be coupled with inappropriate grazing
management that favors shrub and tree dominance.
Transition T2B: Catastrophic fire.
Infilled Tree State 3.0 Community Pathways
3.1a: Time and lack of disturbance such as fire, disease, or drought allows younger trees to infill.
Transition T3A: Catastrophic fire.
Transition T3B: Loss of understory vegetation destabilizes soil surface. Inappropriate grazing management may further reduce the perennial
grass understory.
Restoration Pathway R3A: Thinning of trees coupled with seeding. Success unlikely from phase 3.2.
Annual State
4.0 Community Pathways
None.
Transition T4A: Catastrophic fire or multiple fires.
Eroded State 5.0 Community Pathways
None.


MLRA 25
GROUP 11
JUOS/ARNO/PSSP6-ACTH7-ACHY
025XY060NV
Reference State 1.0
1.1
Old growth Utah juniper dominates; canopy cover 10-20%
Black sagebrush, Indian ricegrass, and Thurber's needlegrass dominate
Few tree seedlings and saplings occur in understory
1.1a
1.2
Indian ricegrass, Thurber's needlegrass, and other perennial bunchgrasses dominate
Forbs increase
Juniper seedlings present
Black sagebrush present in unburned patches
Burned tree skeletons present
1.1b
1.4a
1.4b
1.2a
1.3a
1.4 (at-risk)
Multiple age classes of Utah juniper dominate
Tree canopy cover increases
Black sagebrush reduced and/or decadent
Perennial bunchgrasses reduced
Bare ground increases
1.3b
1.3
Immature Utah juniper trees dominate
Perennial bunchgrasses and black sagebrush dominate understory
T1A
T1B
Current Potential State 2.0
2.1
Old growth Utah juniper dominates; canopy cover 10-20%
Black sagebrush, Indian ricegrass, and Thurber's needlegrass dominate
Few tree seedlings and saplings occur in understory
Annual non-native species present
2.1a
2.2
Indian ricegrass, Thurber's needlegrass, and other perennial bunchgrasses dominate
Forbs increase
Juniper seedlings present
Black sagebrush present in unburned patches
Annual non-native species present
2.1b
2.4a
2.4b
2.2a
2.3a
2.4 (at-risk)
Multiple age classes of Utah juniper dominate
Tree canopy cover increases
Black sagebrush reduced and/or decadent
Perennial bunchgrasses reduced
Bare ground increases
Annual non-native species present
2.3b
2.3
Immature Utah juniper trees dominate
Perennial bunchgrasses and black sagebrush dominate understory
Annual non-native species present
T2A
R3A
T2B
T3A
Annual State 4.0
4.1
Annual non-native species dominate
Trace amounts of perennial bunchgrasses may be present
T4A
Infilled Tree State 3.0
3.1
Juniper dominates overstory; canopy cover >30%
Understory vegetation thinning
Black sagebrush skeletons common
Annual non-natives may be present
Bare ground areas increasing
3.1a
3.2
Juniper dominates overstory; canopy cover >50%
Understory vegetation sparse or absent
Annual non-natives may be present
Bare ground areas large and connected
Soil redistribution may be extensive
T3B
Eroded State 5.0
5.1
Soil redistribution significant
Utah juniper may still be present on the site, but is reduced in density and not controlling site processes
268

Narrative

Shallow Calcareous Loam 8-10"024XY030NV

Current State: 4.2- Black sagebrush and/or rabbitbrush dominate. Annual non-native species dominant in understory. Seeded species may be present in 4.2a.

Desired State: 2.1- Old growth Utah juniper dominates; canopy cover 10-20%. Black sagebrush, Indian ricegrass, and Thurber's needlegrass dominate. Few tree seedlings and saplings occur in understory. Annual non-native species present.

Potential Undesired State: Community could go to annual state 4.2.

Shallow Calcareous Loam 10-14"024XY031NV

Current State: 2.3 (at risk)- Black sagebrush increases. Sprouting shrubs increase. Perennial bunchgrasses are reduced. Annual non-native species are present. Single leaf pinyon may be present.

Desired State: 2.1- Black sagebrush, bluebunch wheatgrass and Thurber's needlegrass dominate. Annual non-native species present

Potential Undesired State: Community could go to tree state 5.1 or 5.2.

Loamy 8-10" 025XY019NV

Current State: 2.3 (at risk)- Wyoming big sagebrush increases. Thurber's needlegrass and bluebunch wheatgrass decrease. Sandberg bluegrass and squirreltail increase. Annual non-native species stable to increasing. Juniper may be present.

Desired State: 2.1- Wyoming big sagebrush and Thurber's needlegrass/bluebunch wheatgrass dominates. Annual non-native species present.

Potential Undesired State: Community could go to seeded state 5.1, 5.2 or 5.3 or community could go to tree state 6.1 or 6.2.

JUOS/ARNO/PSSP6-ACTH7-ACHY 025XY060NV

Current State: 2.2- Indian ricegrass, Thurber's needlegrass, and other perennial bunchgrasses dominate. Forbs increase. Juniper seedlings present. Black sagebrush present in unburned patches.
Annual non-native species present.

Desired State: 1.2- Indian ricegrass, Thurber's needlegrass, and other perennial bunchgrasses dominate. Forbs increase. Juniper seedlings present. Black sagebrush present in unburned patches. Burned tree skeletons present

Potential Undesired State: Community could go to annual state 4.1 or eroded state 5.1.

Adaptive Management Procedures (AMP)

Post project implementation vegetation monitoring would be done to determine if objectives were being met. This may include but would not be limited to monitoring vegetation for community composition, diversity, vigor, productivity, and ground cover. If monitoring indicates a post implementation treatment site is moving toward an undesirable vegetation pathway or state, adaptive management procedures (Section 2.1.1. Adaptive Management) are in place and would be utilized to address the given situation on the specific project site. The adaptive management procedures may include but would not be limited to reseeding, pinyon-juniper removal, harrowing, seedling planting, the use of herbicide and fence construction to limit herbivore access to the site.

Unit 4: Cow Creek Fire Restoration

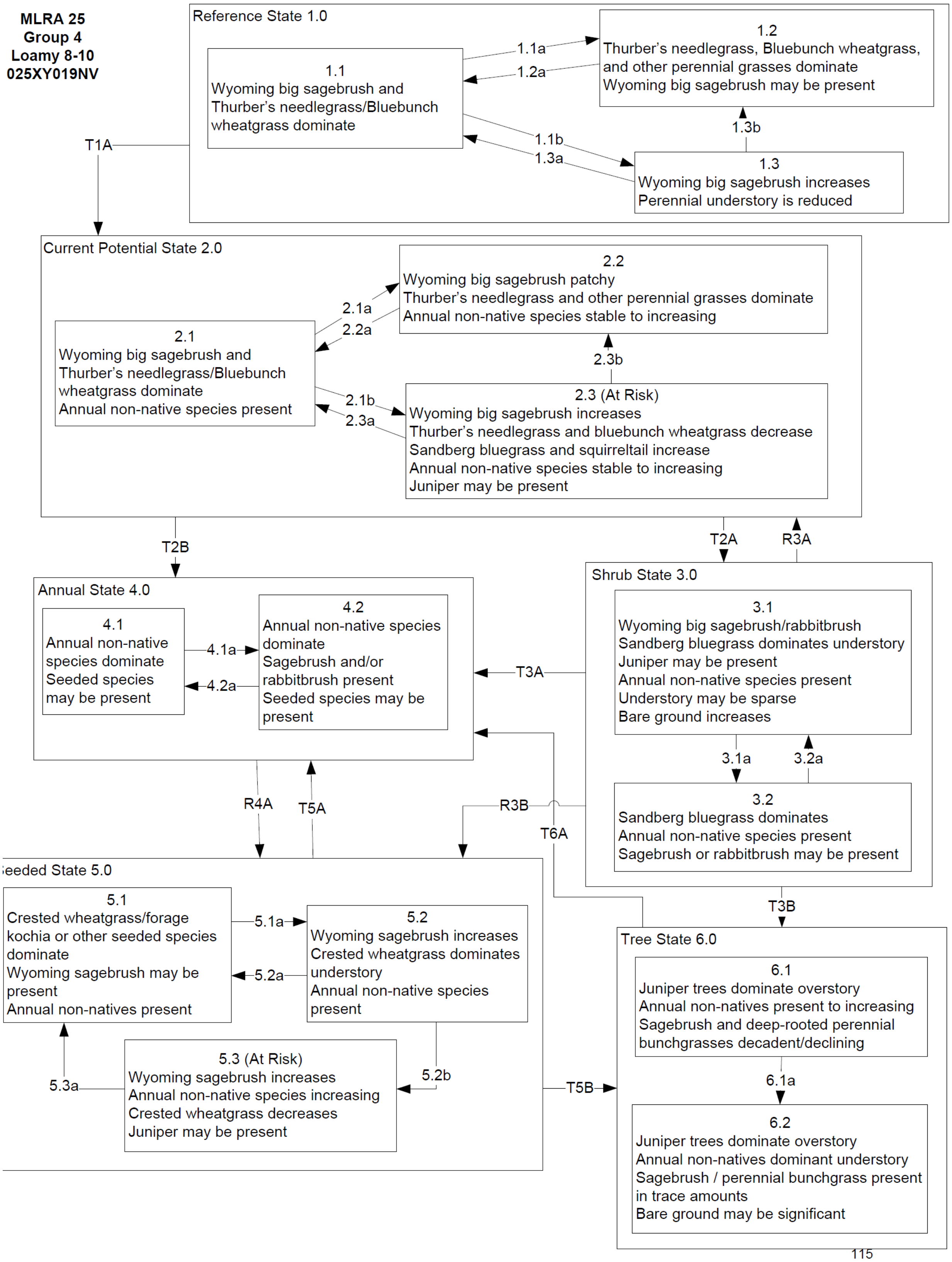
Loamy 8-10"025XY019NV

The Loamy 8-10" modal site occurs on low hills, fan remnants and partial ballenas on all exposures. Slopes range from 2 to 50 percent but slope gradients of 4 to 30 percent are most typical. Elevations are 4,500 to 6,000 feet. The soils of this site are typically moderately deep to deep. Soil depth is not important to the site concept; however, effective rooting depth is important. This site typically has an ochric epipedon, no abrupt horizon boundaries, no salinity, and typically has low available water capacity. Soil temperature regime is mesic, and the moisture regime is aridic bordering on xeric. Many soils are modified with a high volume of gravels, cobbles or stones through their profile. The plant community is dominated by Thurber 's needlegrass, bluebunch wheatgrass, and Wyoming big sagebrush. Production ranges from 400 to 800 lbs/acre.

Loamy 8-10" 025XY019NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/midseralcommunity, dominated by grasses and forbs
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to early/mid-seral community. Transition T1A: Introduction of non-native species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.

2.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to a early/mid-seral community.
Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses will lead to phase 3.1.
Soil disturbing treatments will lead to phase 3.2.
Transition T2B: Catastrophic fire (to 4.1); inappropriate cattle/horse grazing management that removes bunchgrasses, favors shrubs and
promotes the presence of non-native annual species (to 4.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
3.2a: Time and lack of disturbance.
Restoration R3A: Brush management and seeding of native deep-rooted bunchgrasses (probability of success is low).
Restoration R3B: Brush management and seeding of crested wheatgrass and/or other non-native desirable species.
Transition T3A: Fire and/or soil disturbing treatments.
Transition T3B: Time and lack of disturbance such as fire favors an increase in tree dominance (from phase 3.1.)
Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance. Big sagebrush is unlikely to reestablish and may take many years.
4.2a: High-severity fire.
Restoration R4A: Application of herbicide and seeding of desired species (probability of success best immediately following fire).
Seeded State 5.0 Community Phase Pathways
5.1a: Time without disturbance.
5.2a: Fire, brush management, or Aroga moth infestation reduces shrub component.
5.2b: Inappropriate grazing management decreases perennial bunchgrass understory.
5.3a: Fire, brush management, Aroga moth infestation.
Transition T5A: Catastrophic fire (coming from 5.3).
Transition T5B: Time and lack of disturbance allows trees to dominate site resources.
Tree State 6.0 Community Phase Pathways
6.1a: Time without disturbance.
Transition T6A: Catastrophic fire that kills trees. Inappropriate tree removal practices may also lead to dominance by non-native annuals.



MLRA 25
Group 4
Loamy 8-10
025XY019NV
Reference State 1.0
1.1
Wyoming big sagebrush and Thurber's needlegrass/Bluebunch wheatgrass dominate
1.2
Thurber's needlegrass, Bluebunch wheatgrass, and other perennial grasses dominate
Wyoming big sagebrush may be present
1.3
Wyoming big sagebrush increases
Perennial understory is reduced
1.1a
1.2a
1.1b
1.3a
1.3b
T1A
Current Potential State 2.0
2.1
Wyoming big sagebrush and Thurber's needlegrass/Bluebunch wheatgrass dominate
Annual non-native species present
2.2
Wyoming big sagebrush patchy
Thurber's needlegrass and other perennial grasses dominate
Annual non-native species stable to increasing
2.3 (At Risk)
Wyoming big sagebrush increases
Thurber's needlegrass and bluebunch wheatgrass decrease
Sandberg bluegrass and squirreltail increase
Annual non-native species stable to increasing
Juniper may be present
2.1a
2.2a
2.1b
2.3a
2.3b
T2B
T2A
R3A
Annual State 4.0
4.1
Annual non-native species dominate
Seeded species may be present
4.2
Annual non-native species dominate
Sagebrush and/or rabbitbrush present
Seeded species may be present
4.1a
4.2a
T3A
Shrub State 3.0
3.1
Wyoming big sagebrush/rabbitbrush
Sandberg bluegrass dominates understory
Juniper may be present
Annual non-native species present
Understory may be sparse
Bare ground increases
3.2
Sandberg bluegrass dominates
Annual non-native species present
Sagebrush or rabbitbrush may be present
3.1a
3.2a
R4A
T5A
R3B
T6A
T3B
Seeded State 5.0
5.1
Crested wheatgrass/forage kochia or other seeded species dominate
Wyoming sagebrush may be present
Annual non-natives present
5.2
Wyoming sagebrush increases
Crested wheatgrass dominates understory
Annual non-native species present
5.3 (At Risk)
Wyoming sagebrush increases
Annual non-native species increasing
Crested wheatgrass decreases
Juniper may be present
5.1a
5.2a
5.2b
5.3a
T5B
Tree State 6.0
6.1
Juniper trees dominate overstory
Annual non-natives present to increasing
Sagebrush and deep-rooted perennial bunchgrasses decadent/declining
6.2
Juniper trees dominate overstory
Annual non-natives dominant understory
Sagebrush / perennial bunchgrass present in trace amounts
Bare ground may be significant
6.1a
115

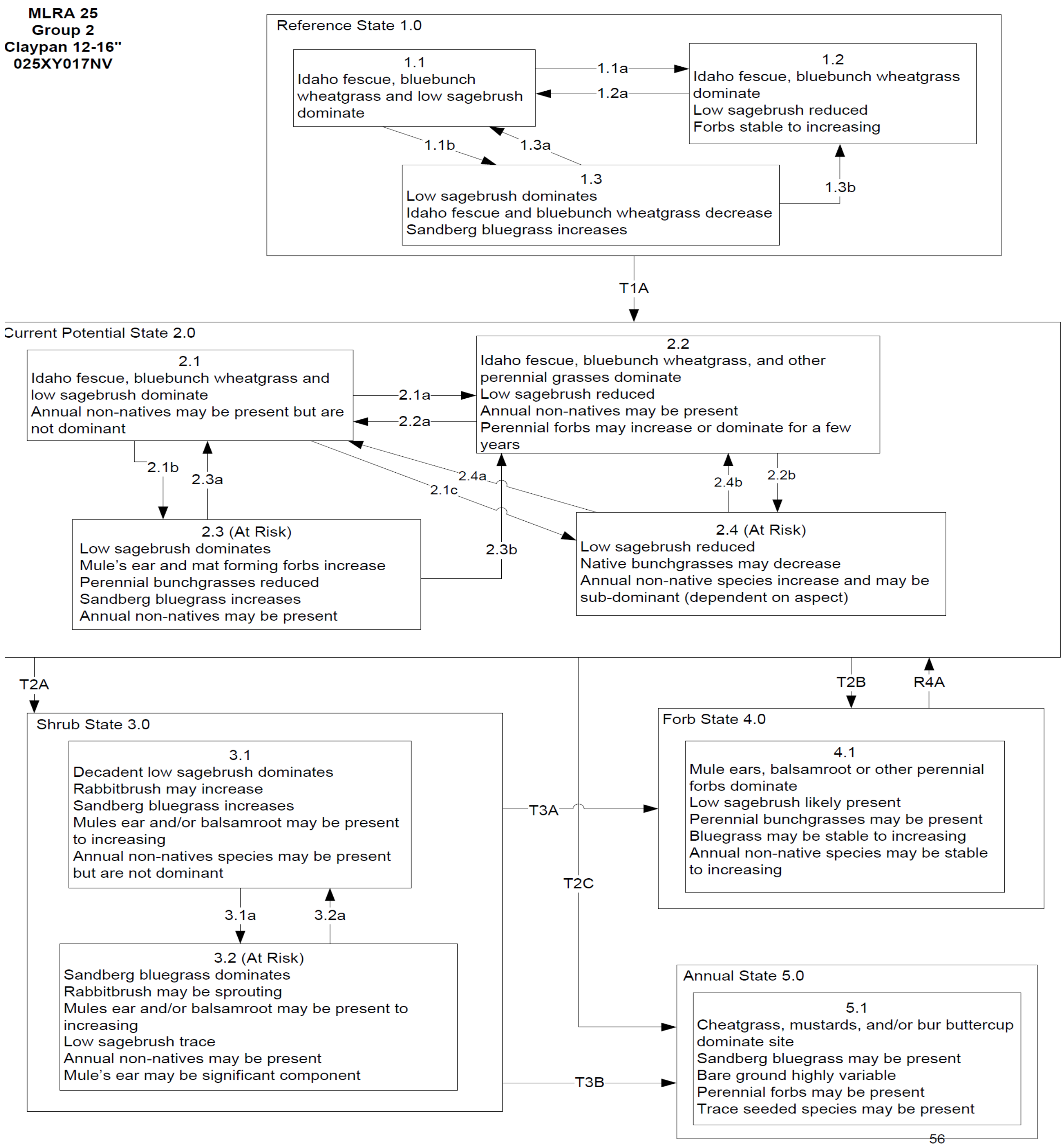
Claypan 12-16 025XY017NV

The Claypan 12-16” modal site occurs on summits and side slopes of mountains, hills, erosional fan remnants and rock-pediments on all aspects. Slopes range from 4 to 50 percent, with less than 30 percent typical. Elevations are 6000 to 8000 feet. Soils on this site are derived from volcanic rock and a loess mantel high in ash. Soils are shallow to an abrupt argillic horizon. Soils are well drained. Periodic wet, non-satiated conditions exist in surface horizons for brief periods in the spring resulting in poor aeration. Soil temperature regime is frigid, and the moisture regime is aridic bordering on xeric. Pedestalling of shallow rooted plants from frost heaving is normal on this site. The plant community is dominated by Idaho fescue, bluebunch wheatgrass and low sagebrush. Production ranges from 400 to 900 lbs./acre.

Claypan 12-16 025XY017NV

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance. Excessive herbivory and/or long-term drought may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire creates sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid seral community.
Transition T1A: Introduction of non-native species
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid seral
community dominated by grasses and forbs.
2.1b: Time and lack of disturbance. Inappropriate grazing management and/or long-term drought may also reduce perennial understory.
2.1c: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.2a: Time and lack of disturbance allows for shrub regeneration.
2.2b: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatments with minimal soil disturbance; late-fall/winter grazing causing
mechanical damage to sagebrush would reduce the shrub overstory.
2.3b: High severity fire significantly reduces sagebrush cover leading to early/mid seral community.
2.4a: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer precipitation)
2.4b: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer precipitation)
Transition T2A: Grazing management favoring shrubs and/or Mule’s ear/balsamroot.
Transition T2B: Inappropriate grazing management that promotes dominance of forbs; this may be coupled with fire (4.1).
Transition T2C: Catastrophic fire and/or soil disturbing treatments such as drill seeding, roller chopper, Lawson aerator etc. Probability of
success of seeding on this site is low (5.1).
Shrub State 3.0 Community Pathways

3.1a: Fire.
3.2a: Time without disturbance.
Transition T3A: Inappropriate grazing management promotes dominance of forbs; this may be coupled with fire (4.1).
Transition T3B: Catastrophic fire or multiple fires. Bare ground levels depend on variations in annual precipitation (5.1)
Forb State 4.0 Community Pathways
None
Restoration R4A: Herbicide treatment may be coupled with seeding of desired species.
Annual State 5.0 Community Pathways
None

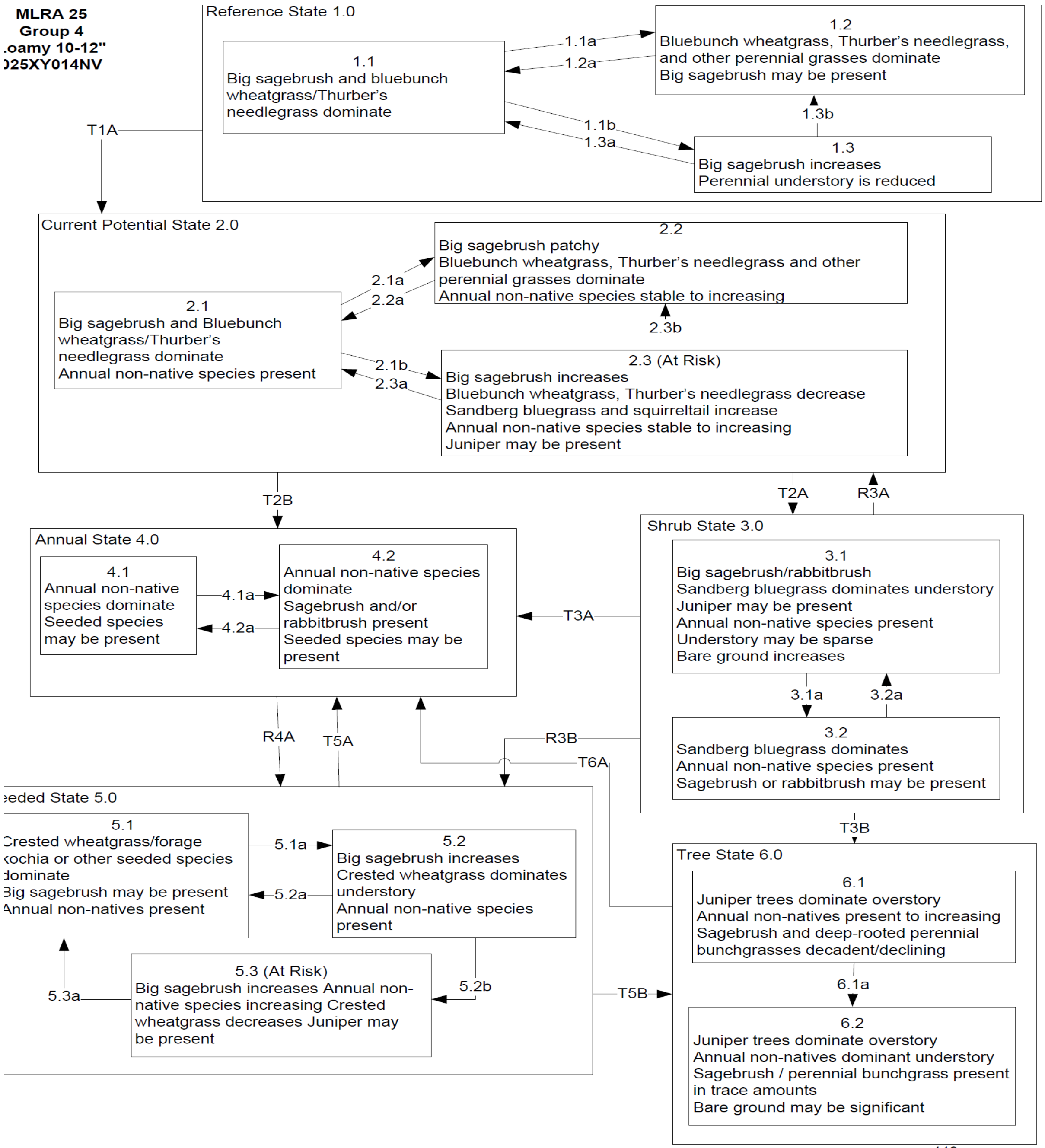


Loamy 10-12" 025XY014NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral

community, dominated by grasses and forbs
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to a early/mid-seral community.
Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses will lead to phase 3.1.
Soil disturbing treatments will lead to phase 3.2.
Transition T2B: Catastrophic fire (to 4.1); inappropriate cattle/horse grazing management that removes bunchgrasses, favors shrubs and
promotes the presence of non-native annual species (to 4.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
3.2a: Time and lack of disturbance.
Restoration R3A: Brush management and seeding of native deep-rooted bunchgrasses (probability of success is low).
Restoration R3B: Brush management and seeding of crested wheatgrass and/or other non-native desirable species.
Transition T3A: Fire and/or soil disturbing treatments.
Transition T3B: Time and lack of disturbance such as fire favors an increase in tree dominance (from phase 3.1.)
Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance. Big sagebrush is unlikely to reestablish and may take many years.
4.2a: High-severity fire.
Restoration R4A: Application of herbicide and seeding of desired species (probability of success best immediately following fire).
Seeded State 5.0 Community Phase Pathways
5.1a: Time without disturbance.
5.2a: Fire, brush management, or Aroga moth infestation reduces shrub component.
5.2b: Inappropriate grazing management decreases perennial bunchgrass understory.
5.3a: Fire, brush management, Aroga moth infestation.
Transition T5A: Catastrophic fire (coming from 5.3).

Transition T5B: Time and lack of disturbance allows trees to dominate site resources.
Tree State 6.0 Community Phase Pathways
6.1a: Time without disturbance.
Transition T6A: Catastrophic fire that kills trees. Inappropriate tree removal practices may also lead to dominance by non-native annuals.



Narrative

Loamy 8-10"025XY019NV

Current State: 2.1-Wyoming big sagebrush and Thurber’s needlegrass/bluebunch wheatgrass dominate Annual non-native species present.

Desired State: 2.3 (at risk)- Wyoming big sagebrush increases Thurber’s needlegrass and bluebunch wheatgrass decrease Sandberg bluegrass and squirreltail increase
Annual non-native species stable to increasing
Juniper may be present

Potential Undesired State: - Need to know shrub to grass composition and be careful not to push community to a shrub state 3.0 community.

Claypan 12-16 025XY017NV

Current State: 2.2-Idaho fescue, bluebunch wheatgrass, and other perennial grasses dominate
Low sagebrush reduced Annual non-natives may be present Perennial forbs may increase or dominate for a few years.

Desired State: 2.3 (at risk)- Low sagebrush dominates Mule’s ear and mat forming forbs increase Perennial bunchgrasses reduced Sandberg bluegrass increases Annual non-natives may be present.

Potential Undesired State: May move community to a 2.3 at risk or 3.1 shrub state.

Loamy 10-12" 025XY014NV

Current State: 2.1 or 1.2- Big sagebrush and bluebunch wheatgrass/Thurber’s needlegrass dominate.
Annual non-native species present or bluebunch wheatgrass, Thurber’s needlegrass,
and other perennial grasses dominate Big sagebrush may be present.

Desired State: 2.3 (at risk)- Big sagebrush increases bluebunch wheatgrass, Thurber’s needlegrass decrease Sandberg bluegrass and squirreltail increase.
Annual non-native species stable to increasing. Juniper may be present.

Potential Undesired State: May moved community to a seeded 5.1 at risk state.

Adaptive Management Procedures (AMP)

Post project implementation vegetation monitoring would be done to determine if objectives were being met. This may include but would not be limited to monitoring vegetation for community composition, diversity, vigor, productivity, and ground cover. If monitoring indicates a post implementation treatment site is moving toward an undesirable vegetation pathway or state, adaptive management procedures (Section 2.1.1. Adaptive Management) are in place and would be utilized to address the given situation on the specific project site. The adaptive management procedures may include but would not be limited to reseeding, pinyon-juniper removal, harrowing, seedling planting, the use of herbicide and fence construction to limit herbivore access to the site.

Unit 5: Deer Fire Restoration

025XY007NV gravelly loam 12-16 p.z.

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire, and/or herbivory, would create sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native annual species.
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire and/or grazing management creates sagebrush/grass mosaic.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.
2.3c: Inappropriate grazing management coupled with fire
2.4a: Time and lack of disturbance and a change in grazing management to facilitate perennial bunchgrass production.
Transition T2A: Inappropriate grazing management (3.1). High severity fire (3.2).
Transition T2B: Inappropriate grazing management that promotes dominance of forbs; this may be coupled with fire (4.1).
Transition T2C: Multiple fires and/or soil disturbing treatments (drill seeding, roller chopper, or Lawson aerator etc)(5.1), or inappropriate
grazing management in the presence of annual non-native species (5.2).
Transition T2D: Time and lack of disturbance allows for trees to dominate site resources.
Shrub State 3.0 Community Pathways
3.1a: Fire and/or brush treatments with minimal soil disturbance (i.e., mowing).
3.2a: Time and lack of disturbance allows for sagebrush regeneration.
Restoration R3A: Brush management and/or seeding of desired species.
Transition T3A: Inappropriate grazing management promotes dominance of forbs; this may be coupled with fire (4.1)
Transition T3B: Multiple fires and/or soil disturbing treatments (5.1) and/or inappropriate grazing management eliminates bluegrass
understory and leaves site open for non-native invasive species (5.2).
Transition T3C: Time and lack of disturbance allows for trees to dominate site resources.
Forb State 4.0 Community Pathways
Restoration R4A: Herbicide treatment may be coupled with seeding of desired species.

Annual State 5.0 Community Pathways
5.1a: Time and lack of disturbance (unlikely to occur).
5.2a: Fire
Tree State 6.0 Community Pathways
6.1a: Time and lack of disturbance allows for maturation of tree community.
Restoration R6A: Tree removal and seeding of desired species or recovery of herbaceous understory.
Restoration R6B: Tree removal when Sandberg bluegrass is dominant and remains in understory.
Transition T6B: Catastrophic fire (5.1).
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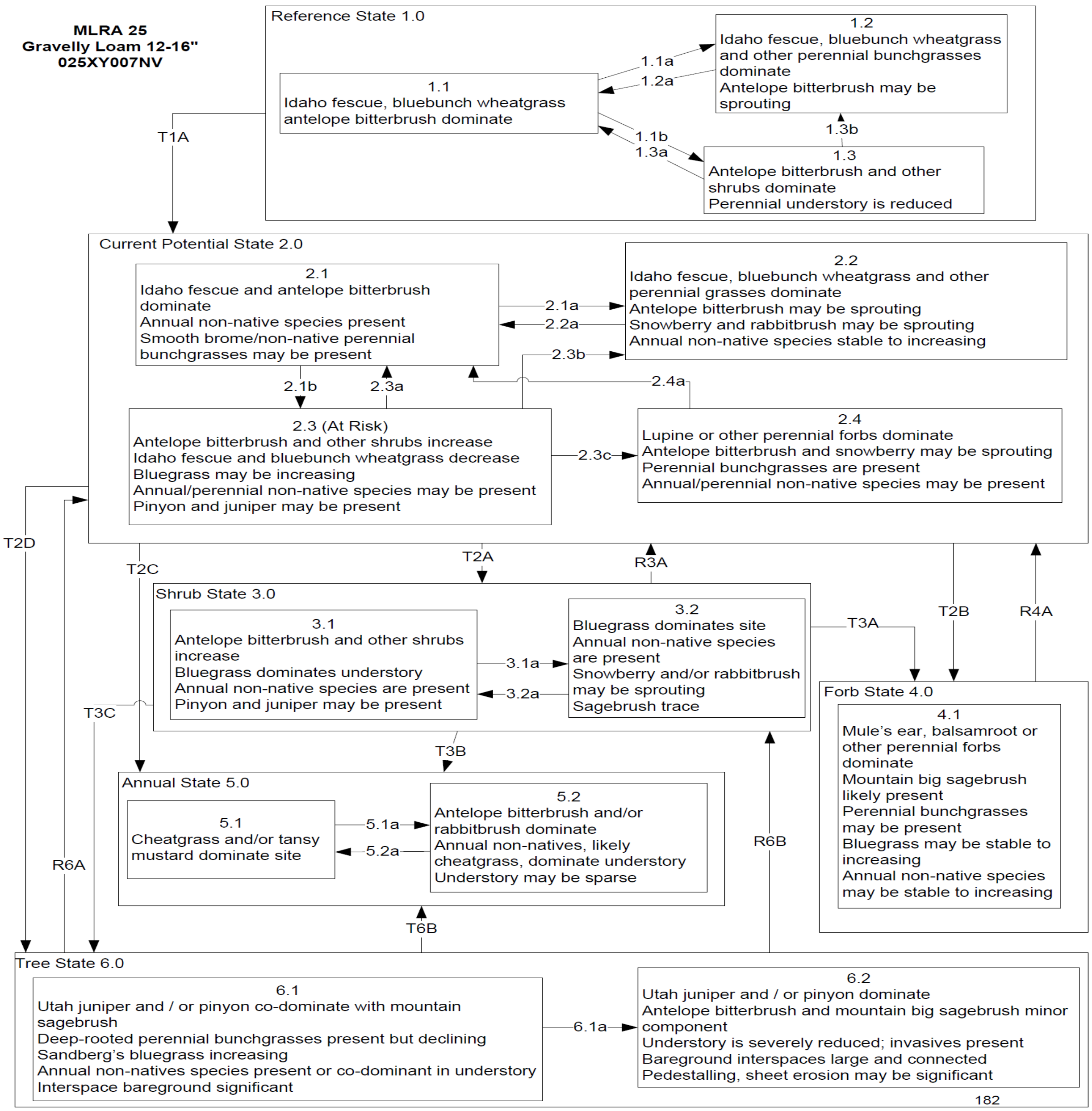


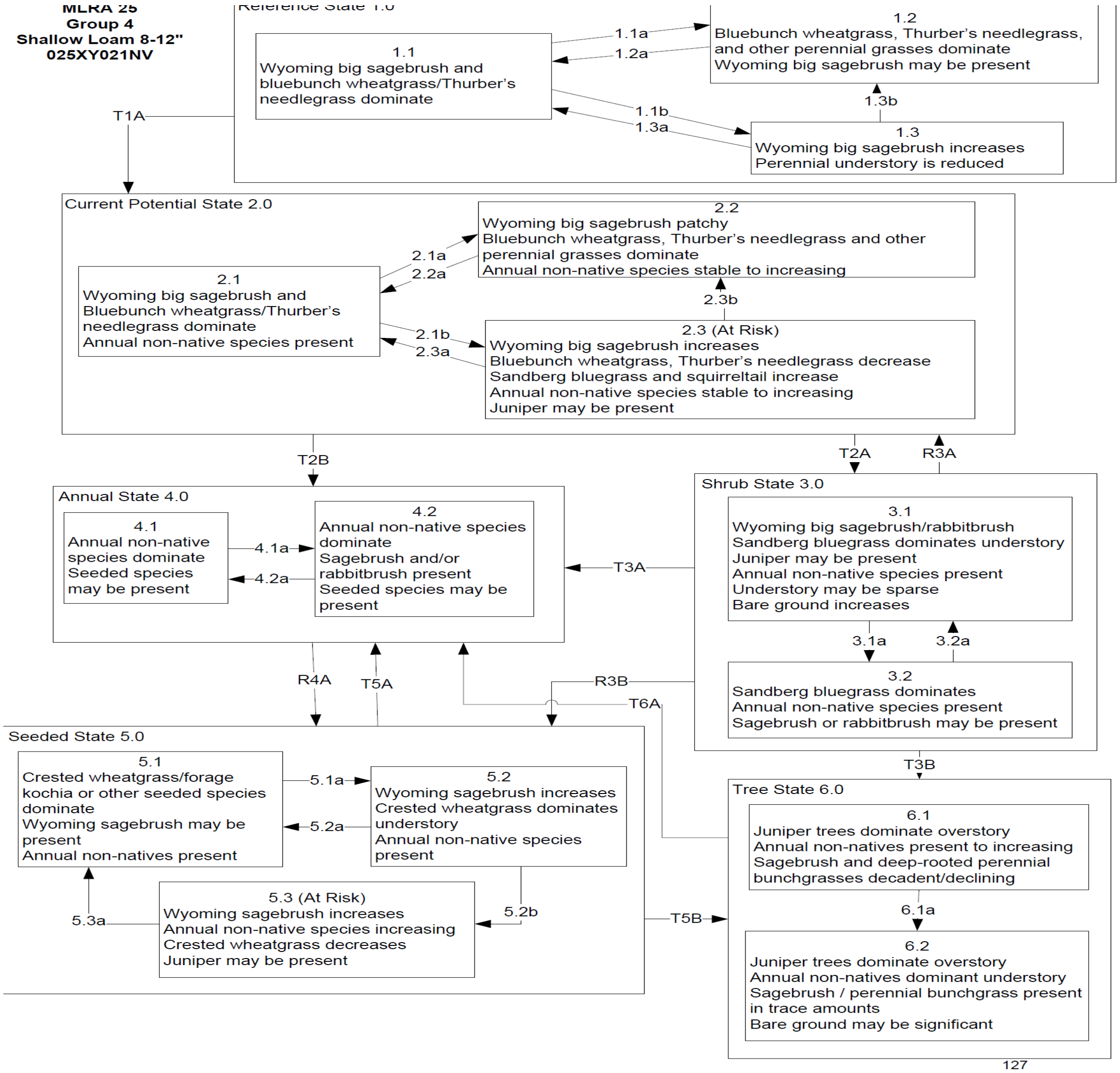
025XY021NV shallow loam 8-12 p.z.

