

Shivwits Plateau Landscape Restoration Project

Environmental Assessment

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Acronyms

ACEC	Area of Critical Environmental Concern
AIM	Assessment Inventory and Monitoring
AMP	Allotment management plan
ASDO	Arizona Strip District Office
ATV	All-terrain vehicle
AUM	Animal use month
AZGFD	Arizona Game and Fish Department
BLM	Bureau of Land Management
BSC	Biological soil crust
CAA	Cumulative Assessment Area
CFR	Code of Federal Regulations
DBH	Diameter at breast height
DFC	Desired future condition
DPC	Desired plant community
DRC	Diameter at root crown
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESD	USDA Ecological Site Description
FEMA	Federal Emergency Management Agency
FLPMA	Federal Land Policy and Management Act
FMH	Fire Monitoring Handbook
GHG	Greenhouse gas
GIS	Geographic Information System
GMP/RMP	Grand Canyon-Parashant National Monument General Management/Resource Management Plans
GMU	Game Management Unit
GNI	Grassland – Native or Introduced
IAT	Interdisciplinary assessment team
IM	Instruction Memorandum
IPM	Integrated Pest Management
KOP	Key Observation Point
LHE	Land Health Evaluations
MIST	Minimum impact suppression techniques
Monument	Grand Canyon – Parashant National Monument
MOU	Memorandum of Understanding
MRDG	Minimum Requirement Decision Guide
MRA	Minimum Requirements Analysis

NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OHV	Off highway vehicle
PEPC	NPS Planning, Environment and Public Comment System
PM	Particulate matter
PW	Proposed Wilderness
RAC	Arizona Resource Advisory Council
RRT	Rangeland Resource Team
SHPO	State Historic Preservation Officer
SPLRP	Shivwits Plateau Landscape Restoration Project
SR	Salvage restricted
S&G	Standards for Rangeland Health and Guidelines for Grazing Administration
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VCC	Vegetation Condition Class
VRM	Visual Resource Management
WHA	Wildlife Habitat Area
WO	Washington Office
WUI	Wildland Urban Interface

Chapter 1. Purpose and Need for Action

1.1 Introduction and Background

The Shivwits Plateau Landscape Restoration Project (SPLRP) area extends north from the rim of the Grand Canyon to the northern boundary of Grand Canyon – Parashant National Monument (Monument) and is bounded by Parashant Canyon on the east and the Grand Wash Cliffs to the west. The Monument is cooperatively managed by the National Park Service (NPS) and the Bureau of Land Management (BLM). The project area includes approximately 318,000 acres of NPS and BLM managed lands of the Monument. The project area is a mix of pinyon-juniper, ponderosa pine and sagebrush vegetation communities. The Monument staff have identified the need to restore vegetation in this area, at a landscape scale, to improve biodiversity, ecosystem function, and fire resiliency.

The Shivwits Plateau has been inhabited by humans since before written records. In that time, the plateau has hosted, amongst others, settlements, seasonally moving camps, herds of cattle and lumber mills. Areas of the plateau, like the Colorado Plateau of which it is part, have been burned, farmed in fields, cleared of timber, grazed, seeded, chained, chemically treated, and been subject to fire suppression, all during the last 125 years. These landscape manipulations were typically done with only one or two goals and did not consider the impacts to the entire plateau.

Due in part to past practices, portions of the project area lack species diversity and desired wildlife habitat conditions. Current understanding of ecosystem dynamics suggests a holistic and larger scale vegetation management approach on the Shivwits Plateau would restore and promote native plant and animal biodiversity and decrease unintended side effects of past management actions. This project is designed to address these concerns and implement direction contained in the Grand Canyon-Parashant National Monument General Management/Resource Management Plans (GMP/RMP), approved on January 29, 2008 (BLM 2008).

The proposed action addresses resource needs in the project area using an adaptive management approach and a combination of treatment methods that include manual, mechanical, chemical, seeding and fire. Proposed treatments would be implemented in a staggered fashion over time and would range from several acres to several thousand acres depending on the resource management goals, funding, and desired outcomes for specific treatment areas.

1.2 Purpose and Need

Using information from rangeland health evaluations, survey plots, trend data and field observations, Monument staff have identified areas where vegetation is not meeting desired conditions. Based on this information, the Monument identified several purposes for the project, integral to achieving the vegetation management objectives and goals for wildlife habitat and vegetation resources in the GMP/RMP (Appendix A) for the SPLRP including:

- Managing and enhancing wildlife habitat cover for healthy self-sustaining wildlife populations.

-
- Continuing to move vegetation communities toward more natural ranges of composition, structure, and function.
 - Continuing to use prescribed fire as an integral part of the ecosystem, particularly in the ponderosa pine forest.
 - Provide necessary forage for wildlife and livestock.

1.3 Decision to be Made

Based on this analysis, the BLM Monument Manager and NPS Regional Director will decide to either implement the proposed action with relevant Design Features, terms and conditions, mitigation measures, or take no action.

1.4 Conformance with Land Use Plans

The alternatives described in Chapter 2 of this EA are in conformance with decisions found in the Grand Canyon – Parashant Nation Monument GMP/RMP, approved January 29, 2008 (BLM 2008). Appendix A lists applicable GMP/RMP decisions.

1.5 Relationship to Statutes, Regulations, or Other Plans

Numerous federal laws, regulations, and policies guide federal land management activities on public lands, with the most prominent laws being listed in this section. The Monument staff have prepared this EA for the Shivwits Plateau Landscape Restoration Project in compliance with the National Environmental Policy Act (NEPA).

The NPS Organic Act directs the NPS to manage units “to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such a manner as will leave them unimpaired for the enjoyment of future generations.” (16 United States Code [U.S.C.] § 1) The Organic Act prohibits actions that permanently impair park resources unless a law directly and specifically allows for the acts. An action constitutes an impairment when its impacts “harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources and values.” (Management Policies 1.4.5)

NPS Management Policies 2006 include direction for preserving and protecting cultural resources, natural resources, processes, systems, and values (NPS 2006). It is the goal of the NPS to avoid or minimize potential impacts to resources to the greatest extent practicable consistent with the management policies.

The Federal Land Policy and Management Act (FLPMA) (43 U.S.C. 1701), directs the BLM to manage public lands “in a manner that will protect the quality of scientific, scenic, historic, ecological, environmental, air and atmospheric, water resources, and archeological values.”

The Monument Management are actively consulting with Indian tribes on a government-to-government basis in accordance with the National Historic Preservation Act of 1966 (NHPA), Executive Order 13175 - Consultation and Coordination with Indian Tribal Governments and other policies.

The proposed action is consistent with the Fundamentals of Rangeland Health (43 CFR 4180.1) and Arizona's Standards and Guidelines, which were developed through a collaborative process involving the Arizona Resource Advisory Council and the BLM State Standards and Guidelines Team. The Secretary of the Interior approved the Standards and Guidelines in April 1997. These standards and guidelines address watersheds, ecological condition, water quality, and habitat for sensitive species. These resources are addressed later in this document.

Under the Antiquities Act (16 U.S.C. 431-433), BLM and NPS must protect objects identified in the presidential proclamation (3 CFR 7265) that established the national monument. Therefore, if BLM or NPS determines that any monument objects are harmed by current management then management will be modified accordingly. The analysis of impacts to specific resources constitutes the analysis of impacts to monument objects in this EA.

The Arizona Strip District Fire Management Plan states that the focus for the district Fuels Program is to reduce the risk from wildfire to both Wildland Urban Interface (WUI) and non-WUI areas by implementing fuels/vegetation treatments, including chemical, biological, mechanical, and prescribed fire.

The project area is in Mohave County, Arizona. The alternatives are consistent with the Mohave County General Plan (adopted September 21, 2015). While the Shivwits Plateau is not specifically addressed in the Mohave County General Plan, this action does not conflict with decisions contained within the Plan and supports the Natural Resources Element decisions in the Plan.

In addition, the alternatives would comply with the following laws and/or agency regulations, and other plans, and are consistent with applicable federal, state, and local laws, regulations, and plans to the maximum extent possible.

The Archeological Resources Protection Act of 1979 (PL 96-95, 93 Stat. 712, 16 U.S.C. Section 470aa et seq. and 43 CFR 7, subparts A and B, 36 CFR)

Clean Air Act of 1970 (42 U.S.C. 7401 et seq.)

Endangered Species Act of 1973, as amended

Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755), as amended

Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001-3013; 104 Stat. 3048-3058)

Wilderness Act of 1964 (PL 88-577 16 U.S.C. 1131-1136)

1.6 Identification of Issues

Identification of issues for this assessment was accomplished by considering the resources that could be affected by implementation of one of the alternatives. A summary of the issues and the rationale for analysis are given below.

Air Resources (including Air Quality, Night Skies, and Greenhouse Gas

Emissions): Vegetation treatments have the potential to impact air quality and visibility through the generation of dust from vehicle and equipment use on dirt roads and in areas of treatment, generation of exhaust and emissions through vehicle and equipment use, and production of smoke through prescribed fire. Vegetation treatments have the potential to impact climate change through the release of greenhouse gas (GHG) emissions.

Areas Managed to Maintain Wilderness Characteristics: Vegetation treatments have the potential to impact the wilderness characteristics (naturalness, outstanding opportunities for solitude, and opportunities for primitive and unconfined recreation) within areas that are not designated wilderness but are identified as areas managed to maintain wilderness characteristics.

Fuels and Fire Management: Vegetation treatments have the potential to impact fire and fuels management by reducing fuel loading in ladder fuels and surface fuels, changing fire regime condition class; and altering risk of a high intensity wildland fire.

Livestock Grazing: Vegetation treatments have the potential for short-term impacts to the livestock grazing permittees through disruption of their operations on the allotments with proposed treatments. A potential for long-term benefits also exists due to increases in palatable forage within these allotments.

Proposed Wilderness (NPS managed lands only): Vegetation treatments have the potential to impact the qualities of wilderness character (untrammelled, undeveloped, naturalness, outstanding opportunities for solitude, or for primitive and unconfined recreation and other features of value) within NPS proposed wilderness areas.

Soil Resources: Actions proposed in the alternatives have the potential to affect soil resources depending on the treatment type.

Vegetation (Including Noxious Weeds and Invasive, Non-native Species): Vegetation treatments have the potential to impact plant communities through changes in productivity and species diversity and overall ecological health.

Visual Resources: Vegetation treatments have the potential to impact visual resources in the project area through visual changes in the form of the landscape, diagonal, horizontal, and vertical lines created by vegetation patterns and soils, colors of vegetation and soils, and texture of the landscape.

Wildlife (including BLM Sensitive Species and Migratory Birds): Sensitive animal species and migratory birds in the project area may be affected by impacts anticipated from implementation of the proposed vegetation treatments.

Chapter 2. Proposed Action and Alternatives

2.1 Introduction

This EA focuses on the Proposed Action and No Action Alternatives. The No Action Alternative is considered and analyzed to provide a baseline for comparing the impacts of the Proposed Action. Several alternatives were considered but eliminated from further analysis. They are described in Section 2.3 with a rationale for not being considered.

2.2 Description of the Alternatives

2.2.1 Alternative A – Proposed Action

The proposed action is to use a combination of manual, chemical and mechanical treatments, prescribed fire, and seeding (pre or post treatment) to address the purpose and need to move the project area toward desired conditions. Table 2.1 provides proposed treatment units and treatment types per unit. Proposed treatments are described below, listed by treatment. Several units may have mechanical or manual treatment or a mix of the two treatment types. Current vegetation conditions may change, prior to treatment implementation. For example, mechanical treatment may be more effective in the future than manual treatment due to growing density of woody vegetation. The proposed action includes this flexibility to adaptively manage the unit specific treatment. The total acreage indicated below for manual, mechanical, seeding, and prescribed fire treatments is the maximum acres of each treatment type proposed as if there was no flexibility in treatment selection or scope and the entire target vegetation type(s) in a unit would only be treated by a single method.

Figures 2.1 to 2.3 provide proposed treatment unit locations within the project area. The project area, refined from the pre-scoping period acreage of approximately 322,000, is approximately 318,000 acres. This refinement was based on moving the project area boundary to align with the topographic edge of the Shivwits Plateau more closely. Of the approximately 318,000 acres considered for treatment, approximately 58,000 acres were excluded due to vegetation type and slope. Treatment units incorporated small acreages of these excluded categories. While the treatment units total approximately 103,000 acres, approximately 29,310 acres within the treatment units would be excluded due to non-target vegetation type (such as pinyon-juniper woodland in an area where prescribed fire would be used only in ponderosa pine woodland) and approximately 10,030 acres within the treatment units would be excluded as pinyon-juniper vegetation types leave area. Actual treatment proposed is approximately 55,370 acres. Additional area may be excluded due to the presence of cultural sites, topography and sensitive species habitat.

Manual Treatment

Under this alternative, up to 49,850 acres of manual treatments are proposed. Manual treatments would typically be used in shrublands, pinyon-juniper woodlands, sagebrush and chaparral where vegetation to be treated is sparse and not overly dense.

Manual treatments typically are the use of the “lop and scatter” technique where small trees would be cut with chainsaws or other hand-held tools, and the resultant slash would be scattered on the ground in a manner that maximizes soil-biomass contact to the extent practicable to aid in water retention, promote herbaceous species growth, and reduce erosion. Scattered branches and slash may also be piled along roadways and trails or burned to reduce visual impacts and maintain prescribed fire treatment boundaries. Manual treatments are highly selective and can be used in sensitive areas or areas inaccessible to vehicles.

Mechanical Treatment

Up to 32,590 acres of mechanical treatment are proposed. Mechanical treatments would be used in shrublands, pinyon-juniper woodlands, sagebrush, and chaparral where vegetation to be treated is dense. Mechanical treatments are designed to reduce vegetation, usually juniper trees, to favor growth of seeded or existing vegetation. Leave areas, where no treatment would be conducted, would be designed around areas of sensitive resources, washes, and slopes greater than 30% or on cliffs and scree slopes. Mechanical treatments involve the use of vehicles such as wheeled tractors or front-end loader types, chipper/shredder/bull hog, crawler-type tractors and specially designed vehicles with attached mulching/chipping/mowing implements that cut or chop existing vegetation (i.e. trees and shrubs) over large areas of thick vegetation and scatter the debris (mulch) on site. The selection of a particular mechanical method would be based on the characteristics of the vegetation, seedbed preparation and revegetation needs, topography, soil characteristics, weather conditions, and availability by contractors.

Chemical Treatment

Chemical treatments are proposed for up to 150 acres. In addition, other areas within the manual, mechanical, seeding, and prescribed fire treatment units may also be treated for invasive non-native plants as part of the other treatments. See Table 2.1 and Appendix B Figure B.13 for units where herbicide treatment appears likely as of October 2020. The BLM would use the Programmatic EIS on Vegetation Treatments Using Herbicides on BLM lands in 17 Western States (BLM 2007c) and the Final PEIS for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Lands in 17 Western States (BLM 2016) to guide herbicide treatment actions for this project. Site specific analysis for herbicide use on the Monument was completed by the BLM through the Arizona Strip District Herbicide Application Plan for the Control and Eradication of Noxious and Invasive Species (BLM 2017). Chemical treatments on lands managed by the NPS would require approval by the NPS Regional or National Integrated Pest Management (IPM) Coordinator. All standard operating procedures (including following herbicide product label instructions) for each herbicide proposed for use as part of this project would be adhered to. Chemical treatments would target invasive non-native plants species only¹. Tebuthiuron treatments are not proposed as part of this alternative.

¹ Invasive non-native plant species are defined as “Non-native (or alien) to the ecosystem under consideration; and, whose introduction causes or is likely to cause economic or environmental harm or harm to human health”

Herbicide applications would be designed to minimize potential impacts to non-target plants and animals, while achieving project objectives. They would be applied using a variety of techniques (including hand application) under specified rates of application. Treatment objectives, site topography, vegetation conditions, and other factors would be considered prior to any chemical application. The appropriate application method would be determined by the invasive species being treated, the herbicide being applied, the skills of the applicator, and the application site (Tu et al. 2001). Methods of application can be broadly classified as follows:

- Foliar application where herbicide is applied to intact, green leaves
- Spot application using a precise tool such as a backpack applicator or spray bottle
- Broadcast application using boom or boomless sprayers to distribute herbicide over a relatively large area depending on the treatment area
- Basal bark application where herbicide is applied to intact bark around the circumference of the trunk
- Cut stump treatment where the tree or stem is first cut straight across then herbicide is applied to the freshly cut stump for transport to the root system
- Pelletized treatment where herbicide is made into a pellet that is implanted at the plant's base
- Pre-emergent where herbicide is applied to the soil before the target species seeds germinate and emerge

Prescribed Fire

Prescribed fire treatments are proposed for up to 22,540 acres. Prescribed fire treatments would largely be focused on ponderosa pine stands. Ponderosa pine habitat is important for wildlife use, especially so-called old growth trees which are noted for their physical characteristics such as possessing large bark plates, yellow and/or red deeply furrowed bark, relatively large diameters, and drooping branches with widely flattened crowns. These trees are not targeted for treatment during prescribed fires. Rather, thinning² potential ladder fuels around the above-described trees as well as large snags and habitat trees would be accomplished to protect these for wildlife use. Pinyon-juniper areas, within proposed wilderness on NPS managed lands may also be treated with prescribed fire using the decision-making process defined in the adaptive management section of this EA. Prescribed fire is the intentional application of fire to vegetation under specified weather conditions. Fuel moisture, humidity, temperature, windspeed, and other environmental variables would be used to guide prescribed fire treatments. Prescribed fire may

(Executive Order 13112). In the context of the EA, non-native is defined as not native to North America and invasive is defined as able to establish on many sites, grow quickly, and spread to the point of disrupting plant communities or ecosystems” (NRCS n.d.)

² Thinning in this context is defined as removal of pinyon pine, juniper, and thick small stem ponderosa pine (>1 tree/ft²) in ponderosa pine woodlands that may cause prescribed fire to damage or kill non-target vegetation. During thinning treatment duff and heavy dead and down may be removed from boles of trees to reduce fire intensity upon mature or so-called old-growth trees.

follow a manual treatment to prepare the site for favorable outcomes or may take place with limited pre-treatment site preparation.

Prescribed fire treatments include broadcast burning and burning of hand-stacked piles. Techniques include hand, land, and/or aerial ignition operations (drip torch, terra torch, Heli torch). Prescribed fire would reduce hazardous fuel loads, reduce vegetation density, stimulate the rejuvenation of herbaceous species, and assist in seed preparation. Prescribed fire could be conducted at any time of the year, provided that favorable conditions are present to produce a vegetative response that meets resource objectives. Each prescribed fire is subject to a written, management approved prescribed fire plan that follows the Interagency Prescribed Fire Planning and Implementation Procedures Guide (NWCG 2017) and subsequent agency specific requirements. This plan includes specific objectives for undertaking the burn, as well as prescriptions for fire behavior and operational details.

Seeding

Seeding treatments are proposed for up to 17,250 acres. Seed would be applied by a variety of methods, including manual (hand seeders) or mechanical application (like rangeland drills, drag covering implements, and rubber tired cross-country seed applicators), aerial application, and may be in conjunction with herbicide application for invasive non-native plant species such as cheatgrass. Seeding may be preceded by or follow other treatment types. Seeding would be used in areas where the onsite seed source is inadequate to ensure successful revegetation of the site. Seed mixes would primarily be composed of native species, although non-native species may be used per NPS and BLM policy (Appendix A). Seed selection would be based on site potential as indicated by known species composition in the area and potential vegetative community components as indicated in USDA Ecological Site Descriptions (ESD), and GMP/RMP objectives.

Proposed Treatment Locations

Proposed treatment areas were developed using a variety of criteria. Treatments could be implemented for up to 30 years, although similar projects have occurred during shorter timeframes. If conditions change substantially in the project area where this EA is determined to be no longer valid, the BLM and NPS may write another EA to address new issues and/or conditions. Treatments were developed in collaboration with Arizona Game and Fish Department (AZGFD) staff, grazing permittees with allotments within the project area, and subject matter experts who work on the Monument. Throughout the project area, survey plots were placed to capture a data snapshot of current vegetation conditions in previous treatment areas and a cross section of vegetation types based on soils and ESDs. In addition, Rangeland Health Assessments (Appendix F), trend plot data, past treatment outcomes observations, previous project proposals, and other similar landscape restoration projects were used to develop the proposed action.

Within the proposed project area, some locations were excluded from consideration for treatment. These fell into three general categories: vegetation types where treatment would be highly unlikely to benefit the ecosystem, soil physical characteristics, and topography. Mojave transition shrubland and blackbrush mixed shrubland vegetation types typically responds poorly to vegetation manipulation on the Shivwits Plateau. These areas have the potential to convert to invasive plant dominated landscapes, while losing the unique mix of plant species found in the transition zones between the Colorado Plateau and Mojave or Sonoran Desert floristic provinces found along the margins of the project area. Rocky and gravelly soils, where no fine soils exist, typically do not provide sufficient substrate for more than a few new plants to establish over many years. Topography was captured as slope and as a vegetative type. Slopes over 30% are logistically difficult to treat and are locations where even slight ground disturbance may result in erosion (Appendix B Figure B.12). Cliff and scree slopes vegetative type coincides with both high angle slopes and highly unstable soil slopes that may not exceed 30%.