This site is very similar in composition to the modal site, but is less productive and therefore less resilient. Soils are modified by 35-75% gravels or coarse fragments throughout the profile, which effectively reduces the available water capacity of the site. Bluebunch wheatgrass and Wyoming big sagebrush co-dominate the site.

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/midseral

community, dominated by grasses and forbs
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/midseral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to a early/mid-seral community.
Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses will lead to phase 3.1.
Soil disturbing treatments will lead to phase 3.2.
Transition T2B: Catastrophic fire (to 4.1); inappropriate cattle/horse grazing management that removes bunchgrasses, favors shrubs and
promotes the presence of non-native annual species (to 4.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
3.2a: Time and lack of disturbance.
Restoration R3A: Brush management and seeding of native deep rooted bunchgrasses (probability of success is low).
Restoration R3B: Brush management and seeding of crested wheatgrass and/or other non-native desirable species.
Transition T3A: Fire and/or soil disturbing treatments.
Transition T3B: Time and lack of disturbance such as fire favors an increase in tree dominance (from phase 3.1.)
Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance. Big sagebrush is unlikely to reestablish and may take many years.
4.2a: High-severity fire.
Restoration R4A: Application of herbicide and seeding of desired species (probability of success best immediately following fire).
Seeded State 5.0 Community Phase Pathways
5.1a: Time without disturbance.
5.2a: Fire, brush management, or Aroga moth infestation reduces shrub component.
5.2b: Inappropriate grazing management decreases perennial bunchgrass understory.
5.3a: Fire, brush management, Aroga moth infestation.
Transition T5A: Catastrophic fire (coming from 5.3).

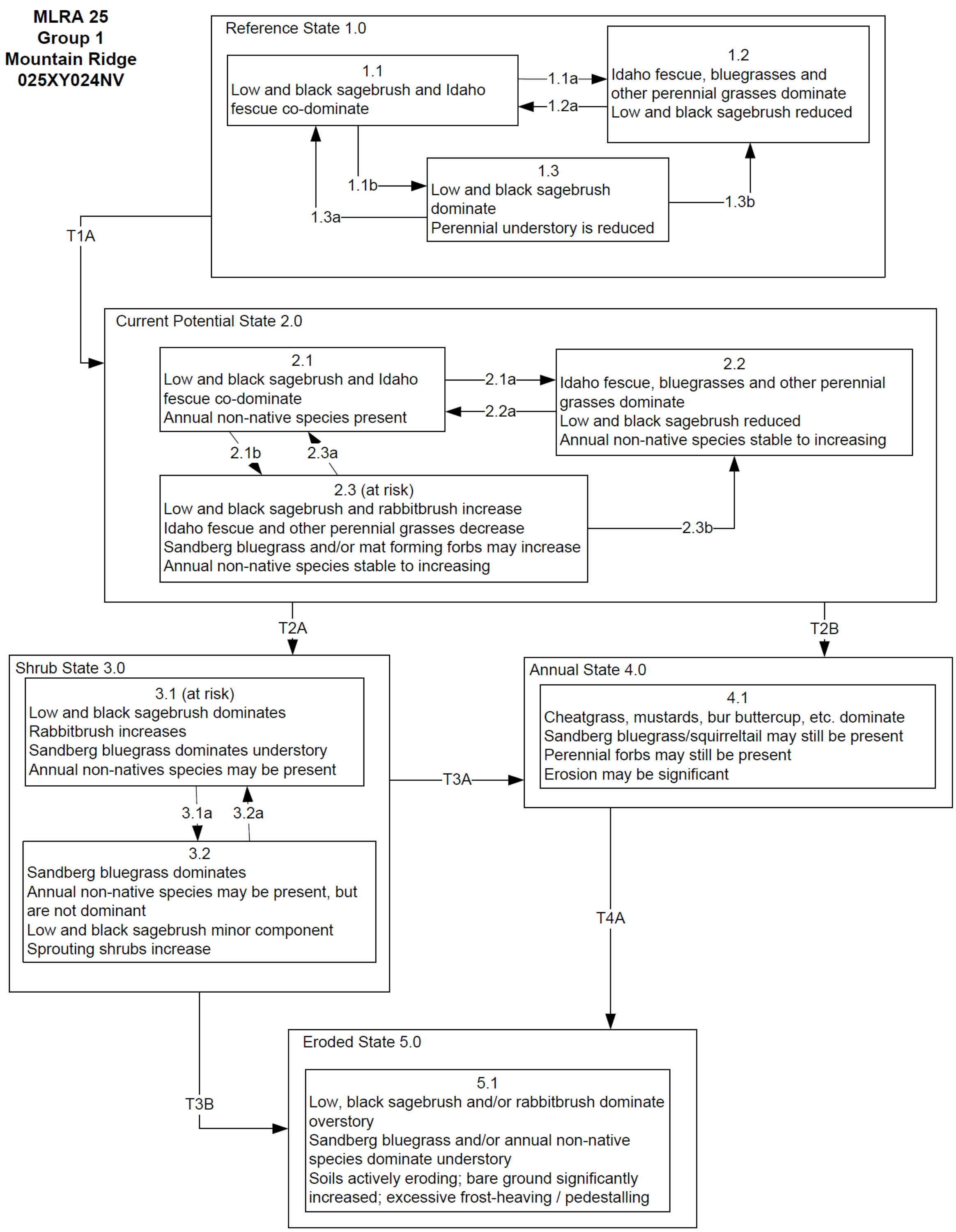
Transition T5B: Time and lack of disturbance allows trees to dominate site resources.
Tree State 6.0 Community Phase Pathways
6.1a: Time without disturbance.
Transition T6A: Catastrophic fire that kills trees. Inappropriate tree removal practices may also lead to dominance by non-native annuals.



25XY024NVmountain ridge

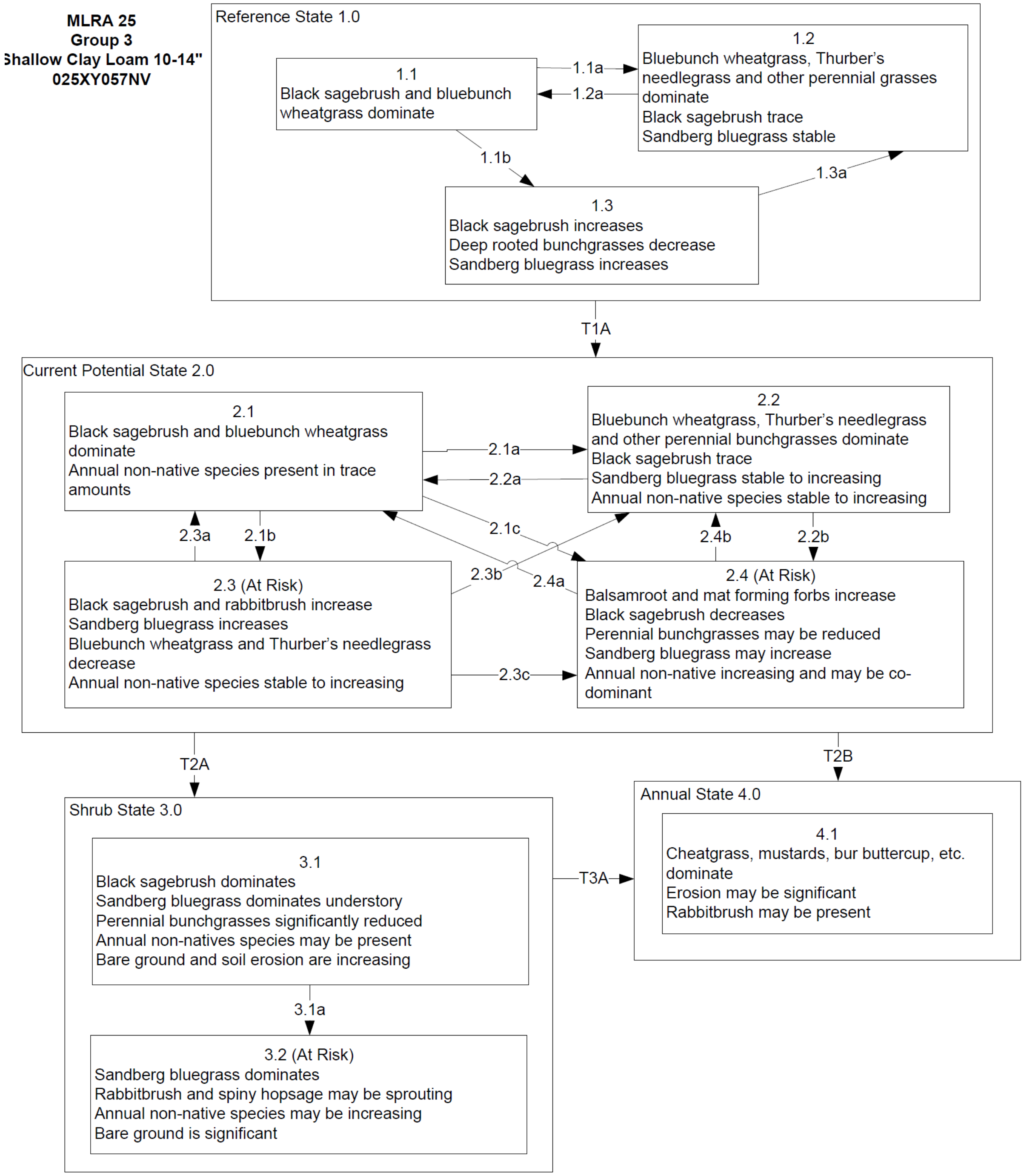
Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory and/or long-term drought may also reduce perennial

understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire would create sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native annual species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance. Inappropriate grazing management and/or long-term drought may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire creates sagebrush/grass mosaic, herbivory, or combinations. Brush management with minimal soil disturbance
reduces sagebrush.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community. Brush management with minimal soil
disturbance reduces sagebrush.
Transition T2A: Inappropriate grazing management (3.1), or high severity fire (3.2)
Transition T2B: Fire or brush management causing severe soil disturbance
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire
3.2a: Time and lack of disturbance
Transition T3A: Catastrophic fire and/or treatments that disturb the existing plant community
Transition T3B: Inappropriate grazing management following fire and/or multiple fires and/or prolonged drought. Additional soil disturbing
treatments (ex: failed drill seeding) could also increase erosion.
Annual State 4.0
Transition T4A: Inappropriate grazing management following fire and/or multiple fires and/or long-term drought. Additional soil disturbing
treatments (ex: seedings that fail) could also increase erosion.
Eroded State 5.0 Community Phase Pathways
5.1a: Inappropriate grazing management and/or impact of off-road vehicles or other ground disturbing activity leads to further plant
community reduction and increased bare ground.


MLRA 25
Group 1
Mountain Ridge
025XY024NV
Reference State 1.0
1.1
Low and black sagebrush and Idaho fescue co-dominate
1.1a
1.2a
1.2
Idaho fescue, bluegrasses and other perennial grasses dominate
Low and black sagebrush reduced
1.1b
1.3a
1.3
Low and black sagebrush dominate
Perennial understory is reduced
1.3b
T1A
Current Potential State 2.0
2.1
Low and black sagebrush and Idaho fescue co-dominate
Annual non-native species present
2.1a
2.2a
2.2
Idaho fescue, bluegrasses and other perennial grasses dominate
Low and black sagebrush reduced
Annual non-native species stable to increasing
2.1b
2.3a
2.3 (at risk)
Low and black sagebrush and rabbitbrush increase
Idaho fescue and other perennial grasses decrease
Sandberg bluegrass and/or mat forming forbs may increase
Annual non-native species stable to increasing
2.3b
T2A
T2B
Shrub State 3.0
3.1 (at risk)
Low and black sagebrush dominates
Rabbitbrush increases
Sandberg bluegrass dominates understory
Annual non-natives species may be present
3.1a
3.2a
3.2
Sandberg bluegrass dominates
Annual non-native species may be present, but are not dominant
Low and black sagebrush minor component
Sprouting shrubs increase
T3A
Annual State 4.0
4.1
Cheatgrass, mustards, bur buttercup, etc. dominate
Sandberg bluegrass/squirreltail may still be present
Perennial forbs may still be present
Erosion may be significant
T4A
T3B
Eroded State 5.0
5.1
Low, black sagebrush and/or rabbitbrush dominate overstory
Sandberg bluegrass and/or annual non-native species dominate understory
Soils actively eroding; bare ground significantly increased; excessive frost-heaving / pedestalling

025XY057NV shallow clay loam 10-14 p.z.

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of annual non-native species.
Transition T1B: Inappropriate grazing management
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.1c: Grazing management targeted at shrubs (i.e. sheep) reduces black sagebrush canopy. Inappropriate sheep grazing management allows
unpalatable forbs to increase. Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.2a: Time and lack of disturbance allows for regeneration of sagebrush
2.2b: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.3a: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy and favors deep-rooted perennial bunchgrasses.
2.3b: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.3c: Change in grazing management to allow for an increase in mat forming forbs and annual non-native species.
2.4a: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer)
2.4b: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer).
Transition T2A: Time and lack of disturbance and/or inappropriate grazing management (to 3.1) or fire (to 3.2).
Transition T2B: Fire in at-risk community phase (from 2.3 or 2.4) may transition to annual state (to 4.0).
Shrub State 3.0 Community Pathways
3.1a: Fire.
Transition T3A: High-severity fire or soil-disturbing treatments (to 4.0).


MLRA 25
Group 3
Shallow Clay Loam 10-14"
025XY057NV
Reference State 1.0
1.1
Black sagebrush and bluebunch wheatgrass dominate
1.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial grasses dominate
Black sagebrush trace
Sandberg bluegrass stable
1.3
Black sagebrush increases
Deep rooted bunchgrasses decrease
Sandberg bluegrass increases
1.1a
1.2a
1.1b
1.3a
T1A
Current Potential State 2.0
2.1
Black sagebrush and bluebunch wheatgrass dominate
Annual non-native species present in trace amounts
2.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial bunchgrasses dominate
Black sagebrush trace
Sandberg bluegrass stable to increasing
Annual non-native species stable to increasing
2.3 (At Risk)
Black sagebrush and rabbitbrush increase
Sandberg bluegrass increases
Bluebunch wheatgrass and Thurber's needlegrass decrease
Annual non-native species stable to increasing
2.4 (At Risk)
Balsamroot and mat forming forbs increase
Black sagebrush decreases
Perennial bunchgrasses may be reduced
Sandberg bluegrass may increase
Annual non-native increasing and may be co-dominant
2.1a
2.2a
2.1c
2.3a
2.1b
2.3b
2.4a
2.4b
2.2b
2.3c
T2A
T2B
Shrub State 3.0
3.1
Black sagebrush dominates
Sandberg bluegrass dominates understory
Perennial bunchgrasses significantly reduced
Annual non-natives species may be present
Bare ground and soil erosion are increasing
3.1a
3.2 (At Risk)
Sandberg bluegrass dominates
Rabbitbrush and spiny hopsage may be sprouting
Annual non-native species may be increasing
Bare ground is significant
T3A
Annual State 4.0
4.1
Cheatgrass, mustards, bur buttercup, etc. dominate
Erosion may be significant
Rabbitbrush may be present

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025XY019NV loamy 8-10 p.z.

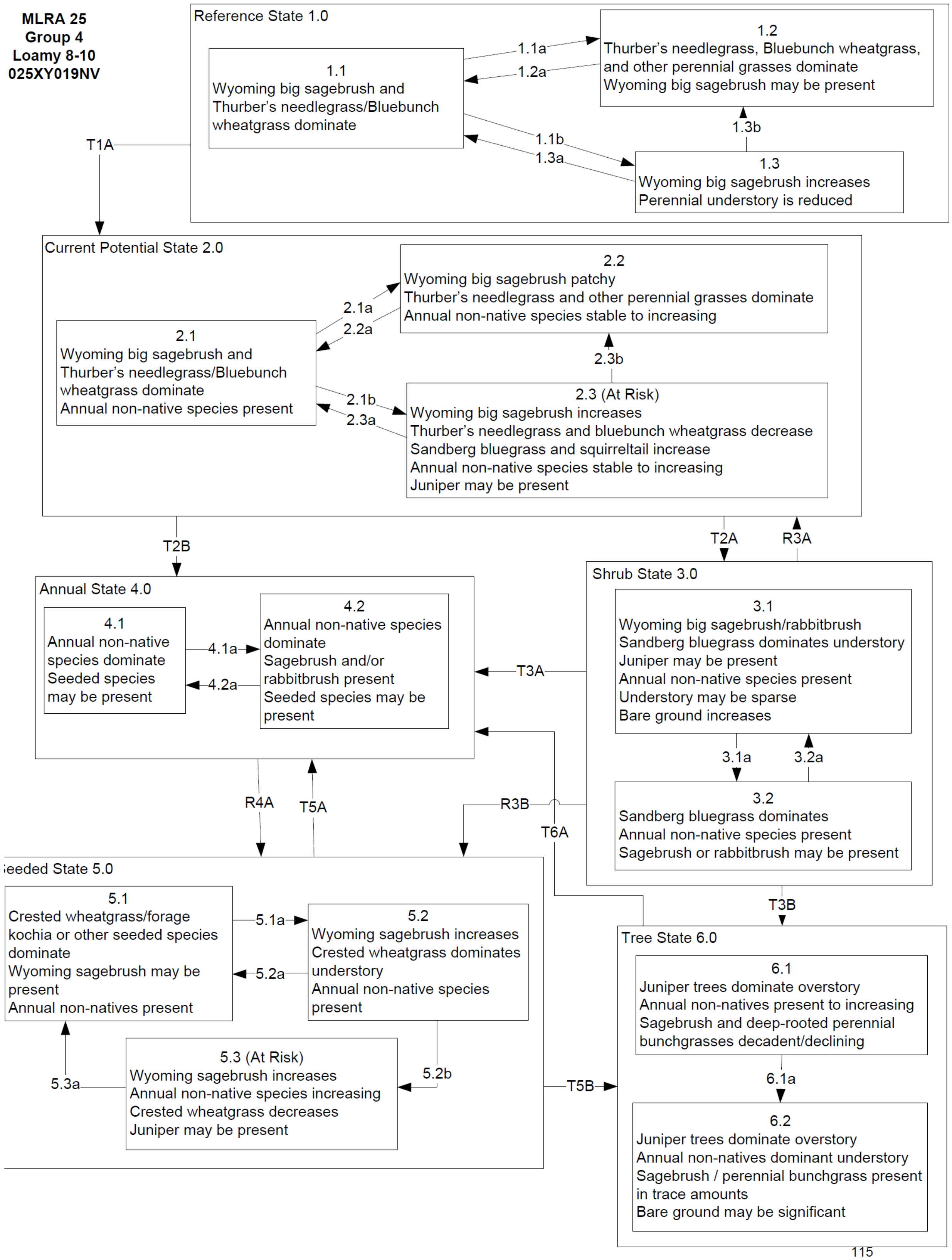
MLRA 25 Loamy 8-10"025XY019NV

The Loamy 8-10" modal site occurs on low hills, fan remnants and partial ballenas on all exposures. Slopes range from 2 to 50 percent but slope gradients of 4 to 30 percent are most typical. Elevations are 4,500 to 6,000 feet. The soils of this site are typically moderately deep to deep. Soil depth is not important to the site concept; however, effective rooting depth is important. This site typically has an ochric epipedon, no abrupt horizon boundaries, no salinity, and typically has low available water capacity. Soil temperature regime is mesic and the moisture regime is aridic bordering on xeric. Many soils are modified with a high volume of gravels, cobbles or stones through their profile. The plant community is dominated by Thurber's needlegrass, bluebunch wheatgrass, and Wyoming big sagebrush. Production ranges from 400 to 800 lbs./acre.

Key MLRA 25 Group 4 Loamy 8-10" 025XY019NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs
1.1b:Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to early/mid-seral community. Transition T1A: Introduction of non-native species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to a early/mid-seral community.
Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses will lead to phase 3.1.
Soil disturbing treatments will lead to phase 3.2.
Transition T2B: Catastrophic fire (to 4.1); inappropriate cattle/horse grazing management that removes bunchgrasses, favors shrubs and
promotes the presence of non-native annual species (to 4.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
3.2a: Time and lack of disturbance.
Restoration R3A: Brush management and seeding of native deep rooted bunchgrasses (probability of success is low).

Restoration R3B: Brush management and seeding of crested wheatgrass and/or other non-native desirable species.
Transition T3A: Fire and/or soil disturbing treatments.
Transition T3B: Time and lack of disturbance such as fire favors an increase in tree dominance (from phase 3.1.)
Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance. Big sagebrush is unlikely to reestablish and may take many years.
4.2a: High-severity fire.
Restoration R4A: Application of herbicide and seeding of desired species (probability of success best immediately following fire).
Seeded State 5.0 Community Phase Pathways
5.1a: Time without disturbance.
5.2a: Fire, brush management, or Aroga moth infestation reduces shrub component.
5.2b: Inappropriate grazing management decreases perennial bunchgrass understory.
5.3a: Fire, brush management, Aroga moth infestation.
Transition T5A: Catastrophic fire (coming from 5.3).
Transition T5B: Time and lack of disturbance allows trees to dominate site resources.
Tree State 6.0 Community Phase Pathways
6.1a: Time without disturbance.
Transition T6A: Catastrophic fire that kills trees. Inappropriate tree removal practices may also lead to dominance by non-native annuals.


MLRA 25
Group 4
Loamy 8-10
025XY019NV
Reference State 1.0
1.1
Wyoming big sagebrush and Thurber's needlegrass/Bluebunch wheatgrass dominate
1.2
Thurber's needlegrass, Bluebunch wheatgrass, and other perennial grasses dominate
Wyoming big sagebrush may be present
1.3
Wyoming big sagebrush increases
Perennial understory is reduced
1.1a
1.2a
1.1b
1.3a
1.3b
T1A
Current Potential State 2.0
2.1
Wyoming big sagebrush and Thurber's needlegrass/Bluebunch wheatgrass dominate
Annual non-native species present
2.2
Wyoming big sagebrush patchy
Thurber's needlegrass and other perennial grasses dominate
Annual non-native species stable to increasing
2.3 (At Risk)
Wyoming big sagebrush increases
Thurber's needlegrass and bluebunch wheatgrass decrease
Sandberg bluegrass and squirreltail increase
Annual non-native species stable to increasing
Juniper may be present
2.1a
2.2a
2.1b
2.3a
2.3b
T2B
T2A
R3A
Annual State 4.0
4.1
Annual non-native species dominate
Seeded species may be present
4.2
Annual non-native species dominate
Sagebrush and/or rabbitbrush present
Seeded species may be present
4.1a
4.2a
Shrub State 3.0
3.1
Wyoming big sagebrush/rabbitbrush
Sandberg bluegrass dominates understory
Juniper may be present
Annual non-native species present
Understory may be sparse
Bare ground increases
3.2
Sandberg bluegrass dominates
Annual non-native species present
Sagebrush or rabbitbrush may be present
3.1a
3.2a
T3A
R4A
T5A
R3B
T6A
T3B
Seeded State 5.0
5.1
Crested wheatgrass/forage kochia or other seeded species dominate
Wyoming sagebrush may be present
Annual non-natives present
5.2
Wyoming sagebrush increases
Crested wheatgrass dominates understory
Annual non-native species present
5.3 (At Risk)
Wyoming sagebrush increases
Annual non-native species increasing
Crested wheatgrass decreases
Juniper may be present
5.1a
5.2a
5.2b
5.3a
T5B
Tree State 6.0
6.1
Juniper trees dominate overstory
Annual non-natives present to increasing
Sagebrush and deep-rooted perennial bunchgrasses decadent/declining
6.2
Juniper trees dominate overstory
Annual non-natives dominant understory
Sagebrush / perennial bunchgrass present in trace amounts
Bare ground may be significant
6.1a
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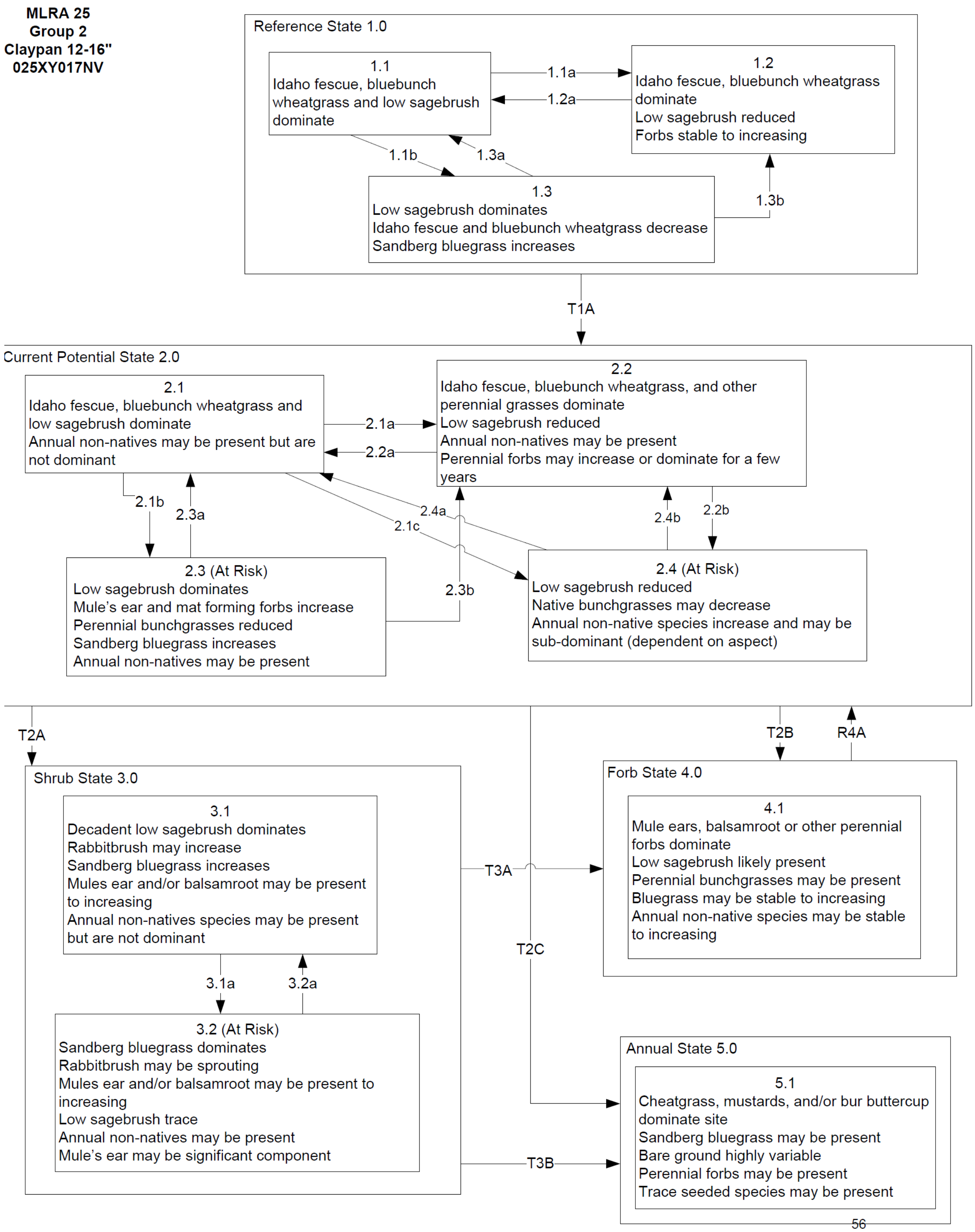
025XY017NV claypan 12-16 p.z.

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance. Excessive herbivory and/or long-term drought may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire creates sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid seral community.
Transition T1A: Introduction of non-native species
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid seral
community dominated by grasses and forbs.
2.1b: Time and lack of disturbance. Inappropriate grazing management and/or long-term drought may also reduce perennial understory.
2.1c: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.2a: Time and lack of disturbance allows for shrub regeneration.
2.2b: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatments with minimal soil disturbance; late-fall/winter grazing causing
mechanical damage to sagebrush would reduce the shrub overstory.
2.3b: High severity fire significantly reduces sagebrush cover leading to early/mid seral community.
2.4a: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer precipitation)
2.4b: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer precipitation)
Transition T2A: Grazing management favoring shrubs and/or Mule’s ear/balsamroot.
Transition T2B: Inappropriate grazing management that promotes dominance of forbs; this may be coupled with fire (4.1).
Transition T2C: Catastrophic fire and/or soil disturbing treatments such as drill seeding, roller chopper, Lawson aerator etc. Probability of
success of seeding on this site is low (5.1).
Shrub State 3.0 Community Pathways
3.1a: Fire.
3.2a: Time without disturbance.
Transition T3A: Inappropriate grazing management promotes dominance of forbs; this may be coupled with fire (4.1).
Transition T3B: Catastrophic fire or multiple fires. Bare ground levels depend on variations in annual precipitation (5.1)
Forb State 4.0 Community Pathways
None
Restoration R4A: Herbicide treatment may be coupled with seeding of desired species.
Annual State 5.0 Community Pathways
None


MLRA 25
Group 2
Claypan 12-16"
025XY017NV
Reference State 1.0
1.1
Idaho fescue, bluebunch wheatgrass and low sagebrush dominate
1.1a
1.2a
1.2
Idaho fescue, bluebunch wheatgrass dominate
Low sagebrush reduced
Forbs stable to increasing
1.1b
1.3a
1.3b
1.3
Low sagebrush dominates
Idaho fescue and bluebunch wheatgrass decrease
Sandberg bluegrass increases
T1A
Current Potential State 2.0
2.1
Idaho fescue, bluebunch wheatgrass and low sagebrush dominate
Annual non-natives may be present but are not dominant
2.1a
2.2a
2.2
Idaho fescue, bluebunch wheatgrass, and other perennial grasses dominate
Low sagebrush reduced
Annual non-natives may be present
Perennial forbs may increase or dominate for a few years
2.1b
2.3a
2.4a
2.1c
2.4b
2.2b
2.3b
2.3 (At Risk)
Low sagebrush dominates
Mule's ear and mat forming forbs increase
Perennial bunchgrasses reduced
Sandberg bluegrass increases
Annual non-natives may be present
2.4 (At Risk)
Low sagebrush reduced
Native bunchgrasses may decrease
Annual non-native species increase and may be sub-dominant (dependent on aspect)
T2A
T2B
R4A
Shrub State 3.0
3.1
Decadent low sagebrush dominates
Rabbitbrush may increase
Sandberg bluegrass increases
Mules ear and/or balsamroot may be present to increasing
Annual non-natives species may be present but are not dominant
3.1a
3.2a
3.2 (At Risk)
Sandberg bluegrass dominates
Rabbitbrush may be sprouting
Mules ear and/or balsamroot may be present to increasing
Low sagebrush trace
Annual non-natives may be present
Mule's ear may be significant component
T3A
T2C
T3B
Forb State 4.0
4.1
Mule ears, balsamroot or other perennial forbs dominate
Low sagebrush likely present
Perennial bunchgrasses may be present
Bluegrass may be stable to increasing
Annual non-native species may be stable to increasing
Annual State 5.0
5.1
Cheatgrass, mustards, and/or bur buttercup dominate site
Sandberg bluegrass may be present
Bare ground highly variable
Perennial forbs may be present
Trace seeded species may be present
56

Narrative

Loamy 8-10"025XY019NV

Current State: 2.2- Wyoming big sagebrush patchy. Thurber's needlegrass and other perennial grasses dominate. Annual non-native species stable to increasing.

Desired State: 2.3 (at risk)- Wyoming big sagebrush increases Thurber's needlegrass and bluebunch wheatgrass decrease Sandberg bluegrass and squirreltail increase Annual non-native species stable to increasing juniper may be present.

Potential Undesired State: - Need to know shrub to grass composition and be careful not to push community to a shrub state 3.0 community which is Wyoming big sagebrush/rabbitbrush Sandberg bluegrass dominates understory. Juniper may be present. Annual non-native species present. Understory may be sparse and bare ground increases.

Claypan 12-16 025XY017NV

Current State: 2.2- Idaho fescue, bluebunch wheatgrass, and other perennial grasses dominate. Low sagebrush reduced. Annual non-natives may be present. Perennial forbs may increase or dominate for a few years.

Desired State: 2.4 (at risk)- Low sagebrush reduced. Native bunchgrasses may decrease. Annual non-native species increase and may be sub-dominant (dependent on aspect).

Potential Undesired State: May move community to a 2.4 at risk then to a 3.1 shrub state which decadent low sagebrush dominates. Rabbitbrush may increase. Sandberg bluegrass increases.
Mules ear and/or balsamroot may be present to increasing. Annual non-natives species may be present but are not dominant.

Gravelly Loam 12-16 p.z. 025XY007NV

Current State: 2.4- Lupine or other perennial forbs dominate. Antelope bitterbrush and snowberry may be sprouting. Perennial bunchgrasses are present. Annual/perennial non-native species may be present.

Desired State: 3.1- Antelope bitterbrush and other shrubs increase. Bluegrass dominates understory. Annual non-native species are present. Pinyon and juniper may be present.

Potential Undesired State: May have potential to move community to annual state 5.1 Cheatgrass and/or tansy mustard dominate site or 5.2 Antelope bitterbrush and/or rabbitbrush dominate Annual non-natives, likely cheatgrass, dominate understory. Understory may be sparse.

Shallow Loam 8-12 p.z. 025XY021NV

Current State: 2.1a/2.2- Wyoming big sagebrush patchy. Bluebunch wheatgrass, Thurber's needlegrass and other perennial grasses dominate. Annual non-native species stable to increasing.

Desired State: 2.1-Wyoming big sagebrush and bluebunch wheatgrass/Thurber's needlegrass dominate. Annual non-native species present.

Potential Undesired State: 4.2- Annual non-native species dominate. Sagebrush and/or rabbitbrush present. Seeded species may be present.

Mountain Ridge 025XY024NV

Current State: 2.2- Idaho fescue, bluegrasses and other perennial grasses dominate. Low and black sagebrush reduced. Annual non-native species stable to increasing.

Desired State: 1.3- Low and black sagebrush dominate. Perennial understory is reduced.

Potential Undesired State: 2.3 (at risk)- Low and black sagebrush and rabbitbrush increase. Idaho fescue and other perennial grasses decrease. Sandberg bluegrass and/or mat forming forbs may increase. Annual non-native species stable to increasing.

Shallow Clay Loam 10-14 p.z. 025XY057NV

Current State: 2.2- Bluebunch wheatgrass, Thurber's needlegrass and other perennial bunchgrasses dominate. Black sagebrush in trace amounts. Sandberg bluegrass stable to increasing. Annual non-native species stable to increasing.

Desired State: 2.1- Black sagebrush and bluebunch wheatgrass dominate. Annual non-native species present in trace amounts.

Potential Undesired State: 3.1-Black sagebrush dominates. Sandberg bluegrass dominates understory. Perennial bunchgrasses significantly reduced. Annual non-natives species may be present. Bare ground and soil erosion are increasing.

Adaptive Management Procedures (AMP)

Post project implementation vegetation monitoring would be done to determine if objectives were being met. This may include but would not be limited to monitoring vegetation for community composition, diversity, vigor, productivity, and ground cover. If monitoring indicates a post implementation treatment site is moving toward an undesirable vegetation pathway or state, adaptive management procedures (Section 2.1.1. Adaptive Management) are in place and would be utilized to address the given situation on the specific project site. The adaptive management procedures may include but would not be limited to reseeding, pinyon-juniper removal, harrowing, seedling planting, the use of herbicide and fence construction to limit herbivore access to the site.

Unit 6: Hepworth Fire Restoration

MLRA 24 Group 10 Saline Bottom 024XY007NV

Reference State 1.0 Community Phase Pathways

1.1a: Low severity fire creates grass/shrub mosaic.

.1b: Time and lack of disturbance, drought, herbivory or combinations.

1.2a: Time and lack of disturbance allows for shrub regeneration.

1.3a: Fire significantly reduces shrub cover and leads to early/mid-seral community. Transition T1A: Introduction of non-native species such as cheatgrass and halogeton. Current Potential State 2.0 Community Phase Pathways

2.1a: Fire or brush treatments (i.e. mowing) with minimal soil disturbance

.2.1b: Time and lack of disturbance, drought, inappropriate grazing, lowering of water table through groundwater pumping and/or channel incision or combinations.

2.2a: Time and lack of disturbance allows for shrub regeneration, may be coupled with grazing management to increase shrubs.

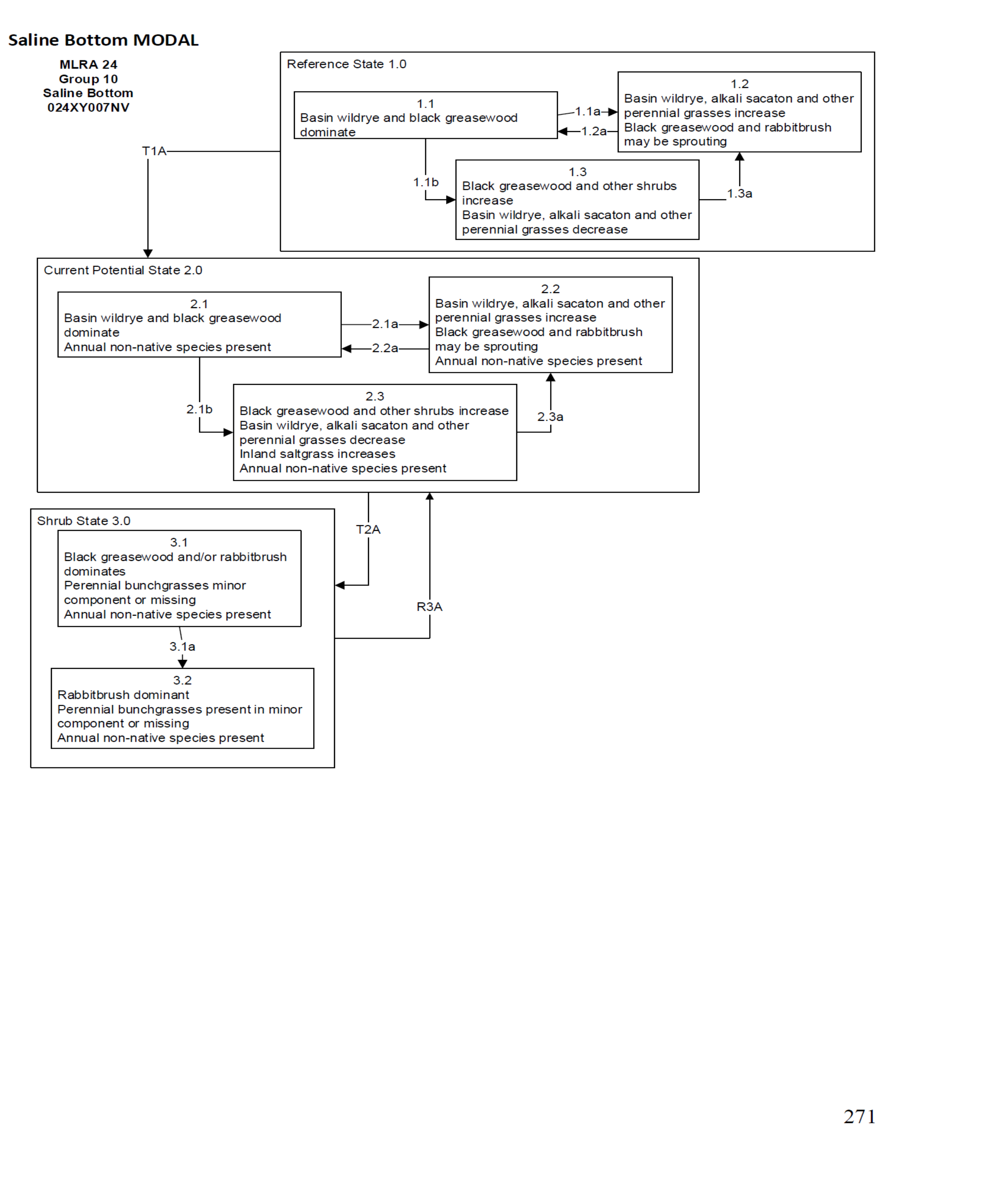
2.3a: Heavy late fall/winter grazing, brush treatments, release from drought, water table recovery and/or fire. Transition

T2A: Inappropriate grazing management would reduce the perennial understory (3.1 or 3.2). Fire, soil disturbing brush treatments and/or lowering of the water table by groundwater pumping and/or channel incision

(3.2)Shrub State 3.0 Community Phase Pathways

3.1a: Fire and/or lowering of water table by groundwater pumping and/or channel incision. Soil disturbing brush treatments such as plowing and drill seeding may also reduce black greasewood Restoration

R3A: Brush management with minimal soil disturbance, coupled with seeding of desired species. IT may also be necessary to reduce groundwater pumping or repair of incised channel(s). Probability of success is low.

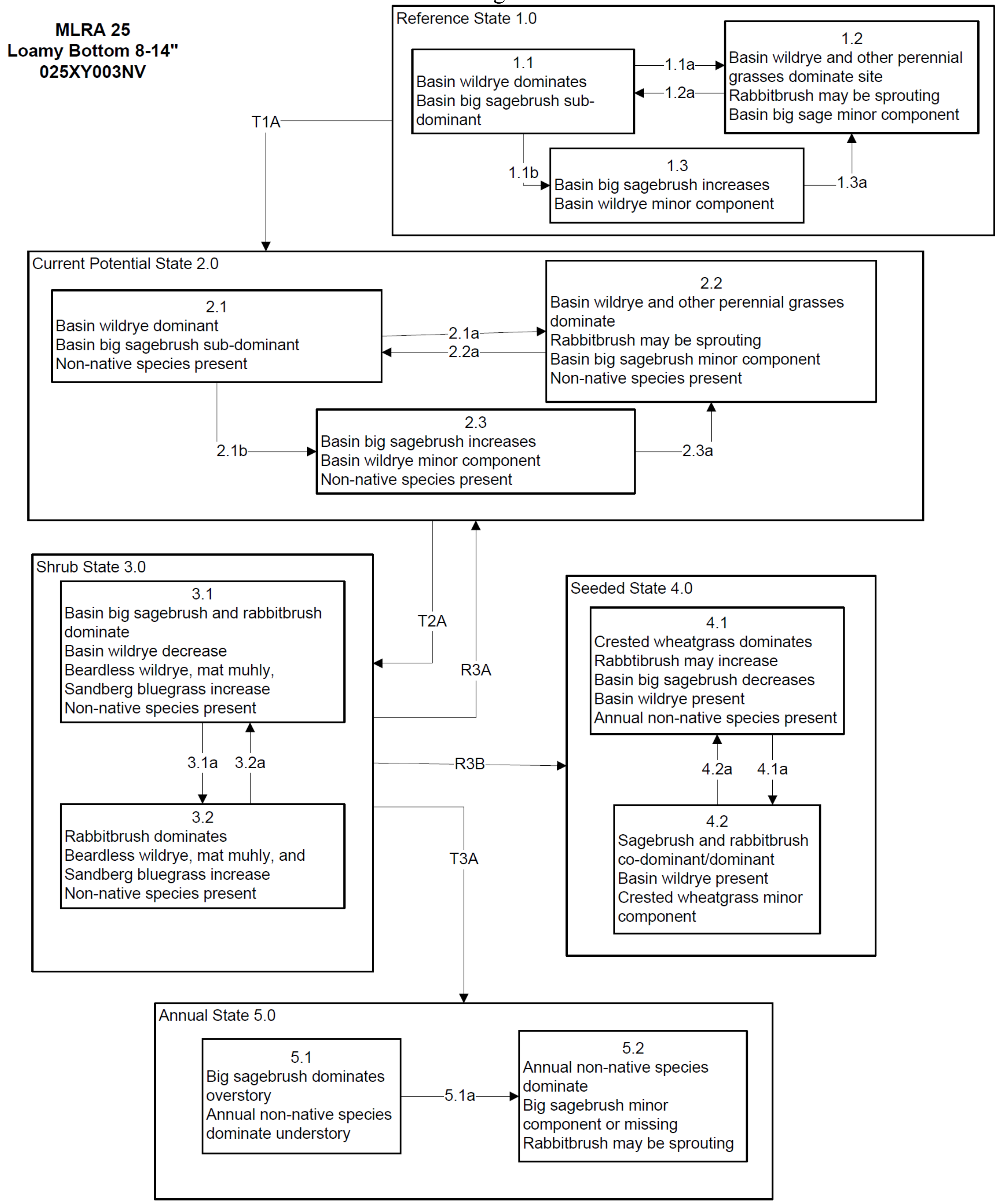


Loamy Bottom 8-14" (025XY003NV)

The Loamy Bottom 8-14" ecological site occurs on outer margins of axial-stream floodplains and on inset fans adjacent to perennial streams. Slopes range from 0 to 4 percent but slopes of 2 to 4 percent are most typical. Elevations range from 4500 to 7000 feet. The soils in this site are very deep and moderately well drained. Permeability is moderate to moderately rapid and runoff is very low. The soils have a mollic epipedon and high available water holding capacity. Some soils have a seasonally high water table at depths of 30 to 60 inches which allows for significant fluctuations in herbage production. Moisture is also added from stream overflow and run-in from higher landscapes. In many areas, this site occurs where a channel has become entrenched lowering the water table required to support a meadow plant community. These soils are susceptible to gullying, which intercepts normal overflow patterns and causes meadow degradation. The plant community is dominated by basin wildrye (*Leymuscinereus)*. Basin big sagebrush (*Artemisia tridentata var. tridentata)* is the most common shrub on this site. Annual production ranges from 2000 to 4500 pounds per acre.

Reference State 1.0 Community Phase Pathways
1.1a: Fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs. Aroga moth may
cause a large die-off in sagebrush resulting in a mosaic of grass and sagebrush.
1.1b: Time and lack of disturbance such as fire. Excessive herbivory, chronic drought or combinations may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs. Aroga moth may
cause a large die-off in sagebrush resulting in a mosaic of grass and sagebrush.
Transition T1A: Introduction of non-native species such as cheatgrass.
Current Potential State 2.0 Community Phase Pathways
2.1a: Fire creates grass/sagebrush mosaic. Aroga moth may also cause a large die-off in sagebrush; non-native annual species present.
2.1b: Time and lack of disturbance such as fire. Inappropriate grazing management, chronic drought or combinations may also reduce
perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush
2.3a: Fire reduces sagebrush. Aroga moth infestation may create a sagebrush/grass mosaic. Brush management with minimal soil disturbance;
late-fall/winter grazing causing mechanical damage to sagebrush.
Transition T2A: Hydrologic alteration (lowering of water table i.e. gullying of associated channel), inappropriate grazing management or
combinations (3.1). Fire (3.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Fire and/or brush management with minimal soil disturbance
3.2a: Time and lack of disturbance (not likely to occur)
Transition T3A: Continual inappropriate grazing management and/or hydrologic alteration (i.e. gullying of associated channel) (5.1). Severe fire,
and/or failed brush management and seeding (5.2)
Restoration R3A: Brush management and seeding of native species, may be coupled with restoration of channel (2.2)
Restoration R3B: Brush management with minimal soil disturbance coupled with seeding of desired species (4.1)
Seeded State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance; inappropriate grazing management may also reduce perennial understory
4.2a: Fire, brush management, and/or Aroga moth infestation.
Annual State 5.0 Community Phase Pathways

5.1a: Severe fire or failed brush treatment and seeding.



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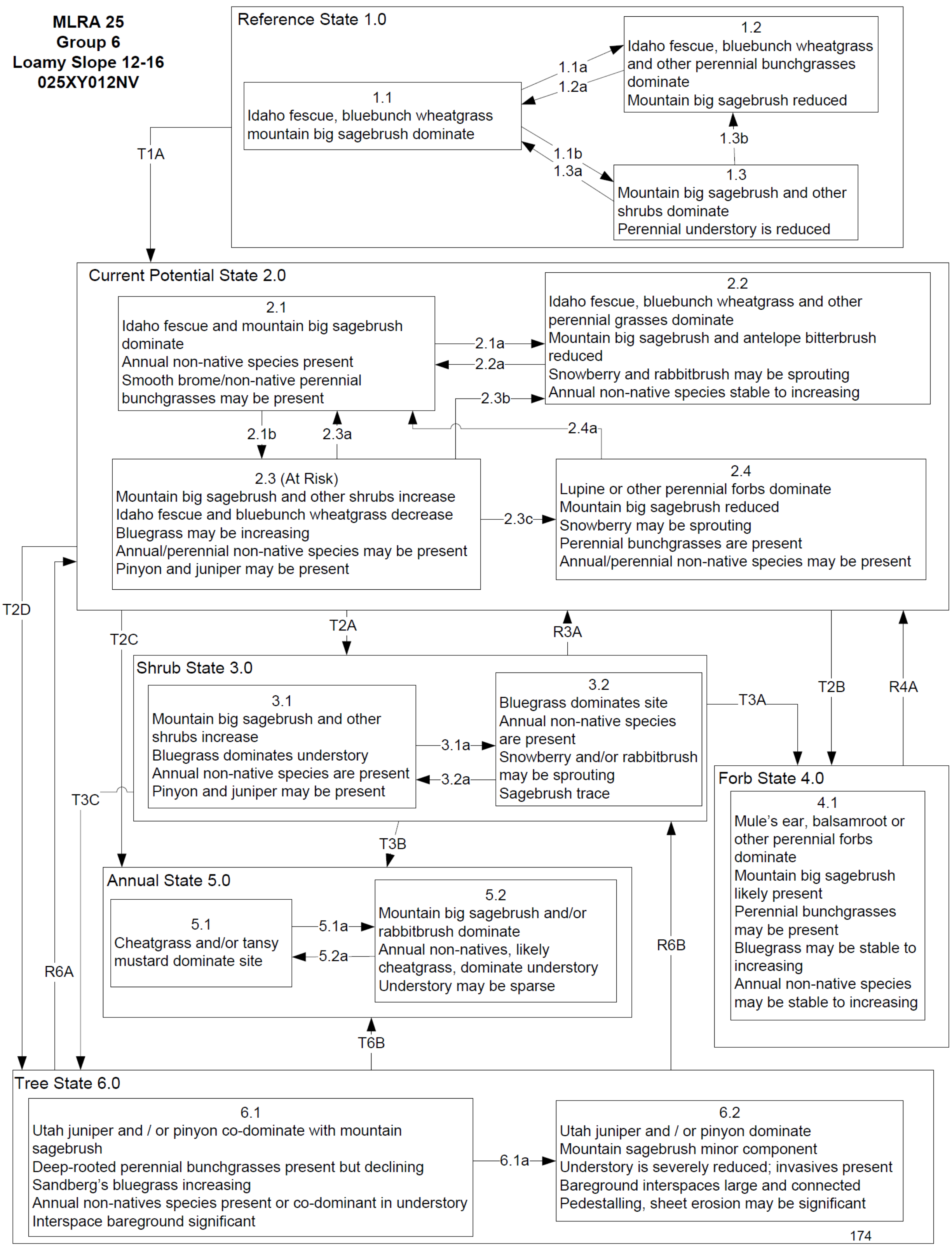
No Group
Site: Wet Meadow, R025XY005NV State 3
Location: 41 51 16, 114 49 46 Elev. 6920 feet. Slope 8%
Soil Map Unit: 420 Soil: Typic Haploaquoll
Landform: Azimuth: E-facing slope of inset fan
Plants: JUBA, POSE, CADO, PONE, ELEL, IVAX, ARLU, Cirsium, SYMPH, ARTRV, PUTR, ERIGERON, NAVARR,
MIGR, TAOF, AGGL, PERIDERIDIA, AMUT, BRTE (in pockets); Trace: ARAR, ERNAC, ACMI, ROWO, IRMI,
FEID
Production: 1000 lbs/ac, grasses 85%, forbs 10%, shrubs 2-5%
Canopy cover: 80-85%
Photos: 1682-1685
Notes: redox features within 12 inches of surface
• "pugging" where cattle water around drainage
• CADO-JUBA-PONE dominated; JUBA is very stressed
• Site has dried out; draining along north side due to excessive livestock use
o Over 10" of soil loss in area that has drained
o PONE is very pedestalled in drainage area
o Water flow path is well developed
o Increased IVAX in this area
• State 3: drained
o Severe grazing and increased erosion
o Increased ARLU, IVAX, and bareground → increased ARNO/ARAR
• Very degraded site
• Lots of Dry Meadows have been mapped and are degraded Wet Meadows

MLRA 25 Group 6 Loamy Slope 12-16 025XY012NV

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire, and/or herbivory, would create sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native annual species.
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire and/or grazing management creates sagebrush/grass mosaic.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.

2.3c: Inappropriate grazing management coupled with fire
2.4a: Time and lack of disturbance and a change in grazing management to facilitate perennial bunchgrass production.
Transition T2A: Inappropriate grazing management (3.1). High severity fire
(3.2).Transition T2B: Inappropriate grazing management that promotes dominance of forbs; this may be coupled with fire
(4.1). Transition T2C: Multiple fires and/or soil disturbing treatments (drill seeding, roller chopper, or Lawson aerator etc.) (5.1), or inappropriate grazing management in the presence of annual non-native species
(5.2).Transition T2D: Time and lack of disturbance allows for trees to dominate site resources.
Shrub State 3.0 Community Pathways
3.1a: Fire and/or brush treatments with minimal soil disturbance (i.e. mowing).
3.2a: Time and lack of disturbance allows for sagebrush regeneration.
Restoration R3A: Brush management and/or seeding of desired species.
Transition T3A: Inappropriate grazing management promotes dominance of forbs; this may be coupled with fire (4.1)
Transition T3B: Multiple fires and/or soil disturbing treatments (5.1) and/or inappropriate grazing management eliminates bluegrass
understory and leaves site open for non-native invasive species (5.2).
Transition T3C: Time and lack of disturbance allows for trees to dominate site resources.
Forb State 4.0 Community Pathways
Restoration R4A: Herbicide treatment may be coupled with seeding of desired species.
Annual State 5.0 Community Pathways
5.1a: Time and lack of disturbance (unlikely to occur).
5.2a: Fire
Tree State 6.0 Community Pathways
6.1a: Time and lack of disturbance allows for maturation of tree community.
Restoration R6A: Tree removal and seeding of desired species or recovery of herbaceous understory.
Restoration R6B: Tree removal when Sandberg bluegrass is dominant and remains in understory.
Transition T6B: Catastrophic fire (5.1).


MLRA 25
Group 6
Loamy Slope 12-16
025XY012NV
Reference State 1.0
1.1
Idaho fescue, bluebunch wheatgrass mountain big sagebrush dominate
1.2
Idaho fescue, bluebunch wheatgrass and other perennial bunchgrasses dominate
Mountain big sagebrush reduced
1.3
Mountain big sagebrush and other shrubs dominate
Perennial understory is reduced
1.1a
1.2a
1.1b
1.3a
1.3b
T1A
Current Potential State 2.0
2.1
Idaho fescue and mountain big sagebrush dominate
Annual non-native species present
Smooth brome/non-native perennial bunchgrasses may be present
2.2
Idaho fescue, bluebunch wheatgrass and other perennial grasses dominate
Mountain big sagebrush and antelope bitterbrush reduced
Snowberry and rabbitbrush may be sprouting
Annual non-native species stable to increasing
2.3 (At Risk)
Mountain big sagebrush and other shrubs increase
Idaho fescue and bluebunch wheatgrass decrease
Bluegrass may be increasing
Annual/perennial non-native species may be present
Pinyon and juniper may be present
2.4
Lupine or other perennial forbs dominate
Mountain big sagebrush reduced
Snowberry may be sprouting
Perennial bunchgrasses are present
Annual/perennial non-native species may be present
2.1a
2.2a
2.3b
2.4a
2.1b
2.3a
2.3c
T2D
T2C
T2A
R3A
T2B
R4A
T3A
Shrub State 3.0
3.1
Mountain big sagebrush and other shrubs increase
Bluegrass dominates understory
Annual non-native species are present
Pinyon and juniper may be present
3.2
Bluegrass dominates site
Annual non-native species are present
Snowberry and/or rabbitbrush may be sprouting
Sagebrush trace
3.1a
3.2a
T3C
T3B
Forb State 4.0
4.1
Mule's ear, balsamroot or other perennial forbs dominate
Mountain big sagebrush likely present
Perennial bunchgrasses may be present
Bluegrass may be stable to increasing
Annual non-native species may be stable to increasing
Annual State 5.0
5.1
Cheatgrass and/or tansy mustard dominate site
5.2
Mountain big sagebrush and/or rabbitbrush dominate
Annual non-natives, likely cheatgrass, dominate understory
Understory may be sparse
5.1a
5.2a
R6A
R6B
T6B
Tree State 6.0
6.1
Utah juniper and / or pinyon co-dominate with mountain sagebrush
Deep-rooted perennial bunchgrasses present but declining
Sandberg's bluegrass increasing
Annual non-natives species present or co-dominant in understory
Interspace bareground significant
6.2
Utah juniper and / or pinyon dominate
Mountain sagebrush minor component
Understory is severely reduced; invasives present
Bareground interspaces large and connected
Pedestalling, sheet erosion may be significant
6.1a
174

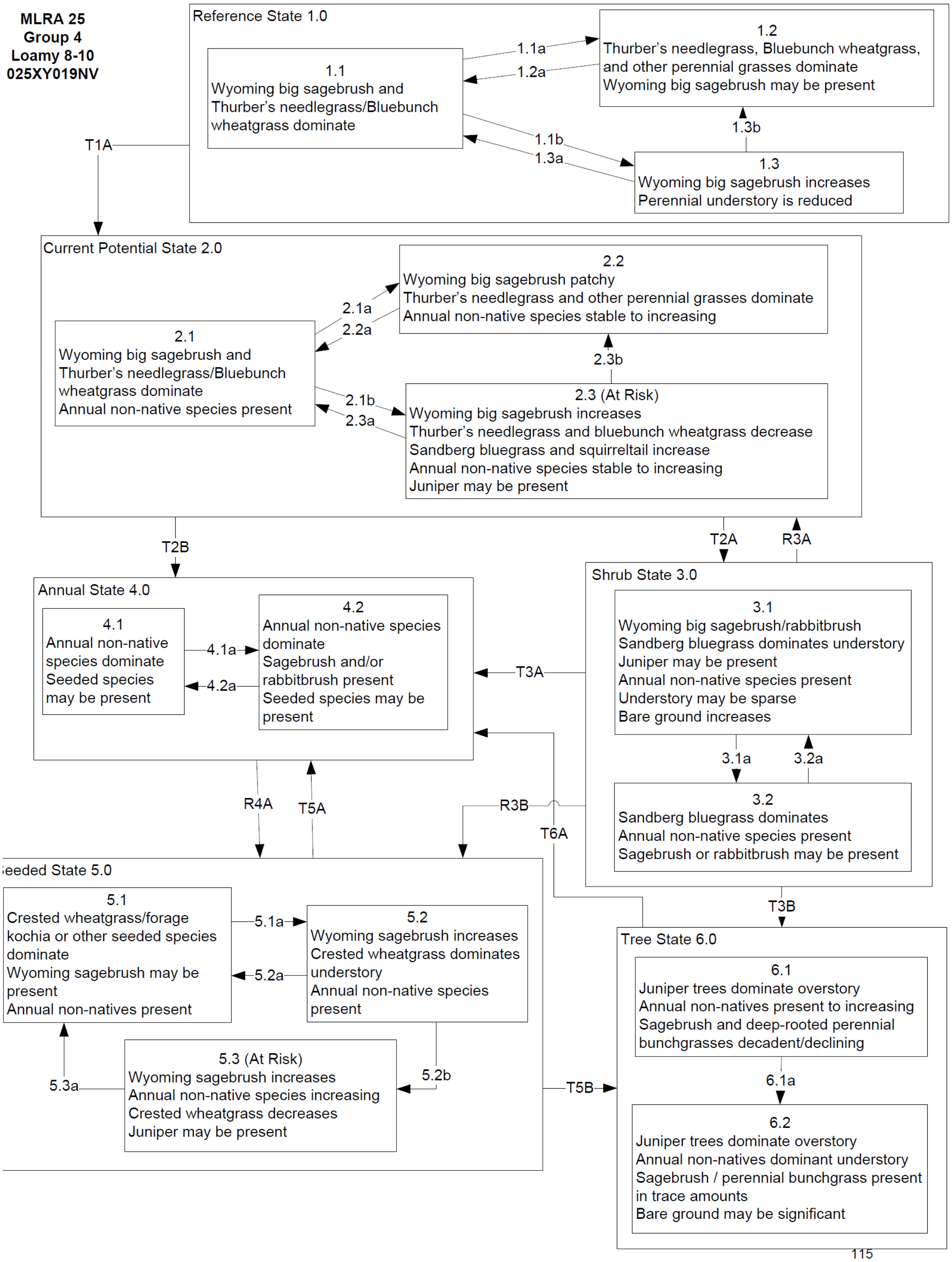
MLRA 25 Loamy 8-10"025XY019NV

The Loamy 8-10" modal site occurs on low hills, fan remnants and partial ballenas on all exposures. Slopes range from 2 to 50 percent but slope gradients of 4 to 30 percent are most typical. Elevations are 4,500 to 6,000 feet. The soils of this site are typically moderately deep to deep. Soil depth is not important to the site concept; however, effective rooting depth is important. This site typically has an ochric epipedon, no abrupt horizon boundaries, no salinity, and typically has low available water capacity. Soil temperature regime is mesic and the moisture regime is aridic bordering on xeric. Many soils are modified with a high volume of gravels, cobbles or stones through their profile. The plant community is dominated by Thurber's needlegrass, bluebunch wheatgrass, and Wyoming big sagebrush. Production ranges from 400 to 800 lbs/acre.

Key MLRA 25 Group 4 Loamy 8-10" 025XY019NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-sera lcommunity, dominated by grasses and forbs
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to early/mid-seral community.Transition T1A: Introduction of non-native species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/midseral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to a early/mid-seral community.
Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses will lead to phase 3.1.
Soil disturbing treatments will lead to phase 3.2.
Transition T2B: Catastrophic fire (to 4.1); inappropriate cattle/horse grazing management that removes bunchgrasses, favors shrubs and
promotes the presence of non-native annual species (to 4.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
3.2a: Time and lack of disturbance.
Restoration R3A: Brush management and seeding of native deep rooted bunchgrasses (probability of success is low).

Restoration R3B: Brush management and seeding of crested wheatgrass and/or other non-native desirable species.
Transition T3A: Fire and/or soil disturbing treatments. Transition T3B: Time and lack of disturbance such as fire favors an increase in tree dominance (from phase 3.1.)
Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance. Big sagebrush is unlikely to reestablish and may take many years.
4.2a: High-severity fire.
Restoration R4A: Application of herbicide and seeding of desired species (probability of success best immediately following fire).
Seeded State 5.0 Community Phase Pathways
5.1a: Time without disturbance.
5.2a: Fire, brush management, or Aroga moth infestation reduces shrub component.
5.2b: Inappropriate grazing management decreases perennial bunchgrass understory.
5.3a: Fire, brush management, Aroga moth infestation.
Transition T5A: Catastrophic fire (coming from 5.3).
Transition T5B: Time and lack of disturbance allows trees to dominate site resources.
Tree State 6.0 Community Phase Pathways 6.1a: Time without disturbance. Transition T6A: Catastrophic fire that kills trees. Inappropriate tree removal practices may also lead to dominance by non-native annuals.



MLRA 25
Group 4
Loamy 8-10
025XY019NV
Reference State 1.0
1.1
Wyoming big sagebrush and
Thurber's needlegrass/Bluebunch
wheatgrass dominate
1.2
Thurber's needlegrass, Bluebunch wheatgrass,
and other perennial grasses dominate
Wyoming big sagebrush may be present
1.3
Wyoming big sagebrush increases
Perennial understory is reduced
1.1a
1.2a
1.1b
1.3a
1.3b
T1A
Current Potential State 2.0
2.1
Wyoming big sagebrush and
Thurber's needlegrass/Bluebunch
wheatgrass dominate
Annual non-native species present
2.2
Wyoming big sagebrush patchy
Thurber's needlegrass and other perennial grasses dominate
Annual non-native species stable to increasing
2.3 (At Risk)
Wyoming big sagebrush increases
Thurber's needlegrass and bluebunch wheatgrass decrease
Sandberg bluegrass and squirreltail increase
Annual non-native species stable to increasing
Juniper may be present
2.1a
2.2a
2.1b
2.3a
2.3b
T2B
T2A
R3A
Annual State 4.0
4.1
Annual non-native
species dominate
Seeded species
may be present
4.2
Annual non-native species
dominate
Sagebrush and/or
rabbitbrush present
Seeded species may be
present
4.1a
4.2a
Shrub State 3.0
3.1
Wyoming big sagebrush/rabbitbrush
Sandberg bluegrass dominates understory
Juniper may be present
Annual non-native species present
Understory may be sparse
Bare ground increases
3.2
Sandberg bluegrass dominates
Annual non-native species present
Sagebrush or rabbitbrush may be present
3.1a
3.2a
T3A
R4A
T5A
R3B
T6A
T3B
Seeded State 5.0
5.1
Crested wheatgrass/forage
kochia or other seeded species
dominate
Wyoming sagebrush may be
present
Annual non-natives present
5.2
Wyoming sagebrush increases
Crested wheatgrass dominates
understory
Annual non-native species
present
5.3 (At Risk)
Wyoming sagebrush increases
Annual non-native species increasing
Crested wheatgrass decreases
Juniper may be present
5.1a
5.2a
5.2b
5.3a
T5B
Tree State 6.0
6.1
Juniper trees dominate overstory
Annual non-natives present to increasing
Sagebrush and deep-rooted perennial
bunchgrasses decadent/declining
6.2
Juniper trees dominate overstory
Annual non-natives dominant understory
Sagebrush / perennial bunchgrass present
in trace amounts
Bare ground may be significant
6.1a
115

Narrative

Saline Bottom 024XY007NV

Current State: No information on current state.

Desired State: 2.1- Basin wild rye and black greasewood dominate. Some annual non- native species present.

Potential Undesired State: May moved community to a shrub 3.0 state.

Loamy Bottom 8-14 p.z. 025XY003NV

Current State: 2.2- Basin wild rye and other perennial grasses dominate. Rabbit brush maybe sprouting.

Desired State: 2.1**-** Basin wild rye dominate and Basin big sage brush sub-dominate. Non-native annual species present.

Potential Undesired State: May moved community to a shrub state 3.2. Rabbit brush and non-native annual species dominate.

Wet Meadow 025XY005NV

No state and transition model completed for this vegetation community type.

Loamy Slope 12-16 p.z. 025XY012NV

Current State: 2.3 (at risk) - Idaho fescue and blue bunch wheatgrass increase. Bluegrass increases. Annual and perennial non-native species present.

Desired State: 2.1-Idaho fescue and Mountain big sagebrush dominate. Annual non-native species present. Smooth brome and non-native perennial bunch grasses maybe present.

Potential Undesired State: May moved community to an annual state 5.2. Rabbitbrush and cheat grass dominate. Understory may be sparse.

Loamy 8-10 p.z. 025XY019NV

Current State: 2.2- Wyoming Big sagebrush patchy. Thurber's needlegrass and other perennial dominate. Annual non-native species stable to increasing.

Desired State: 2.1- Wyoming big sagebrush and Thurber's needlegrass/bluebunch wheatgrass dominate. Annual non-native grasses present.

Potential Undesired State: May moved community to a annual 4.2 state. Annual non-native species dominate. Sagebrush, rabbitbrush and seeded species may be present.