Treatment Unit Specific Planning

Each treatment unit would have a plan established prior to on the ground implementation. All units except units 29 and 41 would be treated to create a mosaic effect (Figure 2.2). Areas within the unit would include untreated, partially or lightly treated, and fully treated sections. Units 29 and 41 are herbicide and seed units. In the case of Unit 41, effective treatment would require herbicide application over the entire unit. Unit 29 would require herbicide application over the areas designated sagebrush grassland, sagebrush shrubland, grassland, and recent fire or disturbance; a mosaic approach to herbicide application would not attain the desired restoration to the native plant ecosystem (Appendix C, Figure C.7).

An area may be treated more than once during this project, as necessary. For example, treatments may target a particular species, i.e., ponderosa pine, or a particular ecosystem subtype within a larger area, such as early seral juniper patches within sagebrush flats. Treatments may be combined, for example mechanical mowing may be preceded or followed by seeding. Treatments in mule deer habitat may be adapted from techniques used by a variety of land managers and researchers referenced throughout the EA. All actions in this alternative would be subject to the design features discussed below.

In the proposed manual and mechanical treatments in pinyon-juniper woodland and savanna each unit would be divided into a mosaic of treatment intensity based on recommendations in Bender (2012). Approximately one quarter of the unit would remain unchanged; approximately half of the unit would remove pinyon and/or juniper trees to result in a 30-60 percent canopy cover by trees. The final quarter of the unit (or no-small-tree treatment area) would have all pinyon and juniper trees removed except large trees. See Appendix C, Figure C.8 for a hypothetical depiction of a typical treatment unit.

Trees targeted for removal would be smaller diameter junipers (up to 20-inch diameter at root crown (DRC)) and pinyon trees (up to 10-inch diameter at breast height (DBH)). Larger diameter trees would be left in place (junipers over 20-inch DRC and pinyon trees over ten

inches DBH) in the entire treatment unit. Figures C.5 and C.6 show examples of areas in juniper where pinyon trees would be thinned (Appendix C). The Natural Resources Conservation Service (NRCS) interpretation of the Bender (2012) mosaic targets, modified for variations in local ESDs, translates the 30-60 percent cover category to retain four trees per acre in Rangeland ESDs and eight trees per acre in Forest ESDs. Wherever possible the leave trees would be pinyon trees. The unchanged quarter of the unit would be in sections no less than 40 acres. The no-small-tree quarter would be in swaths through the units with a maximum distance to cover of not more than 660 feet and ideally less than 300 feet. See Appendix C Figure C.8 for an example of this mosaic.

Mechanical treatments in sagebrush grassland, sagebrush shrubland and grassland - native or introduced (GNI) would remove all pinyon under ten inches DBH and juniper trees under twenty inches DRC found within the treatment area to bring these areas closer to conformance with the applicable ESDs. Treatment of sagebrush and other shrubs would be in meandering swaths at least ten feet wide, avoiding washes, rocky areas and any isolated seeps and springs.

Units 24, 46, 62 and 63 all include previous chaining treatments (Appendix B Figure B.10). These units are areas where mule deer are expected to be present, and all have openings with minimal tree cover larger than expected based on ESDs. Within these units, regardless of other treatment specifics, a minimum of one tree (preferably pinyon) or one tree/shrub cluster (oak, cliffrose, or locust) per acre would be retained to provide cover for wildlife in the large openings.

Due to the mixed vegetation types in the project area, some treatment units included vegetation types excluded from treatment or vegetation types beyond those of treatment priority. For example, Unit 17 Grassy Mountain, a ponderosa pine woodland prescribed fire treatment, contains, amongst others, cliff and scree slopes and sagebrush shrubland; neither would be treated because they are not in the target vegetation types for the unit. In units where pinyon-juniper woodland and savanna would be treated, a minimum of 25% of the unit would be untreated.

Table 2.1. Treatment Units. Units incorporate areas excluded from treatment based on vegetation type and treatment plan. Unit acres are therefore larger than actual acres to be treated. All acres are approximate.

Unit No.	Unit Name	Treatment	Primary Target Vegetation	Unit Acres	Treatment Acres	Herbicide Anticipated
1	Agway Valley East	Mechanical, Seed	<i>Artemisia tridentata</i>	126	82	No
2	Agway Valley North	Manual, Mechanical, Seed	<i>Pinus edulis</i> , <i>Juniperus osteosperma</i>	600	447	Yes
3	Agway Valley Southwest	Manual, Mechanical, Seed	<i>J. osteosperma</i> , <i>A. tridentata</i>	164	123	No
4	Agway Wash	Manual, Mechanical, Seed	<i>P. edulis</i> , <i>J. osteosperma</i> , <i>Purshia mexicana</i>	286	196	No
5	Ambush	Prescribed Fire	understory, high density <i>Pinus ponderosa</i> saplings	380	120	No
6	Ambush North	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	560	550	No
7	Andrus	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	5,881	1,758	Yes
8	Boundary	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	131	60	No
9	Buster	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	675	670	No
10	Castle Peak	Manual, Mechanical	<i>P. edulis</i> , <i>J. osteosperma</i>	3,652	2,487	No
11	Castle Peak II	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	7099	718	Yes
12	Dellenbaugh	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i> , understory, high density <i>P. ponderosa</i> saplings	247	247	No
13	Fire Camp	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	95	24	No
14	Fire Camp Extension	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	30	24	No
15	Fire Camp South	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	899	884	No
16	Gardner Canyon North	Manual, Mechanical	<i>P. mexicana</i>	1,228	599	No
17	Grassy Mountain	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	3063	321	No
18	Grassy Mountain East	Manual, Mechanical, Seed	<i>P. edulis</i> , <i>J. osteosperma</i>	1,040	730	No
19	Green Springs	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	60	20	No
20	Green Springs East	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	330	170	No
21	Green Springs North	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	680	170	No

Unit No.	Unit Name	Treatment	Primary Target Vegetation	Unit Acres	Treatment Acres	Herbicide Anticipated
22	Halfway	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	200	60	No
23	Hidden Hills North	Manual, Mechanical, Seed	<i>P. edulis</i> , <i>J. osteosperma</i>	4,721	3,531	Yes
24	Hidden Hills West	Manual, Mechanical, Seed	<i>J. osteosperma</i>	3,424	2,564	Yes
25	Horse Valley	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	70	30	No
26	Horse Valley Meadow	Manual	<i>P. edulis</i> , <i>J. osteosperma</i>	200	120	No
27	Horse Valley North	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	530	530	No
28	Kelly	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	2,780	2,760	No
29	Kelly Dam	Herbicide, Seed	<i>Convolvulus arvensis</i>	104	71	Yes
30	Kelly East	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	1,950	1,640	No
31	Kelly East Extension	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	540	520	No
32	Kelly West	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	530	490	No
33	Lake Flat	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	3,301	376	Yes
34	Lake Flat East	Manual, Mechanical	<i>P. edulis</i> , <i>J. osteosperma</i>	346	255	No
35	Lundell Tank	Manual, Mechanical, Seed	<i>J. osteosperma</i>	1,020	765	No
36	McDonald Flat	Mechanical, Seed	<i>A. tridentata</i>	912	663	No
37	McDonald Flat West	Manual, Mechanical, Seed	<i>J. osteosperma</i>	831	619	Yes
38	Middle Ambush	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	1,080	800	No
39	Mociac Well	Manual, Mechanical	<i>P. edulis</i> , <i>J. osteosperma</i>	383	287	No
40	Nutter	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	430	420	No
41	Overnight Draw East	Herbicide, Mechanical, Seed	<i>Bromus tectorum</i>	83	83	Yes
42	Overnight Draw North	Mechanical, Seed	<i>A. tridentata</i>	35	19	No
43	Overnight Draw West	Mechanical, Seed	<i>A. tridentata</i>	322	76	Yes
44	Parashant Wash East	Manual, Mechanical	<i>P. edulis</i> , <i>J. osteosperma</i>	124	93	No
45	Penn Valley Hills	Manual, Mechanical	<i>P. edulis</i> , <i>J. osteosperma</i>	912	683	No
46	Penn Valley Hills East	Manual, Mechanical	<i>P. edulis</i> , <i>J. osteosperma</i>	1,639	1,213	Yes
47	Peter's Pocket	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	540	530	No
48	Pine Valley East	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	1,210	470	No
49	Pine Valley Loop	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	40	20	No
50	Pine Valley Meadow	Manual	<i>P. edulis</i> , <i>J. osteosperma</i>	70	40	Yes

Unit No.	Unit Name	Treatment	Primary Target Vegetation	Unit Acres	Treatment Acres	Herbicide Anticipated
51	Pine Valley Ranch	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	290	90	No
52	Pine Valley West	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	170	70	No
53	Pine Well	Manual, Mechanical	<i>P. edulis</i> , <i>J. osteosperma</i>	491	364	Yes
54	Pleasant Valley	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	215	63	No
55	Pleasant Valley East	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	140	18	No
56	Pleasant Valley Meadow	Manual	<i>P. edulis</i> , <i>J. osteosperma</i>	22	2	Yes
57	Pleasant Valley South	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	750	730	No
58	Rattlesnake	Manual, Mechanical	Trees	1,576	1,150	Yes
59	Red Pond South	Mechanical, Seed	<i>A. tridentata</i>	83	49	No
60	Salt House Draw	Mechanical, Seed	<i>A. tridentata</i>	343	231	Yes
61	Salt House Draw South	Manual, Mechanical, Seed	<i>P. edulis</i> , <i>J. osteosperma</i>	776	582	Yes
62	Salt House East	Manual, Mechanical	<i>J. osteosperma</i>	1,900	1389	Yes
63	Salt House West	Manual, Mechanical	<i>J. osteosperma</i>	3,030	1,648	No
64	Sawmill	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i> , understory, high density <i>P. ponderosa</i> saplings	33	32	No
65	Sawmill Meadow	Manual	<i>P. edulis</i> , <i>J. osteosperma</i>	15	4	No
66	Sawmill South	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	80	20	No
67	Shanley	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	360	340	No
68	Slim	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	200	200	No
69	Tincanebitts	Manual, Mechanical	<i>J. osteosperma</i>	160	120	No
70	Twin I	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	406	353	No
71	Twin Creek	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	515	468	No
72	Twin II	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	1,976	1,829	No
73	Twin North	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	1,539	1,420*	No
74	Twin Spring Boundary	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	633	585	Yes
75	Twin West	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	1,405	1,245	Yes
76	Waring	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	170	60	No
77	Waring East	Manual, Prescribed Fire	<i>P. edulis</i> , <i>J. osteosperma</i>	330	310	No

Unit No.	Unit Name	Treatment	Primary Target Vegetation	Unit Acres	Treatment Acres	Herbicide Anticipated
78	Waring South	Manual, Prescribed Fire	<i>P. edulis, J. osteosperma</i>	430	420	No
79	West Fork	Mechanical, Seed	<i>A. tridentata</i>	232	152	Yes
80	West Fork South	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	7,515	862	Yes
81	Wildcat I	Manual, Mechanical, Seed	<i>P. edulis, J. osteosperma, A. tridentata, P. mexicana</i>	734	550	No
82	Wildcat II	Mechanical, Seed	<i>A. tridentata</i>	100	64	Yes
83	Wildcat III	Manual, Mechanical, Seed	<i>P. edulis, J. osteosperma</i>	229	172	No
84	Wildcat IV	Manual, Mechanical	<i>P. edulis, J. osteosperma</i>	4,695	1,271	No
85	Wildcat V	Manual, Mechanical, Seed	<i>P. edulis, J. osteosperma</i>	2,196	1,600	Yes
86	Yellow John East (NPS)	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	167	7	No
87	Yellow John Mountain	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	3,294	283	No
88	Yellow John Mtn East	Manual, Mechanical	<i>P. edulis, J. osteosperma</i>	489	362	No
89	Yellow John South	Manual, Prescribed Fire	<i>P. edulis, J. osteosperma</i>	180	170	No
90	Yellow John West	Prescribed Fire	understory, high density <i>P. ponderosa</i> saplings	236	6	No
91	Gardner Canyon South	Manual, Mechanical	<i>P. mexicana</i>	2,945	1,458	No
92	Agway Valley West	Manual, Mechanical, Seed	<i>J. osteosperma, A. tridentata</i>	1,076	807	Yes
93	Agway Wash North	Manual, Mechanical, Seed	<i>P. edulis, J. osteosperma, A. tridentata</i>	353	265	Yes
94	Andrus North	Manual, Mechanical	<i>P. edulis, J. osteosperma, A. tridentata</i>	2,470	1843	Yes
95	Parashant Canyon North	Manual, Mechanical, Seed	<i>P. edulis, J. osteosperma</i>	250	181	No
96	Parashant Canyon South	Manual, Mechanical, Seed	<i>J. osteosperma, A. tridentata</i>	2,313	1,723	No
97	Red Pond I	Manual, Mechanical, Seed	<i>P. edulis, J. osteosperma</i>	1,210	904	No
98	Penn Valley South	Manual, Mechanical	<i>P. edulis, J. osteosperma</i>	268	193	No

*Twin North unit treatment acres are incorporated in portions of Twin II, Twin Creek and Twin Boundary treatment units.

Figure 2.1 Proposed Vegetation Treatment Types

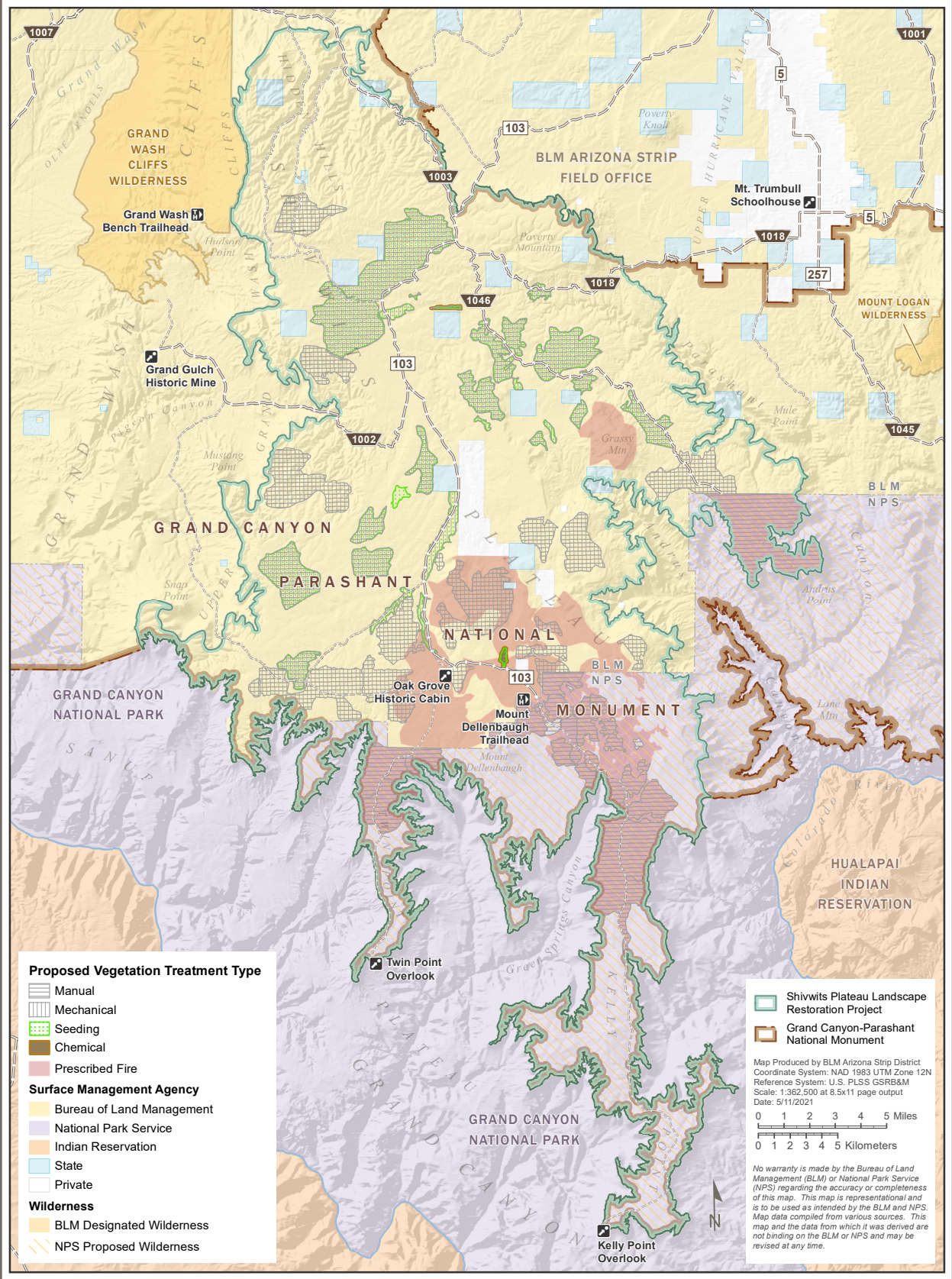


Figure 2.2 Proposed Manual, Mechanical, Seeding and Chemical Treatment Units Index

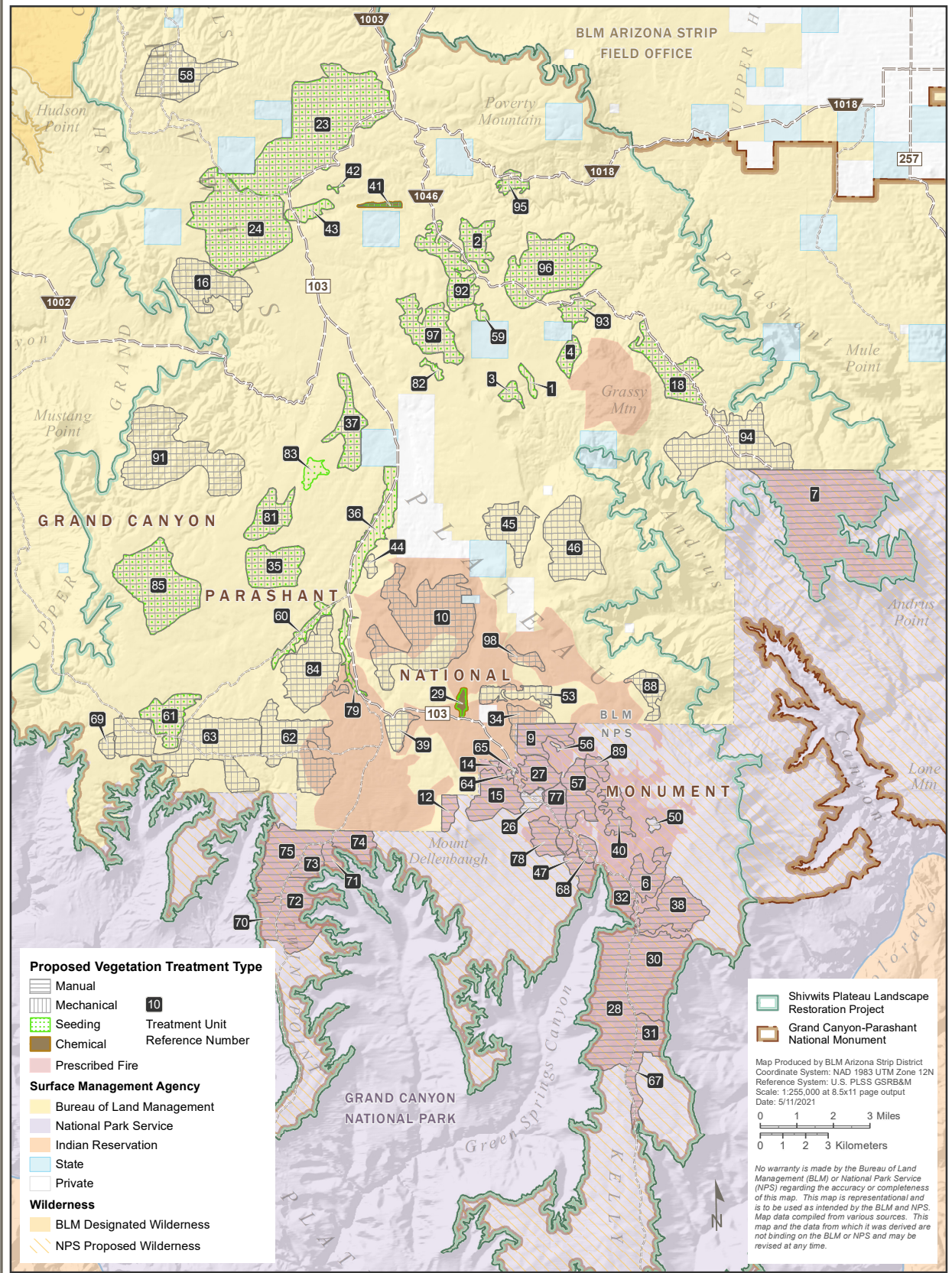
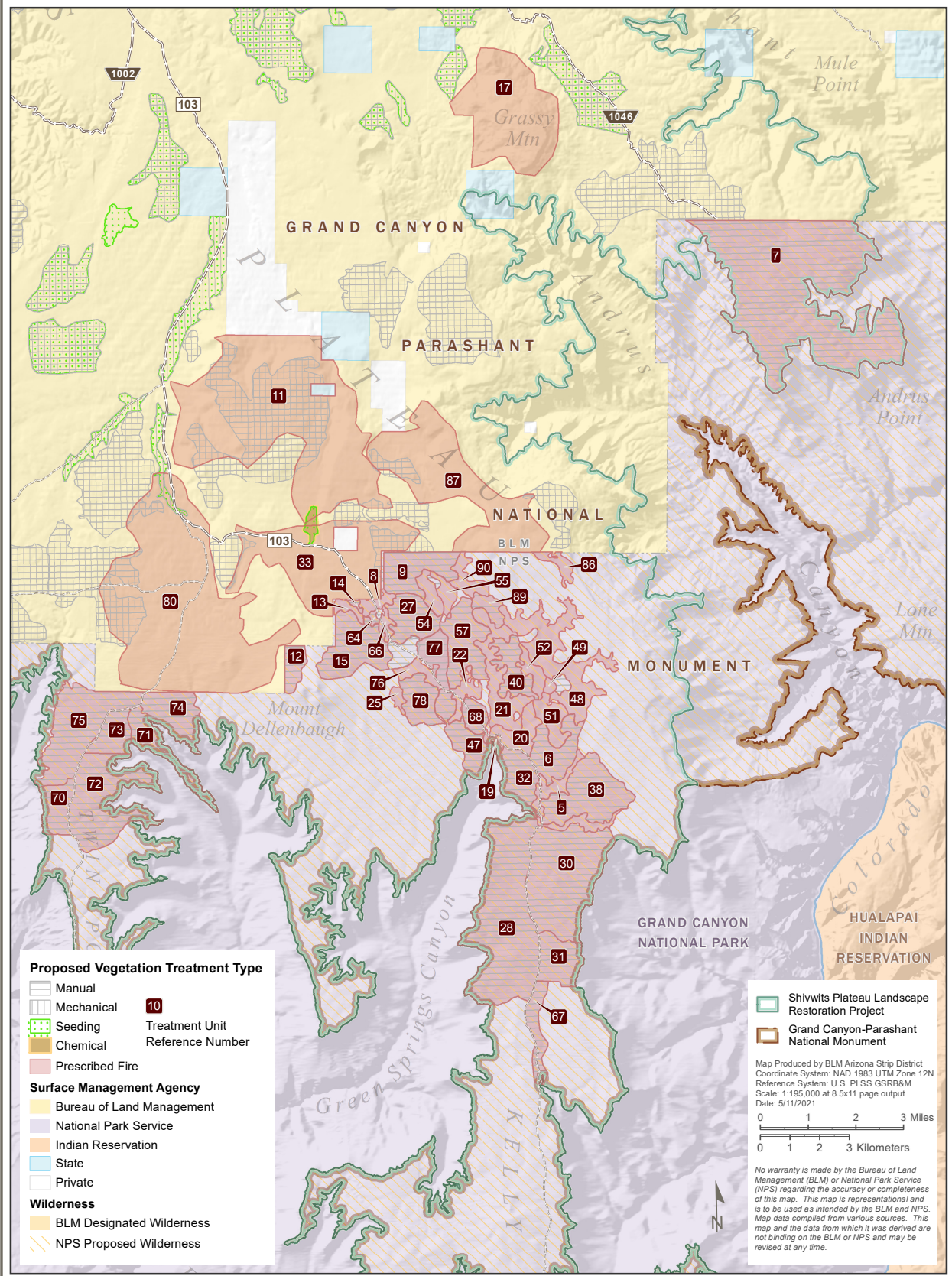


Figure 2.3 Proposed Prescribed Fire Treatment Units Index



Adaptive Management and Monitoring

Timing and individual treatment feasibility would be considered throughout the project area based on climatic variability. Because treatments would take place over several years, completed treatments and their monitored outcomes would be used to inform the exact methodology of later treatments. Changes in the landscape unrelated to the project, such as wildfire or incursion of invasive non-native plant species, would be incorporated into the initial planned treatments and may result in areas removed from the treatment schedule unless certain local conditions are met. Best available science would be expected to change over the life of the project. New information and techniques would be incorporated into methodology, especially those that increase positive treatment outcomes and minimize any potential negative impacts.

Monitoring of treatment outcomes would incorporate both surveys specific to the project and other monitoring efforts within the project area. Specific surveys include remeasuring the survey plots, both within and outside treatment units, established for this project, post-fire monitoring, and monitoring to determine if livestock can be returned to treated areas (Appendix D). Other monitoring efforts include rangeland health evaluations, Assessment Inventory and Monitoring (AIM) plots, Integrated Upland (sagebrush area) plots, trend analysis, invasive plant surveys, wildlife surveys (typically carried out by AZGFD), desert spring surveys, and USFS Forest Inventory. Data from the various monitoring work would be incorporated into the adaptive management planning for this project.

An issue brought forward during scoping was the potential expansion of invasive plants (i.e. cheatgrass) in pinyon-juniper woodlands and savanna that are proposed for treatment with prescribed fire. To address this issue, the following adaptive management process would be employed. All units proposed for this type of treatment would be monitored using the FMH (NPS 2003) protocol. Two to five units would initially be treated after the following decision-making process is employed.

1. Determine the extent of invasive plant distribution and characterize the vegetative community of the site within one year prior to treatment.
2. (a) In areas where invasive plants are found at a greater than 10% frequency, pretreat with herbicide prior to treatment.
(b) In areas where little to no invasive plants are found (less than 10% frequency), commence prescribed fire treatment.
3. Post-fire monitor in one, two, and five years as part of the FMH protocol.
4. (a) If post fire monitoring indicates no substantial spread of invasive plants, as determined by the vegetation specialist or their designee, or the introduction of new invasive plant species and favorable regeneration of the understory, similar units may be treated.
(b) If post fire monitoring indicates substantial spread of invasive plants, as determined by the vegetation specialist or their designee, the unit would be evaluated for follow-up herbicide or other invasive plant eradication treatments and no

additional prescribed fire treatment would occur in the unit. Similar units would be reevaluated for treatment and may not receive a prescribed fire treatment.

(c) If post fire monitoring indicates substantial spread of invasive plants and no to minimal regeneration of the understory, similar units would be reevaluated for treatment.

Long-term Maintenance

Treatments within the project area would be periodically maintained in order to continue meeting project objectives. Maintenance of treatments would be accomplished using the same type(s) of treatment method (chemical, manual, mechanical, prescribed fire, seeding) as the original proposed treatment(s). Treatment maintenance specifics may vary from the original treatment intensity, seasonality, and tool (ex. use bull hog during maintenance when original treatment used front-end loader), depending on the most appropriate type of maintenance at the time of retreatment.

Field Logistics

Remote camps and administrative sites would be used by crews and personnel based on the remoteness of the area. These camps would be placed in either previously disturbed locations or within the treatment area (such as within sagebrush that would be mowed during the treatment). Camps would use Leave No Trace^{® 3} principles. Camps and associated equipment would also follow the relevant design features listed below.

Design Features

The following proposed design features would be required as stipulations during implementation of the Proposed Action to minimize potential environmental impacts.

Cultural Resources

- All ground-disturbing mechanical and all fuels projects will have a complete Class III cultural resource inventory conducted prior to implementation. All sites will be treated as Eligible for the National Register of Historic Places and impacts avoided through individual project design.
- When in the vicinity of known cultural resources (i.e., archeological site(s)), treatment boundaries would be designed to avoid all cultural resources and to avoid making the archaeological site more visually obvious.
- Any cultural (historic/prehistoric site or object) or paleontological resource (fossil remains of plants or animals) discovered within the project areas that has not been determined to be previously documented and noted during project planning would immediately be reported to the Monument Manager, Monument Superintendent (Superintendent) and the Monument archeologist or their designee. All operations in the immediate area of the discovery shall be suspended until written authorization to proceed

³ See [Leave No Trace Seven Principles \(U.S. National Park Service\) \(nps.gov\)](#) or [LNT.org](#) for more information.

is issued. An evaluation of the discovery shall be made by a qualified archeologist or paleontologist to determine appropriate actions to prevent the loss of scientifically significant cultural or paleontological values.

- If any human remains, funerary objects, sacred objects, or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (Public Law 101-601; 104 Stat. 3048; 25 U.S.C. 3001) are discovered, operations in the immediate area of the discovery would stop, the remains and objects would be protected, and the Monument Manager, Monument Superintendent (or designee) and the Monument archeologist would be immediately notified. The immediate area of the discovery would be protected until notified by the Monument Manager or Monument Superintendent (or designee) that operations may resume.

Hazardous Materials and Trash

- At no time would vehicle or equipment fluids (including motor oil and lubricants) be dumped on public lands. All accidental spills would be reported to the authorized officer and be cleaned up immediately and disposed of in an authorized disposal site, using best available practices required by law. All spills of federally or state listed hazardous materials which exceed the reportable quantities would be promptly reported to the appropriate agency and the authorized officer.
- The project sites would be cleaned up at the end of each workday (e.g. trash removed, scrap materials picked up). “Waste” means all discarded matter including, but not limited to, human waste, trash, garbage, refuse, oil drums, petroleum products and equipment.

Livestock Grazing

- If treatments would impact subsections of a pasture, portable electric fencing with solar panels may be used to temporarily exclude livestock.
- Project scheduling and implementation would include consultation, cooperation, and coordination with affected grazing permittees. Annual operations of all permittees within the project area would be considered during project implementation to minimize impact on operations as much as possible, while also ensuring treatment success. The Monument management and staff would consider the following when implementing treatments over time:
 - Coordinate treatment areas in time and space within the allotment/pasture and season of use to reduce impact to livestock operations.
 - Utilize Tuweep Forage Reserve to mitigate allotment/pasture displacement due to treatments in the short term. Tuweep Forage Reserve, administered by the Monument, may be available if normal allotment/pasture rotations are not possible or practicable due to proposed vegetation treatments and subsequent reseeding efforts.
- Livestock would not be permitted to enter a treated unit for a minimum of two growing seasons to ensure herbaceous growth establishment and soil stability; this may be reduced or increased in consultation with BLM resource staff based on the site-specific conditions

within the particular unit treated and the criteria described in Restoration Project Objectives for Resumption of Livestock Grazing in Areas Treated for Restoration (Appendix D).

Soils

- Fieldwork activities would be limited to periods when the soil surface is dry except when in temporarily wetted areas such as drainage ditches and tanks.
- Mechanical work would not take place when ruts greater than 4 inches form on roadways adjacent to work areas.
- Wheeled/tracked vehicles used for project implementation would not operate or travel across slopes exceeding 30 percent.
- Pinyon and junipers growing in drainages with roots that may be stabilizing banks would be left in place.
- To minimize soil compaction, treatment activities that involve use of vehicles or equipment off designated routes would be limited to periods when the soil and ground surface are not excessively wet.

Vegetation

- No prescribed fire, seeding or mastication treatments would take place during a severe or worse drought as indicated by the U.S. Drought Monitor (NDMC 2021).
- Vehicles and equipment would be power washed off-site before treatment activities begin to minimize the risk of spreading noxious weeds. This would include cleaning all equipment before entering the Arizona Strip. The treatment areas would be monitored by the Monument for invasive non-native plants for a minimum of two years following completion of the treatment and may be re-treated as needed.
- All seed would be certified as “weed free”.
- Areas of dense (at least 30 percent cover) biological soil crust coverage (determined by the Monument Ecologist or their representative) would be avoided to the greatest extent practicable.
- Mastication residues (e.g., wood chips) would be spread as evenly as possible, with a maximum depth of 3 inches so that seed germination is not inhibited.
- Lop and scatter biomass to a discontinuous, low depth of 24 inches or less to maintain biomass to soil contact and encourage decomposition of slash and eventual conversion to soil organic matter, except in units where prescribed fire would follow lop and scatter treatments. In such cases, continuous biomass would aid in the spread of prescribed fire.
- Herbicide treatment would be incorporated into any treatment unit planning where cheatgrass or red brome (*Bromus tectorum* or *rubens*) exceeds 10 percent cover.

Wildlife

- Fieldwork, excluding prescribed fire, would be limited to daylight hours to minimize impacts to wildlife and to minimize unwanted fire behavior which may present holding, or fire containment, control and objectives issues for prescribed fire personnel.

-
- Surveys for pinyon jays would be necessary prior to treatment if occurring during nesting season (February 1 to July 31). Identified active nest sites or nesting behavior associated with a particular location would be protected during treatment by a no-treatment buffer of 500 meters (1640 feet.) (Somershoe 2020).
 - Surveys for northern goshawks would be necessary prior to treatment if occurring during nesting season. Identified active nest sites or nesting behavior associated with a particular location would be protected during treatment by a no-treatment buffer of 200 meters (650 feet.) (Reynolds 1992).
 - No hazing or harassment of wildlife is permitted.
 - Existing snags would be retained within the project area. In areas with dense snags in a similar state of decay and where mastication is the preferred treatment, some snags may be partially masticated to provide a more diverse habitat for wildlife. In such cases, criteria for retention would be larger juniper, pinyon or ponderosa snags, particularly any with existing cavities suitable for nesting (NRCS 2013), and those not presenting a hazard to personnel in the treatment area.
 - Conservation Measures, Terms and Conditions – California Condor. The following conservation measures are contained in USFWS Memorandum 02EAAZ00-2016-CPA-0038 (2016) and incorporated into this project.
 1. If a condor occurs at the construction site, construction activities that could result in injury to condors should cease until the condor leaves on its own or until techniques are employed by permitted personnel that result in the condor leaving the area.
 2. Construction worker and supervisors should be instructed to avoid interaction with condors and to immediately contact the Flagstaff office of the U.S. Fish and Wildlife Service (FWS) or The Peregrine Fund personnel if condor(s) occur at a construction site. Non-permitted personnel cannot haze or otherwise interact with condors.
 3. The construction site should be cleaned up (e.g. trash removed, scrap materials picked up) at the end of each day that work is being conducted to minimize the likelihood of condors visiting the site.

Miscellaneous

- Treatment boundaries would be irregularly shaped (i.e. not straight lines, unless using roads and fences as a boundary) to minimize the level of change to the characteristic landscape, avoid creating obvious lines of extreme visual contrast, and avoid attracting the attention of the casual observer.
- During prescribed fire operations, certain lighting techniques may be employed to reduce smoke, such as strip head-firing or chevron firing. These techniques can create pulses of heat to lift smoke aloft quickly. Backing fires can also be created. These are fires that burn against the wind and consume fuels completely and thus have less resident time for

smoke production. These techniques can be used, as needed, and in accordance with applicable laws and regulations set forth by the Arizona Department of Environmental Quality.

- Vegetation treatments would not be permitted during the mule deer rifle hunting seasons, per AZGFD annual proclamation schedule, up to 10 days in November.
- Roads and trails may be temporarily closed to provide safety for both employees and public during prescribed fire operations.
- Researchers, holding valid research permits within the project area, would be informed prior to non-emergency work to coordinate their research requirements with anticipated work that may affect their project area or plan.

Access

Access to the individual project areas would be by way of existing designated routes using standard ½ to 1-ton trucks, and/or ATVs or UTVs. In mastication units, heavy machinery would be allowed within designated treatment unit boundaries and designated routes. Seeding treatments may require the use of aerial, ground, or ATV/UTV cross-country travel without creating new routes.

2.2.2 Alternative B – No Action

Under the No Action Alternative, no additional management actions would be taken beyond those identified in the GMP/RMP or in previous environmental compliance documents such as Grazing Permit Renewal and Vegetation Treatments for Wildcat Allotment (DOI-BLM-AZ-A030-2018-0013-EA) and Mociac - Dellenbaugh Fuels Treatments (DOI-BLM-AZ-A030-2013-0003-DNA), or specifically required by law or policy.

2.3 Alternatives Considered but Eliminated from Detailed Analysis

NEPA requires federal agencies 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). Alternatives not considered in detail in an EA may include, but are not limited to, those that fail to meet the purpose and need; are technologically infeasible or illegal; are inconsistent with basic policy objectives (such as not in conformance with the GMP/RMP); are substantially similar in design to an alternative that is analyzed; or would have substantially similar effects to an alternative that is analyzed.

2.3.1 Only non-ground-disturbing treatments

Limiting treatments to types with no ground disturbance was considered. These include manual, chemical, and some prescribed fire treatments included in the proposed action. While this would have partially fulfilled the purpose and need for this project, several practical issues arise. Mechanical treatments in the form of mastication and mowing of vegetation has a two-fold effect, removal of vegetative biomass and providing a light mulch layer to promote successful seeding. Successful seeding (typically a mechanical treatment) is a necessary component of

treatments in certain vegetation types to bolster the local seedbank and increase the local native plant biodiversity. Seeding would help aid the restriction of invasive plant species; more herbicide application would likely be necessary to accomplish the same goal without this treatment type. For these reasons, this alternative has been dismissed from detailed analysis.

2.3.2 Use prescribed fire as the only treatment, or as the only treatment in proposed wilderness and/or areas with wilderness characteristics

Prescribed fire as the sole treatment type, either across the entire project area or at least within proposed wilderness and areas with wilderness characteristics was considered. This would partially fulfill the purpose and need for this project. Prescribed fire is part of the suite of vegetation treatments in the proposed action. In the ponderosa pine dominant areas, using only prescribed fire, if preceded by thinning or ladder fuel reduction is recommended. In other vegetation types where fire would be expected (pinyon-juniper, sagebrush, oak, chaparral, and grassland), prescribed fire would be a useful tool if not for consideration of proliferation of invasive species. In areas without robust grass and forb understory, cheatgrass and other invasive non-native plants proliferate after fire, altering the fire regime and beginning the conversion of the ecosystem to one dominated by invasive non-native plant species. The areas targeted for manual, mechanical, and chemical treatments have a poor grass and forb understory, so treatment with only prescribed fire would be generally expected to have this negative impact. This would degrade the ecosystems within the project area, cause resource impairment, and contradict the Purpose and Need for all ecosystems within the project area. For these reasons, this alternative has been dismissed from detailed analysis.

2.3.3 No grazing

Removal of livestock grazing from the project area was proposed by various commentators during public scoping and the public comment period. However, making permanent changes to the livestock grazing permits is outside the scope of this analysis under the purpose and need for the project. The proposed action incorporates design features, monitoring, and adaptive management principles which includes temporarily resting treated areas from livestock grazing to ensure treatment success. However, these actions do not constitute the equivalency of a no-grazing alternative based on the temporary nature of the rest periods and the ability of many permittees to rest areas while grazing other parts of the allotments. Finally, the Monument Proclamation (2000) states:

The Bureau of Land Management shall continue to issue and administer grazing leases within the portion of the monument within the Lake Mead National Recreation Area, consistent with the Lake Mead National Recreation Area authorizing legislation. Laws, regulations, and policies followed by the Bureau of Land Management in issuing and administering grazing leases on all lands under its jurisdiction shall continue to apply to the remaining portion of the monument.

For these reasons, this alternative has been dismissed from detailed analysis.

2.3.4 Sierra Club et al Alternative

An alternative proposed by Sierra Club et al (SC) was considered. This alternative is similar to Alternative A, Proposed Action, and/or Alternative B, No Action Alternative, in most points, though different terminology was used. Some aspects, such as SC Section 1.3.3, were outside the scope of the project and refer to determinations made by other federal agencies. Other aspects, such as SC Section 1.3, 2.4 and 2.5 were not part of either Alternatives A or B. Specific points of departure from Alternatives A and B that would not fulfill the Purpose and Need or are not incorporated in other alternatives in this section are discussed below.

SC 1.2 “Pinyon pines are never removed as part of juniper removal treatments”

The pinyon-juniper woodlands of the project area are mixed with many dense shrubby pinyon trees around large diameter juniper trees (Appendix C Figures C.5 and C.6). Ignoring the overcrowding of small pinyon trees while removing only juniper trees would not result in a healthy diverse multi-age class woodland, but rather a dense shrub dominated savanna that does not align with the ESD.

SC 3.2.1 “If a site with invasive species potential is treated, hand-treatment [e.g. chainsaws] will be the preferred method...”

In areas without robust grass and forb understory, cheatgrass and other invasive non-native plants tend to be potential invaders. The areas targeted for treatment have a poor grass and forb understory. While mechanical treatment may be ground disturbing, manual treatment would necessitate the use of large hand crews that typically are not contracted for such work because mastication is more efficient and are a potential vector for invasive species expansion from areas adjacent to the treatment area. Herbicide application and seeding (typically a mechanical treatment) are included in the proposed action to combat the expansion of invasive plants areas in treatment units.

In summary, this alternative was not analyzed in detail in the EA based on its similarity to the proposed action and that some portions of the SC alternative did not meet the purpose and need of the proposed action.

Chapter 3. Affected Environment & Environmental Consequences

3.1 Introduction to the Analysis

This section describes the affected environment, the condition and trend of issue-related elements of the human environment that may be impacted by implementing one of the alternatives. This section also describes the environmental consequences to each issue-related resource from the analyzed alternatives. It describes past and ongoing actions that contribute to present conditions, and provides a baseline for analyzing direct, indirect, and cumulative effects.

For some resources, effects would be short-term, lasting only during project implementation or for three years; long-term effects would persist for a minimum of ten years.

Direct effects are those caused by the action and occurring at the same time and place. Indirect effects are those caused by the action but occurring later or in a different location. Cumulative effects result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. The cumulative effects analysis includes other federal actions, and non-federal (including private) actions. Reasonably foreseeable future actions are those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends. The Cumulative Assessment Area (CAA) defines the area in which Cumulative Impacts are considered in light of the Proposed Action. The CAA typically consists of those lands that are within the project planning boundary, other federal (or State) agencies, and private holdings. Past, present, and reasonably foreseeable actions that have occurred in the CAA have impacted the human environment to varying degrees.

3.2 Elements or Resources of the Human Environment

Table 3.1 addresses the elements and resources of concern considered in the development of this EA; this table indicates whether the element or resource is not present in the project area, present but not impacted to a degree that requires detailed analysis, or present and potentially impacted.