Adaptive Management Procedures (AMP)

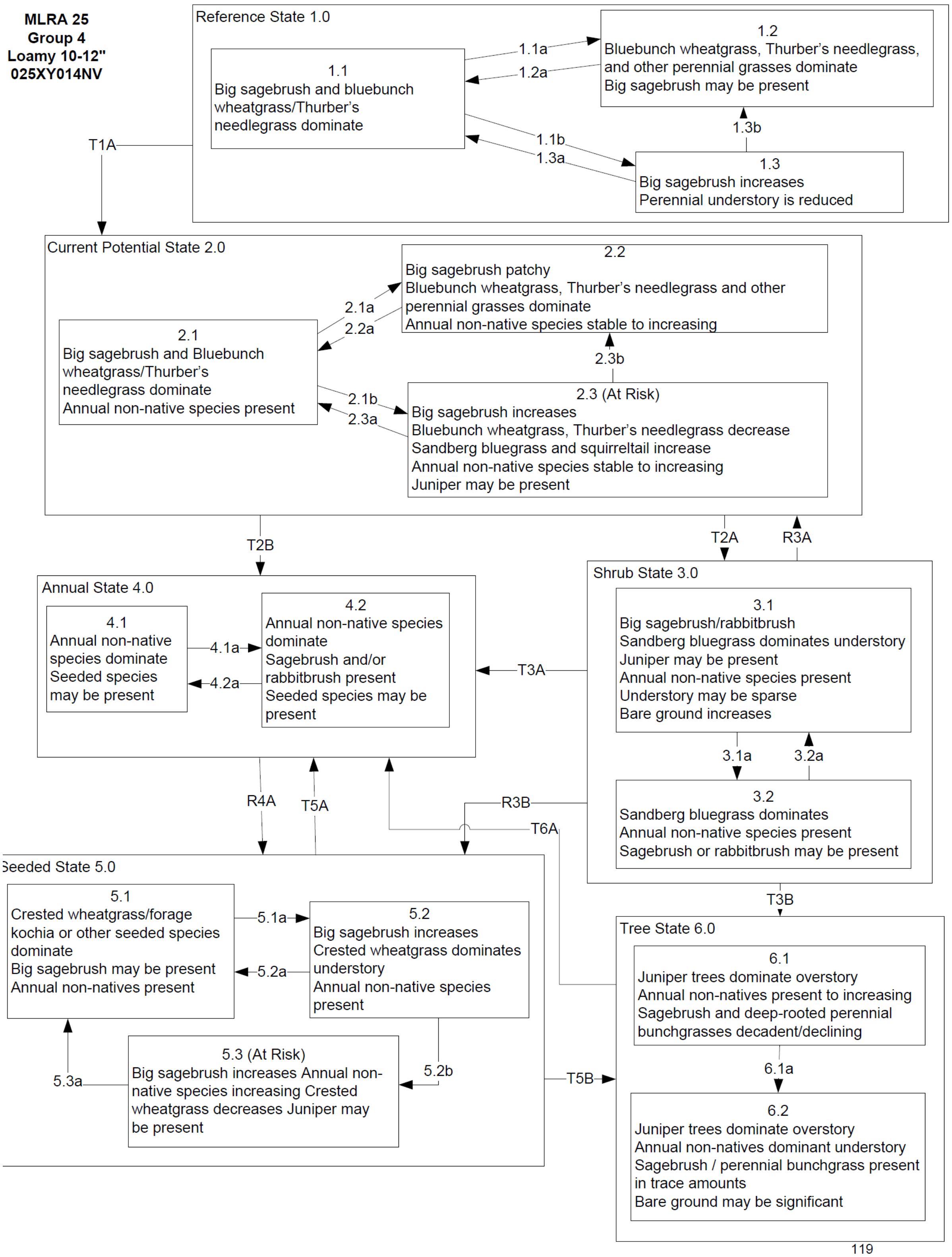
Post project implementation vegetation monitoring would be done to determine if objectives were being met. This may include but would not be limited to monitoring vegetation for community composition, diversity, vigor, productivity, and ground cover. If monitoring indicates a post implementation treatment site is moving toward an undesirable vegetation pathway or state, adaptive management procedures (Section 2.1.1. Adaptive Management) are in place and would be utilized to address the given situation on the specific project site. The adaptive management procedures may include but would not be limited to reseeding, pinyon-juniper removal, harrowing, seedling planting, the use of herbicide and fence construction to limit herbivore access to the site.

Unit 7: North Gollaher Fire Restoration

025XY014NV loamy 10-12 p.z.

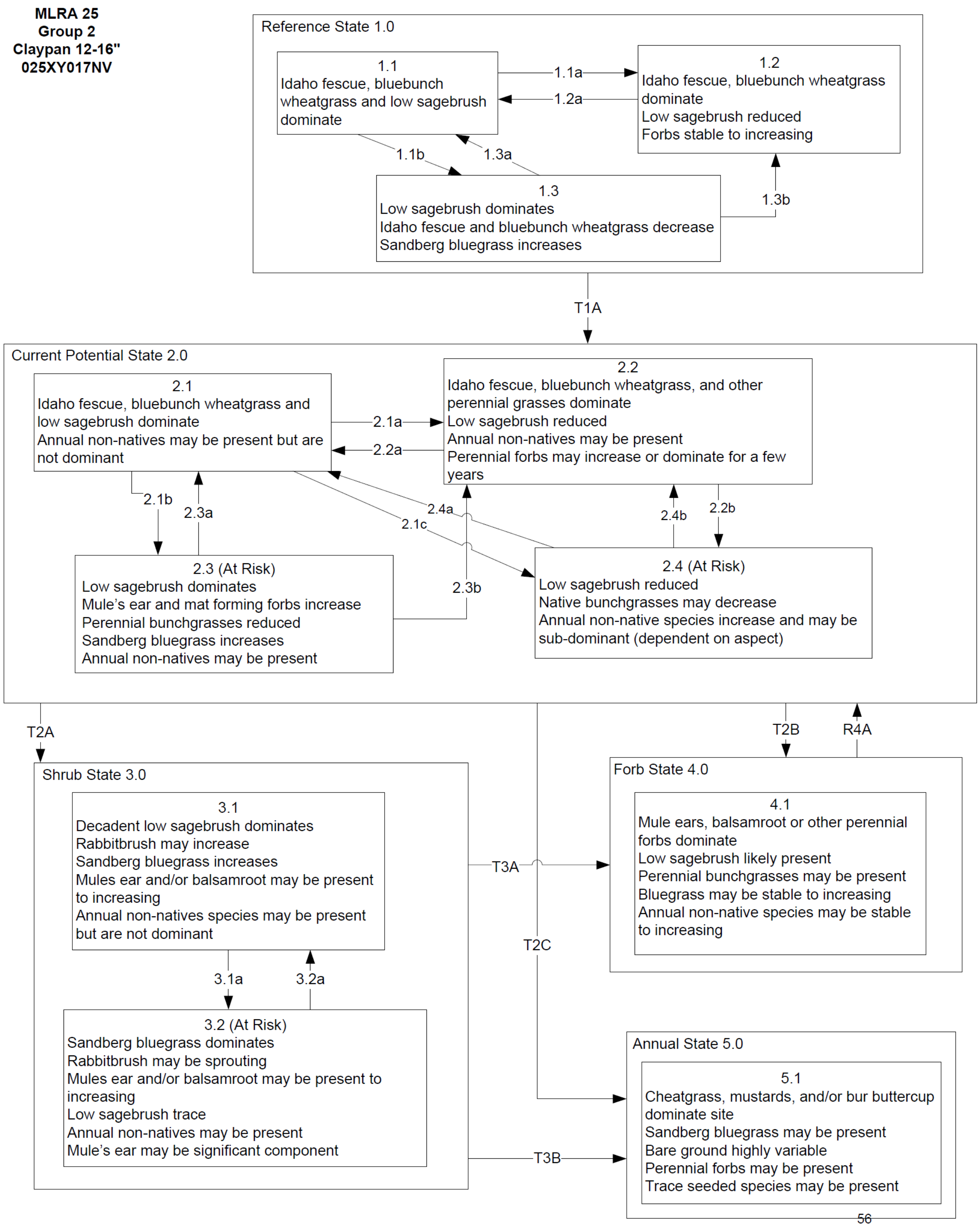
Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community, dominated by grasses and forbs
1.1b:Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to a early/mid-seral community.
Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses will lead to phase 3.1.
Soil disturbing treatments will lead to phase 3.2.
Transition T2B: Catastrophic fire (to 4.1); inappropriate cattle/horse grazing management that removes bunchgrasses, favors shrubs and
promotes the presence of non-native annual species (to 4.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
3.2a: Time and lack of disturbance.

Restoration R3A: Brush management and seeding of native deep rooted bunchgrasses (probability of success is low).
Restoration R3B: Brush management and seeding of crested wheatgrass and/or other non-native desirable species.
Transition T3A: Fire and/or soil disturbing treatments.
Transition T3B: Time and lack of disturbance such as fire favors an increase in tree dominance (from phase 3.1.)
Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance. Big sagebrush is unlikely to reestablish and may take many years.
4.2a: High-severity fire.
Restoration R4A: Application of herbicide and seeding of desired species (probability of success best immediately following fire).
Seeded State 5.0 Community Phase Pathways
5.1a: Time without disturbance.
5.2a: Fire, brush management, or Aroga moth infestation reduces shrub component.
5.2b: Inappropriate grazing management decreases perennial bunchgrass understory.
5.3a: Fire, brush management, Aroga moth infestation.
Transition T5A: Catastrophic fire (coming from 5.3).
Transition T5B: Time and lack of disturbance allows trees to dominate site resources.
Tree State 6.0 Community Phase Pathways
6.1a: Time without disturbance.
Transition T6A: Catastrophic fire that kills trees. Inappropriate tree removal practices may also lead to dominance by non-native annuals.


MLRA 25
Group 4
Loamy 10-12"
025XY014NV
Reference State 1.0
1.1
Big sagebrush and bluebunch wheatgrass/Thurber's needlegrass dominate
1.2
Bluebunch wheatgrass, Thurber's needlegrass, and other perennial grasses dominate
Big sagebrush may be present
1.3
Big sagebrush increases
Perennial understory is reduced
1.1a
1.2a
1.1b
1.3a
1.3b
T1A
Current Potential State 2.0
2.1
Big sagebrush and Bluebunch wheatgrass/Thurber's needlegrass dominate
Annual non-native species present
2.2
Big sagebrush patchy
Bluebunch wheatgrass, Thurber's needlegrass and other perennial grasses dominate
Annual non-native species stable to increasing
2.3 (At Risk)
Big sagebrush increases
Bluebunch wheatgrass, Thurber's needlegrass decrease
Sandberg bluegrass and squirreltail increase
Annual non-native species stable to increasing
Juniper may be present
2.1a
2.2a
2.1b
2.3a
2.3b
T2B
T2A
R3A
Annual State 4.0
4.1
Annual non-native species dominate
Seeded species may be present
4.2
Annual non-native species dominate
Sagebrush and/or rabbitbrush present
Seeded species may be present
4.1a
4.2a
T3A
Shrub State 3.0
3.1
Big sagebrush/rabbitbrush
Sandberg bluegrass dominates understory
Juniper may be present
Annual non-native species present
Understory may be sparse
Bare ground increases
3.1a
3.2a
3.2
Sandberg bluegrass dominates
Annual non-native species present
Sagebrush or rabbitbrush may be present
R4A
T5A
R3B
T6A
T3B
Seeded State 5.0
5.1
Crested wheatgrass/forage kochia or other seeded species dominate
Big sagebrush may be present
Annual non-natives present
5.2
Big sagebrush increases
Crested wheatgrass dominates understory
Annual non-native species present
5.1a
5.2a
5.3 (At Risk)
Big sagebrush increases Annual non-native species increasing Crested wheatgrass decreases Juniper may be present
5.3a
5.2b
T5B
Tree State 6.0
6.1
Juniper trees dominate overstory
Annual non-natives present to increasing
Sagebrush and deep-rooted perennial bunchgrasses decadent/declining
6.1a
6.2
Juniper trees dominate overstory
Annual non-natives dominant understory
Sagebrush / perennial bunchgrass present in trace amounts
Bare ground may be significant
119

25XY017NV claypan 12-16 p.z.

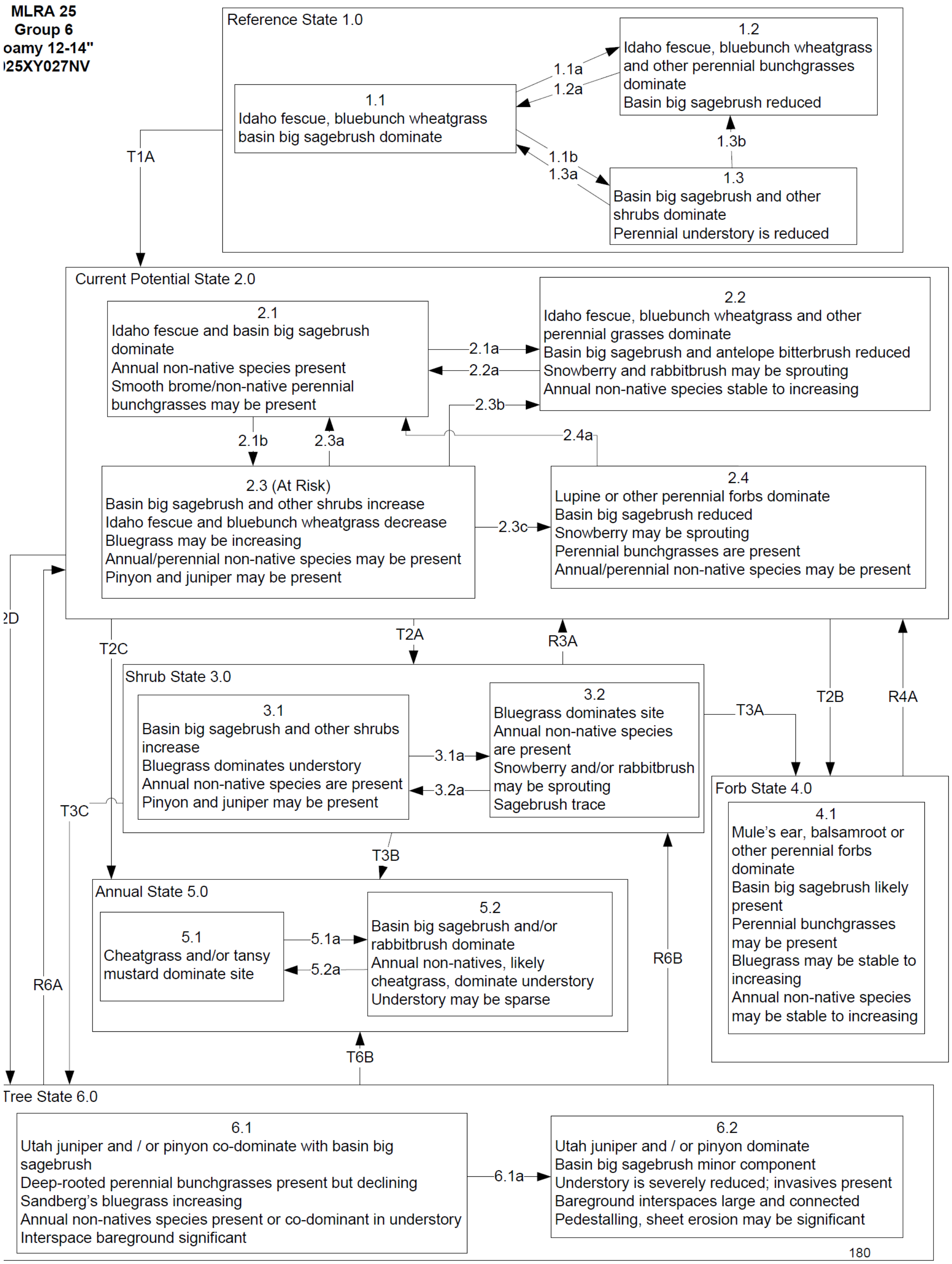
Reference State 1.0 Community Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance. Excessive herbivory and/or long-term drought may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire creates sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid seral community.
Transition T1A: Introduction of non-native species
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid seral
community dominated by grasses and forbs.
2.1b: Time and lack of disturbance. Inappropriate grazing management and/or long-term drought may also reduce perennial understory.
2.1c: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.2a: Time and lack of disturbance allows for shrub regeneration.
2.2b: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatments with minimal soil disturbance; late-fall/winter grazing causing
mechanical damage to sagebrush would reduce the shrub overstory.
2.3b: High severity fire significantly reduces sagebrush cover leading to early/mid seral community.
2.4a: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer precipitation)
2.4b: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer precipitation)
Transition T2A: Grazing management favoring shrubs and/or Mule's ear/balsamroot.
Transition T2B: Inappropriate grazing management that promotes dominance of forbs; this may be coupled with fire (4.1).
Transition T2C: Catastrophic fire and/or soil disturbing treatments such as drill seeding, roller chopper, Lawson aerator etc. Probability of
success of seeding on this site is low (5.1).
Shrub State 3.0 Community Pathways
3.1a: Fire.
3.2a: Time without disturbance.
Transition T3A: Inappropriate grazing management promotes dominance of forbs; this may be coupled with fire (4.1).
Transition T3B: Catastrophic fire or multiple fires. Bare ground levels depend on variations in annual precipitation (5.1)
Forb State 4.0 Community Pathways
None
Restoration R4A: Herbicide treatment may be coupled with seeding of desired species.
Annual State 5.0 Community Pathways
None


MLRA 25
Group 2
Claypan 12-16"
025XY017NV
Reference State 1.0
1.1
Idaho fescue, bluebunch wheatgrass and low sagebrush dominate
1.1a
1.2a
1.2
Idaho fescue, bluebunch wheatgrass dominate
Low sagebrush reduced
Forbs stable to increasing
1.1b
1.3a
1.3b
1.3
Low sagebrush dominates
Idaho fescue and bluebunch wheatgrass decrease
Sandberg bluegrass increases
T1A
Current Potential State 2.0
2.1
Idaho fescue, bluebunch wheatgrass and low sagebrush dominate
Annual non-natives may be present but are not dominant
2.1a
2.2a
2.2
Idaho fescue, bluebunch wheatgrass, and other perennial grasses dominate
Low sagebrush reduced
Annual non-natives may be present
Perennial forbs may increase or dominate for a few years
2.1b
2.3a
2.4a
2.1c
2.4b
2.2b
2.3b
2.3 (At Risk)
Low sagebrush dominates
Mule's ear and mat forming forbs increase
Perennial bunchgrasses reduced
Sandberg bluegrass increases
Annual non-natives may be present
2.4 (At Risk)
Low sagebrush reduced
Native bunchgrasses may decrease
Annual non-native species increase and may be sub-dominant (dependent on aspect)
T2A
T2B
R4A
Shrub State 3.0
3.1
Decadent low sagebrush dominates
Rabbitbrush may increase
Sandberg bluegrass increases
Mules ear and/or balsamroot may be present to increasing
Annual non-natives species may be present but are not dominant
3.1a
3.2a
3.2 (At Risk)
Sandberg bluegrass dominates
Rabbitbrush may be sprouting
Mules ear and/or balsamroot may be present to increasing
Low sagebrush trace
Annual non-natives may be present
Mule's ear may be significant component
T3A
T2C
T3B
Forb State 4.0
4.1
Mule ears, balsamroot or other perennial forbs dominate
Low sagebrush likely present
Perennial bunchgrasses may be present
Bluegrass may be stable to increasing
Annual non-native species may be stable to increasing
Annual State 5.0
5.1
Cheatgrass, mustards, and/or bur buttercup dominate site
Sandberg bluegrass may be present
Bare ground highly variable
Perennial forbs may be present
Trace seeded species may be present
56

025XY027NV loamy 12-14 p.z

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire, and/or herbivory, would create sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native annual species.
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire and/or grazing management creates sagebrush/grass mosaic.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.
2.3c: Inappropriate grazing management coupled with fire
2.4a: Time and lack of disturbance and a change in grazing management to facilitate perennial bunchgrass production.
Transition T2A: Inappropriate grazing management (3.1). High severity fire (3.2).
Transition T2B: Inappropriate grazing management that promotes dominance of forbs; this may be coupled with fire (4.1).
Transition T2C: Multiple fires and/or soil disturbing treatments (drill seeding, roller chopper, or Lawson aerator etc)(5.1), or inappropriate
grazing management in the presence of annual non-native species (5.2).
Transition T2D: Time and lack of disturbance allows for trees to dominate site resources.
Shrub State 3.0 Community Pathways
3.1a: Fire and/or brush treatments with minimal soil disturbance (i.e. mowing).
3.2a: Time and lack of disturbance allows for sagebrush regeneration.
Restoration R3A: Brush management and/or seeding of desired species.
Transition T3A: Inappropriate grazing management promotes dominance of forbs; this may be coupled with fire (4.1)
Transition T3B: Multiple fires and/or soil disturbing treatments (5.1) and/or inappropriate grazing management eliminates bluegrass
understory and leaves site open for non-native invasive species (5.2).
Transition T3C: Time and lack of disturbance allows for trees to dominate site resources.
Forb State 4.0 Community Pathways
Restoration R4A: Herbicide treatment may be coupled with seeding of desired species.
Annual State 5.0 Community Pathways
5.1a: Time and lack of disturbance (unlikely to occur).
5.2a: Fire
Tree State 6.0 Community Pathways
6.1a: Time and lack of disturbance allows for maturation of tree community.
Restoration R6A: Tree removal and seeding of desired species or recovery of herbaceous understory.

Restoration R6B: Tree removal when Sandberg bluegrass is dominant and remains in understory.
Transition T6B: Catastrophic fire (5.1).



Narrative

Loamy 10-12 p.z. 025XY014NV

Current State: 2.1a - Annual non-native species present or bluebunch wheatgrass, Thurber's needlegrass,and other perennial grasses dominate Big sagebrush may be present.

Desired State: 2.3 (at risk)- Big sagebrush increases bluebunch wheatgrass, Thurber's needlegrass decrease. Sandberg bluegrass and squirreltail increase.
Annual non-native species stable to increasing. Juniper may be present.

Potential Undesired State: May moved community to an annual 4.1 state. Non-native and seeded species may be present.

Claypan 12-16 p.z. 25XY017NV

Current State: 3.1a to 3.2 (at risk)- Sandberg bluegrass dominates, rabbitbrush may be sprouting, low sagebrush may be a trace presence, annual non- native are present and mule's ear may be increasing.

Desired State: 2.1 – Blue bunch wheatgrass, Idaho Fescue and low sagebrush are dominate.
Annual non-native species are present but not dominant.

Potential Undesired State: This is the same as the current state.

Loamy 12-14 p.z 025XY027NV

Current State: 2.2 – Blue bunch wheatgrass and other perennial grasses dominate. Annual non-native species present and stable to increasing. Basin Big sagebrush and antelope bitterbrush reduced. Rabbitbrush and snowberry may be sprouting.

Desired State: 2.1 - Big sagebrush and Idaho fescue dominate. Annual species may be present. Smooth brome and non- native perennial bunch grasses may be present.

Potential Undesired State: 2.4- Lupine and other perennial forbs dominate. Basin Big sagebrush is reduced and snowberry may be sprouting. Perennial bunch grasses are present. Annual /perennial non-native grasses are present.

Adaptive Management Procedures (AMP)

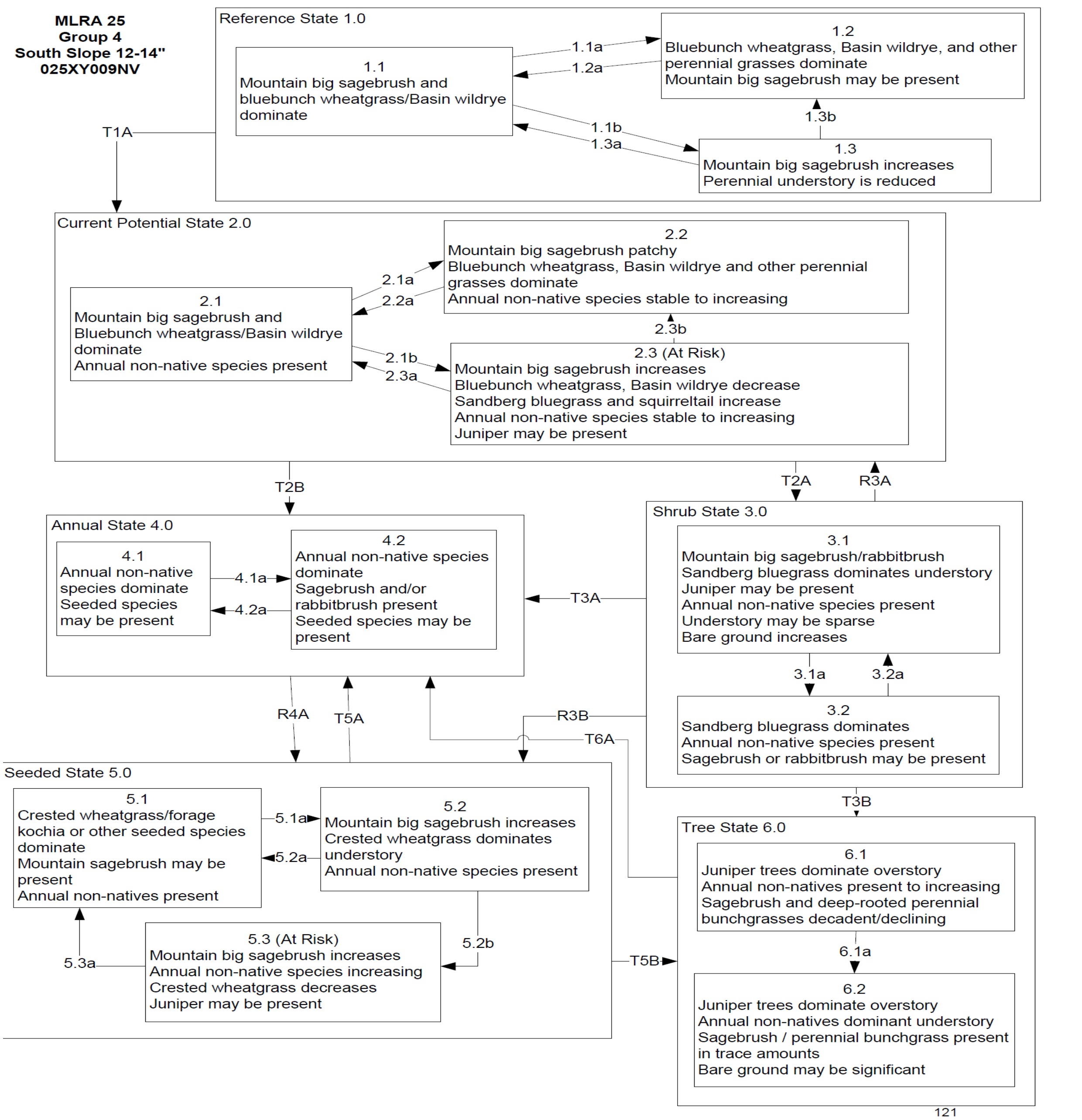
Post project implementation vegetation monitoring would be done to determine if objectives were being met. This may include but would not be limited to monitoring vegetation for community composition, diversity, vigor, productivity, and ground cover. If monitoring indicates a post implementation treatment site is moving toward an undesirable vegetation pathway or state, adaptive management procedures (Section 2.1.1. Adaptive Management) are in place and would be utilized to address the given situation on the specific project site. The adaptive management procedures may include but would not be limited to reseeding, pinyon-juniper removal, harrowing, seedling planting, the use of herbicide and fence construction to limit herbivore access to the site.

Unit 8: Salmon Fire Restoration

South Slope 12-14" 025XY009NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community, dominated by grasses and forbs
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/midseral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to a early/mid-seral community.
Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses will lead to phase 3.1.
Soil disturbing treatments will lead to phase 3.2.
Transition T2B: Catastrophic fire (to 4.1); inappropriate cattle/horse grazing management that removes bunchgrasses, favors shrubs and
promotes the presence of non-native annual species (to 4.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
3.2a: Time and lack of disturbance.
Restoration R3A: Brush management and seeding of native deep rooted bunchgrasses (probability of success is low).
Restoration R3B: Brush management and seeding of crested wheatgrass and/or other non-native desirable species.
Transition T3A: Fire and/or soil disturbing treatments.
Transition T3B: Time and lack of disturbance such as fire favors an increase in tree dominance (from phase 3.1.)
Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance. Big sagebrush is unlikely to reestablish and may take many years.
4.2a: High-severity fire.

Restoration R4A: Application of herbicide and seeding of desired species (probability of success best immediately following fire).
Seeded State 5.0 Community Phase Pathways
5.1a: Time without disturbance.
5.2a: Fire, brush management, or Aroga moth infestation reduces shrub component.
5.2b: Inappropriate grazing management decreases perennial bunchgrass understory.
5.3a: Fire, brush management, Aroga moth infestation.
Transition T5A: Catastrophic fire (coming from 5.3).
Transition T5B: Time and lack of disturbance allows trees to dominate site resources.
Tree State 6.0 Community Phase Pathways
6.1a: Time without disturbance.
Transition T6A: Catastrophic fire that kills trees. Inappropriate tree removal practices may also lead to dominance by non-native annuals.



Shallow Calcareous Loam 10-14"024XY031NV

Reference State 1.0 Community Pathways:1.1a: Low severity fire resulting in a mosaic pattern.

1.1b: Time and lack of disturbance such as fire. Drought, herbivory, or combinations of these would reduce the perennial grasses in the understory.

1.2a: Time and lack of disturbance such as fire.

1.3a: Low severity fire or herbivory resulting in a mosaic pattern.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native plants. Current Potential State 2.0 Community Pathways:

2.1a: Fire or brush treatments (i.e. mowing) with minimal soil disturbance.

2.1b: Time and lack of disturbance such as fire. Drought, inappropriate grazing management, or combinations of these would reduce the perennial grasses in the understory. Trees may invade from neighboring sites

2.2a: Time and lack of disturbance such as fire, drought, inappropriate grazing management, or combinations of these.

2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance and/or grazing management that reduces shrubs would allow for an increase in perennial bunchgrasses.

2.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community. Transition

T2A: Time and lack of disturbance and/or inappropriate grazing management. Trees may invade from neighboring sites (to 3.1) or fire, soil disturbing brush treatments and/or inappropriate sheep grazing (3.2).

Transition T2B: Fire in at-risk community phase (from 2.3) may transition to annual state (4.0), soil disturbing treatments may also transition to an annual state.

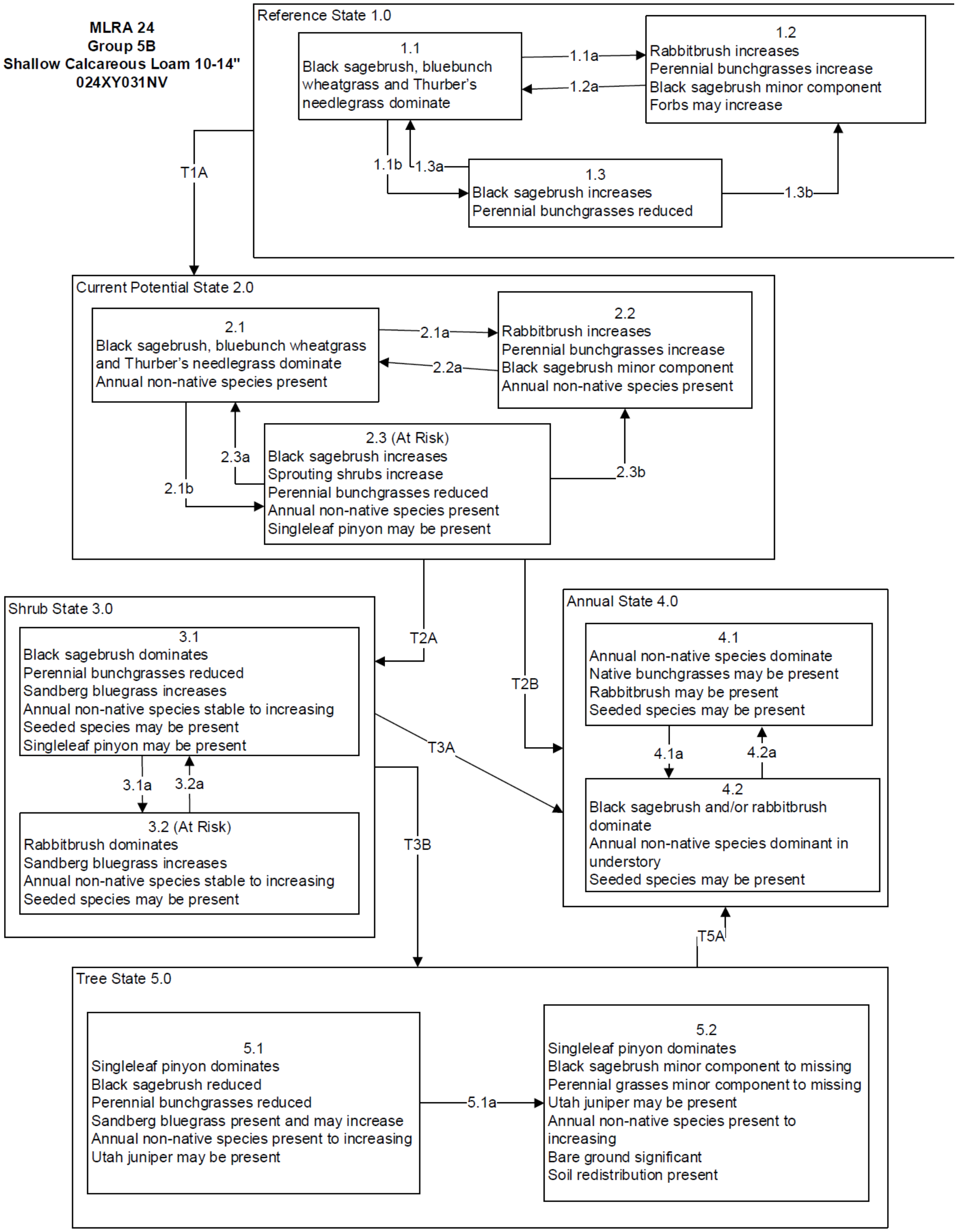
Shrub State 3.0 Community Pathways:3.1a: Fire and/or sheep grazing management which reduces black sagebrush. Brush treatments (i.e. mowing) with minimal soil disturbance.

3.2a: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows for the shrub component to recover.

Transition T3A: Fire and/or soil disturbing treatments (i.e. failed restoration attempts) (to 4.0).