Table 3.1. Elements or Resources of the Human Environment.

NP= not present in the area impacted by any of the alternatives

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

PI = present with potential for impact – analyzed in detail in the EA

Resource/Issue	Determination	Rationale for Determination
Air Resources (including Air Quality, Night Skies, and Greenhouse Gas Emissions)	PI	Implementing the proposed actions would result in some impacts to air quality in terms of prescribed fire smoke production, dust abatement and vehicle exhaust emissions. Impacts to night skies would be localized, short-lived and largely confined to prescribed fire operations for several days.
Areas of Critical Environmental Concern (ACEC)	NP	The Monument does not contain any ACECs per the 2008 GMP/RMP and 2000 Monument Proclamation.

Resource/Issue	Determination	Rationale for Determination
Areas Managed to Maintain Wilderness Characteristics	PI	Mechanical, chemical, and fire treatments have the potential to impact the wilderness characteristics (high degree of naturalness, and outstanding opportunities for solitude or outstanding opportunities for primitive and unconfined recreation) within areas that are not designated wilderness but are identified as areas managed to maintain wilderness characteristics.
Cultural Resources	NI	Known and unknown cultural resources exist in the project area. All sites will be treated as Eligible for the NRHP and would be avoided by project design.
Farmlands (Prime or Unique)	NP	There are no prime or unique farmlands within or adjacent to the project area based on a review of the USDA Soil Survey on May 1, 2020.
Floodplains	NI	According to the FEMA National Flood Hazard Layer, some washes within the project area are classified as Zone A (1% annual chance of flood) while the remainder of the project area is classified as Zone D (unmapped probability of flood risk). No treatments would be accomplished in Zone A.
Fuels / Fire Management	PI	Vegetation treatments have both short- and long-term impacts to fuels and fire management to a degree that requires detailed analysis. Vegetation treatments have the potential to impact fire and fuels management by reducing fuel loading in ladder fuels and surface fuels, changing fire regime condition class; altering risk of a high intensity wildland fire; and dictating the level of protection of structures in the wildland-urban interface or any combination thereof.
Geology / Mineral Resources / Energy Production/Cave and Karst Features	NI	The Monument is closed to new mineral claims and energy production as per the 2000 Monument Proclamation. No existing claims are in the project area. A review of GIS data and knowledge of the area indicates that there are no cave/karst features within the proposed treatment units.
Lands / Access	NI	Access to public lands would not be altered or impaired by implementation of the alternatives with the exception of short-term temporary road closures associated with prescribed fire operation. Public notifications or press releases would be used to inform the public. No other issues have been identified in connection with the proposed action.
Livestock Grazing	PI	Vegetation treatments have the potential for short-term impacts to the livestock grazing permittees through disruption of their operations on the allotments with proposed treatments. A potential for long-term benefits also exists due to increases in

Resource/Issue	Determination	Rationale for Determination
		palatable forage within these allotments. This issue is therefore analyzed in detail in this EA.
Native American Religious Concerns	NI	No concerns were identified during tribal consultation.
Paleontology	NI	Much of the paleontological resources in this proposed project area occur in the Kaibab and Toroweep Limestone strata. The fossil occurrence would not be altered, nor would access to them. The mineralized nature of the fossils allows the proposed action to occur without damage to this resource.
Recreation	NI	While there is potential for impacts to recreational activities in the project area during project implementation, these impacts would be minor, lasting only while treatments are occurring. Design Features would mitigate impacts to trophy mule deer rifle hunting season. These impacts would include disruption to those recreating in the immediate vicinity of treatment units. However, proposed vegetation management activities in treatment areas would not substantially affect the availability of recreational opportunities in the area.
Socioeconomic Values	NI	The economic base of the Arizona Strip is mainly ranching with a few mines on the Arizona Strip Field Office. Nearby communities are supported by tourism (including outdoor recreation), construction, mining activities, and light industry. The social aspect involves remote unpopulated settings with moderate to high opportunities for solitude. Implementation of the proposed vegetation treatments would have little impact on the local economy or social aspect of the region since there would be no displacements or disruption to established businesses or uses in the area. While there is the potential for periodic local job creation due to possible contracting of the treatments, this impact is not expected to result in more than a negligible to minor influence on local income or to the economy overall.
Soil Resources	PI	The vegetative treatment proposed could have potential for impact when considering issues such as soil compaction, and alterations to the natural landscape which would exacerbate soil erosion. Further analysis is needed to assess these potential impacts.
Threatened, Endangered, and Candidate Animal Species	NI	The California condor is the only known federally listed animal species that may occur within the project area. California condors are federally listed as endangered, and a population of these condors was reintroduced on the Arizona Strip in 1996. This population is designated as experimental non-essential under Section 10(j) of the Endangered Species Act (ESA). Although condors may either fly over or feed within the project area, they have not been observed doing so. No effect to this

Resource/Issue	Determination	Rationale for Determination
		species is expected due to design features (USFWS Memorandum 02EAAZ00-2016-CPA-0038) included in the proposed action.
Threatened, Endangered, and Candidate Plant Species	NP	No Threatened, Endangered or Candidate plant species are known to occur within the project area based on a GIS review on January 27, 2021 and field observations.
Vegetation (Including Special Status Species, and Invasive Non-native Species)	PI	The proposed action is composed of various vegetation treatments, or manipulations, each of which may potentially impact the species composition of the project area. Therefore, this issue will be further analyzed in this EA.
Visual Resources	PI	Vegetation treatments have the potential to impact visual resources in the project area through visual changes to the project area. This issue is therefore analyzed in detail in this EA.
Wastes (hazardous or solid)	NI	No known hazardous or solid waste issues occur in the project area, and the alternatives would not produce hazardous or solid waste. While motorized vehicles and equipment involve use of petroleum products, which are classified as hazardous materials, there is nothing unique about the actions associated with the alternatives which could affect their use or risks associated with their use. No chemicals subject to reporting under Superfund Amendments and Reauthorization Act, Title III in an amount equal to or greater than 10,000 pounds would be used, produced, stored, transported, or disposed of annually in association with any of the alternatives. Furthermore, no extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities, would be used, produced, stored, transported, or disposed of in association with any of the alternatives.
Water Quality (drinking / ground)	NI	A review of the proposed project area watersheds, existing springs/seeps, and underlying aquifers determined the proposed actions would have limited to no impact on these resources given that no soluble materials would be introduced /exposed on the surface, nor injected into the subsurface. Overall, the recharge rate of the underlying aquifers would remain largely the same, as well as the current patterns of surface water runoff, resulting with no changes to the naturally occurring water chemistry.
Wetlands / Riparian Zones	NP	No treatments would take place in wetland or riparian zones in the project area as per design features.

Resource/Issue	Determination	Rationale for Determination
Wild Horses and Burros	NP	There are no wild horses or burros, or herd management areas, within or adjacent to the Shivwits Plateau Landscape Restoration Project area (BLM 2008) as per GIS review.
Wild and Scenic Rivers	NP	There are no river segments that are designated, eligible, or suitable as wild, scenic, or recreational under the Wild and Scenic Rivers Act in the Monument as per GIS review
Wilderness and Proposed Wilderness	PI	No Congressionally designated Wilderness areas are located in the project area. The project area includes proposed Wilderness on the NPS managed lands within the Monument. Potential impacts will therefore be analyzed in the section Proposed Wilderness (NPS managed only).
Wildlife (including BLM Sensitive Species, and Migratory Birds)	PI	Vegetation treatments have the potential for short-term disturbance to wildlife and impact to habitat during implementation of the proposed treatments. A potential for long-term benefits also exists due to improvement of wildlife habitat for some species. Impacts to affected species are therefore analyzed in detail in this EA. Species present in the project area, but not affected to a degree that detailed analysis is required, are described in Appendix L and Table L.1.
Woodland/Forestry	PI	Woodlands and forestry resources are addressed in the Vegetation section.

3.3 Air Resources (including Air Quality, Night Skies, and Greenhouse Gas Emissions)

3.3.1 Affected Environment

Air quality assessment entails understanding sources of particulates such as dust or smoke often using the metric PM 2.5 and PM 10 (Particulate Matter) to indicate size of particulates and effect on human health. Also considered are fossil fuel emissions of GHG, such as water vapor, carbon dioxide, and methane, which contribute to ongoing atmospheric concentrations. Overall, air quality is monitored by the Environmental Protection Agency (EPA) and addresses six criteria pollutants, via the Clean Air Act and defined by the National Ambient Air Quality Standards (NAAQS). These pollutants are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), particulate matter with a nominal aerodynamic diameter of less than 10 micrometers (PM₁₀) and fine particulates with a nominal aerodynamic diameter of less than 2.5 micrometers (PM_{2.5}), ozone (O₃), and sulfur dioxide (SO₂).

The proposed project area, located in Mohave County, AZ, is designated by the EPA as being “in attainment” meaning that the area meets air pollutant concentration levels for all criteria pollutants as defined under the EPA NAAQS. The area of potential impact or airshed, encompasses the Grand Wash Cliffs on the west, towards the Hurricane Cliffs on the east, the

Monument boundary on the north and Grand Canyon National Park to the south. Topographical features such as ridges and mountains may prevent the circulation of air and hold pollution within their boundaries. However, weather conditions change daily, and land features which obstruct movement of air on some days may operate as a conduit when weather patterns shift.

Existing air quality is generally rated as “good” from EPA NAAQS standards, stemming from ongoing metrics from the nearest NPS IMPROVE air quality station, GRCA2, located above the rim at Grand Canyon National Park, at Hance Camp, 72 miles to the southeast of the proposed project area. Regional haze is a common occurrence during late spring through early fall, as wildfires west of the project area (California, Nevada) produce smoke which becomes widely dispersed and travels west to east through upper troposphere elevations. Winter conditions within this airshed are susceptible to weather inversions, creating trapped pockets of air allowing for concentrations of pollutions to increase. These inversion events occur adjacent to the proposed project area in the Pakoon Basin and Grand Canyon and conclude as weather patterns shift. Infrequent vehicle usage in the proposed project area, creates short durations of dust particulates along with typical vehicle emissions. Local smoke emissions from prescribed burns, wildfires, and the burning of vegetation on private lands cause localized air pollution due to the release of particles and gases. Short lived fugitive dust is also present, generated by the erosive force of winds blowing across the area, mainly coming from disturbed areas such as roads or recent burns.

3.3.2 Environmental Impacts

Direct and Indirect Impacts of Alternative A – Proposed Action

Alternative A calls for the use of manual, mechanical, chemical, prescribed fire, and seeding treatments at various locations across the project area. The primary driver for air pollution would stem from vehicle emissions, prescribed fire emissions, and fugitive dust. To assess the impacts to air quality, available data obtained from US Federal Highway Administration Multi-Pollutant Emissions Benefits of Transportation Strategies (ICF 2006), and EPA (2009) AP 42: Compilation of Air Pollutant Emission Factors, Chapter 13, is utilized. Air quality considerations include unpaved dry roads, with an average silt content of 8.5%, untreated with water or chemical dust suppressants. The below assessments are what is considered a typical usage of crew and equipment and are used to provide an estimate of air quality impacts.

Manual Treatment – The following estimates of particulates would be produced by two gasoline trucks, two diesel trucks to transport crew with a round trip of 200 miles, two off highway vehicles (OHV) at 25 miles total miles each, associated with manual treatments. Dust: impacts are estimated with total PM 2.5 = 5.12 lbs., and total PM 10 = 28.52 lbs. Impacts from fugitive dust would be short lived and localized to the roads and project treatment areas. GHGs emissions would be considered negligible based on the low number of vehicles used in the treatment process and the sporadic nature by which treatments are conducted due to funding and logistics.

Mechanical Treatment - The following estimates of non-point source emissions would be produced by two gasoline trucks, two diesel trucks to transport crew with a round trip of 200 miles, one wheeled tractor or crawled type tractor or skid-steer tractor or one mulcher or masticator, equating to 20 hours duration for use of tractor and mulcher/masticator. Dust impacts are estimated with total PM 2.5 =6.96 lbs., and total PM 10 =31.76 lbs. Impacts from mechanical operations create additional dust and particulates due to the mulching and physical grinding of vegetation matter. Overall, dust would be short lived, and occur close to the ground surface, offering little opportunity for dust to drift offsite. Remnant mulch and debris produced ground cover and would abate fugitive dust arising from disturbed soil conditions, allowing the soil surface time to reconsolidate, and become resistant to erosional winds. GHGs would be considered negligible, based on the low number of vehicles used in the treatment process and the sporadic nature by which treatments are conducted due to funding and logistics.

Chemical Treatment - The following estimates of particulates would be produced by one gasoline truck, one diesel truck to transport crew with a round trip of 200 miles. one wheeled tractor or crawler type tractor or skid-steer tractor for a duration of 10 hours. Impacts are estimated with total PM 2.5 = 6.26 lbs., and total PM 10 =30.44 lbs. Impacts from chemical treatment would be utilized on a small portion of the proposed project area with a selective application. The bulk of dust and GHG emissions would stem from the transport of crews. Fugitive dust would be short lived and largely localized to the roadways, GHG emissions would be considered negligible and less than other treatments based on the short-lived and localized nature of chemical treatments.

Prescribed Fire Treatment – Estimated vehicle emissions for prescribed fire would be produced by five gasoline trucks, five diesel trucks to transport crew with a round trip of 200 miles, three fire trucks idling for two hours each and possibly one helicopter for six hours of operation are estimated to produce total PM 2.5 = 69.02 lbs., and total PM 10 = 284.60 lbs. Impacts from fire emissions are estimated from particulates (both PM 2.5 & PM 10) at 214 lbs./acre, carbon monoxide at 1,828 lbs./acre, volatile organics at 289 lbs./acre, and nitrogen oxides 52 lbs./acre.

Amounts of air pollutant emissions are directly related to the intensity and direction (relative to the wind) of the fire treatment and are indirectly related to the rate at which the fire spreads. The factors that affect the rate of spread are weather conditions (wind velocity, ambient temperature, relative humidity), fuels (fuel type, fuel bed array, moisture content, fuel size), and topography (slope and profile). The proposed project prescribed fire treatments would reduce air quality and visibility and increase GHG emissions in the immediate area for a short period of time. However, long-term benefits to air quality would be realized as the treated area would be less prone to uncontrolled wildfire events creating equally uncontrolled emissions.

Seeding Treatment – Estimated vehicle emissions would include one gasoline truck, one diesel truck to transport crew with a round trip of 200 miles, one aircraft per hour of seeding, and two OHVs at 25 miles total miles each, with dust impacts estimated at total PM 2.5 =4.32 lbs., and total PM 10 =28.24 lbs. Impacts from seeding would be short lived and localized to the roads and

project treatment areas. GHGs emissions would be considered negligible based on the low number of vehicles used in the treatment process and the sporadic nature by which treatments are conducted due to funding and logistics. Increased vegetation from successful seeding would result in a reduction in erosion prone areas and reduce fugitive dust from wind events.

Direct and Indirect Impacts of Alternative B – No Action

Within Alternative B, the No Action Alternative, air resources would persist in their current state and continue to be monitored by Monument staff. Not implementing treatments would result in no additional dust or vehicle emissions, but without additional mulch and organic matter on the surface, from manual and mechanical treatments, there may be a localized increase of wind/water driven erosion. The No Action Alternative would also create the possibility of increased frequency and size of wildfires, resulting in considerable air quality impacts in the forms of fugitive dust and GHG emissions from burning vegetation, although sporadic and short-lived.

3.3.3 Cumulative Impacts

Air pollutants which may arise from Alternative A, are known to disperse into a wide geographic area, as described above, as the local airshed. The cumulative area of analysis encompasses the Grand Wash Cliffs on the west, towards Hurricane Cliffs on the east, bounded by the Monument boundary on the north and the Grand Canyon Class I Airshed to the south. Emission of GHGs would also contribute towards atmospheric concentrations. Overall, this airshed in the past has had little development, with grazing activities and periodic episodes of nearby prescribed fires and wildfires. This trend continues today, however with additional recreation vehicle usage. Analysis of Alternative A indicates prescribed fire treatments would be most likely to contribute towards a cumulative impact as the other treatments consist of short-lived dust events and limited GHG emissions. Prescribed fire treatments could create substantial loads of particulates and pollutants into nearby topographic air traps during winter weather inversions events. Design features in Section 2.2.1, addresses seasonal timing of prescribed fire treatments which would greatly reduce this possibility. Other cumulative impacts would be short lived such as neighboring areas encountering durations of limited air visibility or elevated particulates, given the west to east prevailing winds.

3.4 Areas Managed to Maintain Wilderness Characteristics

3.4.1 Affected Environment

Federal lands that possess wilderness characteristics (high degree of naturalness, and outstanding opportunities for solitude or outstanding opportunities for primitive and unconfined recreation), but are not designated as a wilderness by Congress, are managed in the project area. These wilderness characteristics are managed according to direction in the GMP/RMPs (2008). There are 152,219 acres of areas managed for wilderness characteristics within the project planning area. These acres are organized in nine units, with eight of these units intersecting with proposed

treatment polygons, totaling approximately 23,536 acres subject to treatment. (Appendix B Figure B.1). These units are shown on the referenced map and in Table 3.2.

3.4.2 Environmental Impacts

Direct and Indirect Impacts of Alternative A – Proposed Action

Table 3.2 displays the treatments that would occur within lands managed to maintain wilderness characteristics. Based on the data in Table 3.2, approximately 18% of the affected units would be treated. Prescribed fire treatments would result in impacts that usually appear much like the effects of natural wildfire. These effects would temporarily displace recreators in the area, and affect solitude and naturalness during fire operations, but maintain the integrity of wilderness character in the long term.

Vegetation treatments, both manual and mechanical, would temporarily affect solitude during treatment activities based on chainsaw, vehicle, and equipment noise. Similar to other treatments, recreators would be displaced during treatment and naturalness would be impacted temporarily. The naturalness of proposed treatment areas would not be permanently affected because treatments would restore vegetation to a more natural appearance, although some visitors to the project area may not notice the changes to the landscape.

Table 3.2 Areas with Wilderness Characteristics by Treatment*

Unit Name	Total Unit Acreage	Total Potential Treatment Acreage in Unit	Prescribed Fire	Mechanical or Manual	Mechanical Only
Andrus Canyon	37,272	6,902	2,858	3,876	168
Castle Peak	10,314	8,209	7,191	3,833	159
Grand Wash Addition	27,079	1,017	0	1,017	0
Grassy Mountain	5,735	3,869	3,017	851	0
Mociac Well	3,070	2,197	1,831	366	0
Mustang Point	19,604	1,041	0	1,041	0
Parashant Canyon 1	15,619	120	0	120	0
Snap Canyon 2	3,350	181	0	181	0

*Seeding and herbicide treatments were not separated in this table due to their small scale and the intermixing of the treatments across boundaries.

Direct and Indirect Impacts of Alternative B – No Action

Under Alternative B, current management would continue in the project area. Proposed activities to improve vegetation communities would not occur, although some previously approved projects would take place. The No Action Alternative would continue to limit opportunities for

fire to play its natural role in wilderness based on continued fire suppression activities, which have inadvertently increased fuel loads and the risk of greater impacts from wildfire.

3.4.3 Cumulative Impacts

The cumulative analysis area for areas managed to maintain wilderness characteristics are the identified wilderness characteristics units in Table 3.2, and Figure B.1 in Appendix B. Past, present, and reasonably foreseeable impacts to areas managed to maintain wilderness characteristics include livestock grazing, fire and fuels management activities, hunting, sightseeing, and OHV tours. The impacts of these associated activities can affect naturalness, and opportunities for solitude or primitive and unconfined recreation within the project area. The effects to solitude and primitive unconfined recreation have been generally short-term, while naturalness has been impacted for a greater length of time due to the longer lasting effects of grazing (the presence of fences, corrals, etc.) and fire, although these activities did not affect the ability of BLM to identify and manage for wilderness characteristics. Livestock grazing is expected to continue in the project area, and recreation (particularly OHV use) is expected to increase as local and regional communities grow.

Under the No Action Alternative, a high-severity wildfire (See Section 3.5.2) could cumulatively alter enough of the landscape to impact primitive recreation and solitude through excessive loss of vegetation. This could also affect the naturalness of the landscape and require greater management actions to restore the native landscape in the future. As described above, either of the action alternatives would result in short-term impacts to wilderness characteristics, but neither alternative would substantially impact recreation opportunities or settings of areas managed to maintain wilderness characteristics, even when considered cumulatively with the impacts of other past, present, and reasonably foreseeable future actions.

3.5 Fuels / Fire Management and Fire Safety

3.5.1 Affected Environment

The project area elevation spans from 5,900 feet to 7,100 feet. Vegetation in the area is predominantly pinyon, juniper, and big sagebrush with a large community of ponderosa pine in the higher elevations. Oak brush, cliffrose, grasses, and other forbs occur throughout the project area. Average annual precipitation ranges from 12 inches to 18 inches.

For over 100 years, wildfire has been largely restricted across the landscape and that has caused buildup of fuels, creating dense and closed canopy ponderosa pine forests with high amounts of litter and duff. Pinyon-juniper woodlands have encroached upon, and in places, overtaken prior plant communities, such as sagebrush-grassland types, creating continuous fuel beds, high fuel loadings, and ladder fuels capable of sustaining catastrophic wildfires. Pinyon-juniper woodland is the third largest vegetation type in the United States.

Overly dense vegetative plant communities also exhibit a highly reduced energy flow and nutrient cycling. As tree canopy cover may become increasingly dense, less sunlight can reach

the ground, therefore very little herbaceous vegetation survives. When this happens, the nutrients become confined to above-ground biomass (i.e. canopy), inhibiting plant growth.

Fire history on the Shivwits Plateau has shown that fires generally remain small and suppression resources are able to respond and suppress fires to keep them small (Appendix B Figure B.2). This has had both positive and negative outcomes. Keeping fires small has led to hazardous fuels buildup creating a greater risk of future larger fires and thus loss of ecosystem functions. The positive side is that keeping fires small also leads to safety of the firefighters and public by limiting exposure to fire suppression actions and keeping operational costs at a minimum. However, large fires have occurred in the project area, particularly in areas where there was a higher concentration of grasses and brush due to seasons of high precipitation; this has allowed for the rapid growth and spread of wildfires that were more difficult to manage (Twin Complex, 1999, 4,112 acres; Rattlesnake, 2000, 1,427 acres; Last Chance, 2005, 5,674 acres). These areas of higher grass and brush content still exist and could create larger fires across the landscape. This could be especially true as fire seasons are trending longer, providing more opportunity for fires to start in receptive fuels. It is important to reestablish and maintain a fire-adapted landscape for the sake of firefighters, the public, and ecosystems.

Fire Regimes and Vegetation Condition Classes

Table 3.3. Fire Regime Groups.

Fire Regime Group	Frequency	Severity	Existing Vegetation Types in Project Area	Acres of Existing Vegetation in Project Area*
I	0 – 35 years	<i>Low to mixed</i> (low-severity replacing less than 25% of dominant overstory vegetation, can include mixed-severity fires that replace up to 75% of the overstory)	Ponderosa pine woodland Pinyon-juniper savanna Oak shrubland	8,120 59,160 420
II	0 – 35 years	<i>Replacement</i> (High-severity fires replacing greater than 75% of the dominant overstory vegetation)	Sagebrush shrubland Grassland Shivwits chaparral	42,300 700 3,990
III	35 – 200 years	<i>Low to mixed</i> (Mixed-severity; can include low-severity fires)	Blackbrush mixed shrubland	1,650
IV	35 – 200 years	<i>Replacement</i> (High-severity fires)	Sagebrush grassland	1,750
V	200+ years	<i>Replacement/any severity</i> (Replacement severity; can include any severity type in this frequency and range)	Pinyon-juniper woodland Mojave transition shrubland	188,100 2,080

*10,325 acres of other classification such as cliffs and scree slopes and recently disturbed vegetation through fire or mechanical treatment, were not included.

A standardized tool that is used across agencies for determining the degree of ecological departure from reference, or historical (natural), conditions of vegetation, fuels, and disturbance regimes is the Vegetation Condition Class (VCC). This tool can help decision makers meet their management objectives and treatment priorities.

A historical or reference period is defined as the time when ecosystems and their natural disturbance regimes were still intact and functioning as sustainable landscapes before Euro-American settlement activities. Current condition departure assessments are based on fire frequency and intensity, current species composition, structural stage, age and canopy closure, and fuel accumulations compared to conditions under historic disturbance regimes (Hann 2003). A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human intervention but including the possible influence of aboriginal fire use (Agee 1993, Brown 1995, Brown 2000).

Table 3.4. Fire Regime/Vegetation Condition Class Definitions. From Schmidt (2002).

Condition Class	Fire Regime	Risk of Losing Key Ecosystem Components	Acres in Project Area*
I	Fire regimes are within historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species is low. composition, structure, and pattern) are intact and functioning within the historical range.	Risk of losing key ecosystem components from fire is low.	100,920
II	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical fire frequencies by one or more fire return intervals (either increased or decreased), resulting in moderate changes in one or more of the following: fire size, fire intensity and severity, and landscape patterns. Vegetation and fuel attributes have been moderately altered from their historical range.	There exists a moderate risk in losing key ecosystem components from fire.	198,300
III	Fire regimes have been significantly altered from their historical range. The risk of losing of losing key ecosystem is high. Fire frequencies have departed from historical frequencies by multiple return intervals, resulting in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range.	There exists a high risk of losing key ecosystem components from fire.	9,800

*9,744 ac of barren/sparse ground

On the Shivwits Plateau there exists nine primary vegetation types used in this analysis (Appendix B Figure B.3). Each vegetation type can be classified into one of the five Fire Regime Groups, described in Table 3.3. Through years of study and research, ecologists and research

scientists have determined the frequency (how often a fire historically burned) and the severity (how much of the dominant vegetation overstory was replaced by fire) in vegetation types around the world. These Fire Regime classifications can help land managers determine how often to expect a fire to burn, and to what severity, in different types of vegetation (NIFTT 2010). This knowledge can assist in determining what actions to take from both a vegetation and fire suppression standpoint. For the vegetation types, acres associated with each, and the Fire Regime Group classification see Table 3.3.

As shown in Table 3.4 and Figure B.4 (Appendix B), there exists a considerable need for action. Nearly 200,000 acres are Condition Class II, which means there is a moderate risk of losing key ecosystem components due to fire; while nearly 10,000 acres are Condition Class III, having reached the point of being at high risk to losing key ecosystem components from fire. Currently 100,000 acres reside in Condition Class I and are low risk. With appropriate treatments, these ecosystem components can be maintained, altered, and reversed to provide for a more fire adapted landscape and reduce these risks of losing key ecosystem components. Fire adapted landscapes can also prove to be safer to both firefighters and the public when fire suppression actions are taken.

3.5.2 Environmental Impacts

Direct and Indirect Impacts of Alternative A – Proposed Action

Vegetation treatments under Alternative A would reduce the threat of high severity wildland fire within the project area, as well as any adjacent private lands and/or improvements. Additionally, the vegetation structure within the project area would be returned to more historical values.

Treatments identified under the proposed action would help reduce hazardous fuel loads and create fuel breaks which would reduce the overall threat and extent of a catastrophic wildfire event adversely impacting natural resources, and firefighter and public safety by reducing the overall fuel loads.

Changes to the surface, ladder and canopy fuel components would influence future fire behavior, as well as the ability of firefighters to control future fire. Research shows that important elements of historical frequent-fire ponderosa pine forests in the Southwest can be re-established over time as a shifting mosaic of groups of trees with adjacent and interlocking crowns; single trees; open grass-forb-shrub interspaces; and dispersed snags, logs, woody debris (Larson 2012, Long 2000, Reynolds 1992). A reduction in surface and ladder fuels would make it difficult for surface fire to climb into the overstory pine canopy, by lowering flame lengths and thus lessening potential for crown fire. The thinning of the canopy, both by mechanical and prescribed fire, would create a more open stand that will not support crown fire, even if the fire could climb from the surface into isolated trees throughout the stand post-treatment. These post-treatment effects would result in fire that is more likely to stay on the ground with 2-4' flame lengths, rather than climbing up into, and moving through, the canopy with 30-50' flame lengths that firefighters cannot readily control. It would be expected that there would be an increase in grass and forbs cover post

treatment that would have the potential to increase surface fuel continuity, and subsequently, the surface fire rate of spread could increase in the finer grass fuels. Fires that do start are likely to stay on the surface but also have potential to spread slightly more rapidly along the surface. Given that flame lengths and resistance to control would be lower post-treatment, firefighters could more easily control the fire once on scene. The reduction in heavier fuels such as limbs and logs would decrease the residence time and intensity of future fires therefore decreasing the overall severity of such events.

In sagebrush and grass communities, treatments would be designed to reduce potential for high intensity wildfire by breaking up continuous fuel loading and creating a heterogeneity across the landscape. This would allow these areas to be more fire adapted and fire would be allowed to play a more natural role in these ecosystems.

The removal and/or thinning of pinyon and juniper, much like in the sagebrush and grass communities, would reduce the hazardous fuel loads and inhibit the encroachment of pinyon and juniper into other plant communities. These treatments would also be designed to break up continuity and reduce the risk of a high intensity wildfire. These ecosystems and plant communities have a great risk of conversion to shrublands and annual grasslands following a high intensity wildfire. When the ecological succession is disrupted to this degree, these areas become susceptible to a type change, which on the Colorado Plateau means a cheatgrass invasion. The proposed action would reduce this susceptibility and allow for native plant species to persist.

Direct and Indirect Impacts of Alternative B – No Action

The No Action Alternative would increase the potential risk and severity of future wildfires in this area. Future wildfires would exhibit greater intensity (flame length), higher resistance to control, and increased threat to infrastructure, private lands with structures, resources in the area, and firefighter and public safety. Pinyon and juniper would continue to encroach into sagebrush and grasslands which threatens these ecosystems. Sagebrush would not have variations of age classes and risk becoming decadent and more prone to high intensity wildfire. Pinyon and juniper would also continue to encroach into ponderosa pine stands creating ladder fuels that promote fire reaching the canopy and becoming a crown fire. Much of the project area would remain in a substantially or moderately altered state (Condition Class 2 & 3) outside of the historical fire regime and could result in a loss of desired species.

3.5.3 Cumulative Impacts

The geographic area of analysis for cumulative impacts to fire and fuels is the project area including BLM and NPS administered lands within, and adjacent area from Hidden Canyon to Kelly Point and the Upper Grand Wash Cliffs to Andrus Point. Actions taken primarily affect fire and fuels by altering fuel loading but other factors that may be affected are those that provide potential ignition sources, such as recreation. Activities that disturb or modify composition and density of surface fuels can create unnatural spaces between plants allowing for invasive plants

to potentially fill those gaps. Drought, especially prolonged drought, impacts fuel loads and intensity of wildfires which both influence the size of these wildfires. Increased recreation and human activity in the project area may elevate the number of human-caused wildfire ignitions. Adjacent to the project area, similar vegetation and fuel loads exist and treatments in these areas lessen the probability that wildfires spread into the project area. Conversely, treatments within the project area would lessen the probability that wildfires spread into untreated vegetation stands.

Fire history shows that the project area has had several large fires occur adjacently, and some within the project area boundary. As these fires have occurred, much of the vegetation has been replaced by invasive plants (e.g. cheatgrass) that are not fire adapted and highly volatile creating higher potential for recurring fires to continue to encroach into the project area and replace native vegetation. Fire suppression activities, over the years, within the project area, have resulted in closed canopy stands of ponderosa pine and pinyon-juniper and overly mature and decadent stands of sagebrush. The results of treatments proposed in the project area would make future fire suppression actions more effective due to reduced fuel loading, vegetation heterogeneity, reduced probability of catastrophic, vegetation type-changing wildfires, and overall promote a healthier, more resilient landscape, while future fire occurrence within the treatment areas would further contribute to restoration of a more natural fire regime.

3.6 Livestock Grazing

3.6.1 Affected Environment

Table 3.5. Land Ownership and Acres by Allotment in the Project Area. Acreage in this table is from the Rangeland Administrative System (RAS) database. Data analysis for this EA is primarily conducted utilizing Global Information System (GIS). There is sometimes a slight discrepancy in the GIS acreage totals when compared to RAS. The BLM is in the process of addressing and resolving these discrepancies.

Allotment	BLM	NPS	State	Private	Total
Hidden Hills	44,933	0	2,801	0	47,734
Hidden Spring	18,780	0	580	0	19,360
Parashant AMP Forage Reserve	52,923	0	0	0	52,923
Penn's Well	4,225	0	640	620	5,485
Red Pond	55,055	9,744	1,697	161	66,657
Wildcat	91,203	0	681	3,421	95,305

Land Health Evaluations

Land Health Evaluations (LHE) have been conducted on the six allotments within the project area in accordance with directions set forth in the Washington Office (WO) Instruction

Memorandum (IM) No. 98-91 and Arizona State IM No. 99-012 for implementation of Standards for Rangeland Health and Guidelines for Grazing Administration (Standards and Guidelines). Additional guidance is provided in WO IM No. 2009-007. Arizona's Standards for Rangeland Health and Guidelines for Grazing Administration (BLM 1997, Appendices G and H) were developed by the BLM State Standards and Guidelines Team and the Arizona Resource Advisory Council (RAC), a state level council appointed by the Secretary of the Interior.

The purpose of Arizona's Standards and Guidelines is to ensure the health of public rangelands. Present rangeland health is the result of the interaction of many factors in addition to grazing by livestock. Other contributing factors may include, but are not limited to past land uses, recreation, wildlife, rights-of-way, fire, weather, insects, and disease. The standards are goals for the desired condition of the biological and physical components and characteristics of rangelands, such as adequate canopy and ground cover; guidelines are management approaches, methods, and practices that are intended to achieve a standard.

The Land Health Evaluation assessment was conducted by an interdisciplinary assessment team (IAT) of resource specialists from BLM, NRCS, AZGFD, Mohave County Extension, and grazing permittees. The IAT was assisted by the Rangeland Resource Team (RRT), a diverse group of local residents formed and appointed under the RAC charter (see appendices for a list of members on both teams). The RRT may provide informal advice to the BLM Field Manager regarding implementation of Standards and Guides, and "will have opportunities to raise any matter of concern with the resource advisory council and ... to provide information and options to the council for their consideration" as provided for by regulations at 43 CFR 1784.6-2(a)(2)(iv)(A).

Beyond narrative descriptions of proposed treatment areas, these documents do not provide specific maps. The maps provided by AZGFD and developed from input by grazing permittees through public scoping represent these proposals. These proposed treatment areas are considered and incorporated in the Proposed Action where consistent with objectives.

Three of the six allotments are meeting Arizona's Standards for Rangeland Health and Guidelines for Grazing Administration (Appendices G and H). This includes Hidden Hills, Parashant AMP Forage Reserve, and Penn's Well Allotments. The remaining three allotments, Hidden Spring, Red Pond, and Wildcat Allotments are making significant⁴ progress toward meeting the applicable standards for rangeland health. The primary reason cited for not meeting standards is not fully meeting Standard 3 – Desired Resource Conditions (Appendix G)⁵ due to encroachment of woody species including pinyon and juniper trees, and excess decadent

⁴ As defined by Rangeland Health Standards (BLM 2001), significant progress is "[m]ovement toward meeting standards and conforming to guidelines that is acceptable in terms of rate and magnitude. Acceptable levels of rate and magnitude must be realistic in terms of the capability of the resource but must also be as expeditious and effective as practical.

⁵ Productive and diverse ... exist and are maintained, as indicated by (a) composition; (b) structure; and (c) distribution.

sagebrush. This is attributed primarily to fire exclusion. Livestock grazing is not cited as a causal factor of these conditions in the three allotments.

Fire exclusion has allowed pinyon, juniper, and sagebrush to increase beyond what is thought to be historical conditions in not just the three allotments, but all six subject allotments. This is evident when present conditions are compared in each allotment to the ESDs.

Recommendations are assembled from the LHEs from each of the six allotments within the project area (Appendix F). This includes description or status of the allotment and recommendations to achieve a desired plant community. Desired plant community (see referenced LHEs), in this context, is an attempt to address the understory plant community. In portions of these allotments plant diversity is lacking. Proposed woody plant reduction would create openings in the overstory that would allow the understory to increase in both biomass and diversity. This may benefit wildlife, livestock, and land health through reduction in erosion. The time since the field work for these LHEs was conducted average fifteen to twenty years. These statements should be taken in this context when referencing the need for vegetation treatments, which has increased since treatments or maintenance (re-treatment) was first proposed. The LHEs, in their entirety, are available via the reference immediately after the allotment heading. This reference cited is when the LHE was signed, field work proceeds this by years, as public and cooperating agency scoping, and review proceeded final approval of these documents.

Allotment Monitoring Data

Monitoring data is collected on all six allotments on a periodic basis to monitor livestock activities and their associated impact. Monitoring data includes both long-term studies and short-term indicators. Long term monitoring includes, but is not limited to, nested frequency, cover, line intercept, and photographs to determine overall trend of an allotment or pasture. Short-term indicators include key forage species utilization, actual use, and compliance checks. Overall, monitoring data indicates overabundance of woody species and a reduction in grasses and forbs forming the understory as compared to the ESDs.

3.6.2 Environmental Impacts

Direct and Indirect Impacts of Alternative A – Proposed Action

Implementation of this alternative could have a short-term effect on the permittees due to a mandatory rest period of some treatment areas, particularly if seeded. Treatments in these allotments would occur on a per pasture basis. If treatments would impact smaller portions of a pasture, portable electric fencing with solar panels are available to be temporarily installed. This would help alleviate some of the disruption to permittees regular pasture rotations. If larger areas or an entire pasture are impacted by treatments, these areas may be unavailable for approximately two years once treatment is implemented. The rest period is necessary to ensure the establishment, protection and long-term viability of the vegetation treatment projects. The required rest period would vary, depending on the method of treatment, and other factors including drought. All treatments would generally require a minimum two growing season rest

period. The rest period may be shortened if BLM monitoring indicates that site restoration objectives are achieved in a shorter period of time, or it may be extended pending the rate of progress toward vegetative establishment. Monitoring would follow the procedures outlined in Appendix D. Seed germination, drought-related influences, wildland fire, or other natural unforeseen events could affect the rate of vegetative establishment. This would disrupt the permittee's typical rotation and require further trailing or trucking to available pastures, forage reserves, or private pastureland.

Under this alternative, ecological conditions would be expected to improve following implementation of the proposed vegetation treatments. Removing the dense overstory of sagebrush and pinyon and juniper trees would promote the health, vigor, recruitment, and production of perennial grasses, forbs, and a diversity of shrubs by opening the canopy. Thinning, mowing, and other treatments would likely reduce the occurrence, intensity, and spread of wildfires that reduce forage availability in short term. There would also be less competition with the trees and sagebrush for soil moisture and nutrients. The rejuvenation of decadent, even-aged stands of sagebrush and invading pinyon pine and juniper trees would protect soil resources and associated watershed values and would assist in improving the ecological condition of sites within the project areas, specifically the six subject allotments.

Implementation of this alternative would promote attainment of the Rangeland Health Standards 3 (Appendix G) by increasing the quantity and quality of herbaceous vegetation (see Section 3.9 for a full discussion of impacts to vegetation from this alternative).

Implementation of this alternative would improve quantity and quality of forage for livestock over time and would increase the production and vigor of understory herbaceous plant communities. The forage base would more adequately sustain the existing grazing preference of the six subject allotments and would improve overall livestock performance (e.g. increased cow weight, increased calf crops, increased weaning weights). No changes to livestock grazing are proposed in the EA. Although there would potentially be more forage available as a result of the proposed action, any changes to grazing and grazing management would be analyzed in a separate NEPA document during the grazing permit renewal process sometime in the future.

There would be no change in AUMs or season of use as a result of the completion of proposed vegetation treatments. These kinds of changes, if warranted, would be analyzed in a separate NEPA document during the grazing permit renewal process. An updated forage inventory would be required to support changes in AUMs.

Direct and Indirect Impacts of Alternative B – No Action

The No Action Alternative would affect the livestock grazing permittees on the six identified allotments. This action would maintain the current level of livestock grazing authorized for the permittees, which would result in continued viable ranching operation for the livestock operators.

However, management objectives to continue meeting Arizona Rangeland Health Standards (Appendices G and H) in the six allotments, particularly Standard 3, would be at risk. Wyoming

big sagebrush and pinyon and juniper trees would continue to encroach into sites where historically they did not persist due to natural disturbance such as wildfire. This would continue to impede and eliminate understory vegetation including perennial grasses and forbs (see Section 3.9 for more detailed discussion on impacts to vegetation). Forage quantity and quality for livestock would continue to diminish as increasing shrub and tree canopy closure decreases understory vegetation biomass, diversity, and vigor.

3.6.3 Cumulative Impacts

Livestock grazing in the region has evolved and changed considerably since it began in the 1860s and is one factor that has created the current environment. At the turn of the century, large herds of livestock grazed on unreserved public domain in uncontrolled open range. Eventually, the range was stocked beyond its capacity, causing changes in plant, soil, and water relationships. Protective vegetative cover was reduced, and more runoffs brought erosion, rills, and gullies.

In response to these problems, livestock grazing reform began in 1934 with the passage of the Taylor Grazing Act. Subsequent laws, regulations, and policy changes have resulted in adjustments in livestock numbers, season-of-use changes, and other management changes. Given the past experiences with livestock impacts on public land resources, as well as the cumulative impacts that could occur on the larger ecosystem from grazing on various public and private lands in the region, management of livestock grazing is an important factor in ensuring the protection of public land resources. Past, present, and reasonably foreseeable actions within the analysis area would continue to influence range resources, watershed conditions and trends. The impact of vegetation treatments, voluntary livestock reductions during dry periods, and implementation of a grazing system have improved range conditions. The net result has been greater species diversity, improved plant vigor, and increased ground cover from grasses and forbs.

In the long-term, as the population of the surrounding area increases (which would increase the use of public lands), conflicts between livestock grazing and these other uses could arise. Resolving conflicts may require adjustments and/or restrictions placed on livestock grazing management. Other factors also influence livestock grazing operations, such as climatic and market fluctuations. A six-year drought in the region occurred between 1998 and 2004, which dramatically affected livestock grazing operations on the Arizona Strip, resulting in many cattle being temporarily removed from the public lands in 2004. Similar fluctuations in livestock numbers would likely occur in the future.