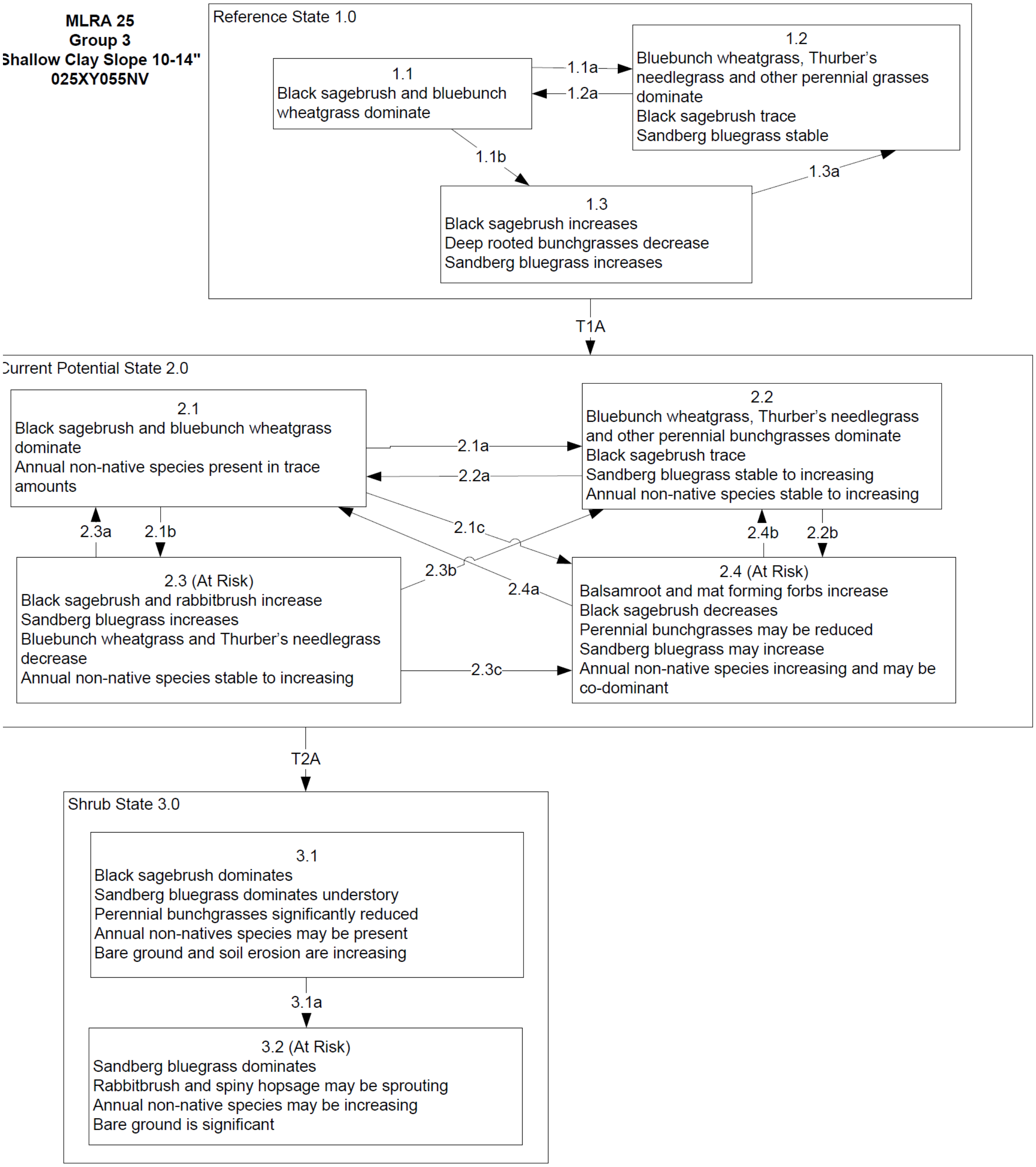
Transition T3B: Time and lack of disturbance allows for maturation of tree community, may be coupled with inappropriate grazing management (5.1). Annual State 4.0 Community Pathways:4.1a: Time and lack of disturbance (unlikely to occur). 4.2a: Fire. Tree State 5.0 Community Pathways:5.1a: Time and lack of disturbance allows for maturation of tree community. Transition. T5A: Catastrophic fire.

hallow Calcareous Loam 10-14



Shallow Clay Slope 10-14 025XY055NV

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of annual non-native species.
Transition T1B: Inappropriate grazing management
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.1c: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy. Inappropriate sheep grazing management allows
unpalatable forbs to increase. Rainfall pattern favoring annual species production (higher than normal spring precipitation) would allow an
increase in annual species.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush
2.2b: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.3a: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy and favors deep-rooted perennial bunchgrasses.
2.3b: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.3c: Change in grazing management to allow for an increase in mat forming forbs and annual non-native species.
2.4a: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer)
2.4b: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer)
Transition T2A: Time and lack of disturbance and/or inappropriate grazing management (to 3.1) or fire (to 3.2).
Shrub State 3.0 Community Pathways
3.1a: Fire.


MLRA 25
Group 3
Shallow Clay Slope 10-14"
025XY055NV
Reference State 1.0
1.1
Black sagebrush and bluebunch wheatgrass dominate
1.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial grasses dominate
Black sagebrush trace
Sandberg bluegrass stable
1.1a
1.2a
1.1b
1.3a
1.3
Black sagebrush increases
Deep rooted bunchgrasses decrease
Sandberg bluegrass increases
T1A
Current Potential State 2.0
2.1
Black sagebrush and bluebunch wheatgrass dominate
Annual non-native species present in trace amounts
2.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial bunchgrasses dominate
Black sagebrush trace
Sandberg bluegrass stable to increasing
Annual non-native species stable to increasing
2.1a
2.2a
2.1c
2.3b
2.4a
2.3a
2.1b
2.4b
2.2b
2.3 (At Risk)
Black sagebrush and rabbitbrush increase
Sandberg bluegrass increases
Bluebunch wheatgrass and Thurber's needlegrass decrease
Annual non-native species stable to increasing
2.4 (At Risk)
Balsamroot and mat forming forbs increase
Black sagebrush decreases
Perennial bunchgrasses may be reduced
Sandberg bluegrass may increase
Annual non-native species increasing and may be co-dominant
2.3c
T2A
Shrub State 3.0
3.1
Black sagebrush dominates
Sandberg bluegrass dominates understory
Perennial bunchgrasses significantly reduced
Annual non-natives species may be present
Bare ground and soil erosion are increasing
3.1a
3.2 (At Risk)
Sandberg bluegrass dominates
Rabbitbrush and spiny hopsage may be sprouting
Annual non-native species may be increasing
Bare ground is significant

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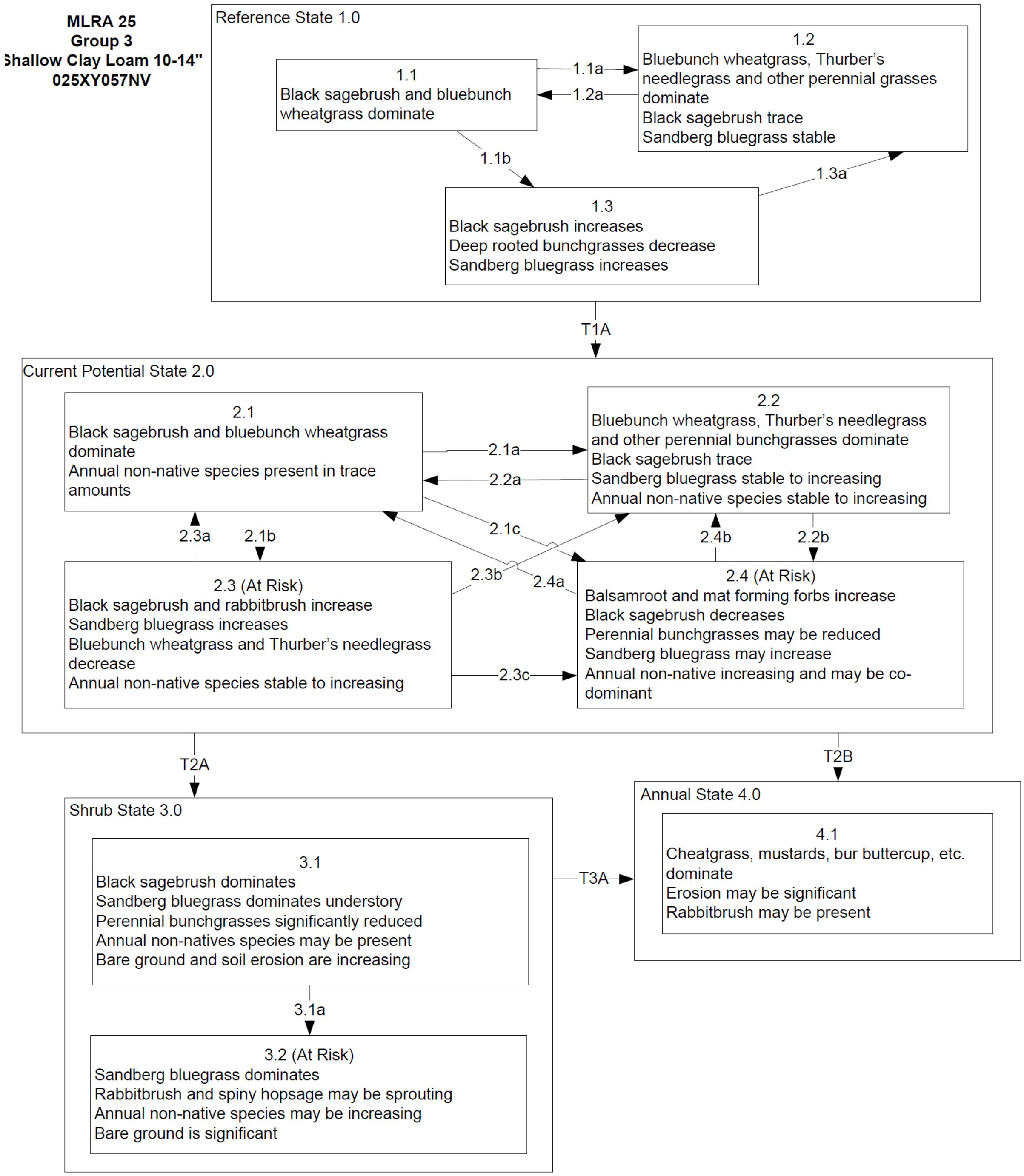
025XY057NV Shallow Clay Loam 10-14 p.z.

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of annual non-native species.
Transition T1B: Inappropriate grazing management
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.1c: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy. Inappropriate sheep grazing management allows
unpalatable forbs to increase. Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.2a: Time and lack of disturbance allows for regeneration of sagebrush
2.2b: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.3a: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy and favors deep-rooted perennial bunchgrasses.
2.3b: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.3c: Change in grazing management to allow for an increase in mat forming forbs and annual non-native species.
2.4a: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer)
2.4b: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer).
Transition T2A: Time and lack of disturbance and/or inappropriate grazing management (to 3.1) or fire (to 3.2).
Transition T2B: Fire in at-risk community phase (from 2.3 or 2.4) may transition to annual state (to 4.0).
Shrub State 3.0 Community Pathways
3.1a: Fire.
Transition T3A: High-severity fire or soil-disturbing treatments (to 4.0).



MLRA 25
Group 3
Shallow Clay Loam 10-14"
025XY057NV
Reference State 1.0
1.1
Black sagebrush and bluebunch wheatgrass dominate
1.1a
1.2a
1.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial grasses dominate
Black sagebrush trace
Sandberg bluegrass stable
1.1b
1.3a
1.3
Black sagebrush increases
Deep rooted bunchgrasses decrease
Sandberg bluegrass increases
T1A
Current Potential State 2.0
2.1
Black sagebrush and bluebunch wheatgrass dominate
Annual non-native species present in trace amounts
2.1a
2.2a
2.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial bunchgrasses dominate
Black sagebrush trace
Sandberg bluegrass stable to increasing
Annual non-native species stable to increasing
2.1c
2.3a
2.1b
2.4b
2.2b
2.3b
2.4a
2.3 (At Risk)
Black sagebrush and rabbitbrush increase
Sandberg bluegrass increases
Bluebunch wheatgrass and Thurber's needlegrass decrease
Annual non-native species stable to increasing
2.3c
2.4 (At Risk)
Balsamroot and mat forming forbs increase
Black sagebrush decreases
Perennial bunchgrasses may be reduced
Sandberg bluegrass may increase
Annual non-native increasing and may be co-dominant
T2A
T2B
Shrub State 3.0
3.1
Black sagebrush dominates
Sandberg bluegrass dominates understory
Perennial bunchgrasses significantly reduced
Annual non-natives species may be present
Bare ground and soil erosion are increasing
3.1a
3.2 (At Risk)
Sandberg bluegrass dominates
Rabbitbrush and spiny hopsage may be sprouting
Annual non-native species may be increasing
Bare ground is significant
T3A
Annual State 4.0
4.1
Cheatgrass, mustards, bur buttercup, etc. dominate
Erosion may be significant
Rabbitbrush may be present

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Narrative

South Slope 12-14" 025XY009NV

Current State: 2.2- Mountain Big sagebrush is patchy. Blue bunch wheatgrass, Basin wildrye and other perennial grasses dominate. Annual non-native species Stable to increasing.

Desired State: 2.1- Mountain big sage, blue bunch wheatgrass and other perennial dominant. Annual non-native species present.

Potential Undesired State: 3.0- Mountain big sage and rabbitbrush dominant. Sandberg blue grass dominant in the understory. Juniper may be present. Annual non-native species present. Understory is sparse with bare ground increasing.

Shallow Calcareous Loam 10-14"024XY031NV

Current State: 2.2- Rabbit brush and perennial bunch grasses increasing. Black sage is a minor component. Annual non-native species are present.

Desired State: 2.1 - Black sage, Thurber's needlegrass are dominant. Annual non-native species are present.

Potential Undesired State: 4.0- Annual non-native species are dominant. Rabbitbrush, seeded species and native bunch grasses may be present.

Shallow Clay Slope 10-14 025XY055NV

Current State: 2.4- Balsam root and mat forming forbs, Sandberg blue grass and annual non-native increase. Black sage decreases. Perennial bunch grasses are reduced.

Desired State: 2.1 – Black sage and blue bunch wheatgrass are dominant and annual non-native species are present.

Potential Undesired State: Same as current state.

Shallow Clay Loam 10-14 p.z. 025XY057NV

Current State: 2.4- Balsam root and mat forming forbs, Sandberg blue grass and annual non-native increase. Black sage decreases. Perennial bunch grasses are reduced.

Desired State: 2.1 – Black sage and blue bunch wheatgrass are dominant and annual non-native species are present.

Potential Undesired State: 4.0- Cheatgrass, bur buttercup and mustard species are dominant. Rabbit brush maybe present.

Adaptive Management Procedures (AMP)
Post project implementation vegetation monitoring would be done to determine if objectives were being met. This may include but would not be limited to monitoring vegetation for community composition, diversity, vigor, productivity, and ground cover. If monitoring indicates a post implementation treatment site is moving toward an undesirable vegetation pathway or state, adaptive management procedures (Section 2.1.1. Adaptive Management) are in place and would be utilized to address the given situation on the specific project site. The adaptive management procedures may include but would not be limited to reseeding, pinyon-juniper removal, harrowing, seedling planting, the use of herbicide and fence construction to limit herbivore access to the site.

Unit 9: Scott Creek 2 Fire Restoration

Shallow Calcareous Loam 8-10"024XY030NV

Reference State 1.0 Community Pathways:

1.1a: Low severity fire resulting in a mosaic pattern.

1.1b: Time and lack of disturbance such as fire. Drought, herbivory, or combinations of these would reduce perennial grasses in the understory.

1.2a: Time and lack of disturbance such as fire.

1.3a: Low severity fire or herbivory resulting in a mosaic pattern.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community. Transition

T1A: Introduction of non-native plants. Current Potential State.

2.0 Community Pathways:

2.1a: Fire or brush treatments (i.e., mowing) with minimal soil disturbance.

2.1b: Time and lack of disturbance such as fire. Drought, inappropriate grazing management, or combinations of these would reduce perennial grasses in the understory

.2.2a: Time and lack of disturbance such as fire, drought, inappropriate grazing management, or combinations of these.

2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance and/or grazing management that reduces shrubs would allow for an increase in perennial bunchgrasses.

2.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community. Transition

T2A: Time and lack of disturbance and/or inappropriate grazing management (to 3.1) or fire, soil disturbing brush treatments and/or inappropriate sheep grazing

(3.2). Transition. T2B: Fire in at-risk community phase (from 2.3) may transition to annual state (4.0), soil disturbing treatments may also transition to an annual state .Shrub State 3.0

Community Pathways:3.1a: Fire and/or sheep grazing management which reduces black sagebrush. Brush treatments (i.e., mowing) with minimal soil disturbance.

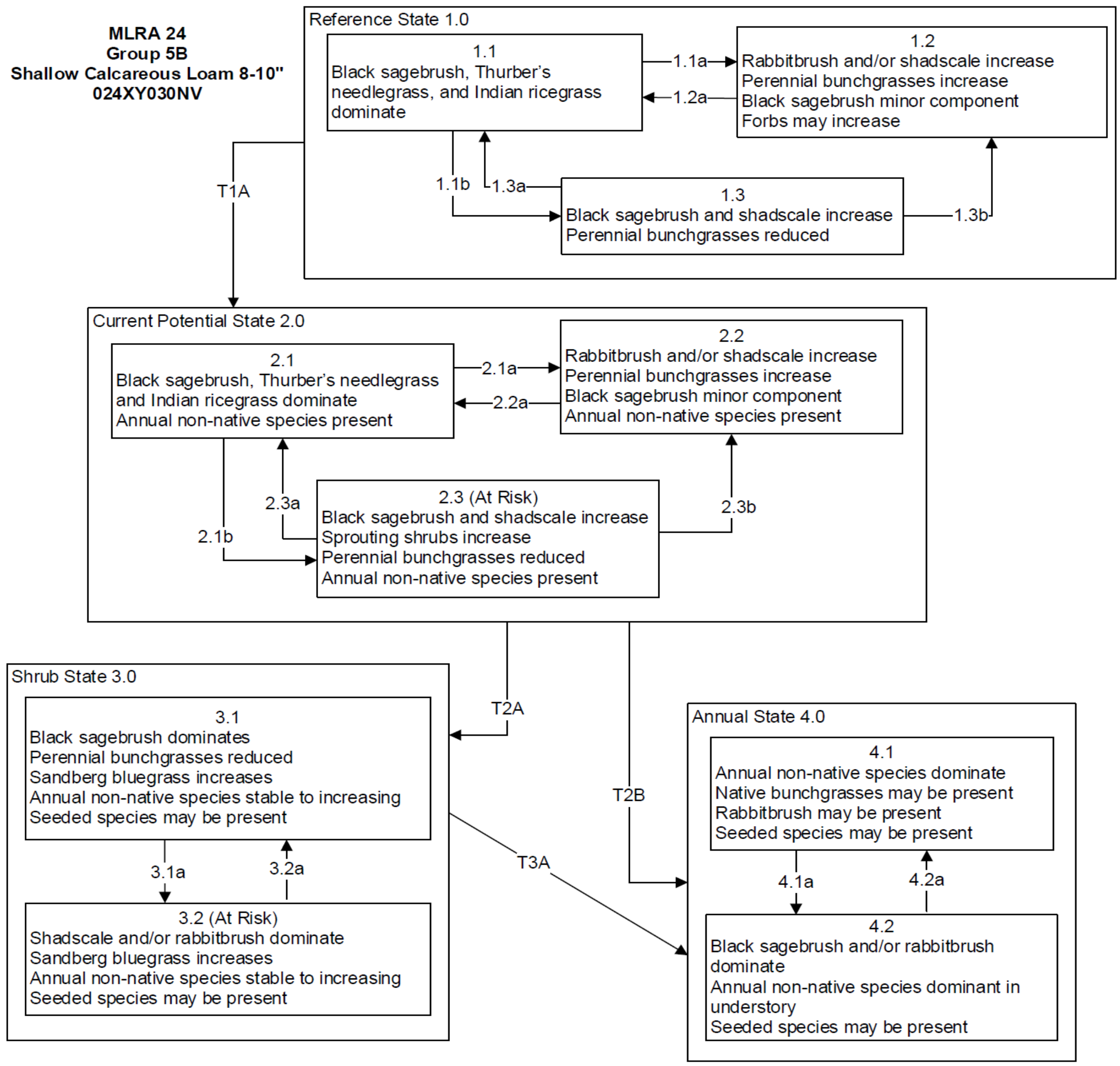
3.2a: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows for the shrub component to recover. Transition

T3A: Fire and/or soil disturbing treatments (i.e. failed restoration attempts) (to 4.0). Annual State 4.0 Community Pathways:

4.1a: Time and lack of disturbance (unlikely to occur).

4.2a: Fire.

Shallow Calcareous Loam 8-10 MODAL



Shallow Calcareous Loam 10-14"024XY031NV

Reference State 1.0 Community Pathways:1.1a: Low severity fire resulting in a mosaic pattern.

1.1b: Time and lack of disturbance such as fire. Drought, herbivory, or combinations of these would reduce the perennial grasses in the understory.

1.2a: Time and lack of disturbance such as fire.

1.3a: Low severity fire or herbivory resulting in a mosaic pattern.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native plants. Current Potential State 2.0 Community Pathways:

2.1a: Fire or brush treatments (i.e. mowing) with minimal soil disturbance.

2.1b: Time and lack of disturbance such as fire. Drought, inappropriate grazing management, or combinations of these would reduce the perennial grasses in the understory. Trees may invade from neighboring sites

2.2a: Time and lack of disturbance such as fire, drought, inappropriate grazing management, or combinations of these.

2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance and/or grazing management that reduces shrubs would allow for an increase in perennial bunchgrasses.

2.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community. Transition.

T2A: Time and lack of disturbance and/or inappropriate grazing management. Trees may invade from neighboring sites (to 3.1) or fire, soil disturbing brush treatments and/or inappropriate sheep grazing (3.2).

Transition T2B: Fire in at-risk community phase (from 2.3) may transition to annual state (4.0), soil disturbing treatments may also transition to an annual state.

Shrub State 3.0 Community Pathways:3.1a: Fire and/or sheep grazing management which reduces black sagebrush. Brush treatments (i.e., mowing) with minimal soil disturbance.

3.2a: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows for the shrub component to recover.

Transition T3A: Fire and/or soil disturbing treatments (i.e., failed restoration attempts) (to 4.0).

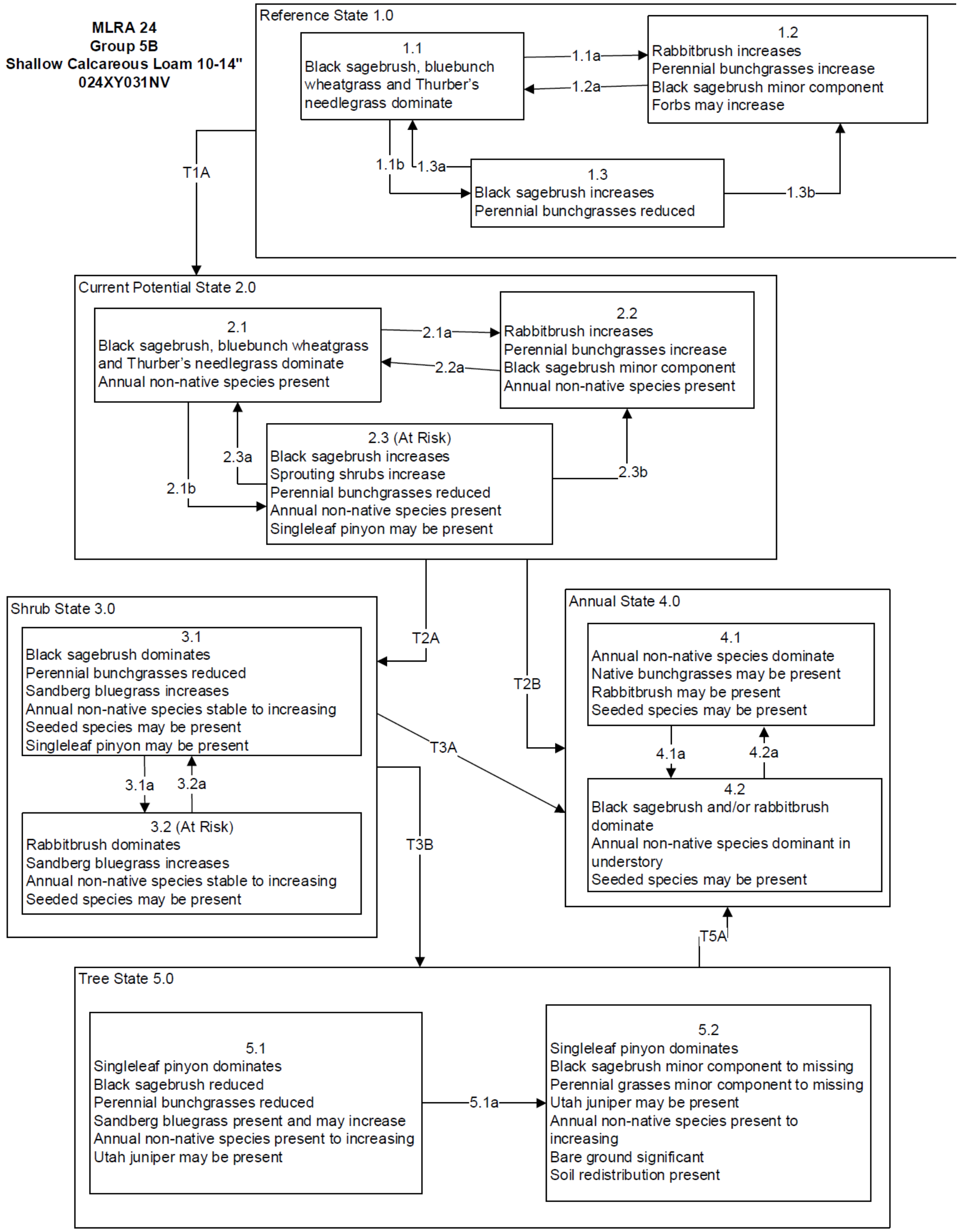
Transition T3B: Time and lack of disturbance allows for maturation of tree community, may be coupled with inappropriate grazing management (5.1).

Annual State 4.0 Community Pathways:4.1a: Time and lack of disturbance (unlikely to occur). 4.2a: Fire.

Tree State 5.0 Community Pathways:5.1a: Time and lack of disturbance allows for maturation of tree community. Transition.

T5A: Catastrophic fire.

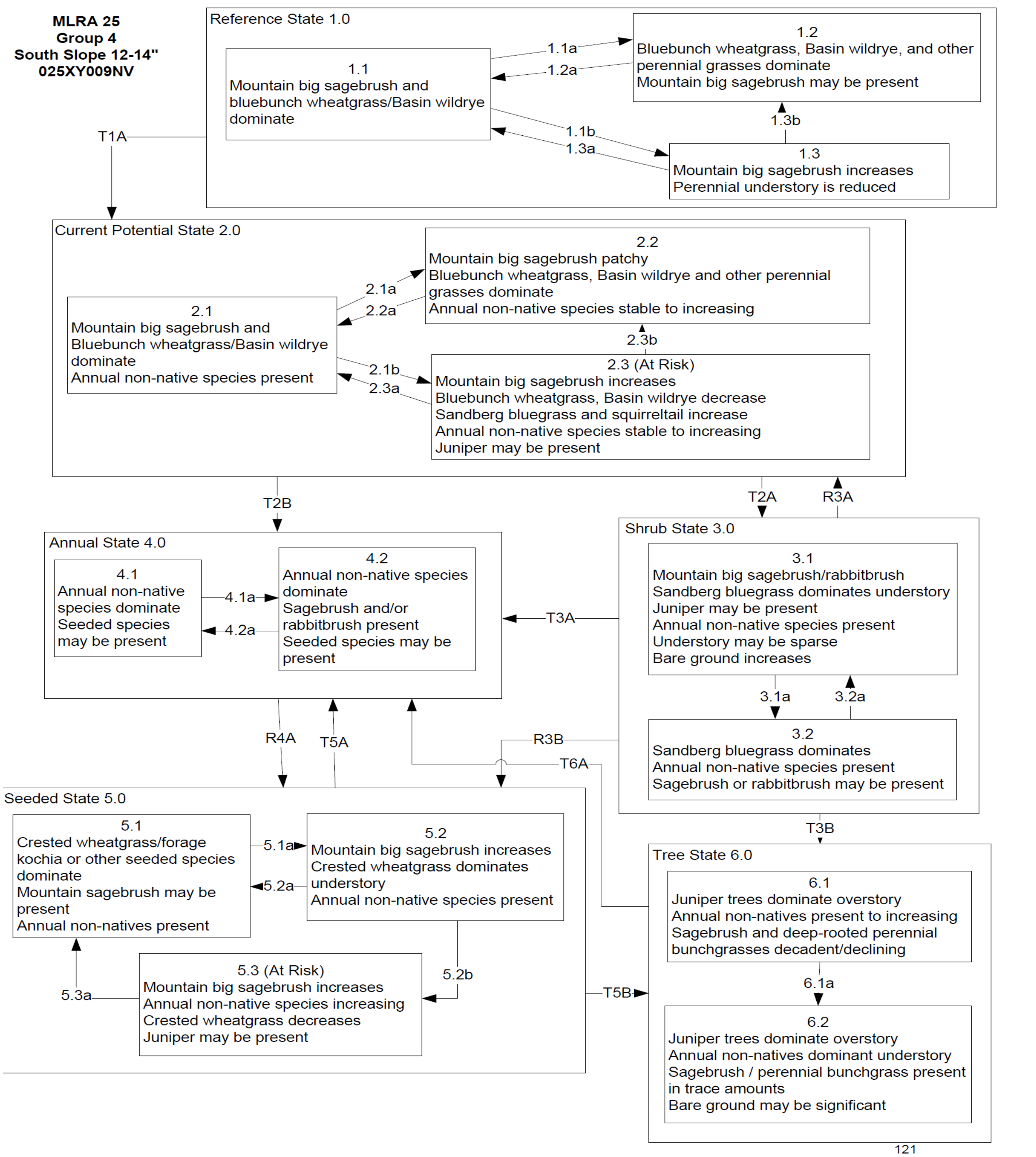
;hallow Calcareous Loam 10-14



South Slope 12-14" 025XY009NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community, dominated by grasses and forbs
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/midseral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to a early/mid-seral community.
Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses will lead to phase 3.1.
Soil disturbing treatments will lead to phase 3.2.
Transition T2B: Catastrophic fire (to 4.1); inappropriate cattle/horse grazing management that removes bunchgrasses, favors shrubs and
promotes the presence of non-native annual species (to 4.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
3.2a: Time and lack of disturbance.
Restoration R3A: Brush management and seeding of native deep-rooted bunchgrasses (probability of success is low).
Restoration R3B: Brush management and seeding of crested wheatgrass and/or other non-native desirable species.
Transition T3A: Fire and/or soil disturbing treatments.
Transition T3B: Time and lack of disturbance such as fire favors an increase in tree dominance (from phase 3.1.)
Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance. Big sagebrush is unlikely to reestablish and may take many years.
4.2a: High-severity fire.
Restoration R4A: Application of herbicide and seeding of desired species (probability of success best immediately following fire).
Seeded State 5.0 Community Phase Pathways

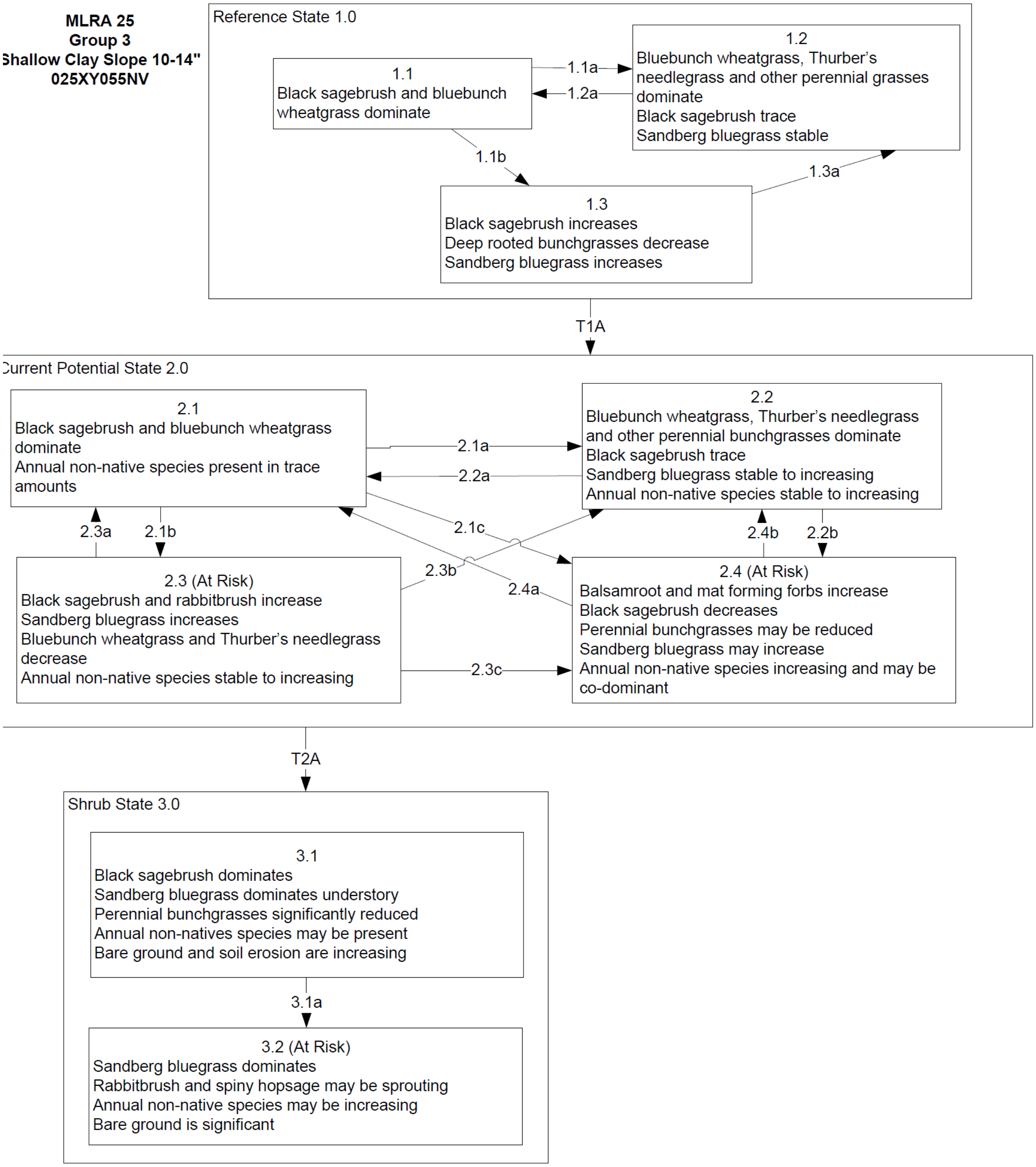
5.1a: Time without disturbance.
5.2a: Fire, brush management, or Aroga moth infestation reduces shrub component.
5.2b: Inappropriate grazing management decreases perennial bunchgrass understory.
5.3a: Fire, brush management, Aroga moth infestation.
Transition T5A: Catastrophic fire (coming from 5.3).
Transition T5B: Time and lack of disturbance allows trees to dominate site resources.
Tree State 6.0 Community Phase Pathways
6.1a: Time without disturbance.
Transition T6A: Catastrophic fire that kills trees. Inappropriate tree removal practices may also lead to dominance by non-native annuals.



Shallow Clay Slope 10-14 025XY055NV

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.

1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of annual non-native species.
Transition T1B: Inappropriate grazing management
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.1c: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy. Inappropriate sheep grazing management allows
unpalatable forbs to increase. Rainfall pattern favoring annual species production (higher than normal spring precipitation) would allow an
increase in annual species.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush
2.2b: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.3a: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy and favors deep-rooted perennial bunchgrasses.
2.3b: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs; non-native annual species present.
2.3c: Change in grazing management to allow for an increase in mat forming forbs and annual non-native species.
2.4a: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer)
2.4b: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer)
Transition T2A: Time and lack of disturbance and/or inappropriate grazing management (to 3.1) or fire (to 3.2).
Shrub State 3.0 Community Pathways
3.1a: Fire.