3.7 Proposed Wilderness (NPS managed lands only)

3.7.1 Affected Environment

While the SPLRP area does not include any designated Wilderness, approximately 80,900 acres of proposed wilderness⁶ (PW) occur within the SPLRP project area (Appendix B Figure B.1). It is identified by the unit's name "Shivwits Plateau", or Unit 33, according to the BLM managed GIS data management system used by the Monument and is equivalent to the information used to develop the Monument's GMP/RMP (2008). All proposed wilderness within the project area is on NPS managed lands and subject to NPS Management Policies 2006 (NPS 2006) and Director's Order #41, Wilderness Stewardship (2013).

In the Draft Wilderness Proposal (NPS 1979), primary contemporary human uses that were compatible with a wilderness designation included hunting, grazing, camping, hiking, rockhounding and nature study. The area was noted to have several roads that would be maintained or expanded to facilitate recreational and grazing access and would be contiguous with Proposed Wilderness units in Grand Canyon National Park. Aspects of the 1979 document incorporated into the Monument's EIS (2007) and GMP/RMP (2008) include the "diversity of recreational activities in a remote and primitive area", "pinyon-juniper and ponderosa pine forests and a [wide] variety of wildlife, and "spectacular views of the Grand Canyon".

In addition to the qualities of wilderness character incorporated in the descriptions of the PW (solitude or primitive and unconfined recreation, and natural), the wilderness boundaries were drawn to maximize the untrammeled and undeveloped wilderness characteristics of the PW. The PW does incorporate grazing infrastructure from previous and current grazing operations and historic structures associated with ranching and homesteading activities. This incorporation, and the recreational value of some of these sites, suggests a baseline assumption by visitors that not all of the PW is undeveloped.

3.7.2 Environmental Impacts

Projects within proposed wilderness must undergo a process referred to as minimum requirements analysis (MRA). This analysis does not consider effects on anything other than wilderness characteristics. As such, the effects of the alternatives on items not considered part of a wilderness characteristic, even if they occur in PW, such as historic structures and grazing apparatus, are not analyzed in this section. A discussion of NPS policy, the differing definition of "impact" used in the Wilderness Act, and MRA produced for the various alternatives considered in this EA can be found in Appendix H.

⁶ For consistency with the GMP/RMP, the wilderness areas on the NPS managed lands within the Monument are referred to as "proposed" in this EA. However, the proposed wilderness is not formally Proposed Wilderness. The area has been studied and a draft proposal and EIS was submitted to the NPS Director. No further action was taken on the sections of the proposal related to the lands on the Shivwits Plateau. As such, the exact formal wilderness status of the area is unknown but likely categorized as eligible.

Direct and Indirect Impacts of Alternative A – Proposed Action

Three types of treatments would occur on approximately 27,958 acres within proposed wilderness. In sagebrush shrublands and sagebrush grasslands, pinyon and juniper trees would be removed to retain the shrubland area. In ponderosa pine woodlands, ladder fuel reductions would precede prescribed fire. In pinyon-juniper areas, pinyon and juniper trees would be thinned and the cut branches and trunks would be allowed to accumulate until a prescribed fire.

Analysis of the proposed action using the MRA process found both negative and positive impacts on four of the five wilderness characters. Some impacts, like those on the undeveloped and solitude or opportunities for primitive and unconfined recreation characters, would be short term and typically occurring during treatment. Except for treatments in pinyon-juniper woodland and savanna, the negative impact would only occur during actual vegetation treatment and may not be noticeable unless a visitor encountered the treatment crew. Intensity of impact increases for both characteristics if motorized equipment would be used beyond the absolute minimum to maintain safety (i.e. pumps for water delivery to fire areas). In pinyon-juniper woodland and savanna areas, the negative direct impact may stretch beyond on-site treatment activities as fuel loads are built up over two to four years to allow fire to spread during the prescribed fire phase of the unit treatment. Any large-scale action with manipulation or control of the natural processes in PW inherently negatively impacts the untrammeled wilderness character (Landres 2015). In this case, there is no metric for intensity or duration to determine the magnitude of impact beyond recognizing that the vegetation treatments are more intense than hand-pulling a few invasive plants in a small area.

The most complex characteristic to be considered for this proposed action is naturalness. NPS policy at once allows for restoration activities to repair ecological integrity while considering that natural (unaltered by humans in timing and intensity) processes should be preferred. In ponderosa pine woodlands, pinyon and juniper trees form an unexpectedly dense understory where treatments over the last several years have not occurred. Both within and outside of recent treatment areas, invasive non-native plants occur, primarily cheatgrass (Appendix J, Table J.2). All these factors decrease the natural quality of wilderness character (Appendix H MRA). All vegetative treatments would negatively impact naturalness. Treatments in sagebrush shrubland and grassland (i.e. lop and scatter) would be minor, low intensity and infrequent. They would have a positive effect on naturalness as well because they would be maintaining the ecosystem currently aligned with the ESD. Treatments in ponderosa pine woodland would be unnatural due to the pre-fire vegetation manipulation but would mimic natural fire regimes and prepare the woodlands to successfully reenter the unrestrained natural fire cycle on that section of the plateau. Treatments in pinyon-juniper woodland and savanna would have a negative impact on naturalness. Similar to ponderosa pine woodland but much more widespread and intense, pre-fire treatments would create downed trees and branches in sufficient density to carry fire. This system appears to have single tree fires or high-intensity stand replacing fires, not low intensity

fire (Romme 2009). Additionally, prescribed fire in pinyon-juniper ecosystems tends to encourage invasion by cheatgrass, especially in areas low in native grasses (Getz 2008, Tausch 1995, Williams 2017). Given the depauperate nature of grasses within the pinyon-juniper treatment units, spread of invasive plants would be likely without mitigation. Using the adaptive management framework in the proposed action, limiting fire to periods with no to moderate drought and pretreating with herbicide should help ameliorate this potential issue.

Direct and Indirect Impacts of Alternative B – No Action

Under the No Action Alternative, natural processes, without human intervention, would be allowed to prevail except in cases of wildfire. Intervention to prevent spread of wildfire under climatic conditions where fire would cause damage to cultural resources and facilities adjoining the PW would negatively impact the untrammeled, undeveloped, natural and solitude or primitive and unconfined recreation qualities of wilderness character to a lesser or greater degree depending on amount and duration of human intervention necessary. Wildfire intervention would also positively impact the natural and solitude or primitive and unconfined recreation wilderness characteristics by retaining more intact vegetation than if wildfire was left to burn at will.

3.7.3 Cumulative Impacts

The cumulative impact analysis area for PW is the PW units on the Monument, roughly equivalent to all the Monument NPS managed lands. The basic vegetative structure of the PW has been altered by past land practices including grazing, timber harvest and restoration efforts. Within ponderosa pine woodlands, pinyon-juniper woodland and pinyon-juniper savanna, understory grasses and forbs have decreased as compared to their expected densities and diversity. No other projects are currently occurring in PW. Grazing, compatible with the Wilderness Act, continues in the PW section of the project area, namely in Andrus Point. Viewpoints, and hunting and camping opportunities in the PW continue to draw recreationists. Other foreseeable activities include emergency wildfire related protection of cultural resources and facilities. Past activities in the PW include timber harvest, grazing in the entire PW, prescribed fire, lop and scatter of pinyon, juniper and ponderosa trees and meadow restoration. The effect of this alternative would be to continue to return or maintain certain ecosystems to a more natural state following previous land uses.

3.8 Soil Resources

3.8.1 Affected Environment

The proposed project area, given its extent of topological relief and ecological transitions, is considerably diverse with 17 discernable soil types, along with differing states of horizons, depths, permeability, compactivity, and ability to resist erosion, collectively characterized as the soil K Factor. Soil data for this area was derived from the NRCS Web Soil Survey (NRCS 2021) providing a general overview of soil types. Further analysis comes from onsite staff visits to

assess current soil conditions such as productivity, compactness, and erosion potential, in much finer detail.

The soils within the project area would be best grouped into two categories, namely by the ecology driving their main soil features: soils which support woodland (pinyon-juniper) vegetation (Appendix I Table I.1) and those that support rangeland shrubs, grasses, and forbs (Appendix I Table I.2).

These two soil units are commonly found in the persistent pinyon- juniper stands of the proposed project area. Typically, the Yumtheska-Natank units are loamy-skeletal, mostly rocky consistency, yet interbedded with horizons of fine textured silt. Most occurrences are shallow in depth 20-30 inches, with numerous bulk limestone outcrops. These soils support a mix of grama grass, cliffrose, sagebrush, along with the dominate pinyon-juniper stands. Overall, these soils are able to maintain good porosity and accept surface run-off readily. If left undisturbed, these soils can resist erosion well. In addition, the angular gravel and rock fragments within these soils allow this it to resist compactness.

The remaining soil types occur in the transitions between pinyon-juniper woodland and savanna, the sagebrush shrublands, and finally into the general rangelands of the proposed project area. Most of these units are a variety of loamy soils with varying attributes such as gravel horizons, deep to shallow soil occurrences, to include interbedded with localized rock units and outcrops. Overall, these are mature soils stemming from limestone erosion into clay minerals. Subsequent fluvial transportation, while low energy, has allowed for the sedimentation of these deep loamy soils, most evident in the low sloped areas of valley floors. The sharp topographic relief seen along cliffs, and canyons yield shallow soils mostly gravel and course angular grains in composition with poorly defined horizons.

For the bulk of the non-woodland soils however, permeability is relatively low as expected with a dominate loamy silt-clay matrix. Recharge rates to underlying aquifers is minimal, with surface run-off and ponding a frequent event. Valley floors in these soils can feature gullies, indicating an elevated potential of soil erosion. However, local vegetation assists with resisting erosion and soil compaction with native grasses such as Indian ricegrass, galleta, and blue grama, shrubs including sagebrush and fourwing saltbush, and lesser amounts of pinyon-juniper trees.

Considerable attention needs to focus on the soil's overall ability to resist erosion which has been analyzed in Appendix B Figure B.6 as the K factor, a blend of values assigned to soil's characteristics such as texture, mineralogy, organic matter, structure, permeability, and total depth. The trend for the proposed project area indicates more susceptibility (higher K factor) in the woodland pinyon-juniper soils. The broader valley areas, associated as range/non-woodland areas, dominated by loamy to silt based soils, show lower K factors, mostly due to the presence of secondary gravel and breccia creating an "armored" surface when undisturbed, allowing for naturally occurring particle sorting. Appendix B Figure B.7 illustrates soil depths in the project area which shows a correlation of this soil K factor. Deeper soils occurring within the higher K

factor areas (woodland soils) may have an increased susceptibility to erosion and may have more a more pronounced response to disturbance (deep ruts, gullies).

3.8.2 Environmental Impacts

Direct and Indirect Impacts of Alternative A – Proposed Action

Alternative A calls for a variety of proposed actions in which the existing vegetation is altered by manual methods (highly selective removal of plants by cutting - i.e. “lop and scatter”), mechanical means (heavy equipment vehicles accessorized with mulching, chipping, and mowing implements), chemical treatments such as herbicides, prescribed fires, and seeding to replenish native vegetation. All these methods would have various effects on soils, some beneficial and others consequential, largely dependent on the proposed design features and the existing soil conditions.

Manual treatments – manual (lop and scatter) treatments on 49,850 acres within the project area, which is a very selective method, mostly consist crews of chainsaw operators on foot. No direct effects to soils from these hand-held devices are anticipated other than slight increases in soil compaction from chainsaw operator foot traffic. Lop and scatter treatments would be used in areas of steeper slopes and/or where motorized vehicle access is unavailable. A benefit of manual work would be to minimize impacts to soil resources by not having vehicle usage on non-road surfaces. Permeability would not be affected given the lop and scatter technique would not obstruct surface water runoff patterns.

Mechanical treatments – The pinyon-juniper woodlands would receive the bulk of mechanical treatments in Alternative A with a proposed 32,590 acres. The most common mechanical approach would utilize a hydro-axe; a heavy equipment vehicle with a mower-mulcher attachment, which grinds vegetation in place. This vehicle is equipped with flotation tires to reduce soil compaction and produces fine mulch litter, strewn about, leaving behind surface protection and a source of organic matter for the native soil. Use of mechanical equipment would disturb soil surfaces, especially where sharp turns are made by the vehicles.

These woodland soils have been identified to have higher susceptibility to erosion yet are deeper in vertical profile. Mechanical treatments would have short term impacts to these soils with the operation of heavy vehicles and creation of debris fields. However, adhering to the design features in Section 2.2.1 would allow for minimal trackways, increased organic matter accumulations, and a flourishing of native understory plant species as the current tree canopy is removed, thereby rejuvenated soil composition in the long term, an overall beneficial effect. Increase potential of soil erosion would be minimized by the resulting organic mulch litter creating a surface that impedes fluvial transport during precipitation events.

Chemical treatments – Herbicide use within the parameters of Alternative A is expected to treat 150 acres, with applications such as individual plants, boom sprayers from vehicles, and pellets on stumps and roots. The advantages of chemical applications in relation to soil resources, is the ability to treat sections where topography and sensitive soil surfaces makes vehicle use

inaccessible, thus sparing soil impacts such as physical disturbance and compaction. Design features in Section 2.2.1 identify conditions where chemical treatment would be best utilized and have highly selective application methods for desired outcomes. However, organic matter accumulations for soils would be slower to realize, than the other proposed treatments, given the gradual decomposition of chemically treated vegetation. Overall, increased erosion concerns and altered permeability would be minimal with the short-term presence of the operator and sprayer. Any overspray would have no effect on soils.

Prescribed fire treatments – As with the mechanical and manual treatments, this treatment would also be focused on sections of the proposed project area, 22,540 acres, identified as woodland soils. While mostly ponderosa pine stands would be targeted, NPS managed lands would also use prescribed fire on pinyon-juniper tree stands. Prescribed fire uses hand stacked lop and scatter excess material to create burn piles, with the actual ignition/burning administered on-foot or aurally. Design features would include a fire plan for each treatment event, with consideration of specific outcomes. These woodland soils would have minimal to some short-term compaction stress with these burn activities with the on-foot operations. Erosion susceptibility does have a short increase given the denuded aftereffects of a prescribed fire. However, these woodland soils are typically deeper, more established, and would benefit long term, from the accelerated addition of organic material (ashes), the increasing availability of soil moisture, resulting from less juniper trees, less monoculture pinyon-juniper settings, and varied native understory plants.

Seeding treatments – Seeding would be applied onto 17,250 acres, in conjunction with other treatments, typically afterward, such as after an herbicide treatment, using on-foot hand seeding, or mechanized drag covering range procedures, which physically disturb the upper most soil surface to allow placement of seeds, or simply by aerial scatter from aircraft. Manual and aerial seeding technique would have little to no compaction impact on soil resources. However, mechanical seeding which would mostly take place in the rangeland soils (loamy and clay rich soils), would have a short-term impact given the physical disturbance along the upper surface portion of the soils. Impacts would include enhanced erosion (rills and gullies) in the short term, yet as the seeding propagates, the soil surface would transition to a well-rooted, erosion resistant state.

Direct and Indirect Impacts of Alternative B – No Action

Within Alternative B, No Action, soil resources would persist in their current state and continue to be monitored and managed. Soil resources would continue to be impacted by the encroachment of pinyon-juniper stands, resulting in lower soil moisture content, lowering soil's ability to ward off wind and fluvial erosion. Wildfire events would arise and create soil with less K-factor on recently burned, denuded, highly sloped hillsides, causing exasperated erosion conditions. Not implementing Alternative A, seeding and erosion control efforts would not provide benefits to soil. Rather, in Alternative B, No Action, soil impacts would continue to be vulnerable to climate effects, land use management, and ongoing fire regimes.

3.8.3 Cumulative Impacts

Soil resources are an integral component to other natural resources such as watersheds, vegetation, grazing, wildlife, etc. Therefore, analyzing for cumulative soil impacts within Alternative A would entail the project area, other associated resources, and the surrounding areas as well as the past, present, and future aspects. Alternative A proposes a blend of treatments each tailored by design features to minimize impacts. As analyzed previously, soil resources would see short term impacts, yet with long term benefits.

Salinity – Cumulative impact resulting from short term compromised soil conditions would impact watershed resources, as salinity increases in surface runoff. Much of this runoff would not reach the Colorado River, rather it would accrue in the adjacent watersheds. Notably, the soils in the project area do not have high concentrations of electrical conductivity (the presence of ions which would contribute to salinity levels). Conversely the long-term effects with beneficial effects to soil such as the restoration of native vegetation, and less monoculture, would result in reductions by further precluding sediment transport to the Colorado River and its tributaries, thereby reducing salinity egress.

Erosion – Mechanical and seeding treatments create short-term impacts due to the implementation of treatments. Short term erosion impacts may result in ruts and gullies, mostly in the loamy, shallow, soils of the lesser sloped valleys, where surface runoff would produce modest sediment transport. These erosion impacts would be short lived as the topsoil becomes re-anchored and revitalized with native plants. Overall, this impact would not be substantial enough to alter floodplains, surface runoff patterns, nor outlying watershed boundaries.

Aquifers – The proposed project area encapsulates a well-defined groundwater basin bounded by the Colorado River, the Upper Grand Wash Cliffs to the Hurricane Cliffs, with both cliff systems segmenting the groundwater basin with detachment faulting. The soils within the project area, while ranging in depth, offer slow to moderate infiltration rates. The proposed actions in Alternative A would not alter the permeability of the soils on a landscape scale which would not have any discernable effect on the meager recharge rate to the underlying aquifers, nor have any effect on the hydrologic budget of the associated groundwater basin.

3.9 Vegetation (including Special Status Plants and Invasive Non-native Species)

3.9.1 Affected Environment

The Shivwits Plateau is primarily an intermixed transition zone between the Colorado Plateau and Great Basin floristic provinces. In addition to this zone, the plateau contains transitional floristic elements of Mojave and Sonoran Deserts and relict cold climate blackbrush zones. All these zones and elements are found within the project area. The currently best available vegetation mapping for the entire project area, the 30-meter pixel National Vegetation Classification (USNVC 2019), produced 47 vegetation categories that were consolidated into 12 vegetation types based on one-meter aerial imagery and subject matter expert input. The

majority of the project area is pinyon-juniper woodland⁷ (60%), followed by pinyon-juniper savanna and sagebrush shrubland (Table 3.6 and Appendix B Figure B.8).

Table 3.6. Vegetation Types Based on Ecological Site Descriptions. Only ESDs with at least 500 acres in a specific vegetation type are included here except for Oak Shrubland and Recent Fire or Treatment Disturbance. For a full list, see Appendix I. Vegetation types includes areas where no Ecological Site number (Unassigned) or name (Unnamed) has been assigned by NRCS. Ecological Site numbers with “F” prefix are forest sites; “R” prefix indicates rangeland site.

Vegetation Type	Acres	Ecological Site Description(s) within Vegetation Type and Acres
Blackbrush Mixed Shrubland	1,651	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 852 acres Unassigned Unnamed 544 acres
Cliff and Scree Slopes	9,875	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 521 acres R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 1622 acres Unassigned Unnamed 7011 acres
Grassland - Native or Introduced	697	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 506 acres
Mojave Transition Shrubland	2,081	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 770 acres Unassigned Unnamed 921 acres
Oak Shrubland	422	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 341 acres
Pinyon-Juniper Savanna	59,164	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 24335 acres F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 7113 acres F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 4268 acres F035XH805AZ Unnamed 1131 acres F035XH820AZ Unnamed 2888 acres R035XC301AZ Basalt Upland 10-14" p.z. 516 acres R035XC313AZ Loamy Upland 10-14" p.z. 808 acres R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 14821 acres Unassigned Unnamed 1987 acres
Pinyon-Juniper Woodland	188,100	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 87807 acres F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 41319 acres F035XF614AZ Unnamed 581 acres F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED) 4301 acres F035XF620AZ Unnamed 1572 acres F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 17325 acres F035XH805AZ Unnamed 2508 acres F035XH806AZ Unnamed 624 acres F035XH820AZ Unnamed 7052 acres R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 15249 acres Unassigned Unnamed 8263 acres

⁷ Two species of pinyon pine, *Pinus edulis* and *Pinus monophylla*, occur throughout the project area and are collectively and interchangeably referred to as “pinyon”. Two species of juniper tree, *Juniperus monosperma* and *Juniperus osteosperma*, occur throughout the project area and are collectively and interchangeably referred to as “juniper”.