MLRA 25
Group 3
Shallow Clay Slope 10-14"
025XY055NV
Reference State 1.0
1.1
Black sagebrush and bluebunch wheatgrass dominate
1.1a
1.2a
1.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial grasses dominate
Black sagebrush trace
Sandberg bluegrass stable
1.1b
1.3a
1.3
Black sagebrush increases
Deep rooted bunchgrasses decrease
Sandberg bluegrass increases
T1A
Current Potential State 2.0
2.1
Black sagebrush and bluebunch wheatgrass dominate
Annual non-native species present in trace amounts
2.1a
2.2a
2.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial bunchgrasses dominate
Black sagebrush trace
Sandberg bluegrass stable to increasing
Annual non-native species stable to increasing
2.1c
2.3a
2.1b
2.4b
2.2b
2.3b
2.4a
2.3 (At Risk)
Black sagebrush and rabbitbrush increase
Sandberg bluegrass increases
Bluebunch wheatgrass and Thurber's needlegrass decrease
Annual non-native species stable to increasing
2.3c
2.4 (At Risk)
Balsamroot and mat forming forbs increase
Black sagebrush decreases
Perennial bunchgrasses may be reduced
Sandberg bluegrass may increase
Annual non-native species increasing and may be co-dominant
T2A
Shrub State 3.0
3.1
Black sagebrush dominates
Sandberg bluegrass dominates understory
Perennial bunchgrasses significantly reduced
Annual non-natives species may be present
Bare ground and soil erosion are increasing
3.1a
3.2 (At Risk)
Sandberg bluegrass dominates
Rabbitbrush and spiny hopsage may be sprouting
Annual non-native species may be increasing
Bare ground is significant

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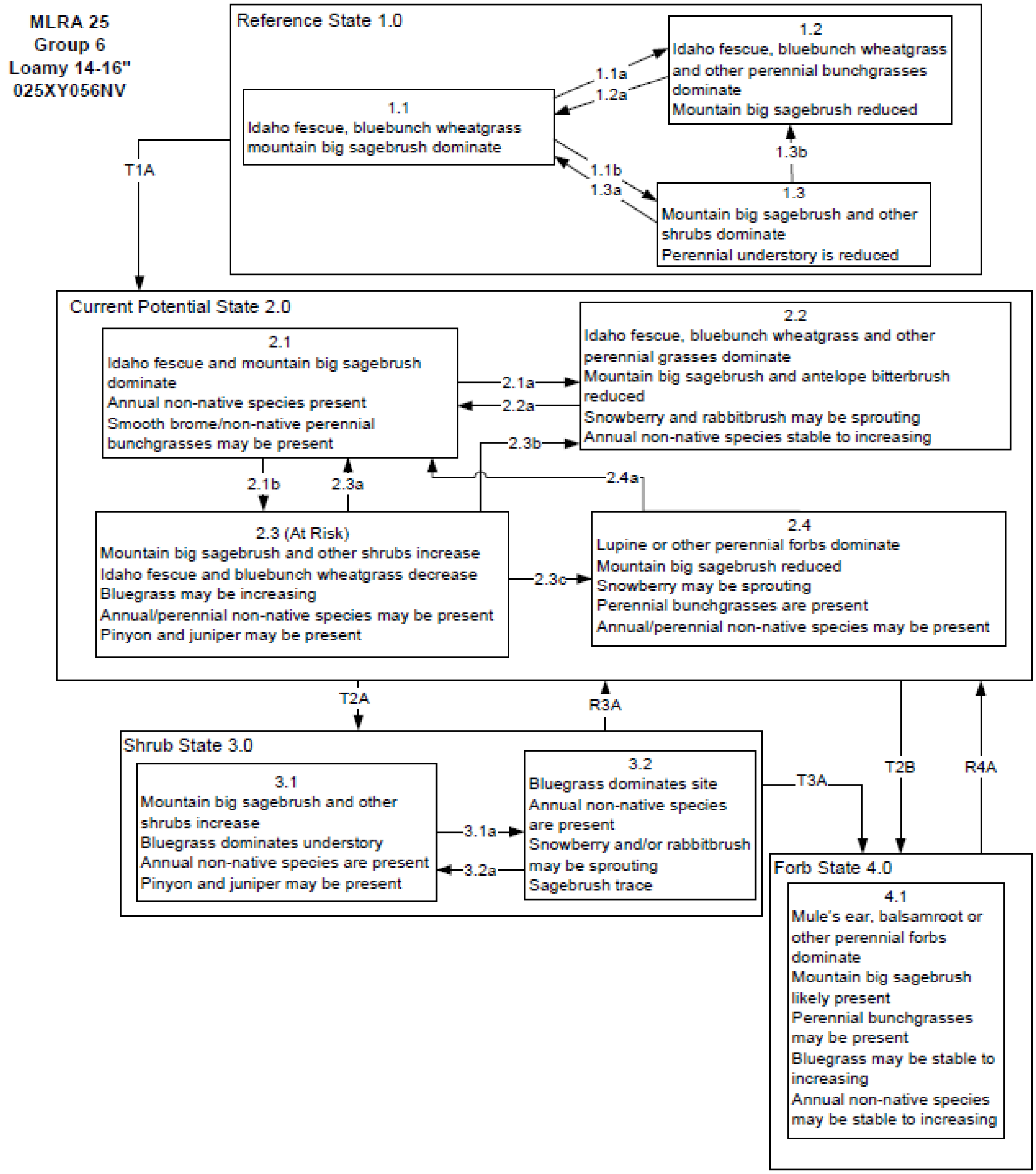
MLRA 25
Group 6
Loamy 14-16"

25XY056NV

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire, and/or herbivory, would create sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native annual species.
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire and/or grazing management creates sagebrush/grass mosaic.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.
2.3c: Inappropriate grazing management coupled with fire
2.4a: Time and lack of disturbance and a change in grazing management to facilitate perennial bunchgrass production.
Transition T2A: Inappropriate grazing management (3.1). High severity fire (3.2).
Transition T2B: Inappropriate grazing management that promotes dominance of forbs; this may be coupled with fire (4.1).
Shrub State 3.0 Community Pathways
3.1a: Fire and/or brush treatments with minimal soil disturbance (i.e., mowing).
3.2a: Time and lack of disturbance allows for sagebrush regeneration.
Restoration R3A: Brush management and/or seeding of desired species.
Transition T3A: Inappropriate grazing management promotes dominance of forbs; this may be coupled with fire (4.1)
Forb State 4.0 Community Pathways
Restoration R4A: Herbicide treatment may be coupled with seeding of desired species.


MLRA 25
Group 6
Loamy 14-16"
025XY056NV
Reference State 1.0
1.1
Idaho fescue, bluebunch wheatgrass
mountain big sagebrush dominate
1.2
Idaho fescue, bluebunch wheatgrass
and other perennial bunchgrasses
dominate
Mountain big sagebrush reduced
1.3
Mountain big sagebrush and other
shrubs dominate
Perennial understory is reduced
1.1a
1.2a
1.1b
1.3a
1.3b
T1A
Current Potential State 2.0
2.1
Idaho fescue and mountain big sagebrush
dominate
Annual non-native species present
Smooth brome/non-native perennial
bunchgrasses may be present
2.2
Idaho fescue, bluebunch wheatgrass and other
perennial grasses dominate
Mountain big sagebrush and antelope bitterbrush
reduced
Snowberry and rabbitbrush may be sprouting
Annual non-native species stable to increasing
2.1a
2.2a
2.3b
2.4a
2.1b
2.3a
2.3 (At Risk)
Mountain big sagebrush and other shrubs increase
Idaho fescue and bluebunch wheatgrass decrease
Bluegrass may be increasing
Annual/perennial non-native species may be present
Pinyon and juniper may be present
2.3c
2.4
Lupine or other perennial forbs dominate
Mountain big sagebrush reduced
Snowberry may be sprouting
Perennial bunchgrasses are present
Annual/perennial non-native species may be present
T2A
R3A
Shrub State 3.0
3.1
Mountain big sagebrush and other
shrubs increase
Bluegrass dominates understory
Annual non-native species are present
Pinyon and juniper may be present
3.1a
3.2a
3.2
Bluegrass dominates site
Annual non-native species
are present
Snowberry and/or rabbitbrush
may be sprouting
Sagebrush trace
T3A
T2B
R4A
Forb State 4.0
4.1
Mule's ear, balsamroot or
other perennial forbs
dominate
Mountain big sagebrush
likely present
Perennial bunchgrasses
may be present
Bluegrass may be stable to
increasing
Annual non-native species
may be stable to increasing

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Shallow Clay Loam 10-14 p.z. 025XY057NV

Reference State 1.0 Community Pathways

1.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs.

1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial understory.

1.2a: Time and lack of disturbance allows for shrub regeneration.

1.3a: Low severity fire, and/or herbivory, would create sagebrush/grass mosaic.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community. Transition T1A: Introduction of non-native annual species. Current Potential State

2.0 Community Pathways

2.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community dominated by grasses and forbs; non-native annual species present.

2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.

2.2a: Time and lack of disturbance allows for regeneration of sagebrush.

2.3a: Low severity fire and/or grazing management creates sagebrush/grass mosaic.

2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.

2.3c: Inappropriate grazing management coupled with fire

2.4a: Time and lack of disturbance and a change in grazing management to facilitate perennial bunchgrass production. Transition T2A: Inappropriate grazing management

(3.1). High severity fire

(3.2). Transition T2B: Inappropriate grazing management that promotes dominance of forbs; this may be coupled with fire

(4.1). Shrub State 3.0 Community Pathways

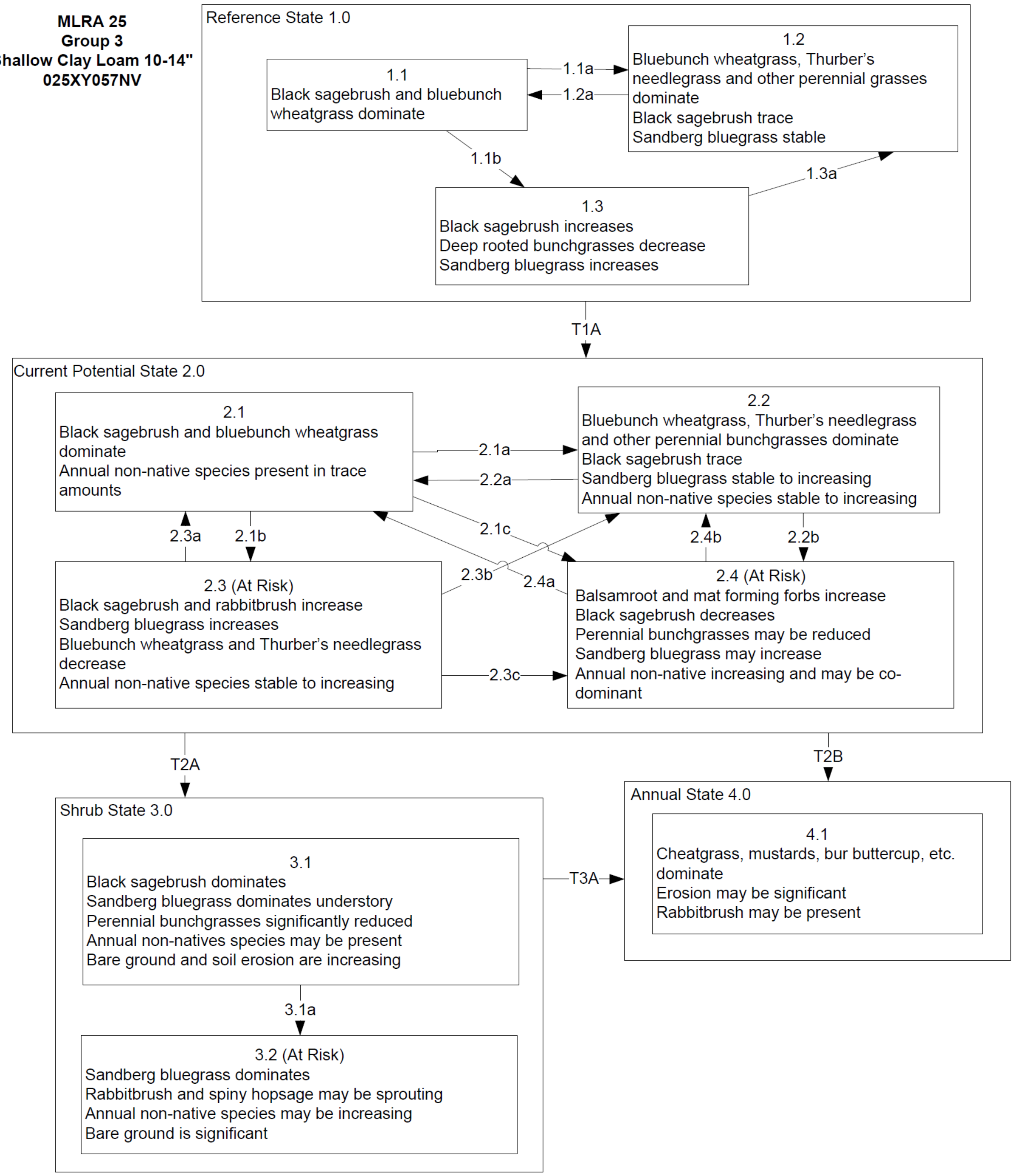
3.1a: Fire and/or brush treatments with minimal soil disturbance (i.e. mowing).

3.2a: Time and lack of disturbance allows for sagebrush regeneration. Restoration R3A: Brush management and/or seeding of desired species. Transition T3A: Inappropriate grazing management promotes dominance of forbs; this may be coupled with fire

(4.1) Forb State

4.0 Community Pathways Restoration R4A: Herbicide treatment may be coupled with seeding of desired species

MLRA 25
Group 3
Shallow Clay Loam 10-14"
025XY057NV



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Narrative

Shallow Calcareous Loam 8-10"024XY030NV

Current State: 4.1a- Annual and non-native species dominate. Native species may be present. Seeded species may be present.

Desired State: 2.1- Black sagebrush, indian ricegrass, and Thurber's needlegrass dominate. Few tree seedlings and saplings occur in understory. Annual non-native species present.

Potential Undesired State: Community could go to annual state 4.2 or remain in annual state 4.1.

024XY031NV

Current State: 2.2- Rabbitbrush increases. Perennial bunch grasses increase. Black sagebrush a minor component. Annual grasses present.

Desired State: 2.1-Black sagebrush, bluebunch wheatgrass and Thurber's needlegrass dominate. Annual grasses present.

Potential Undesired State: Same as current state.

South Slope 12-14" 025XY009NV

Current State: 2.2- Mountain Big sagebrush is patchy. Blue bunch wheatgrass, Basin wildrye and other perennial grasses dominate. Annual non-native species Stable to increasing.

Desired State: 2.1- Mountain big sage, blue bunch wheatgrass and other perennial dominant. Annual non-native species present.
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Potential Undesired State: 3.0- Mountain big sage and rabbitbrush dominant. Sandberg blue grass dominant in the understory. Juniper may be present. Annual non-native species present. Understory is sparse with bare ground increasing.

Shallow Clay Slope 10-14 025XY055NV

Current State: 2.4- Balsam root and mat forming forbs, Sandberg blue grass and annual non-native increase. Black sage decreases. Perennial bunch grasses are reduced.

Desired State: 2.1 – Black sage and blue bunch wheatgrass are dominant and annual non-native species are present.

Potential Undesired State: Same as current state.

025XY56NV

Current State: 2.4- Lupine and other perennials dominant. Mountain big sagebrush reduced. Snowberry sprouting. Perennial bunch grasses present. Annual and perennial non-native species present.

Desired State: 2.1- Idaho fescue and mountain big sagebrush are dominant. Bunch grasses are present. Smooth brome and non-native perennial are present. Annual non-native species are present.

Potential Undesired State: 2.4- Same as current state.

Shallow Clay Loam 10-14 p.z. 025XY057NV

Current State: 2.2- Bluebunch wheatgrass, Thurber’s needlegrass and other perennial bunchgrasses dominate. Black sagebrush in trace amounts. Sandberg bluegrass stable to increasing. Annual non-native species stable to increasing.

Desired State: 2.1- Black sagebrush and bluebunch wheatgrass dominate. Annual non-native species present in trace amounts.

Potential Undesired State: 3.1-Black sagebrush dominates. Sandberg bluegrass dominates understory. Perennial bunchgrasses significantly reduced. Annual non-natives species may be present. Bare ground and soil erosion are increasing.

Adaptive Management Procedures (AMP)

Post project implementation vegetation monitoring would be done to determine if objectives were being met. This may include but would not be limited to monitoring vegetation for community composition, diversity, vigor, productivity, and ground cover. If monitoring indicates a post implementation treatment site is moving toward an undesirable vegetation pathway or state, adaptive management procedures (Section 2.1.1. Adaptive Management) are in place and would be utilized to address the given situation on the specific project site. The adaptive management procedures may include but would not be limited to reseeding, pinyon-juniper removal, harrowing, seedling planting, the use of herbicide and fence construction to limit herbivore access to the site.

Unit 10: South Cricket Fire Restoration

Wet Meadow 025XY005NV

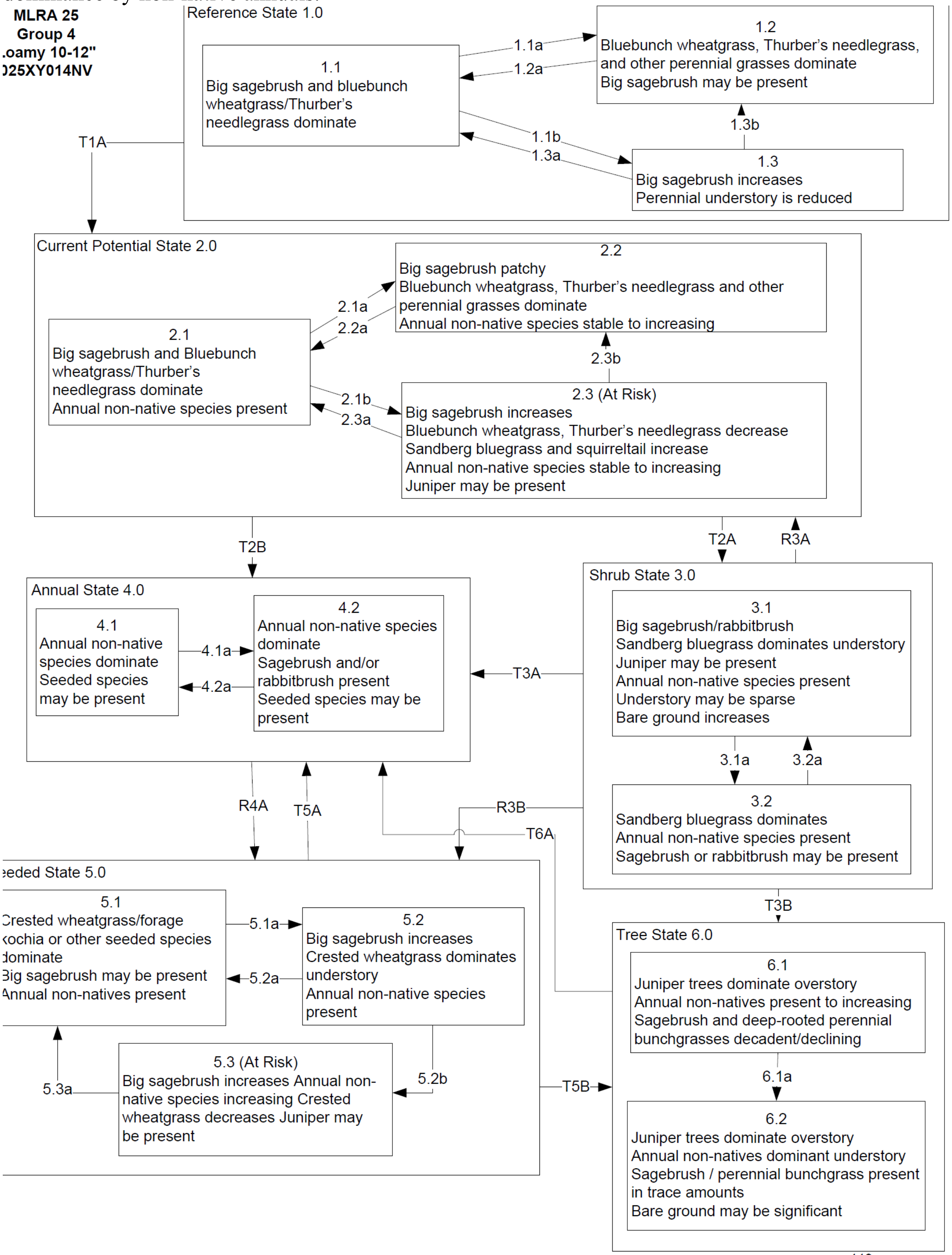
Not modeled.

Loamy 10-12" 025XY014NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/midseral
community, dominated by grasses and forbs
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.

1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to a early/mid-seral community.
Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses will lead to phase 3.1.
Soil disturbing treatments will lead to phase 3.2.
Transition T2B: Catastrophic fire (to 4.1); inappropriate cattle/horse grazing management that removes bunchgrasses, favors shrubs and
promotes the presence of non-native annual species (to 4.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
3.2a: Time and lack of disturbance.
Restoration R3A: Brush management and seeding of native deep rooted bunchgrasses (probability of success is low).
Restoration R3B: Brush management and seeding of crested wheatgrass and/or other non-native desirable species.
Transition T3A: Fire and/or soil disturbing treatments.
Transition T3B: Time and lack of disturbance such as fire favors an increase in tree dominance (from phase 3.1.)
Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance. Big sagebrush is unlikely to reestablish and may take many years.
4.2a: High-severity fire.
Restoration R4A: Application of herbicide and seeding of desired species (probability of success best immediately following fire).
Seeded State 5.0 Community Phase Pathways
5.1a: Time without disturbance.
5.2a: Fire, brush management, or Aroga moth infestation reduces shrub component.
5.2b: Inappropriate grazing management decreases perennial bunchgrass understory.
5.3a: Fire, brush management, Aroga moth infestation.
Transition T5A: Catastrophic fire (coming from 5.3).
Transition T5B: Time and lack of disturbance allows trees to dominate site resources.
Tree State 6.0 Community Phase Pathways
6.1a: Time without disturbance.

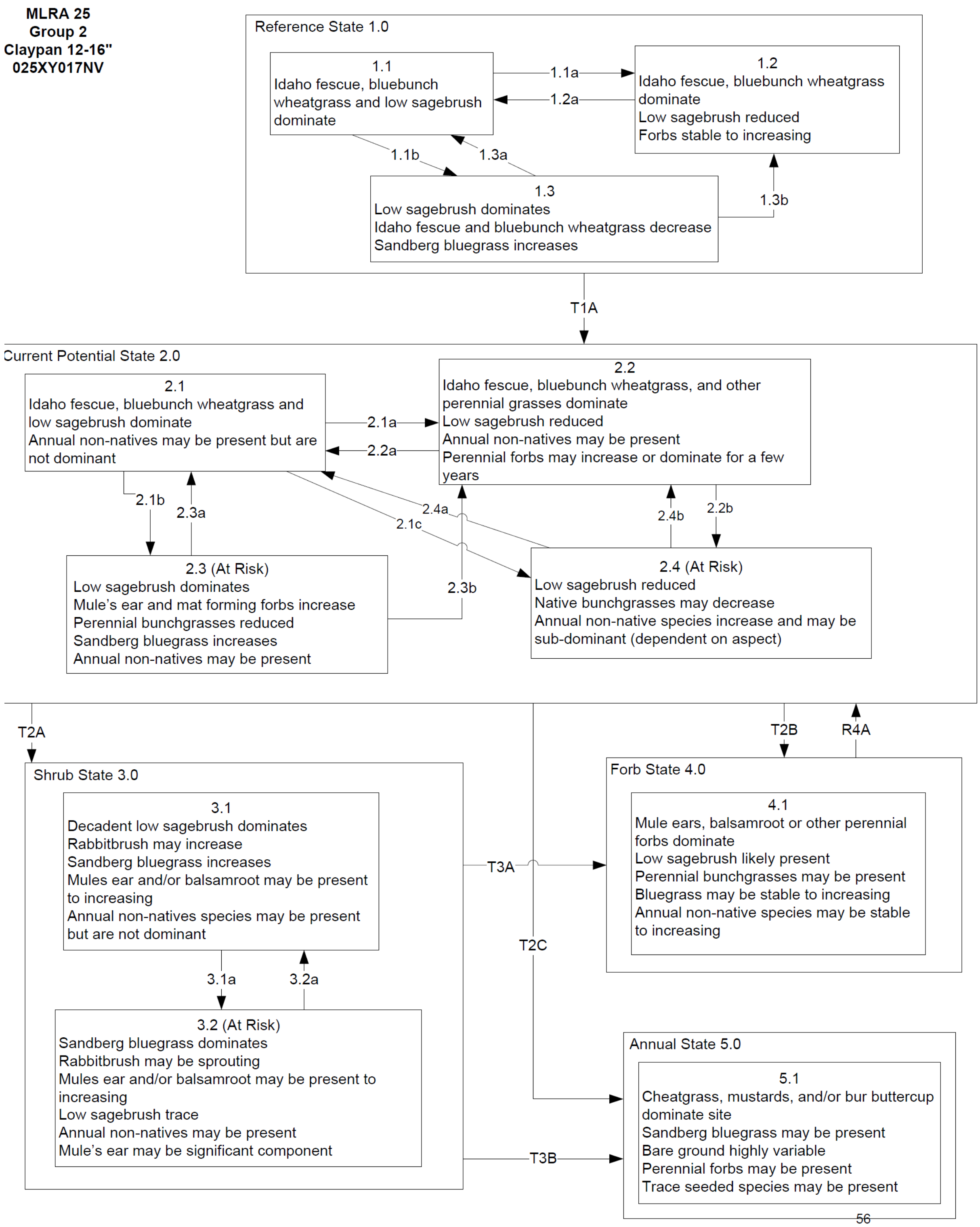
Transition T6A: Catastrophic fire that kills trees. Inappropriate tree removal practices may also lead to dominance by non-native annuals.



Claypan 12-16 025XY017NV

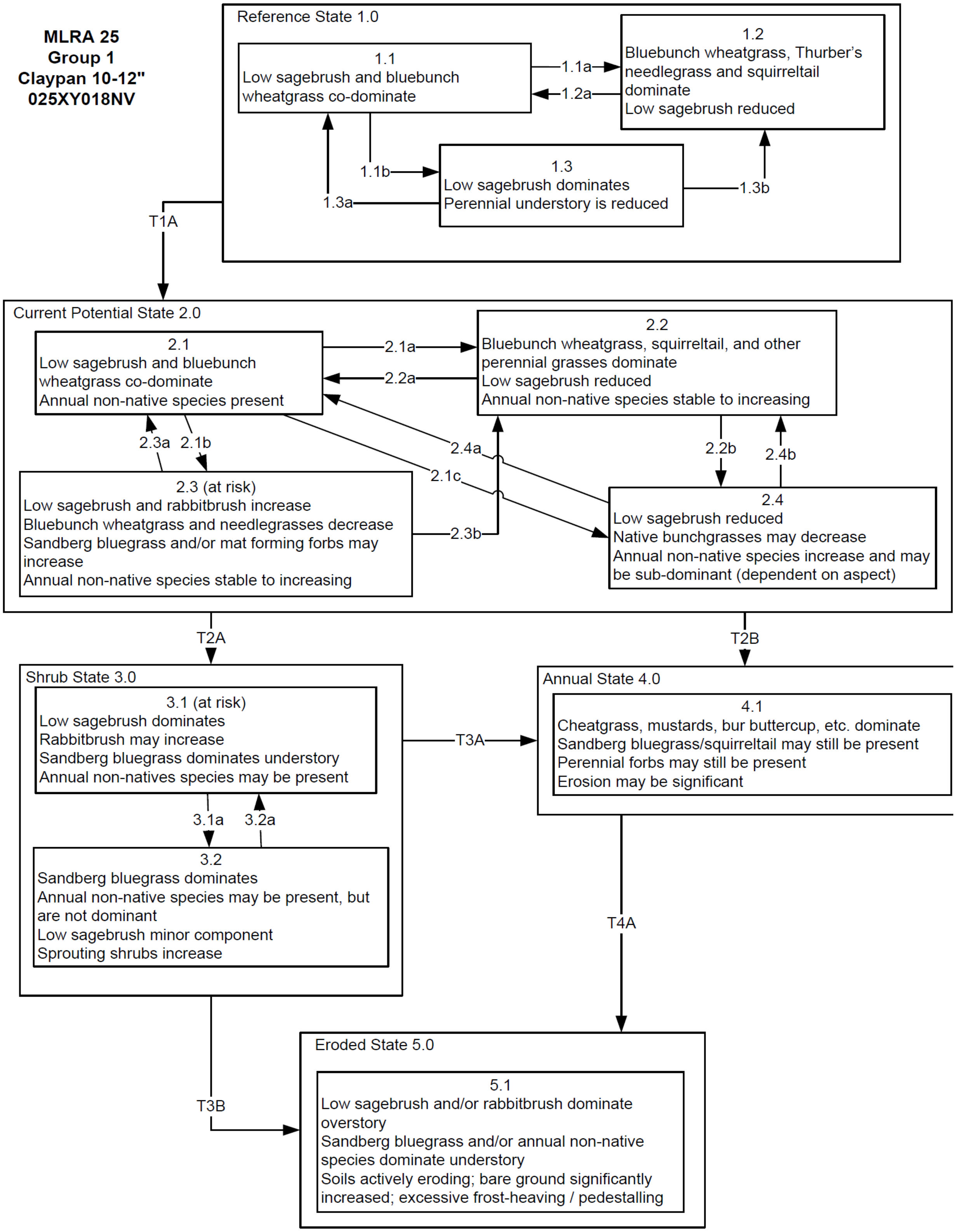
Reference State 1.0 Community Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance. Excessive herbivory and/or long-term drought may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire creates sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid seral community.
Transition T1A: Introduction of non-native species
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid seral
community dominated by grasses and forbs.
2.1b: Time and lack of disturbance. Inappropriate grazing management and/or long-term drought may also reduce perennial understory.
2.1c: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.2a: Time and lack of disturbance allows for shrub regeneration.
2.2b: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatments with minimal soil disturbance; late-fall/winter grazing causing
mechanical damage to sagebrush would reduce the shrub overstory.
2.3b: High severity fire significantly reduces sagebrush cover leading to early/mid seral community.
2.4a: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer precipitation)
2.4b: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer precipitation)
Transition T2A: Grazing management favoring shrubs and/or Mule's ear/balsamroot.
Transition T2B: Inappropriate grazing management that promotes dominance of forbs; this may be coupled with fire (4.1).
Transition T2C: Catastrophic fire and/or soil disturbing treatments such as drill seeding, roller chopper, Lawson aerator etc. Probability of
success of seeding on this site is low (5.1).
Shrub State 3.0 Community Pathways
3.1a: Fire.
3.2a: Time without disturbance.
Transition T3A: Inappropriate grazing management promotes dominance of forbs; this may be coupled with fire (4.1).
Transition T3B: Catastrophic fire or multiple fires. Bare ground levels depend on variations in annual precipitation (5.1)
Forb State 4.0 Community Pathways
None

Restoration R4A: Herbicide treatment may be coupled with seeding of desired species.
Annual State 5.0 Community Pathways
None



Claypan 10-12 025XY018NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory and/or long-term drought may also reduce perennial
understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire would create sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native annual species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance. Inappropriate grazing management and/or long-term drought may also reduce perennial understory.
2.1c: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.2b: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.3a: Low severity fire creates sagebrush/grass mosaic, herbivory or combinations. Brush management with minimal soil disturbance
reduces sagebrush
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community. Brush management with minimal soil
disturbance reduces sagebrush.
2.4a: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher
than normal summer)
2.4b: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher
than normal summer)
Transition T2A: Inappropriate grazing management (3.1), or high severity fire (3.2)
Transition T2B: Fire or brush management causing severe soil disturbance
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire
3.2a: Time and lack of disturbance
Transition T3A: Catastrophic fire and/or treatments that disturb the existing plant community
Transition T3B: Inappropriate grazing management following fire and/or multiple fires and/or prolonged drought. Additional soil disturbing
treatments (ex: failed drill seeding) could also increase erosion.
Annual State 4.0
None
Transition T4A: Inappropriate grazing management following fire and/or multiple fires and/or long-term drought. Additional soil disturbing
treatments (ex: seedings that fail) could also increase erosion.
Eroded State 5.0 Community Phase Pathways None

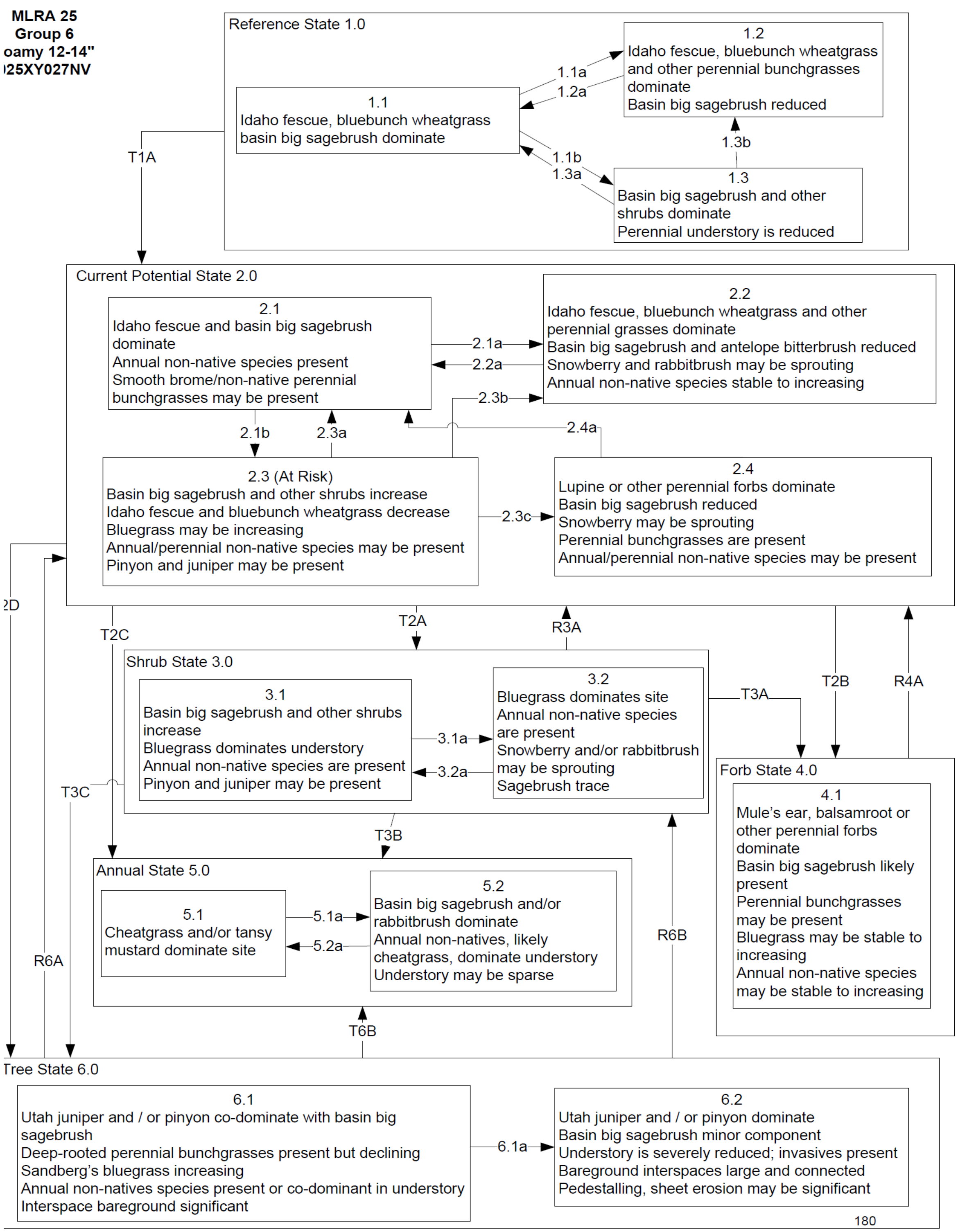


MLRA 25
Group 1
Claypan 10-12"
025XY018NV
Reference State 1.0
1.1
Low sagebrush and bluebunch wheatgrass co-dominate
1.2
Bluebunch wheatgrass, Thurber's needlegrass and squirreltail dominate
Low sagebrush reduced
1.3
Low sagebrush dominates
Perennial understory is reduced
1.1a
1.2a
1.1b
1.3a
1.3b
T1A
Current Potential State 2.0
2.1
Low sagebrush and bluebunch wheatgrass co-dominate
Annual non-native species present
2.2
Bluebunch wheatgrass, squirreltail, and other perennial grasses dominate
Low sagebrush reduced
Annual non-native species stable to increasing
2.3 (at risk)
Low sagebrush and rabbitbrush increase
Bluebunch wheatgrass and needlegrasses decrease
Sandberg bluegrass and/or mat forming forbs may increase
Annual non-native species stable to increasing
2.4
Low sagebrush reduced
Native bunchgrasses may decrease
Annual non-native species increase and may be sub-dominant (dependent on aspect)
2.1a
2.2a
2.3a
2.1b
2.4a
2.1c
2.2b
2.4b
2.3b
T2A
T2B
Shrub State 3.0
3.1 (at risk)
Low sagebrush dominates
Rabbitbrush may increase
Sandberg bluegrass dominates understory
Annual non-natives species may be present
3.2
Sandberg bluegrass dominates
Annual non-native species may be present, but are not dominant
Low sagebrush minor component
Sprouting shrubs increase
3.1a
3.2a
T3A
Annual State 4.0
4.1
Cheatgrass, mustards, bur buttercup, etc. dominate
Sandberg bluegrass/squirreltail may still be present
Perennial forbs may still be present
Erosion may be significant
T4A
T3B
Eroded State 5.0
5.1
Low sagebrush and/or rabbitbrush dominate overstory
Sandberg bluegrass and/or annual non-native species dominate understory
Soils actively eroding; bare ground significantly increased; excessive frost-heaving / pedestalling

Loamy 12-14 p.z 025XY027NV

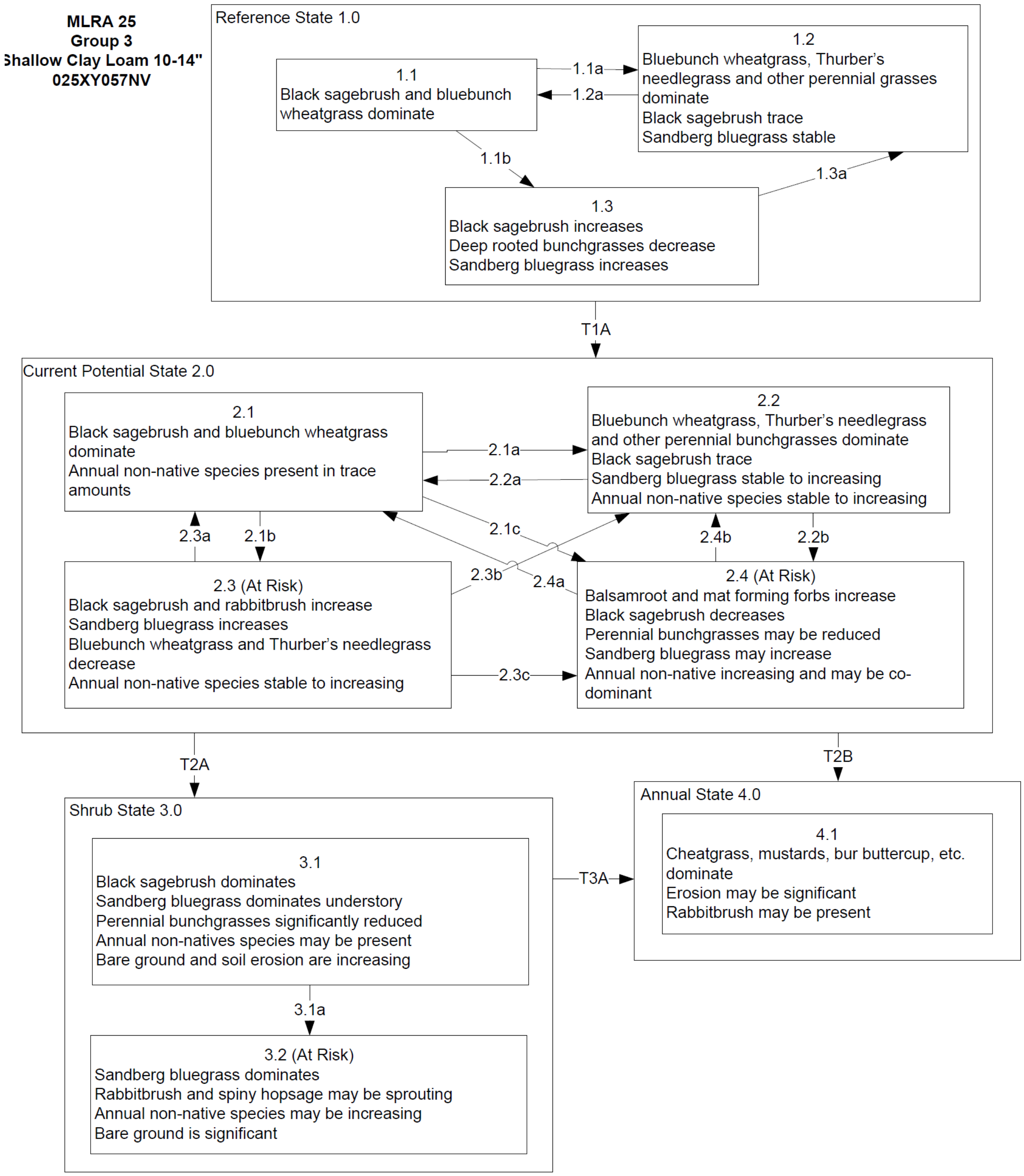
Reference State 1.0 Community Pathways
1.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire, and/or herbivory, would create sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native annual species.
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire and/or grazing management creates sagebrush/grass mosaic.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.
2.3c: Inappropriate grazing management coupled with fire
2.4a: Time and lack of disturbance and a change in grazing management to facilitate perennial bunchgrass production.
Transition T2A: Inappropriate grazing management (3.1). High severity fire (3.2).
Transition T2B: Inappropriate grazing management that promotes dominance of forbs; this may be coupled with fire (4.1).
Transition T2C: Multiple fires and/or soil disturbing treatments (drill seeding, roller chopper, or Lawson aerator etc)(5.1), or inappropriate
grazing management in the presence of annual non-native species (5.2).
Transition T2D: Time and lack of disturbance allows for trees to dominate site resources.
Shrub State 3.0 Community Pathways
3.1a: Fire and/or brush treatments with minimal soil disturbance (i.e., mowing).
3.2a: Time and lack of disturbance allows for sagebrush regeneration.
Restoration R3A: Brush management and/or seeding of desired species.
Transition T3A: Inappropriate grazing management promotes dominance of forbs; this may be coupled with fire (4.1)
Transition T3B: Multiple fires and/or soil disturbing treatments (5.1) and/or inappropriate grazing management eliminates bluegrass
understory and leaves site open for non-native invasive species (5.2).
Transition T3C: Time and lack of disturbance allows for trees to dominate site resources.
Forb State 4.0 Community Pathways
Restoration R4A: Herbicide treatment may be coupled with seeding of desired species.
Annual State 5.0 Community Pathways
5.1a: Time and lack of disturbance (unlikely to occur).
5.2a: Fire
Tree State 6.0 Community Pathways
6.1a: Time and lack of disturbance allows for maturation of tree community.
Restoration R6A: Tree removal and seeding of desired species or recovery of herbaceous understory.

Restoration R6B: Tree removal when Sandberg bluegrass is dominant and remains in understory.
Transition T6B: Catastrophic fire (5.1).



Shallow Clay Loam 10-14 p.z. 025XY057NV

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of annual non-native species.
Transition T1B: Inappropriate grazing management
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.1c: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy. Inappropriate sheep grazing management allows
unpalatable forbs to increase. Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.2a: Time and lack of disturbance allows for regeneration of sagebrush
2.2b: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.3a: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy and favors deep-rooted perennial bunchgrasses.
2.3b: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.3c: Change in grazing management to allow for an increase in mat forming forbs and annual non-native species.
2.4a: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer)
2.4b: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer).
Transition T2A: Time and lack of disturbance and/or inappropriate grazing management (to 3.1) or fire (to 3.2).
Transition T2B: Fire in at-risk community phase (from 2.3 or 2.4) may transition to annual state (to 4.0).
Shrub State 3.0 Community Pathways
3.1a: Fire.
Transition T3A: High-severity fire or soil-disturbing treatments (to 4.0).



MLRA 25
Group 3
Shallow Clay Loam 10-14"
025XY057NV
Reference State 1.0
1.1
Black sagebrush and bluebunch wheatgrass dominate
1.1a
1.2a
1.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial grasses dominate
Black sagebrush trace
Sandberg bluegrass stable
1.1b
1.3a
1.3
Black sagebrush increases
Deep rooted bunchgrasses decrease
Sandberg bluegrass increases
T1A
Current Potential State 2.0
2.1
Black sagebrush and bluebunch wheatgrass dominate
Annual non-native species present in trace amounts
2.1a
2.2a
2.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial bunchgrasses dominate
Black sagebrush trace
Sandberg bluegrass stable to increasing
Annual non-native species stable to increasing
2.1c
2.3a
2.1b
2.4b
2.2b
2.3b
2.4a
2.3 (At Risk)
Black sagebrush and rabbitbrush increase
Sandberg bluegrass increases
Bluebunch wheatgrass and Thurber's needlegrass decrease
Annual non-native species stable to increasing
2.3c
2.4 (At Risk)
Balsamroot and mat forming forbs increase
Black sagebrush decreases
Perennial bunchgrasses may be reduced
Sandberg bluegrass may increase
Annual non-native increasing and may be co-dominant
T2A
T2B
Shrub State 3.0
3.1
Black sagebrush dominates
Sandberg bluegrass dominates understory
Perennial bunchgrasses significantly reduced
Annual non-natives species may be present
Bare ground and soil erosion are increasing
3.1a
3.2 (At Risk)
Sandberg bluegrass dominates
Rabbitbrush and spiny hopsage may be sprouting
Annual non-native species may be increasing
Bare ground is significant
T3A
Annual State 4.0
4.1
Cheatgrass, mustards, bur buttercup, etc. dominate
Erosion may be significant
Rabbitbrush may be present

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Narrative

Loamy 10-12" 025XY014NV

Current State: 2.2- Big sagebrush is patchy. Blue bunch wheatgrass, Thurber's needle grass and other perennials dominate. Annual non- native stable to increasing.

Desired State: 2.1- Big sage brush, blue bunch wheatgrass and Thurber's needlegrass dominate. Annual non-native species present.

Potential Undesired State: Same as current state.

Claypan 12-16 025XY017NV

Current State: 2.2- Idaho Fescue, blue bunch wheatgrass, other perennials and perennial forbs are dominant. Low sagebrush is reduced, and annual non-native species are present.

Desired State: 2.1- Idaho Fescue, blue bunch wheatgrass and low sage brush are dominant. Annual non-native species are present.

Potential Undesired State: Same as current state.

Claypan 10-12 025XY018NV

Current State: 2.2- Blue bunch wheatgrass, squirreltail and other perennials dominate. Low sage brush is reduced, and annual non-native species are present.

Desired State: 2.1- Low sagebrush and blue bunch wheatgrass co-dominant. Annual non-native species present.

Potential Undesired State: 2.4- Low sagebrush and native bunchgrasses are reduced. Annual non-native species are present.

Loamy 12-14 p.z 025XY027NV

Current State: 2.2- Idaho fescue, blue bunch wheatgrass and other perennials dominate. Basin big sagebrush and antelope bitterbrush are reduced while snowberry may be sprouting. Annual grasses maybe present.

Desired State: 2.1- Idaho fescue and basin big sage dominate. Smooth brome and other native bunch grasses are present. Annual non-native species are present.

Potential Undesired State: Lupine and other perennial forbs dominate. Basin big sage is reduced while snowberry maybe sprouting. Perennial bunchgrasses and annual non-native grasses are present.

Shallow Clay Loam 10-14 p.z. 025XY057NV

Current State: 2.4- Balsam root and other mat forming forbs increase. Annual non-native species are co-dominant and increasing. Sandberg blue grass is increasing while black sagebrush and perennial bunch grasses are decreasing.

Desired State: 2.1- Black sagebrush and blue bunch wheatgrass are dominant with trace amounts of annual non-native species.

Potential Undesired State: Same as current state.

Adaptive Management Procedures (AMP)

Post project implementation vegetation monitoring would be done to determine if objectives were being met. This may include but would not be limited to monitoring vegetation for community composition, diversity, vigor, productivity, and ground cover. If monitoring indicates a post implementation treatment site is moving toward an undesirable vegetation pathway or state, adaptive management procedures (Section 2.1.1. Adaptive Management) are in place and would be utilized to address the given situation on the specific project site. The adaptive management procedures may include but would not be limited to reseeding, pinyon-juniper removal, harrowing, seedling planting, the use of herbicide and fence construction to limit herbivore access to the site.

Unit 11: West Fork Fire Restoration

Shallow Calcareous Loam 10-14" 024XY031NV

Reference State 1.0 Community Pathways:1.1a: Low severity fire resulting in a mosaic pattern.

1.1b: Time and lack of disturbance such as fire. Drought, herbivory, or combinations of these would reduce the perennial grasses in the understory.

1.2a: Time and lack of disturbance such as fire.

1.3a: Low severity fire or herbivory resulting in a mosaic pattern.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native plants. Current Potential State 2.0 Community Pathways:

2.1a: Fire or brush treatments (i.e., mowing) with minimal soil disturbance.

2.1b: Time and lack of disturbance such as fire. Drought, inappropriate grazing management, or combinations of these would reduce the perennial grasses in the understory. Trees may invade from neighboring sites

2.2a: Time and lack of disturbance such as fire, drought, inappropriate grazing management, or combinations of these.

2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance and/or grazing management that reduces shrubs would allow for an increase in perennial bunchgrasses.

2.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community. Transition.

T2A: Time and lack of disturbance and/or inappropriate grazing management. Trees may invade from neighboring sites (to 3.1) or fire, soil disturbing brush treatments and/or inappropriate sheep grazing (3.2).

Transition T2B: Fire in at-risk community phase (from 2.3) may transition to annual state (4.0), soil disturbing treatments may also transition to an annual state.

Shrub State 3.0 Community Pathways:3.1a: Fire and/or sheep grazing management which reduces black sagebrush. Brush treatments (i.e., mowing) with minimal soil disturbance.

3.2a: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows for the shrub component to recover.

Transition T3A: Fire and/or soil disturbing treatments (i.e., failed restoration attempts) (to 4.0).

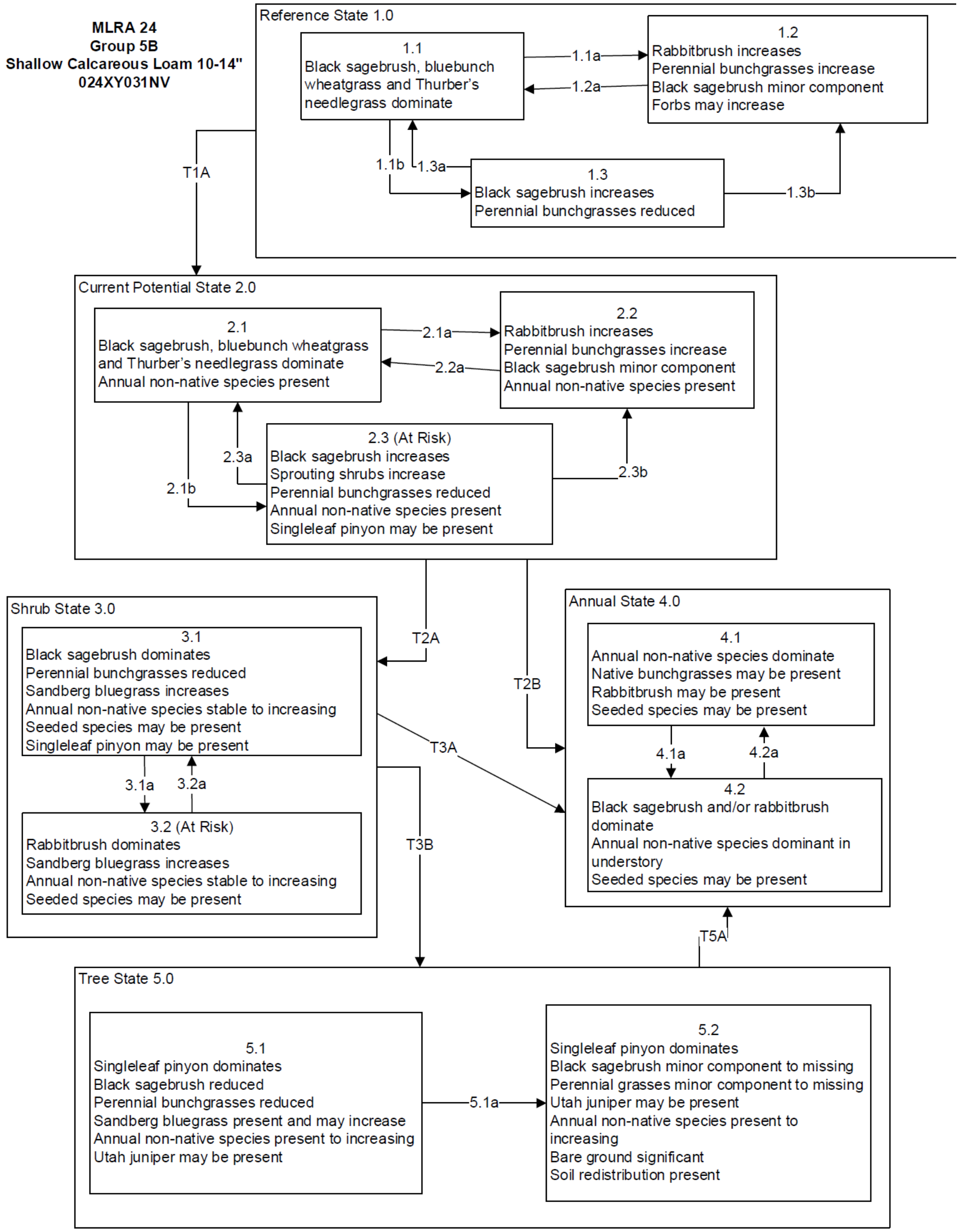
Transition T3B: Time and lack of disturbance allows for maturation of tree community, may be coupled with inappropriate grazing management (5.1).

Annual State 4.0 Community Pathways:4.1a: Time and lack of disturbance (unlikely to occur). 4.2a: Fire.

Tree State 5.0 Community Pathways:5.1a: Time and lack of disturbance allows for maturation of tree community. Transition.

T5A: Catastrophic fire.

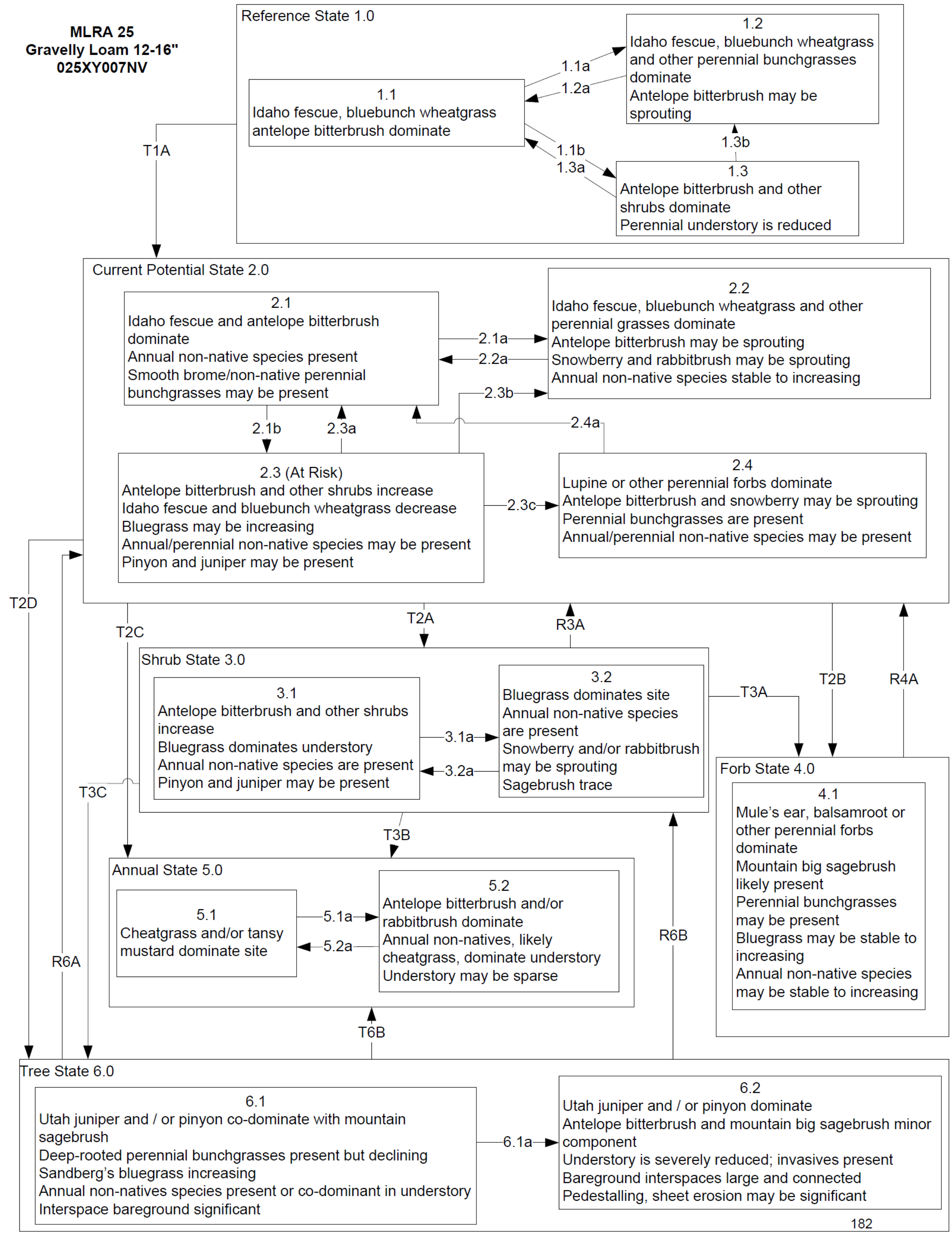
Shallow Calcareous Loam 10-14



Gravelly Loam 12-16 p.z. 025XY007NV

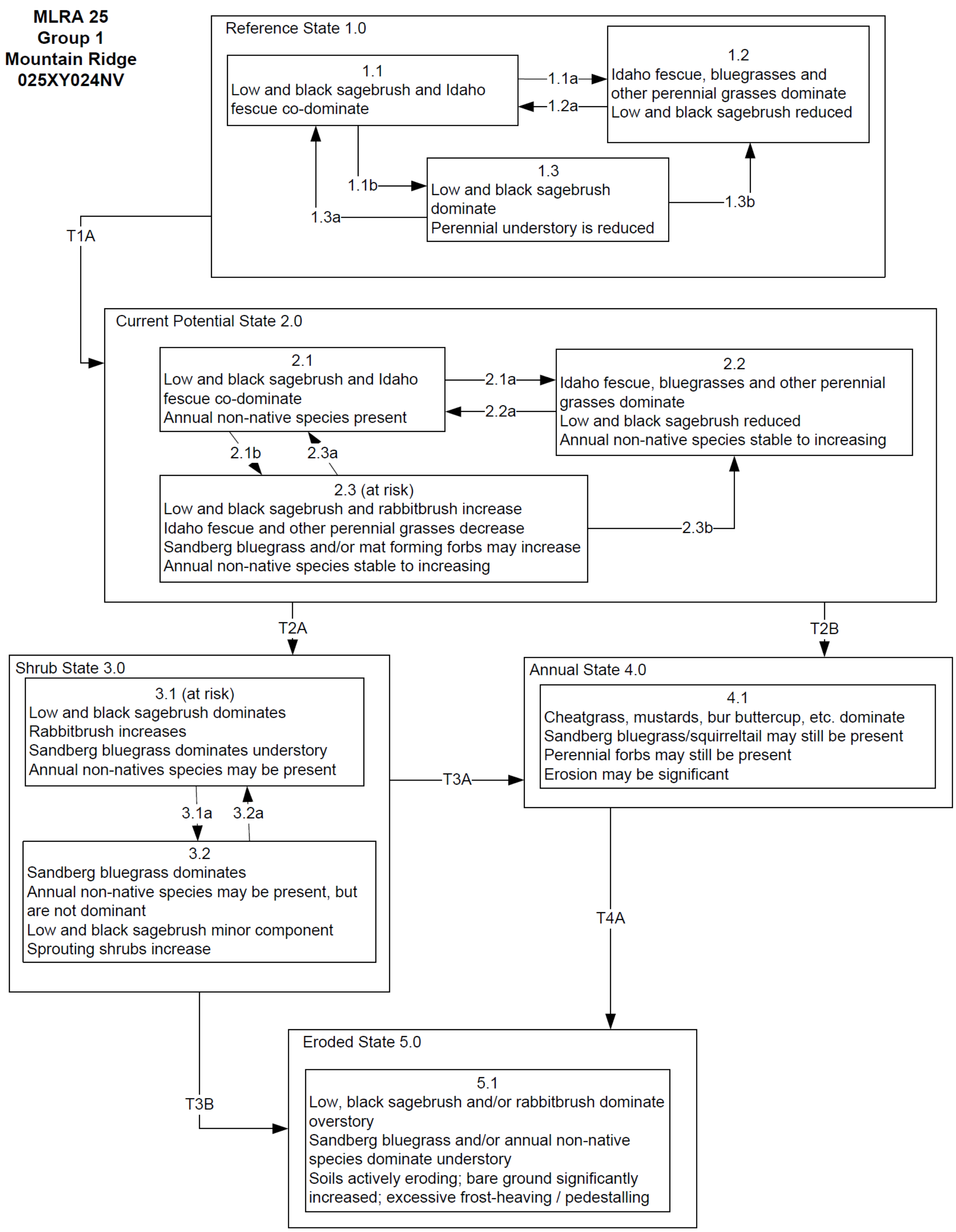
Reference State 1.0 Community Pathways
1.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire, and/or herbivory, would create sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native annual species.
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire and/or grazing management creates sagebrush/grass mosaic.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.
2.3c: Inappropriate grazing management coupled with fire
2.4a: Time and lack of disturbance and a change in grazing management to facilitate perennial bunchgrass production.
Transition T2A: Inappropriate grazing management (3.1). High severity fire (3.2).
Transition T2B: Inappropriate grazing management that promotes dominance of forbs; this may be coupled with fire (4.1).
Transition T2C: Multiple fires and/or soil disturbing treatments (drill seeding, roller chopper, or Lawson aerator etc.) (5.1), or inappropriate
grazing management in the presence of annual non-native species (5.2).
Transition T2D: Time and lack of disturbance allows for trees to dominate site resources.
Shrub State 3.0 Community Pathways
3.1a: Fire and/or brush treatments with minimal soil disturbance (i.e. mowing).
3.2a: Time and lack of disturbance allows for sagebrush regeneration.
Restoration R3A: Brush management and/or seeding of desired species.
Transition T3A: Inappropriate grazing management promotes dominance of forbs; this may be coupled with fire (4.1)
Transition T3B: Multiple fires and/or soil disturbing treatments (5.1) and/or inappropriate grazing management eliminates bluegrass
understory and leaves site open for non-native invasive species (5.2).
Transition T3C: Time and lack of disturbance allows for trees to dominate site resources.
Forb State 4.0 Community Pathways
Restoration R4A: Herbicide treatment may be coupled with seeding of desired species.
Annual State 5.0 Community Pathways
5.1a: Time and lack of disturbance (unlikely to occur).
5.2a: Fire
Tree State 6.0 Community Pathways
6.1a: Time and lack of disturbance allows for maturation of tree community.
Restoration R6A: Tree removal and seeding of desired species or recovery of herbaceous understory.

Restoration R6B: Tree removal when Sandberg bluegrass is dominant and remains in understory.
Transition T6B: Catastrophic fire (5.1).



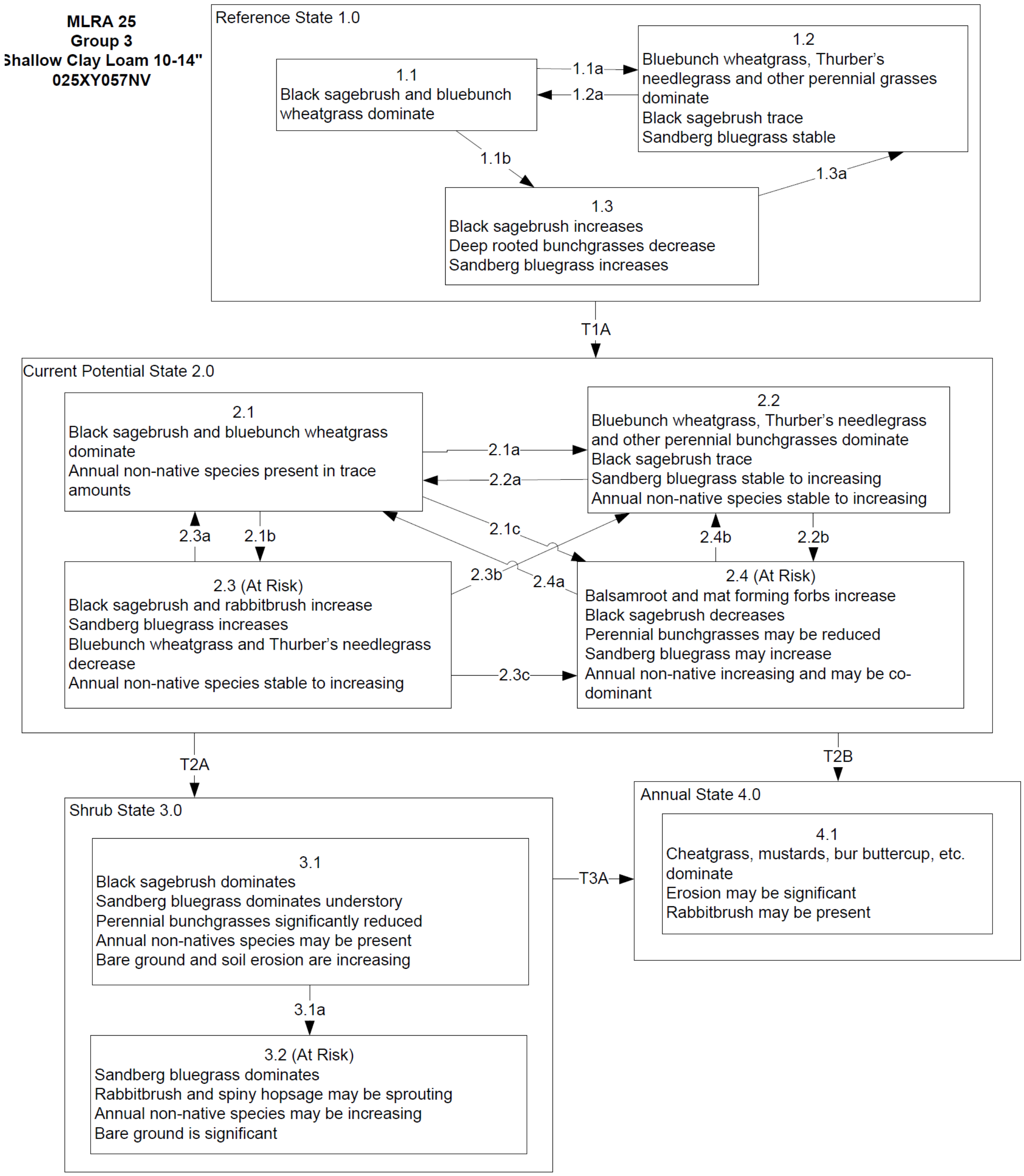
Mountain Ridge 25XY024NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory and/or long-term drought may also reduce perennial
understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire would create sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of non-native annual species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance. Inappropriate grazing management and/or long-term drought may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire creates sagebrush/grass mosaic, herbivory, or combinations. Brush management with minimal soil disturbance
reduces sagebrush.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community. Brush management with minimal soil
disturbance reduces sagebrush.
Transition T2A: Inappropriate grazing management (3.1), or high severity fire (3.2)
Transition T2B: Fire or brush management causing severe soil disturbance
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire
3.2a: Time and lack of disturbance
Transition T3A: Catastrophic fire and/or treatments that disturb the existing plant community
Transition T3B: Inappropriate grazing management following fire and/or multiple fires and/or prolonged drought. Additional soil disturbing
treatments (ex: failed drill seeding) could also increase erosion.
Annual State 4.0
Transition T4A: Inappropriate grazing management following fire and/or multiple fires and/or long-term drought. Additional soil disturbing
treatments (ex: seedings that fail) could also increase erosion.
Eroded State 5.0 Community Phase Pathways
5.1a: Inappropriate grazing management and/or impact of off-road vehicles or other ground disturbing activity leads to further plant
community reduction and increased bare ground.


MLRA 25
Group 1
Mountain Ridge
025XY024NV
Reference State 1.0
1.1
Low and black sagebrush and Idaho fescue co-dominate
1.1a
1.2a
1.2
Idaho fescue, bluegrasses and other perennial grasses dominate
Low and black sagebrush reduced
1.1b
1.3a
1.3
Low and black sagebrush dominate
Perennial understory is reduced
1.3b
T1A
Current Potential State 2.0
2.1
Low and black sagebrush and Idaho fescue co-dominate
Annual non-native species present
2.1a
2.2a
2.2
Idaho fescue, bluegrasses and other perennial grasses dominate
Low and black sagebrush reduced
Annual non-native species stable to increasing
2.1b
2.3a
2.3 (at risk)
Low and black sagebrush and rabbitbrush increase
Idaho fescue and other perennial grasses decrease
Sandberg bluegrass and/or mat forming forbs may increase
Annual non-native species stable to increasing
2.3b
T2A
T2B
Shrub State 3.0
3.1 (at risk)
Low and black sagebrush dominates
Rabbitbrush increases
Sandberg bluegrass dominates understory
Annual non-natives species may be present
3.1a
3.2a
3.2
Sandberg bluegrass dominates
Annual non-native species may be present, but are not dominant
Low and black sagebrush minor component
Sprouting shrubs increase
T3A
Annual State 4.0
4.1
Cheatgrass, mustards, bur buttercup, etc. dominate
Sandberg bluegrass/squirreltail may still be present
Perennial forbs may still be present
Erosion may be significant
T4A
T3B
Eroded State 5.0
5.1
Low, black sagebrush and/or rabbitbrush dominate overstory
Sandberg bluegrass and/or annual non-native species dominate understory
Soils actively eroding; bare ground significantly increased; excessive frost-heaving / pedestalling

Shallow Clay Loam 10-14 p.z. 025XY057NV

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of annual non-native species.
Transition T1B: Inappropriate grazing management
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.1c: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy. Inappropriate sheep grazing management allows
unpalatable forbs to increase. Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.2a: Time and lack of disturbance allows for regeneration of sagebrush
2.2b: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.3a: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy and favors deep-rooted perennial bunchgrasses.
2.3b: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community dominated by grasses and forbs; non-native annual species present.
2.3c: Change in grazing management to allow for an increase in mat forming forbs and annual non-native species.
2.4a: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer)
2.4b: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer).
Transition T2A: Time and lack of disturbance and/or inappropriate grazing management (to 3.1) or fire (to 3.2).
Transition T2B: Fire in at-risk community phase (from 2.3 or 2.4) may transition to annual state (to 4.0).
Shrub State 3.0 Community Pathways
3.1a: Fire.
Transition T3A: High-severity fire or soil-disturbing treatments (to 4.0).