Vegetation Type	Acres	Ecological Site Description(s) within Vegetation Type and Acres
Ponderosa Pine Woodland	8,120	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 3340 acres F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 940 acres F035XH805AZ Unnamed 1462 acres F035XH806AZ Unnamed 692 acres F035XH820AZ Unnamed 766 acres
Recent Fire or Treatment Disturbance	450	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 321 acres
Sagebrush Grassland	1,760	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 632 acres
Sagebrush Shrubland	42,300	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 8365 acres F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 2646 acres F035XF614AZ Unnamed 622 acres R035XC307AZ Clay Loam Upland 10-14" p.z. 1517 acres R035XC313AZ Loamy Upland 10-14" p.z. 1122 acres R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 23297 acres R035XF604AZ Clayey Upland 13-17" p.z. 626 acres Unassigned Unnamed 2658 acres
Shivwits Chaparral	3,990	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 1152 acres R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 1641 acres Unassigned Unnamed 965 acres

Comparing the current vegetation type to the ESD provided a mechanism to compare current conditions to a theoretical version of the landscape based on soil types, climate, and species ranges. In the project area, as might be expected of a multiple floristic province transition zone, all vegetative types incorporate at least ten different ESDs (NRCS 2021) and all contain both ESDs assigned as Forest (dominated by trees) or Rangeland (dominated by shrubs, forbs, or grasses) by the NRCS (Appendix B Figure B.9 and Appendix J Table J.1). This presents a difficulty when analyzing the current vegetative health based on a specific ESD. Instead, general trends for native plant species can be drawn based on the conglomeration of the ESDs within various vegetative types. For all vegetative types except Grassland – Native or Introduced (GNI), the dominant woody tree or shrub aligns with the ESD, though the density of the woody material tends to be higher than expected from the ESD. The GNI type has a much lower to insignificant presence of the dominant woody tree or shrub, a likely legacy of past vegetative treatments and fires. Areas of dead, or primarily dead, and decadent⁸ sagebrush are found more commonly than expected in woodland, savanna, shrubland and grassland. In some pinyon-

⁸ Decadent is defined as “marked by decay or decline” (Merriam-Webster n.d.). In the case of sagebrush communities in the project area, decadence can be defined as areas dominated by sagebrush with a largely dead above-ground biomass, with limited reproduction success, and no to almost no understory.

juniper dominated areas, the most common form of the tree is a one-meter or less “seedling”⁹ under a larger tree’s canopy. Areas of vigorous, multi-age populations of woody species are less common than expected throughout the project area. Forbs are patchy throughout the project area. The understory (grasses and forbs) is extremely lacking within portions of the project area. Data from the survey plots found 15 of the 135 plots had no understory and 36 plots with only one species of grass, when non-native plants were excluded. While the low levels of grasses and forbs found in the survey plots reflects, amongst other factors, an extended multi-year drought, trend data collected by the BLM Arizona Strip District Range Program provides a longer dataset to compare with the ESDs. In some areas, sagebrush (*Artemisia tridentata*) and broom snakeweed (*Gutierrezia sarothae*) have been steadily increasing. Grasses, similar to the survey plot data, typically are dominated by one to two species. Forbs not associated with disturbance can be rare and appear to be generally declining since the early 2000s.

These characterizations descriptions are spread over 318,000 acres. Within the project area, much of the vegetation reflects the ESD in its most species-poor state. Other areas reflect a nearly ideal rendition of the ESD’s described historic climax plant community or reference state. These two categories are intermixed and often adjacent in the project area. This suggests that areas missing key vegetative components, have a low species diversity, or where vegetative community conversion has not occurred still possess the potential to embody the more diverse version of their related ESD.

Special Status Species

Table 3.7. Special Status or Salvage Restricted Plant Species.

Scientific Name	Common Name	Voucher Collected or Known Population in Project Area	Voucher Collected or Known Population in Treatment Unit	Arizona Status*	BLM Sensitive Species
<i>Aquilegia chrysantha</i>	Golden columbine	Yes	Yes, Unit 19	SR	No
<i>Penstemon distans</i>	Mount Trumbull beardtongue	Yes	No	SR	Yes
<i>Rosa stellata abyssa</i>	Grand Canyon rose	Yes	No	SR	Yes
<i>Leucocrinum montanum</i>	Sand lily	Yes	Yes, Unit 33	SR	No
<i>Agave utahensis</i> (var. <i>kaibabensis</i>)	Utah agave	Yes	No, but likely	SR	No

* Data retrieved from NPS IRMA NPSpecies 4/21/2021.

⁹ According to the USDA Fire Effects Information System (Zlatnik 1999), “[u]nder severe site conditions, Utah juniper trees persist in very stunted forms. A 6-inch tree with a 24-inch (60 cm) taproot may be over 50 years old”. The designation “seedling” in the survey plot study was based on height of tree, not tree rings, thus “seedling” may include trees in excess of 10 years in age or mature reproducing trees stunted by site conditions.

Several species of plant occur in the project area that are either a BLM sensitive species (BLM 2017b) or considered Salvage Restricted (SR) by the State of Arizona (Table 3.7). No threatened, endangered or candidate plant species, as defined by the Endangered Species Act, occur within the project area. One special status plant species occur within the project area in small populations. Mt. Trumbull beardtongue (*Penstemon distans*) occurs in 2 populations on the eastern periphery of the project area outside of all treatment units. Utah agave (*Agave utahensis*) is salvage restricted, listed as imperiled by Arizona, and occurs throughout the project area in rocky exposed bedrock areas, where treatments are not proposed.

Biological Soil Crust

Biological Soil Crust (BSC) occurs throughout the project area. It is predominately found on rocky soils and under trees and shrubs. In some areas, such as north of Unit 24, BSC may be found on small, exposed rocks within a larger clay soil matrix. Within the project area, BSC most often appears as a moss in the rugose category (Rosentreter 2007). Smooth BSC occurs in a few areas, typically where desert pavement is forming. No pinnacled or rolling BSCs, the most noticeable and charismatic categories, have been found in the project area. BSC is highly localized and does not occur in many open soil patches within the project area. Only seventeen of the 135 test plots found any BSC, primarily under other vegetation. Surveys, as part of invasive plant work since 2014, consistently find BSC in patches under vegetation, on gravelly or rocky soils, in areas of desert pavement formation or rarely in open loose soils.

Invasive Non-native Plant Species

Thirty non-native species occur in the project area (Appendix J Table J.2) according to surveys conducted along roadsides (2014-2020) and survey plots (2020). All but three, crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromus inermis*) and intermediate wheatgrass (*Thinopyrum intermedium*), are considered invasive on the Monument. Distribution in the project area ranges from widespread, such as cheatgrass (*Bromus tectorum*), red brome (*Bromus rubens*) and curvseed butterwort (*Ceratocephala testiculata*), to highly localized, such as five-stamen tamarisk (*Tamarix chinensis*) and redstem stork's bill (*Erodium cicutarium*). Some have been found on the project area only in the last few years, such as Asian mustard (*Brassica tournifortii*). Invasive plants are managed in the project area as part of the BLM Arizona Strip Weed Program. High priority targets found in the project area are those plants also deemed noxious in the State of Arizona, such as Scotch thistle (*Onopordum acanthium*), bull thistle (*Cirsium vulgare*) and field bindweed (*Convolvulus arvensis*).

The known invasive plant species are found in all vegetation types within the project area. As is common throughout the western United States, they tend to be associated with disturbances and travel corridors. The three species noted as widespread, however, no longer follow this pattern and can be found far from roads and other infrastructure in patches. The reasons for this range from causes as diverse as seed dispersal patterns by wildlife, livestock and abiotic means to past disturbances, including those not captured in land management agency records.

3.9.2 Environmental Impacts

Direct and Indirect Impacts of Alternative A – Proposed Action

The proposed treatments aim to directly influence ecosystem resiliency and resistance. Specifically, the treatments would redress the current unhealthy resource partitioning¹⁰ and age-class distribution (Appendix C Figures C.1-C.6) that are reducing biodiversity by releasing nutrients and water to be used by untreated vegetation, encouraging multi-age species populations, and augmenting the seedbank (Table 3.8 and Appendix J Table J.4). The overall effect of the treatments would be an interconnected mosaic of ecosystems, with species overlapping ecological roles in the vegetative community and resilient to abiotic disturbances such as wildfire and climate change and biotic disturbance such as novel invasive species (Levine 1999, O'Hara 2013). Parts of the vegetative community would be dominated by species that grow and reproduce well when severe disturbance, such as flooding or fire, occurs. Other areas within the community would be dominated by plants with long reproductive times but are key for release of soil nutrients. Multi-age populations of long-lived species would be more resistant to disturbance.

Removing vegetation through mastication, lop and scatter, and prescribed fire decreases competition in a community, allowing the remaining vegetation to take advantage of the nutrients and water previously partitioned by the removed vegetation. The deadfall from mastication, lop and scatter, and mowing, as well as the ash from prescribed fire, would accelerate the process where nutrients from the removed vegetation are returned to the soil and are made available to other living or sprouting vegetation. Additionally, the deadfall increases the complexity of the ground cover, providing niches for new plants to grow.

Mowing and mastication have been shown to help rejuvenate one of the two species targeted for this sort of treatment, cliffrose (*Purshia stansburiana*) (Blaisdell 1956). This species responds to removal of much of their above-ground biomass by sprouting vigorously from their base, effectively allowing the plant to act as if it is in its early life stages.

Combining mowing and mastication with seeding in pinyon-juniper savanna, sagebrush shrubland, and sagebrush grassland amplifies the positive outcomes of perennial forb and grass establishment found when treating only the above-ground biomass of Wyoming big sagebrush (*Artemisia tridentata* var. *wyomingensis*) (Davies 2012, 2020).

Herbicide application increases the likelihood of favorable outcomes from other treatment types, especially when seeding is part of the treatment strategy (Sheley 2011) This approach is a cornerstone of IPM. By targeting invasive non-native species, herbicides decrease competition

¹⁰ In the vegetation types targeted for treatment in the proposed action, unhealthy resource partitioning would be the sequestration, or use, of limited resources by a few species or individuals, excluding other species or individuals expected to occur. While this sort of resource partitioning is expected in patches on a landscape level, the project area has more of this unhealthy resource partitioning than expected based on the ESDs. The limiting resources on the Shivwits Plateau are water and bioavailable nutrients.

for nutrients and water exacerbated by non-native plants and make these resources available to untreated and seeded native plants.

Table 3.8. Treatment Type and Acres of Each Vegetation Type. Only treatments resulting in 500 or more acres of a particular vegetation treatment are included here. Acres are based on treatment unit size, not actual treatment acres within each unit. For a full list, see Appendix J Table J.-3. Treatments classified as manual may instead be treated mechanically and vice versa in some units. See Table 2.1 for units where this may occur.

Treatment	Vegetation Type	Vegetation Type Acres
Herbicide	None exceeding 500 acres	NA
Manual	Pinyon-Juniper Savanna	13,622
Manual	Pinyon-Juniper Woodland	38,914
Manual	Ponderosa Pine Woodland	1,084
Manual	Sagebrush Grassland	591
Manual	Sagebrush Shrubland	13,344
Mechanical	Pinyon-Juniper Savanna	9,257
Mechanical	Pinyon-Juniper Woodland	24,314
Mechanical	Sagebrush Shrubland	10,812
Prescribed Fire	Pinyon-Juniper Savanna	8,650
Prescribed Fire	Pinyon-Juniper Woodland	33,714
Prescribed Fire	Ponderosa Pine Woodland	4,564
Prescribed Fire	Sagebrush Shrubland	5,547
Seed	Pinyon-Juniper Savanna	6,568
Seed	Pinyon-Juniper Woodland	10,899
Seed	Sagebrush Shrubland	5,686

Special Status Species

Two special status species are known to occur in the treatment units, sand lily (*Leucocrinum montanum*) and golden columbine (*Aquilegia chrysantha*) (Table 3.7). A third species, Utah agave, is likely to be found within the treatment units. However, Utah agave is closely associated with cliffs, scree slopes and exposed bedrock, none of which are areas within the treatment units where treatment would occur. Utah agave may occasionally occur in rocky, relatively level areas; however, it is anticipated that very few would be damaged during manual or mechanical treatments due to their scarcity in such areas. Sand lily is only known from a collection location within a meadow in the project area. While this meadow is within a treatment unit, only the ponderosa pine woodland would be treated in that unit; the plant would be unaffected by the proposed action because it does not occur in the vegetation type targeted for treatment. Golden columbine occurs within Unit 19 and would be avoided. During preparation for treatment, the unit would be surveyed to determine best locations for vegetation manipulation, avoiding areas where the columbine occurs.

Biological Soil Crust

Biological soil crust is expected to occur in all treatment units, though in most units it would be found in the form of widely scattered single mosses. Proposed treatments would avoid areas with greater than 30 percent cover, i.e. dense, BSC. In most treatment units, this coincides with areas that would not be treated for other reasons including association with exposed bedrock, cliff, and scree slopes and under large diameter trees. Manual and mechanical treatments may result in a localized decrease in BSC. The dominance of mosses in the BSC community indicates a higher-than-average susceptibility to disturbance (trampling and vehicles). Treatment application within the treatment units would avoid as much as possible dense areas of BSC outside of areas already excluded for other reasons.

BSC resembling smooth soil (i.e. in the primarily cyanobacteria stage of crust development) may be crushed by treatment implementation of any kind simply because they are not visible to the naked eye. However, this stage is relatively disturbance tolerant and would be expected to rapidly recover. Lop and scatter, mowing and mastication treatments would scatter deadfall or debris to a low discontinuous layer (three inches mastication, less than 24 inches lop and scatter), creating a light mulch layer and is not expected to cause damage to the BSC community already in early successional stages due to past land use practices and should help decrease erosion and wind-caused nutrient loss from the disturbance (Ross 2012).

Treatments would not occur while the soil is wet to avoid soil compaction; on these clay soils, wet soils also increase the fragility of BSCs. Herbicide selection and application includes individual analysis to determine if non-target species would be negatively affected, this would include mosses and lichens if they are in the area to be treated with herbicide. Prescribed fires proposed are low-intensity and pile burning. Low intensity fire has not been shown to have deleterious effects on BSC. Pile burns would be situated to avoid BSC. Where this is not possible, pile burns would not occur on dense BSC and would likely mimic natural fire in creating a mosaic of successional stages within the BSC community. (Belnap 2001)

Invasive Non-native Plant Species

Timing and treatment intensity would minimize the spread of invasive species as a direct result of mechanical and manual treatments. Avoiding treatment during drought would aid the native plant community in resisting invasion of non-native plants. Adding seeding and/or targeted herbicide application to these treatments, when warranted, would increase the ability of native plants to compete with established invasive plants either by increasing viable seeds or decreasing the number of invasive plants. For most treatments, invasive plant occurrence would be surveyed for under the existing BLM ASDO Weed Program and would be spot checked and treated prior to manual or mechanical treatment implementation to minimize invasive plant spread. Unit 29, dominated to near monoculture with field bindweed on 70 acres, would be treated with herbicide specifically to remove the invasive plant and allow the site to be recolonized with native plants. Unit 41, similarly dominated to near monoculture with cheatgrass on 70 acres, would be treated to provide niches for native plants to occupy. All units

may have some limited herbicide treatment to limit invasive plant spread. Prescribed fire treatments, conforming to timing and treatment intensity limits like mechanical and manual treatments, would include in their fire planning and post-fire monitoring protocols to limit spread and occurrence of invasive species. Based on the above analysis, the proposed action would decrease the occurrence of invasive non-native plants in the project area.

Direct and Indirect Impacts of Alternative B – No Action

Under the No Action Alternative, vegetation treatments would continue under other existing NEPA documents and may be considered in a piecemeal fashion as in the past. Existing valid projects include some prescribed fire, mechanical, and manual treatments in the central area of the project area (Grazing Permit Renewal and Vegetation Treatments for Wildcat Allotment DOI-BLM-AZ-A030-2018-0013-EA) and directly north of the internal NPS-BLM boundary (Mociac - Dellenbaugh Fuels Treatments DOI-BLM-AZ-A030-2013-0003-DNA) on the Monument. Invasive non-native plants would continue to be managed under the Arizona Strip District Herbicide Application Plan for the Control and Eradication of Noxious and Invasive Species (DOI-BLM-AZ-A000-2016-0001-EA) without being paired with other treatments to enhance positive ecosystem level outcomes with herbicide treatment. No vegetation treatments would occur on the NPS managed portion of the project area.

This alternative would not aid in the recovery of the vegetative community on the plateau. Areas currently undergoing conversion to another vegetative type would continue to do so. Trees would continue to largely occur in high density stands while woody shrubs would remain primarily in the decadent to largely dead life stages. Understories would continue in their current states, dominated by senescing woody shrubs and sparse ground cover. Species diversity would be expected to continue to decline with only one or two trees and shrub species and perhaps one, if any, grass or forb species in large acreages. The vegetative community would be at risk for large continuous high intensity fire, and further invasion of non-native species.

3.9.3 Cumulative Impacts

The cumulative impact of this project can be considered across the entire 318,000-acre Shivwits Plateau project area in light of vegetation projects with known locations beginning in 1956 (Appendix B Figure B.10), livestock grazing since the 1860s, and fires mapped since 1980 (Appendix B Figure B.2).

Historic grazing levels, far in excess of modern grazing, in combination with some past prescribed fire, most notably the Overnight Draw burn, past fire suppression philosophy, past landscape manipulation for cattle and wildlife forage (such as the historic chainings) and abiotic factors beyond human control (drought, monsoon timing, wildfire) all contributed to the limited variability of the local vegetative community and the unusual density of trees and large woody shrubs. This project combined with vegetation treatments starting in the 2000s on NPS managed lands and current vegetation treatments on BLM managed lands seek to redress these issues. Treatment units for this project were selected, in part, based on the outcomes of past activities

and known locations of vegetation treatments already approved. As such, the proposed action works in concert with other ongoing vegetation treatments.

This project is an incremental step in repairing past damage and an important force in preparing the Shivwits Plateau for future landscape level events beyond human control. Other future foreseeable projects on the plateau center around management of grazing infrastructure, maintenance of federal administrative sites, repair and installation of wildlife water catchments and visitor use infrastructure, road maintenance, cultural and natural resource research, and protection of historic structures. Few of these projects would directly intersect with the treatments proposed. In some cases, such as wildlife water catchment placement, the expected vegetative community diversification may dictate placement to enhance wildlife use and protection while watering.

3.10 Visual Resources

3.10.1 Affected Environment

The proposed project area contains many outstanding scenic landscapes including areas of forested land, grassland, shrubland, canyon lands, and mountain ranges. It is internationally recognized for its diverse landscapes and scenic qualities and offers many developed and dispersed backcountry recreation opportunities for sightseeing, wildlife viewing, and on-road touring.

Scenery throughout the project area is made up of a diverse variety of physical elements. The landscape is generally characterized by colorful sedimentary rock formations, steep-walled canyons, wooded plateaus, and broad plains. Because of the remote and undeveloped nature of much of the project area, visitors to the area are rewarded with unrestricted views of forested ridges and mountains, steep, colorful canyons, and vast open plains.

Visual landscape character was assessed along these roads: County Road 103, BLM 1046, BLM/NPS 1019, BLM 1012, and NPS 1203. The project area consists primarily of rolling terrain within a series of broadly enclosed landscapes. Foreground views are primarily composed of broad valleys covered with shrubs and grasses and stands of trees cover the periphery of the valleys and hillsides. The mid-ground and background views are primarily composed of solid expanses of trees. In those areas where the stands of trees are adjacent to the roads, the view is shortened to the immediate surroundings and has a sense of enclosure.

The project area is a classic pinyon-juniper and mixed shrubland landscape of northern Arizona that creates a feeling of vastness and open space similar to many areas within the Colorado Plateau region. Areas near the Mount Dellenbaugh have a classic ponderosa pine landscape.

The lines in the landscape are strongly horizontal and are formed by the landform edges and the edges created when vegetation types change. The textures are primarily coarse to medium, depending on variations in landform and vegetation.

Predominant colors of this landscape are greens, tans, reds, and grays. The greens run the spectrum of sage to dark green because of the vegetation. The tans and reds are lighter and darker variations depending on the soil type and exposed stone outcrops. The grays are the predominant undertone of all other colors in the landscape.

Table 3.9. Visual Resource Management Classes and Objectives.

VRM Class	Description
I	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and should not attract attention. This class includes designated wilderness.
II	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
III	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

There are very few structures within this landscape, but of those that do occur, the roadways are the most obvious and add linear banding to the landscape. Other elements include fences, signs, a few structures, and cattle management infrastructure (such as water tanks and corrals). These elements add vertical and horizontal lines as well as small three-dimensional shapes to the landscape.

The BLM uses its Visual Resource Management (VRM) Classes to guide management decisions. These classes are classified through a matrix of Scenic Quality, Distance Zones, and Sensitivity zones. These classes determine the allowable visual contrast that can be added to the landscape. The BLM established Key Observation Points (KOPs) to rate the possible visual changes. These KOPs are areas where visual changes are of highest concern. Visual Contrast Rating Worksheets (Appendix K) were completed for each KOP to document that degree of expected visual change, in form, line, color, and texture, to the landscape. The KOPs must meet or exceed the VRM class objectives for the project to be approved. The VRM classes and their objectives are described in Table 3.9. Within the project treatment areas, there are approximately 27,000 acres in VRM Class I, approximately 80,930 acres in VRM Class II, and approximately 35,050 acres in VRM Class III (Appendix B Figure B.11).

3.10.2 Environmental Impacts

Direct and Indirect Impacts of Alternative A – Proposed Action

The proposed vegetation treatments would be designed, as noted in Chapter 2, to have natural-appearing edges between vegetation types and to resemble natural openings and clearings in the vegetation patterns, such that contrasts in form, line, color, and texture would be avoided or minimized to meet VRM objectives. Mechanical mastication and mowing would result in trees being mulched and the wood chips scattered across the ground surface. Manual treatments would result in dead trees that have been lopped (i.e. cut up) and scattered across the landscape. Prescribed fire would result in dead (and blackened) standing trees. Treatment areas (particularly burned areas) may be noticeable to the casual observer during implementation and during the short term, but in the long term, when communities of uneven-aged vegetation and a less homogeneous mix of vegetation are established, the visual variety created by this alternative could result in a more varied visual landscape. VRM objectives would be met for the long term in all VRM class areas. Table 3.10 lists the acres of treatment type by VRM class for Alternative A.

Table 3.10. VRM Class Acres in Each Treatment Type.