MLRA 25
Group 3
Shallow Clay Loam 10-14"
025XY057NV
Reference State 1.0
1.1
Black sagebrush and bluebunch wheatgrass dominate
1.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial grasses dominate
Black sagebrush trace
Sandberg bluegrass stable
1.3
Black sagebrush increases
Deep rooted bunchgrasses decrease
Sandberg bluegrass increases
1.1a
1.2a
1.1b
1.3a
T1A
Current Potential State 2.0
2.1
Black sagebrush and bluebunch wheatgrass dominate
Annual non-native species present in trace amounts
2.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial bunchgrasses dominate
Black sagebrush trace
Sandberg bluegrass stable to increasing
Annual non-native species stable to increasing
2.1a
2.2a
2.1c
2.3a
2.1b
2.4b
2.2b
2.3b
2.4a
2.3 (At Risk)
Black sagebrush and rabbitbrush increase
Sandberg bluegrass increases
Bluebunch wheatgrass and Thurber's needlegrass decrease
Annual non-native species stable to increasing
2.4 (At Risk)
Balsamroot and mat forming forbs increase
Black sagebrush decreases
Perennial bunchgrasses may be reduced
Sandberg bluegrass may increase
Annual non-native increasing and may be co-dominant
2.3c
T2A
T2B
Shrub State 3.0
3.1
Black sagebrush dominates
Sandberg bluegrass dominates understory
Perennial bunchgrasses significantly reduced
Annual non-natives species may be present
Bare ground and soil erosion are increasing
3.1a
3.2 (At Risk)
Sandberg bluegrass dominates
Rabbitbrush and spiny hopsage may be sprouting
Annual non-native species may be increasing
Bare ground is significant
T3A
Annual State 4.0
4.1
Cheatgrass, mustards, bur buttercup, etc. dominate
Erosion may be significant
Rabbitbrush may be present

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Narrative

Shallow Calcareous Loam 10-14" 024XY031NV

Current State: 2.2- Rabbit brush and perennial bunch grasses increase while black sagebrush is a minor component. Annual non-native species are present.

Desired State: 2.1- Black sagebrush, blue bunch wheatgrass and Thurber's needle grass are dominant. Annual non-native species are present.

Potential Undesired State: Same as current state**.**

Gravelly Loam 12-16 p.z. 025XY007NV

Current State: 2.4- Lupine and other forbs are dominant with perennial bunch grasses present. Antelope bitterbrush and snowberry maybe sprouting. Annual non-native species are present.

Desired State: 2.1- Black sagebrush, blue bunch wheatgrass and Thurber's needle grass are dominant. Annual non-native species are present.

Potential Undesired State: Same as the current state.

Mountain Ridge 25XY024NV

Current State: 2.2- Idaho fescue and other perennial grass species are dominant with annual non-native species increasing. Low and black sagebrush are reduced.

Desired State: 2.1- Low sagebrush, black sagebrush and Idaho fescue are dominant. Annual non-native species are present.

Potential Undesired State: Same as current state.

Shallow Clay Loam 10-14 p.z. 025XY057NV

Current State: 2.4- Balsam root and other mat forming forbs with Sandberg blue grass are increasing. Black sagebrush and perennial grasses are decreasing.

Desired State: 2.1- Black sagebrush and blue bunch wheatgrass are dominant. Annual non-native species are present.

Potential Undesired State: 4.0- Cheatgrass bur butter cup and mustard species are dominant. Rabbit brush is present. Erosion is significant.

Adaptive Management Procedures (AMP)

Post project implementation vegetation monitoring would be done to determine if objectives were being met. This may include but would not be limited to monitoring vegetation for community composition, diversity, vigor, productivity, and ground cover. If monitoring indicates a post implementation treatment site is moving toward an undesirable vegetation pathway or state, adaptive management procedures (Section 2.1.1. Adaptive Management) are in place and would be utilized to address the given situation on the specific project site. The adaptive management procedures may include but would not be limited to reseeding, pinyon-juniper removal, harrowing, seedling planting, the use of herbicide and fence construction to limit herbivore access to the site.

Unit 12: Wilkins Fire Restoration

Shallow Calcareous Loam 8-10"024XY030NV

Reference State 1.0 Community Pathways:

1.1a: Low severity fire resulting in a mosaic pattern.

1.1b: Time and lack of disturbance such as fire. Drought, herbivory, or combinations of these would reduce perennial grasses in the understory.

1.2a: Time and lack of disturbance such as fire.

1.3a: Low severity fire or herbivory resulting in a mosaic pattern.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community. Transition

T1A: Introduction of non-native plants. Current Potential State

2.0 Community Pathways:

2.1a: Fire or brush treatments (i.e. mowing) with minimal soil disturbance.

2.1b: Time and lack of disturbance such as fire. Drought, inappropriate grazing management, or combinations of these would reduce perennial grasses in the understory

.2.2a: Time and lack of disturbance such as fire, drought, inappropriate grazing management, or combinations of these.

2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance and/or grazing management that reduces shrubs would allow for an increase in perennial bunchgrasses.

2.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community. Transition

T2A: Time and lack of disturbance and/or inappropriate grazing management (to 3.1) or fire, soil disturbing brush treatments and/or inappropriate sheep grazing

(3.2). Transition T2B: Fire in at-risk community phase (from 2.3) may transition to annual state (4.0), soil disturbing treatments may also transition to an annual state. Shrub State 3.0

Community Pathways:3.1a: Fire and/or sheep grazing management which reduces black sagebrush. Brush treatments (i.e. mowing) with minimal soil disturbance.

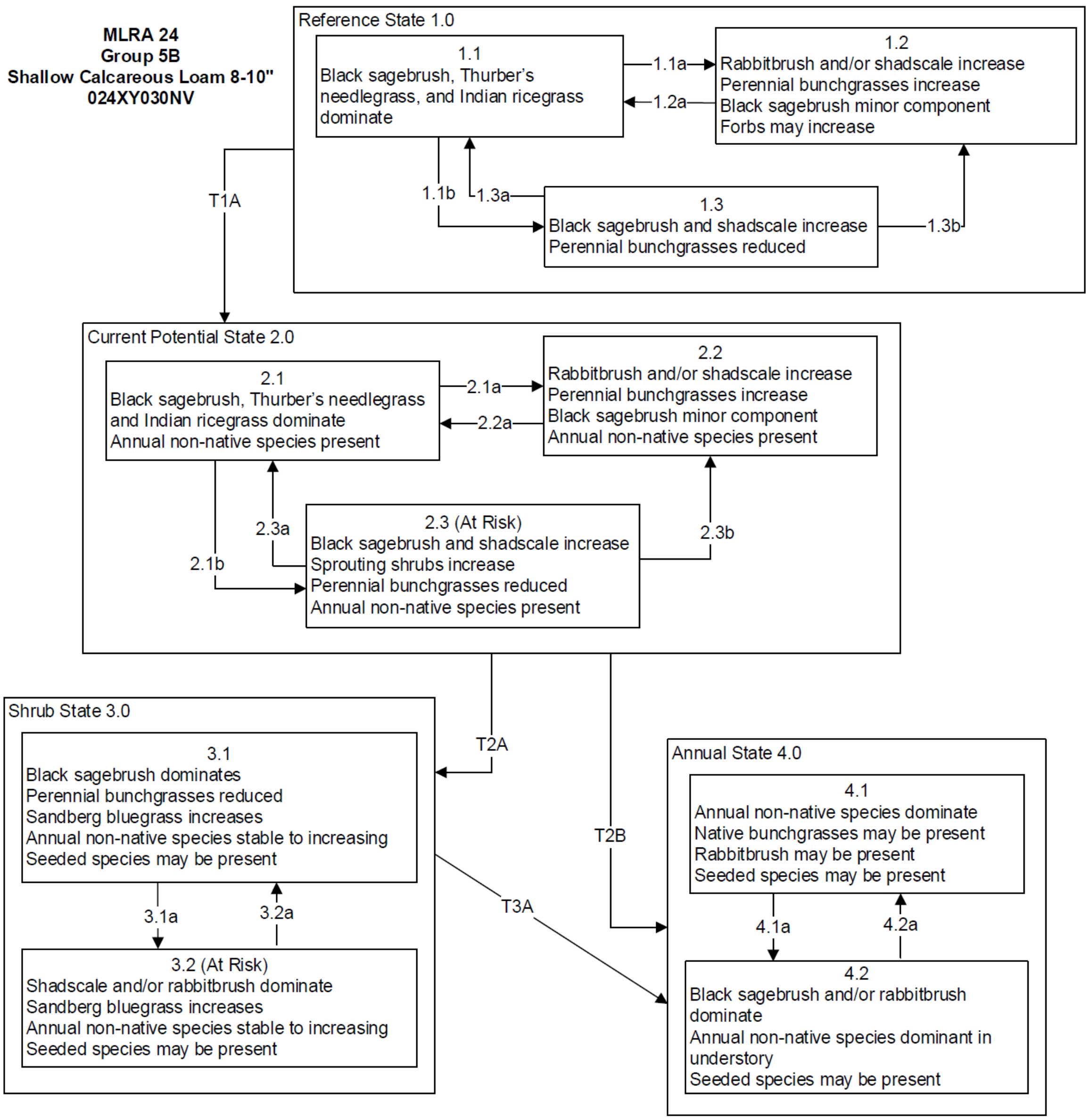
3.2a: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows for the shrub component to recover. Transition

T3A: Fire and/or soil disturbing treatments (i.e. failed restoration attempts) (to 4.0).Annual State 4.0 Community Pathways:

4.1a: Time and lack of disturbance (unlikely to occur).

4.2a: Fire.

Shallow Calcareous Loam 8-10 MODAL



Shallow Calcareous Loam 10-14"024XY031NV

Reference State 1.0 Community Pathways:1.1a: Low severity fire resulting in a mosaic pattern.

1.1b: Time and lack of disturbance such as fire. Drought, herbivory, or combinations of these would reduce the perennial grasses in the understory.

1.2a: Time and lack of disturbance such as fire.

1.3a: Low severity fire or herbivory resulting in a mosaic pattern.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native plants. Current Potential State 2.0 Community Pathways:

2.1a: Fire or brush treatments (i.e. mowing) with minimal soil disturbance.

2.1b: Time and lack of disturbance such as fire. Drought, inappropriate grazing management, or combinations of these would reduce the perennial grasses in the understory. Trees may invade from neighboring sites

2.2a: Time and lack of disturbance such as fire, drought, inappropriate grazing management, or combinations of these.

2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance and/or grazing management that reduces shrubs would allow for an increase in perennial bunchgrasses.

2.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community. Transition.

T2A: Time and lack of disturbance and/or inappropriate grazing management. Trees may invade from neighboring sites (to 3.1) or fire, soil disturbing brush treatments and/or inappropriate sheep grazing (3.2).

Transition T2B: Fire in at-risk community phase (from 2.3) may transition to annual state (4.0), soil disturbing treatments may also transition to an annual state.

Shrub State 3.0 Community Pathways:3.1a: Fire and/or sheep grazing management which reduces black sagebrush. Brush treatments (i.e. mowing) with minimal soil disturbance.

3.2a: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows for the shrub component to recover.

Transition T3A: Fire and/or soil disturbing treatments (i.e. failed restoration attempts) (to 4.0).

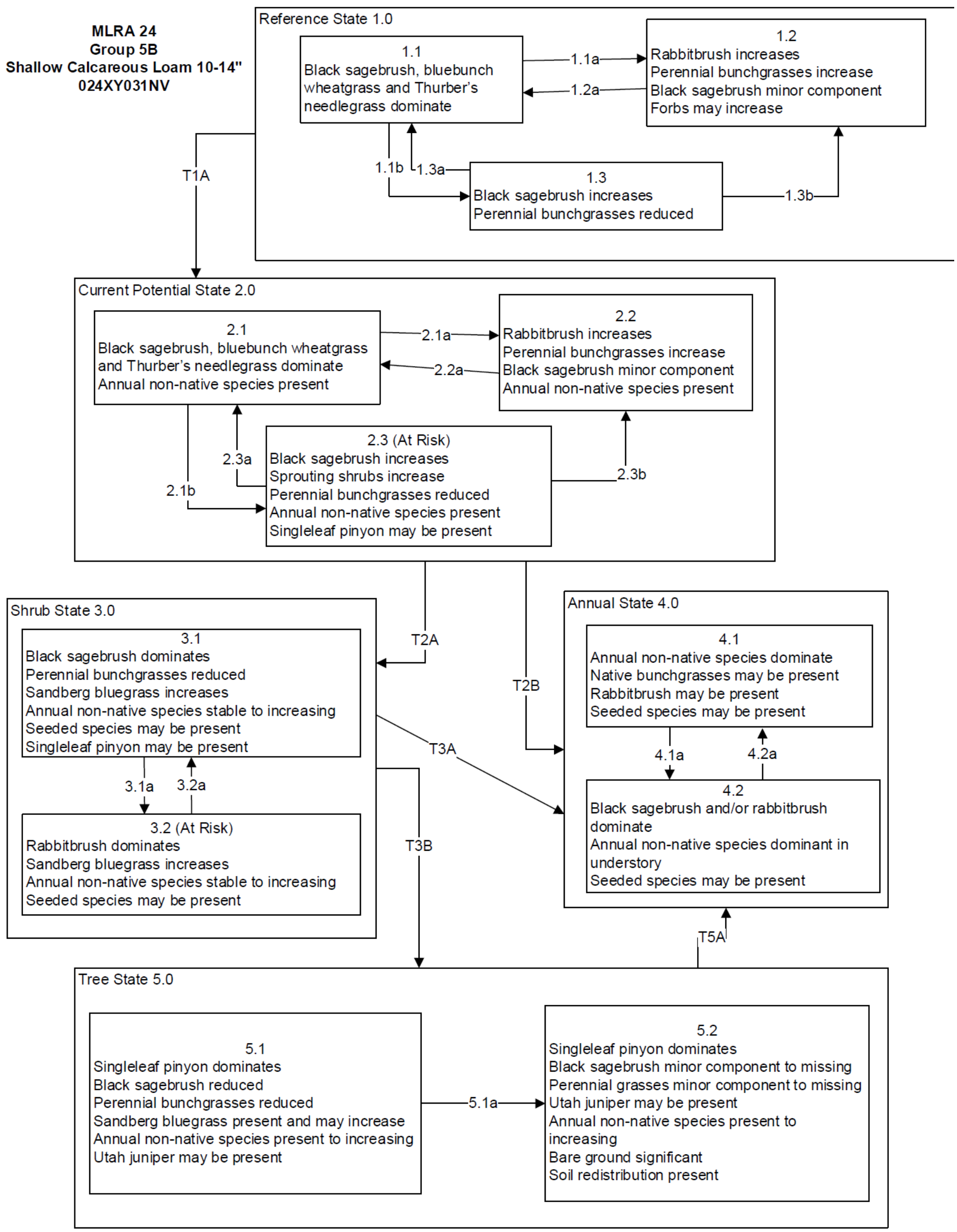
Transition T3B: Time and lack of disturbance allows for maturation of tree community, may be coupled with inappropriate grazing management (5.1).

Annual State 4.0 Community Pathways:4.1a: Time and lack of disturbance (unlikely to occur). 4.2a: Fire.

Tree State 5.0 Community Pathways:5.1a: Time and lack of disturbance allows for maturation of tree community. Transition.

T5A: Catastrophic fire.

›hallow Calcareous Loam 10-14



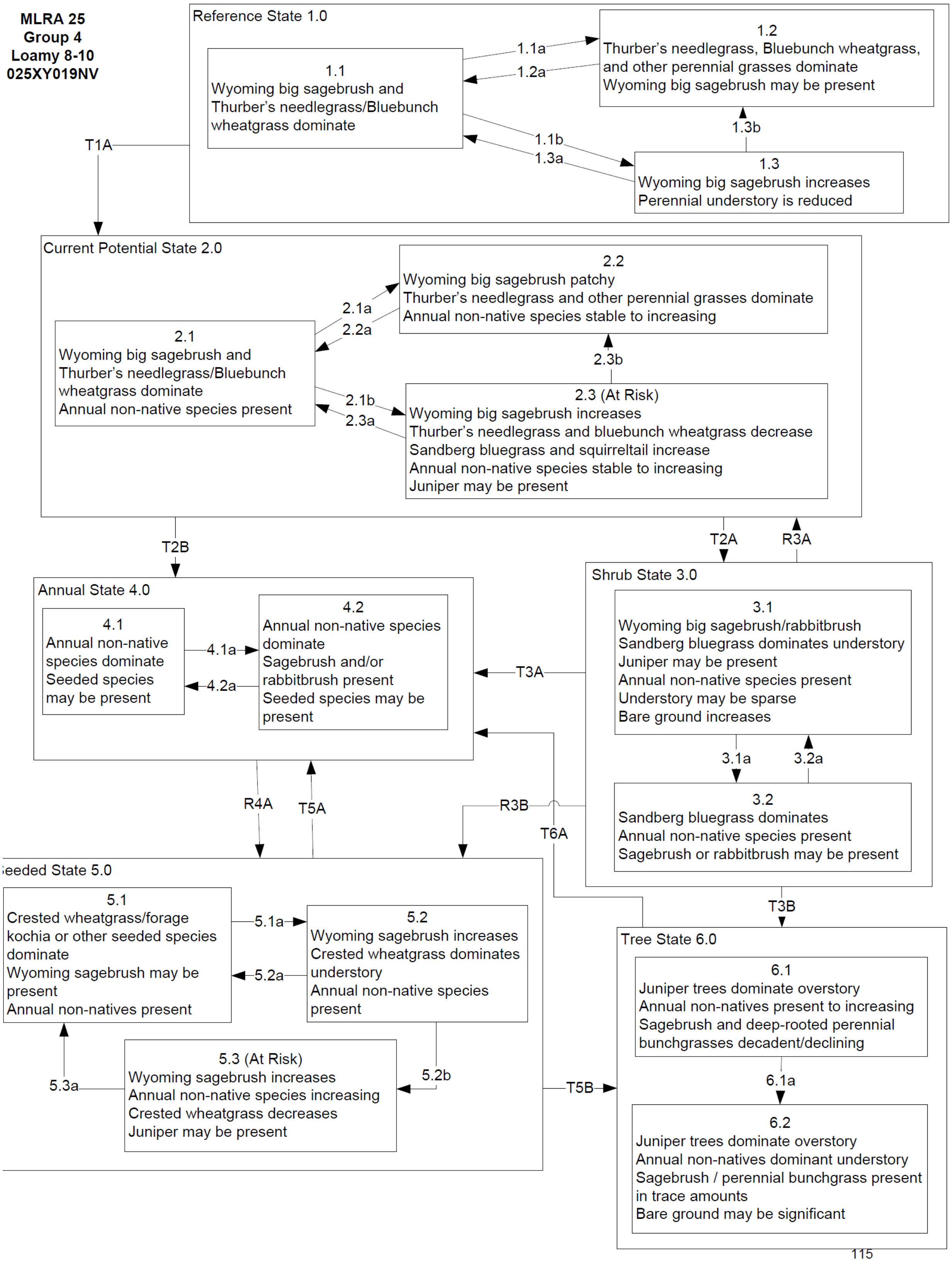
Loamy 8-10"025XY019NV

The Loamy 8-10" modal site occurs on low hills, fan remnants and partial ballenas on all exposures. Slopes range from 2 to 50 percent but slope gradients of 4 to 30 percent are most typical. Elevations are 4,500 to 6,000 feet. The soils of this site are typically moderately deep to deep. Soil depth is not important to the site concept; however, effective rooting depth is important. This site typically has an ochric epipedon, no abrupt horizon boundaries, no salinity, and typically has low available water capacity. Soil temperature regime is mesic and the moisture regime is aridic bordering on xeric. Many soils are modified with a high volume of gravels, cobbles or stones through their profile. The plant community is dominated by Thurber's needlegrass, bluebunch wheatgrass, and Wyoming big sagebrush. Production ranges from 400 to 800 lbs/acre.

Key MLRA 25 Group 4 Loamy 8-10" 025XY019NV

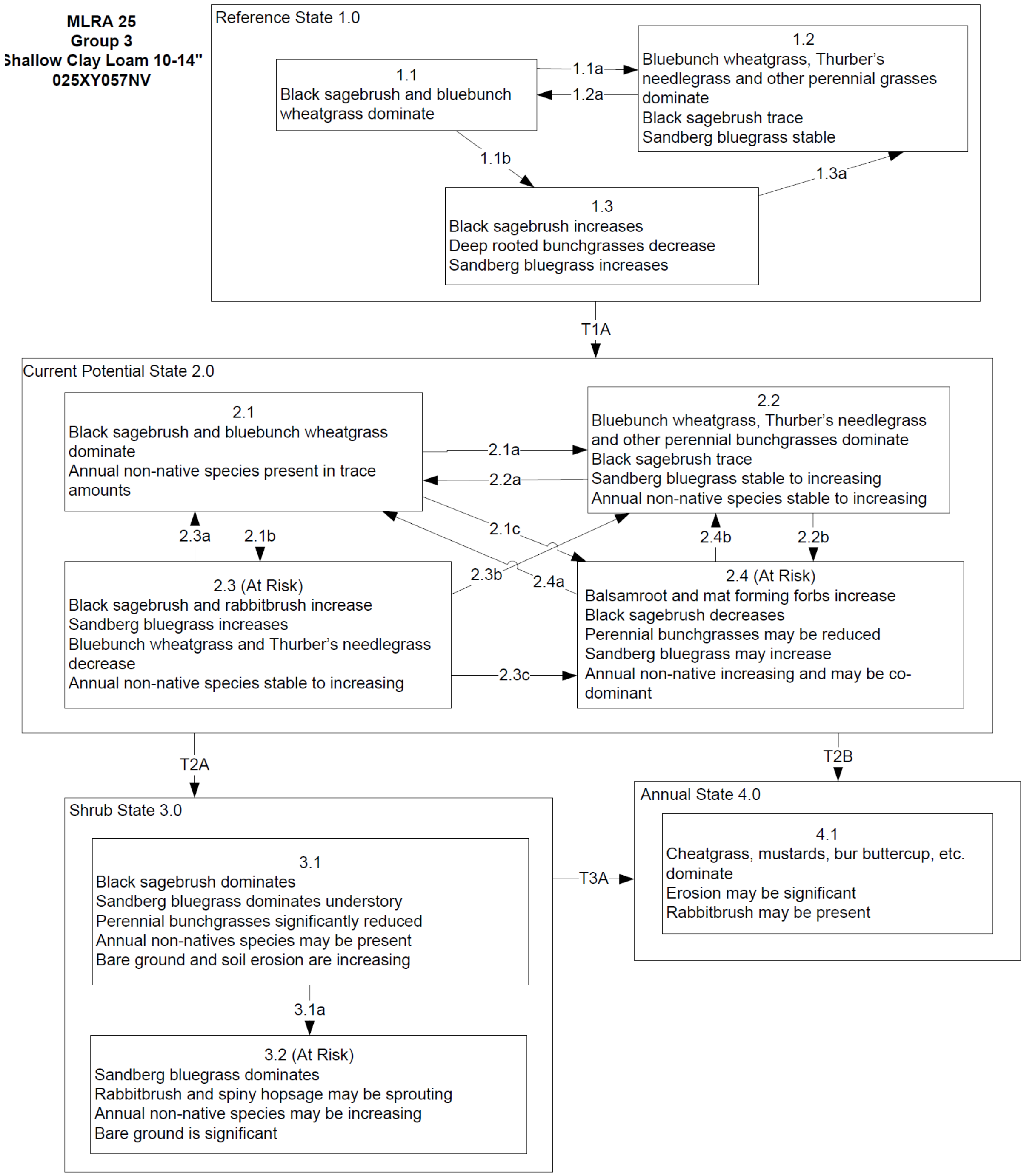
Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to early/mid-seral community. Transition T1A: Introduction of non-native species.
Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire or Aroga moth significantly reduces sagebrush cover leading to a early/mid-seral community.
Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses will lead to phase 3.1.
Soil disturbing treatments will lead to phase 3.2.
Transition T2B: Catastrophic fire (to 4.1); inappropriate cattle/horse grazing management that removes bunchgrasses, favors shrubs and
promotes the presence of non-native annual species (to 4.2)
Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush treatment with minimal soil disturbance; late-fall/
winter grazing causing mechanical damage to sagebrush.
3.2a: Time and lack of disturbance.
Restoration R3A: Brush management and seeding of native deep rooted bunchgrasses (probability of success is low).
Restoration R3B: Brush management and seeding of crested wheatgrass and/or other non-native desirable

species.
Transition T3A: Fire and/or soil disturbing treatments.
Transition T3B: Time and lack of disturbance such as fire favors an increase in tree dominance (from phase 3.1.)
Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance. Big sagebrush is unlikely to reestablish and may take many years.
4.2a: High-severity fire.
Restoration R4A: Application of herbicide and seeding of desired species (probability of success best immediately following fire).
Seeded State 5.0 Community Phase Pathways
5.1a: Time without disturbance.
5.2a: Fire, brush management, or Aroga moth infestation reduces shrub component.
5.2b: Inappropriate grazing management decreases perennial bunchgrass understory.
5.3a: Fire, brush management, Aroga moth infestation.
Transition T5A: Catastrophic fire (coming from 5.3).
Transition T5B: Time and lack of disturbance allows trees to dominate site resources.
Tree State 6.0 Community Phase Pathways
6.1a: Time without disturbance.
Transition T6A: Catastrophic fire that kills trees. Inappropriate tree removal practices may also lead to dominance by non-native annuals.


MLRA 25
Group 4
Loamy 8-10
025XY019NV
Reference State 1.0
1.1
Wyoming big sagebrush and Thurber's needlegrass/Bluebunch wheatgrass dominate
1.2
Thurber's needlegrass, Bluebunch wheatgrass, and other perennial grasses dominate
Wyoming big sagebrush may be present
1.3
Wyoming big sagebrush increases
Perennial understory is reduced
1.1a
1.2a
1.1b
1.3a
1.3b
T1A
Current Potential State 2.0
2.1
Wyoming big sagebrush and Thurber's needlegrass/Bluebunch wheatgrass dominate
Annual non-native species present
2.2
Wyoming big sagebrush patchy
Thurber's needlegrass and other perennial grasses dominate
Annual non-native species stable to increasing
2.3 (At Risk)
Wyoming big sagebrush increases
Thurber's needlegrass and bluebunch wheatgrass decrease
Sandberg bluegrass and squirreltail increase
Annual non-native species stable to increasing
Juniper may be present
2.1a
2.2a
2.1b
2.3a
2.3b
T2B
T2A
R3A
Annual State 4.0
4.1
Annual non-native species dominate
Seeded species may be present
4.2
Annual non-native species dominate
Sagebrush and/or rabbitbrush present
Seeded species may be present
4.1a
4.2a
T3A
Shrub State 3.0
3.1
Wyoming big sagebrush/rabbitbrush
Sandberg bluegrass dominates understory
Juniper may be present
Annual non-native species present
Understory may be sparse
Bare ground increases
3.2
Sandberg bluegrass dominates
Annual non-native species present
Sagebrush or rabbitbrush may be present
3.1a
3.2a
R4A
T5A
R3B
T6A
T3B
Seeded State 5.0
5.1
Crested wheatgrass/forage kochia or other seeded species dominate
Wyoming sagebrush may be present
Annual non-natives present
5.2
Wyoming sagebrush increases
Crested wheatgrass dominates understory
Annual non-native species present
5.3 (At Risk)
Wyoming sagebrush increases
Annual non-native species increasing
Crested wheatgrass decreases
Juniper may be present
5.1a
5.2a
5.2b
5.3a
T5B
Tree State 6.0
6.1
Juniper trees dominate overstory
Annual non-natives present to increasing
Sagebrush and deep-rooted perennial bunchgrasses decadent/declining
6.2
Juniper trees dominate overstory
Annual non-natives dominant understory
Sagebrush / perennial bunchgrass present in trace amounts
Bare ground may be significant
6.1a
115

Shallow Clay Loam 10-14 p.z. 025XY057NV

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.
Transition T1A: Introduction of annual non-native species.
Transition T1B: Inappropriate grazing management
Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.1c: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy. Inappropriate sheep grazing management allows
unpalatable forbs to increase. Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.2a: Time and lack of disturbance allows for regeneration of sagebrush
2.2b: Rainfall pattern favoring annual species production (higher than normal spring precipitation)
2.3a: Grazing management targeted at shrubs (i.e., sheep) reduces black sagebrush canopy and favors deep-rooted perennial bunchgrasses.
2.3b: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral
community dominated by grasses and forbs, non-native annual species present.
2.3c: Change in grazing management to allow for an increase in mat forming forbs and annual non-native species.
2.4a: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer)
2.4b: Rainfall pattern favoring perennial bunchgrass production and reduced cheatgrass production (less than normal spring with higher than
normal summer).
Transition T2A: Time and lack of disturbance and/or inappropriate grazing management (to 3.1) or fire (to 3.2).
Transition T2B: Fire in at-risk community phase (from 2.3 or 2.4) may transition to annual state (to 4.0).
Shrub State 3.0 Community Pathways
3.1a: Fire.
Transition T3A: High-severity fire or soil-disturbing treatments (to 4.0).



MLRA 25
Group 3
Shallow Clay Loam 10-14"
025XY057NV
Reference State 1.0
1.1
Black sagebrush and bluebunch wheatgrass dominate
1.1a
1.2a
1.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial grasses dominate
Black sagebrush trace
Sandberg bluegrass stable
1.1b
1.3a
1.3
Black sagebrush increases
Deep rooted bunchgrasses decrease
Sandberg bluegrass increases
T1A
Current Potential State 2.0
2.1
Black sagebrush and bluebunch wheatgrass dominate
Annual non-native species present in trace amounts
2.1a
2.2a
2.2
Bluebunch wheatgrass, Thurber's needlegrass and other perennial bunchgrasses dominate
Black sagebrush trace
Sandberg bluegrass stable to increasing
Annual non-native species stable to increasing
2.1c
2.3a
2.1b
2.4b
2.2b
2.3b
2.4a
2.3 (At Risk)
Black sagebrush and rabbitbrush increase
Sandberg bluegrass increases
Bluebunch wheatgrass and Thurber's needlegrass decrease
Annual non-native species stable to increasing
2.3c
2.4 (At Risk)
Balsamroot and mat forming forbs increase
Black sagebrush decreases
Perennial bunchgrasses may be reduced
Sandberg bluegrass may increase
Annual non-native increasing and may be co-dominant
T2A
T2B
Shrub State 3.0
3.1
Black sagebrush dominates
Sandberg bluegrass dominates understory
Perennial bunchgrasses significantly reduced
Annual non-natives species may be present
Bare ground and soil erosion are increasing
3.1a
3.2 (At Risk)
Sandberg bluegrass dominates
Rabbitbrush and spiny hopsage may be sprouting
Annual non-native species may be increasing
Bare ground is significant
T3A
Annual State 4.0
4.1
Cheatgrass, mustards, bur buttercup, etc. dominate
Erosion may be significant
Rabbitbrush may be present

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Narrative

Shallow Calcareous Loam 8-10"024XY030NV

Current State: 2.2- Rabbit brush, shadescale and perennial bunchgrasses increase. Black sagebrush is a minor component. Annual non-native species are present.

Desired State: 2.1-Black sagebrush, Indian ricegrass and Thurber’s needle grass are dominant. Annual non-native species are present.

Potential Undesired State: 4.1- Sandberg blue grass increases with rabbitbrush and seeded species present. Annual non-native species are present.

Shallow Calcareous Loam 10-14 p.z. 024XY031NV

Current State: 2.2- Rabbit brush, shadescale and perennial bunchgrasses increase. Black sagebrush is a minor component. Annual non-native species are present.

Desired State: 2.1-Black sagebrush, Indian ricegrass and Thurber’s needle grass are dominant. Annual non-native species are present.

Potential Undesired State: 4.1- Sandberg blue grass increases with rabbitbrush and seeded species present. Annual non-native species are present.

Loamy 8-10 p.z. 025XY019NV

Current State: 2.2- Wyoming big sagebrush is patchy. Thurber’s needle grass and other native perennial natives are dominant. Annual non-native species are increasing.

Desired State: 2.1- Wyoming big sagebrush, blue bunch wheatgrass and Thurber’s needle grass are dominant. Annual non-native species are present.

Potential Undesired State: Same as current state.

Shallow Clay Loam 10-14 p.z. 025XY057NV

Current State: 2.4- Balsam root and other mat forming forbs and Sandberg bluegrass increase while Black sagebrush and perennial bunch grasses decrease. Annual non-native species may be co-dominant.

Desired State: 2.1- Black sagebrush and bluebunch wheat grass are dominant with trace amounts of annual non-native species.

Potential Undesired State: Same as current state.

Appendix K. List of Acronyms and Abbreviations

Table 29. List of Acronyms and Abbreviations

Acronym / Abbreviation	Term
ac	acre
ACHP	Advisory Council on Historic Preservation
AECOM	Company name (Architecture, Engineering, Construction, Operations, and Management)
ARMPA	Approved Resource Management Plan Amendment
ATV	All-Terrain Vehicle
AUM	Animal Unit Month
BASF	Company name; Badische Anilin- und SodaFabrik (German for "Baden Aniline and Soda Factory")
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMP	Best Management Practice
CESA	Cumulative Effects Study Area
CFR	Code of Federal Regulations
COT	Conservation Objectives Team
DFPM	Design Features and Protective Measure
DNA	Determination of NEPA Adequacy
DOI	Department of the Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESD	Ecological Site Description
FIAT	Fire and Invasives Assessment Tool
FONSI	Finding of No Significant Impact
FRCC	Fire Regime Condition Classes
GBBO	Great Basin Bird Observatory
GHG	Greenhouse Gas
GHMA	General Habitat Management Area
GRSG	Greater Sage-Grouse
HFRA	Healthy Forests Restoration Act
HMA	Herd Management Area or Habitat Management Area
IDFG	Idaho Fish and Game
IDT	Inter-Disciplinary Team
LCT	Lahontan Cutthroat Trout (*Oncorhynchus clarkii henshawi*)
LR2000	Legacy Rehost System 2000
LUPA	Land Use Plan Amendment
LWC	Lands with Wilderness Characteristics
MBTA	Migratory Bird Treaty Act
MLRA	Major Land Resource Areas
MSDS	Material Safety Data Sheet
NDA	Nevada Department of Agriculture
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act

Acronym / Abbreviation	Term
NRCS	Natural Resource Conservation Service
OHMA	Other Habitat Management Area
OHV	Off-Highway Vehicle
PEIS	Programmatic Environmental Impact Statement
PHMA	Priority Habitat Management Area
PPA	Project Planning Area
RFFA	Reasonably Foreseeable Future Action
ROW	Right-of-Way
SFA	Sagebrush Focal Areas
SGI	Sage-Grouse Initiative
SHPO	Nevada State Historic Preservation Office
SOP	Standard Operating Procedure
sp. and spp.	species (singular) and species (plural)
ssp. and sspp.	subspecies (singular) and subspecies (plural)
SSS	Special Status Species
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WFO	Wells Field Office
WSA	Wilderness Study Area