Treatment Type	VRM Class I	VRM Class II	VRM Class III
Prescribed Fire	4,435	19,316	5,192
Manual and Prescribed Fire	23,416	716	>1
Manual or Mechanical	0	13,281	10,026
Manual or Mechanical and Seed	0	1,075	19,925
Mechanical and Seed	0	108	2,046
Manual Only	265	37	0
Herbicide and Seed	0	104	0
Seed Only	0	0	229
Herbicide, Mechanical and Seed	0	0	83

Direct and Indirect Impacts of Alternative B – No Action

Under the No Action Alternative, there would be no human-caused alterations to the landscape, leading to VRM objectives continuing to be met. However, failure to conduct vegetation treatments could lead to large, uncontrolled wildfires, which could alter the landscape and create dramatic visual contrasts in vegetation patterns, altering visual form, color, line, and contrast in the area. VRM objectives would still be met in the long-term, but there could be very noticeable changes to the vegetative landscape in the short-term.

3.10.3 Cumulative Impacts

The cumulative impact area of analysis for visual resources consists of the 318,000-acre project area. While the landscape characteristics have primarily remained unchanged, gradual natural vegetation changes have occurred over the past 100 years. Changes in the form, lines, colors, and textures of the area have been primarily due to ranching operations, vegetation treatments like

chaining, and fire related activities. Foreseeable human-caused actions would be designed to meet visual resource management objectives. This includes using visual contrast rating forms to describe the characteristics of the landscape. The Proposed Action would add new disturbances to the existing visual resources landscape. These changes would be mitigated by the design features in the proposed action to create a more natural looking landscape.

The No Action Alternative would leave the resources in the same current condition with minor maintenance occurring. This would leave the resources with the same visual resource characteristics as they are now. Overall, degradation to VRM under both alternatives is expected to be minimal. By mitigating impacts to VRM that would occur under the Proposed Action, it is likely any changes to VRM would be minimal.

3.11 Wildlife (including BLM Sensitive Species and Migratory Birds)

3.11.1 Affected Environment

Mule Deer (*Odocoileus hemionus*)

Mule deer can be found throughout most of the Arizona Strip, and they occur in a wide variety of habitat types. Although vegetative communities vary throughout the range of mule deer, habitat is nearly always characterized by areas of thick brush or trees interspersed with small openings. The thick brush and trees are used for escape cover whereas the small openings provide forage and feeding areas. Mule deer often bed in juniper thickets, Gambel oak stands, or other shrubby areas. Mule deer inhabit several habitat types on the Arizona Strip including ponderosa pine, pinyon-juniper, sagebrush, chaparral, riparian corridors, and steep canyons. They are rarely found in low-elevation desert scrub habitats.

Concentrations of mule deer on the Arizona Strip occur on Black Rock and Poverty Mountains, on Mt. Trumbull, in the Buckskin Mountains, and in the Kanab Creek area. The project area occurs within AZGFD Game Management Unit (GMU) 13B. The mule deer population in this unit exists at low densities: in some areas less than 1 per square mile. The population, while not at levels attained in the 1970s, has shown signs of growth in recent years. The Black Rock Mountain area and southern portions of the Monument have historically contained the highest densities of mule deer in 13B (AZGFD 2015). The most recent population estimate for the mule deer in 13B is 2,064 in 2017.

The GMU 13B contains few perennial water sources. Natural springs do exist, and many have been developed for livestock use. The Virgin River provides a perennial source of water in most years, but because of its low elevation and isolation in the extreme northwest portion of the unit, provides limited benefit to mule deer. Much of the water availability in the unit is from stock tanks, livestock developments, and water catchment facilities. Currently there are 20 wildlife waters and 123 livestock water sources in project area.

The AZGFD has categorized habitat characteristics for mule deer on the Arizona Strip. Habitat categories are based on several factors such as topography, forage and cover, availability of

water, and limiting factors such as prohibitive fencing. Habitat categories for the project area are listed in Table 3.11. AZGFD considers the mule deer population across the Arizona Strip to be stable and increasing.

Table 3.11. Mule Deer Habitat Categories.

Habitat Category	Acres (Percentage)
Summer Crucial	92,167 (28.9%)
Summer	58,157 (18.2%)
Yearlong	163,201 (51.2%)
Winter crucial	5,241 (1.6%)

Merriam's Turkey (*Meleagris gallopavo merriami*)

Merriam's turkey is an upland game species that is known to occur in the ponderosa pine and oak brush habitat of the project area. The populations of turkey across the Monument are the results of transplant efforts since the 1970s. Roosting and nesting habitat consists of large, open-crowned trees, often on steep slopes. Brood-rearing habitat includes natural or created openings, riparian areas, abundant herbaceous vegetation adjacent to forest cover, and mid-day loafing and roosting areas. Turkeys use various parts of their range throughout the year, using areas in the higher elevations during the summer and moving to lower elevations during winter, depending on annual fluctuations in weather conditions.

Migratory Birds

The Migratory Bird Treaty Act of 1918 protects against the unpermitted take of migratory birds, their nests, and eggs. A Memorandum of Understanding (MOU) between the BLM and USFWS states that the BLM shall:

At the project level, evaluate the effects of the BLM's actions on migratory birds during the NEPA process, if any, and identify where take reasonably attributable to agency actions may have a measurable negative effect on migratory bird populations, focusing first on species of concern, priority habitats, and key risk factors. In such situations, BLM will implement approaches lessening such take. (BLM 2010)

The USFWS is mandated to identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act. The 2021 USFWS Birds of Conservation Concern (USFWS 2021) is the most recent effort to carry out this mandate. Bird species considered for the Birds of Conservation Concern include nongame birds, gamebirds without hunting seasons, subsistence-hunted nongame birds in Alaska, ESA candidate, proposed, and recently delisted species. Birds of Conservation Concern found on the Arizona Strip within the habitat types of the project area are summarized in Table 3.12.

Table 3.12. Birds of Conservation Concern Associated with the Project Area.

Species	Habitat Type
Cassin's Finch	Small flocks sporadically occur in pinyon-juniper woodlands during the non-breeding season. Found in higher elevation habitat types such as ponderosa pine during the breeding season. Uncommon on the Arizona Strip.
Black-chinned Sparrow	Breeds in the chaparral habitat type within rocky canyons, especially where tall shrubs are present. Fairly common on the west side of the Arizona Strip within its habitat type.
Broad-tailed Hummingbird	Breeds in meadows and open woodlands, especially pinyon-juniper, pine-oak, evergreen, and montane scrub and thickets from around 5,000–10,500 feet elevation. Fairly common in the project area.
Flammulated Owl	Found primarily in mixed conifer, pine, and pine-oak habitats, but they also occur locally in woodlands of pinyon-juniper, oak, and cypress. Uncommon on the Arizona Strip.
Grace's Warbler	Nests and winters mostly in mature pine and pine-oak forests in mountainous regions. Fairly common in the project area.
Long-eared Owl	Roosts in dense vegetation and forage in open grasslands or shrublands; also open coniferous or deciduous woodlands. Uncommon on the Arizona Strip.
Virginia's Warbler	Breeds in open pinyon-juniper and oak woodlands often on steep slopes with shrubby ravines throughout most of their range. Found in the project area.
Pinyon Jay	This species is also designated as BLM Sensitive Species and is addressed in Sensitive Species section

Sensitive Species

Sensitive species are usually rare within at least a portion of their range. Many are protected under certain state and/or federal laws. Species designated as sensitive by the BLM must be native species found on BLM-administered lands for which the BLM has the capability to substantially affect the conservation status of the species through management, and either:

1. There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a substantial portion of the species range; or
2. The species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk.

All federally designated candidate species, proposed species, and delisted species in the five years following delisting are included as BLM sensitive species. Based on occurrence records and monitoring data, the sensitive species that may occur within the project area and that may be affected by the proposed action are discussed below.

Additional sensitive species may also occur within the project area. However, it has been determined by wildlife biologists that these species would not be affected by actions proposed in this EA. Appendix L lists the sensitive species that will not be discussed in further detail, along with the rationale for their exclusion from further analysis. Additionally, impacts to sensitive species found outside the project area were not analyzed.

Allen's Big-eared Bat (*Idionycteris phyllotis*)

Allen's big-eared bat usually inhabits forested areas of the mountainous southwest and is relatively common in pine-oak forested canyons and coniferous forests; however, it also may occur in non-forested, arid habitats. At most sites where this species occurs, cliffs, outcroppings, boulder piles, or lava flows are found nearby. Day roosts may include rock shelters, caves, trees and mines. Their elevational distribution ranges from 1,320 to 9,800 feet, and their main food source is small moths gleaned from surfaces or in flight (AZGFD 2001). These bats are known to use stock ponds as water and food sources but are theorized as too large-bodied to drink from water catchments (Herder 1996).

The project area contains pinyon-juniper woodlands and semi-arid habitats that occur near lava flows, cliffs, and outcroppings. Allen's big-eared bats are found throughout the Arizona Strip and likely occupy the project area. The presence of livestock reservoirs in the project area may attract Allen's big-eared bats for drinking and foraging opportunities.

Townsend's Big-eared Bat (*Corynorhinus townsendii*)

In Arizona, summer day roosts are found in caves and mines from desert scrub up to woodlands and coniferous forests. Night roosts may often be in abandoned buildings. In winter, they hibernate in cold caves, lava tubes and mines mostly in uplands and mountains from the vicinity of the Grand Canyon to the southeastern part of the state (AZGFD 2003a). These bats prefer to hang from open ceilings in caves or mines and do not use crevices.

Townsend's big-eared bats are found throughout the Arizona Strip and likely occupy the project area, especially those areas that are located in pinyon-juniper woodlands (Sherwin 2000). The presence of livestock reservoirs may attract Townsend's big-eared bats for drinking and foraging opportunities. Suitable roosting and hibernacula sites may be present on the west side of the project area where there are several abandoned mines and caves.

Greater Western Mastiff Bat (*Eumops perotis californicus*)

Found in desert scrub near cliffs, preferring rugged rocky canyons with abundant crevices. They prefer crowding into tight crevices a foot or more deep and two inches or more wide. Colonies prefer crevices even deeper, to ten or more feet. These bats prefer to wedge themselves in the backs of cracks or crevices where they narrow down considerably. Entrances to roosting crevices are usually horizontal but facing downward which facilitates entry and exit (AZGFD 2002b). They are known to forage at least 15 miles from the nearest likely roosting sites.

Greater western mastiff bats have been captured within the project area and potential suitable roosting sites may be found on the west side of the project area. The presence of livestock reservoirs may attract greater western mastiff bats for drinking and foraging opportunities, especially given the long distances they travel from roost sites.

Spotted Bat (*Euderma maculatum*)

Spotted bats are found from low desert in southwestern Arizona to high desert and riparian habitats in northwestern Arizona and Utah to conifer forests in northern Arizona and other western states. They are found in desert scrub, riparian, pinyon-juniper, and montane coniferous forests at elevations up to 8,670 feet. They roost in small cracks found in cliffs and stony outcrops. They forage on large flying insects, primarily moths (AZGFD 2003b).

The project area contains extensive pinyon-juniper woodlands as well as numerous high cliffs and rocky outcrops which may provide suitable roosting habitat. Spotted bats have been captured within the project area. The presence of livestock reservoirs may attract spotted bats for drinking and foraging opportunities.

American Peregrine Falcon (*Falco peregrinus anatum*)

Peregrine falcons utilize areas that range in elevation from sea level to 9,000 feet and breed wherever sufficient prey is available near cliffs. Preferred habitat for peregrine falcons consists of steep, sheer cliffs that overlook woodlands, riparian areas, and other habitats that support a high density of prey species. Nest sites are usually associated with water. In Arizona, peregrine falcons now occur in areas that had previously been considered marginal habitat, suggesting that populations in optimal habitats are approaching saturation (AZGFD 2002a).

Nesting sites, also called eyries, usually consist of a shallow depression scraped into a ledge on the side of a cliff. Peregrine falcons are aerial predators that usually kill their prey in the air. Birds comprise the most common prey item, but bats are also taken (AZGFD 2002a).

Potential nesting habitat is found along the steep cliff faces and canyons in the western section of the project area.

Golden Eagle (*Aquila chrysaetos*)

Golden eagles are typically found in open country, prairies, arctic and alpine tundra, open wooded country, and barren areas, especially in hilly or mountainous regions. Black-tailed jackrabbits and rock squirrels are the main prey species taken (Eakle 1986). Carrion also provides an important food source, especially during the winter months. Nesting occurs on rock ledges, cliffs, or in large trees. Several alternate nests may be used by one pair and the same nests may be used in consecutive years or the pair may shift to an alternate nest site in different years. In Arizona they occur in mountainous areas and vacate desert areas after breeding. Nests were observed at elevations between 4,000 and 10,000 feet. Nests are commonly found on cliff ledges; however, ponderosa pine, junipers, and rock outcrops are also used as nest sites. Golden eagles forage over a large area and utilize the project area for hunting and scavenging.

Potential and historic nesting sites are found along the steep cliff faces along the western boundary of the project area.

Ferruginous Hawk (*Buteo regalis*)

Ferruginous hawks are large hawks that inhabit the grasslands, deserts, and open areas of western North America – they are the largest North American hawk and are often mistaken for eagles due to their size. Ferruginous means “rusty color” and refers to the bird’s colored wings and legs. During the breeding season, they prefer grasslands, sagebrush, and other arid shrub country. Nesting occurs in trees or utility poles surrounded by open areas. Mammals generally comprise 80 to 90 percent of the prey items or biomass in the diet with birds being the next most common mass component.

Ferruginous hawks are known to use open areas within the project area, especially during the winter when they are fairly common. Nesting habitat is available especially in areas where lone trees are located among wide areas of open country.

Northern Goshawk (*Accipiter gentilis*)

In Arizona, northern goshawks are found in coniferous forests in the northern, north central, and eastern parts of the state at elevations ranging between 4,750 to 9,120 feet (AZGFD 2003c). Goshawks in montane areas may winter on or near their home ranges or descend to lower elevations in woodlands, riparian areas, or scrublands (Reynolds 1992). Northern goshawks generally nest in stands of mature trees with a home range of up to 6,000 acres which includes a nest area of 30 acres, a post-fledgling family area of 420 acres (also considered the defended territory), and a foraging area of 5,400 acres (Reynolds 1992). On the Arizona Strip, goshawks most frequently occupy ponderosa pine forests. Their nest sites are typically located on northerly slopes with canopy cover of 50% or greater (Reynolds 1992). Goshawks are opportunistic hunters that prey on a variety of birds and small mammals. Their main prey habitat attributes include snags, downed logs, woody debris, large trees, openings, and herbaceous and woody understories.

While ponderosa pine stands may be preferred, nests have been documented in pinyon-juniper woodlands with high canopy cover on the Dixie National Forest in Utah (Johansson 1994) and in northwestern Colorado (Slater 2010).

The project area contains ponderosa pine habitat and may support nesting. The pinyon-juniper woodlands in the project area may contain suitable nest sites for goshawks as well as components desirable for foraging or winter use. A goshawk was detected in the project area in 1993. More recent survey efforts have not detected any goshawks in the project area.

Pinyon Jay (*Gymnorhinus cyanocephalus*)

The pinyon jay is a medium-sized corvid that inhabits much of the intermountain west and is particularly associated with pinyon-juniper ecosystems. Pinyon jays are highly social birds that nest communally and form large flocks that may number into the hundreds. Pinyon jays harvest

seeds of pinyon pine, and to a lesser extent ponderosa and limber pine, during the fall and cache these seeds for use in late winter and early spring when other food sources are scarce (Balda 1971). Caches are often located in areas that receive little snow, such as under pine and juniper tree crowns or on south slopes where snow melts early, allowing the caches to be accessible during late winter and early spring (Wiggins 2005). Spatial memory is highly developed in pinyon jays and cache relocation is efficient and reliable (Stotz 1995). Seeds that are not relocated and consumed will often germinate and contribute to pinyon pine regeneration.

Pinyon jay habitat preferences include mosaics of large tracts of pinyon-juniper woodlands especially those areas that contain large, mature, seed-producing pinyon pines, and relatively open structure with mixed shrubs (especially sagebrush) and grasses (Latta 1999). One nesting colony of pinyon jays typically requires an area of about 230 acres for nesting and about 5,120 acres for total home range (Balda 1971). Pinyon jays place nests in roughly equal proportions in pinyon and juniper trees and usually select trees that are substantially taller and larger in diameter when compared to random plots (Johnson et al. 2015).

Pinyon-juniper woodlands are extensive in the project area and likely support multiple nesting colonies of pinyon jays. Although nests have not been documented, the presence of fledglings in large flocks seen in the project area indicate that successful breeding does occur.

Monarch Butterfly (*Danaus plexippus*)

Monarch butterflies breed throughout the United States, absent only from the forests of the Pacific Northwest. Breeding densities are highest from the east coast to the Great Plains, with typically low densities in the western states. Migration corridors are found east of the Rocky Mountains, in the Great Basin, and within California. Wintering areas are located along the California coast and in Mexico (Jepsen 2015). Over the past 20 years a 90% decline in wintering monarchs has been detected in Mexico along with a 50% decline noted in California, leading to a petition for listing under the Endangered Species Act. The USFWS found that the petition presented substantial scientific or commercial information indicating that the petitioned actions may be warranted and is currently reviewing the status of the species (USFWS 2014).

Monarch larvae feed exclusively on 27 species of milkweed which can be found in a variety of habitats such as rangelands, agricultural areas, riparian zones, wetlands, deserts, and woodlands. In the western U.S. the two most important larval food sources are narrow-leaved milkweed (*Asclepias fascicularis*) and showy milkweed (*A. speciosa*). Adult monarchs forage on a wide variety of flowering plants for nectar during migration periods (Brower 2006).

Monarchs may breed in low numbers within the project area, although documentation is lacking. Milkweed species are present, including showy milkweed. Migrating monarchs have been observed on the Arizona Strip in the fall in areas outside of the project area.

3.11.2 Environmental Impacts

Direct and Indirect Impacts of Alternative A – Proposed Action

Mule Deer

The proposed treatments are in yearlong, summer, and summer crucial habitat. Management guidelines in the yearlong habitat are to increase or maintain browse species including cliffrose, sagebrush, oak, fourwing saltbush, winterfat, and bitterbrush (AZGFD 2015). Guidelines for summer habitats are to maintain a full complement of browse, forb, and grass species appropriate for the area (AZGFD 2015).

Treatments would use a combination of manual and mechanical treatments, prescribed fire, herbicide and seeding on a maximum of approximately 103,000 acres of mule deer habitat. The actual acres treated would likely be less. One of the stated goals of the project is to manage and enhance wildlife habitat to provide the necessary forage and cover for healthy self-sustaining wildlife populations.

Adverse effects to mule deer common to all treatment methods include noise and other disruptions associated with treatment applications. Hand-held equipment, including chainsaws, and transport vehicles create noise that can disturb animals and cause them to flee or alter their behavior or habitat use. These effects would be short-term and occur within a relatively small area and would not likely have much effect on the long-term health and habitat use of mule deer in the treatment area.

Mechanical treatment in shrublands, pinyon-juniper woodlands, sagebrush, and chapparral also carries the elevated risk of introducing non-native invasive plants. These weeds, such as cheatgrass, can substantially alter the plant community and result in unwanted fire behavior and reduced quality as mule deer (and other wildlife) habitat. Project design features and monitoring plans have been included in the proposed action to minimize the threat of invasive plant establishment.

Retreatment of units over time would be accomplished using the same type of treatment method, and with the same design features as the original treatment. Impacts from retreatment would therefore be the same as those identified above.

Merriam's Turkey

Merriam's turkey habitat would be primarily affected in the ponderosa pine communities where prescribed fire is planned. Prescribed fire treatment would be enacted in small burn units, designed to retain mature ponderosa pine trees that turkey rely on for roosting habitat. Oak brush, when subjected to prescribed fire, typically re-sprouts and is rejuvenated, creating new growth and subsequent cover for winter month use. As the proposed units would be treated over several years, much of the habitat improvements would occur in a staggered fashion, allowing turkey to adapt to the changing mosaic of habitat. Consequently, it is not anticipated that the proposed treatments would cause undue degradation of the habitat.

Migratory Birds

As discussed for mule deer, vegetation treatments are proposed on a maximum of approximately 103,000 acres of the project area. The actual acres treated would be less due to design features used to provide cover for wildlife species. These treatments would consist of reducing tree and shrub density within pinyon-juniper forests and sagebrush shrublands. Adverse effects to migratory birds common to all treatment methods include possible injury or loss of life as well as noise and other disruptions associated with treatment applications. In addition, the use of vehicles and treatment equipment for restoration poses a risk of injury or death by crushing animals or their nests or roosts. However, surveys for goshawks and migratory birds would occur prior to treatment if occurring during nesting season and identified nest sites would be protected during treatment by a no-treatment buffer of at least 200 meters; therefore, impacts to most breeding migratory birds would be avoided.

Pinyon-juniper forests provide important habitat components for many migratory birds including the pinyon jay. Paulin et al. (1997) concluded that mature pinyon-juniper sites (200-400 years old) with few understory plants ranked second in total individual birds and third in diversity of seven upland forest types. Pinyon-juniper also had the highest percentage of obligate and semi-obligate species in the same study. O'Meara et al. (1981) also found that breeding bird densities were more than double in unchained vs. chained areas in northwest Colorado pinyon-juniper woodlands.

Although cone-producing pinyon pines have long been recognized for their benefit to wildlife, more recent studies have focused on the importance of junipers as a habitat component. Francis et al. (2011) found that 86% of nest trees used by birds in northwestern New Mexico pinyon-juniper forests were in junipers, even though the ratio of pinyon to juniper was 1:1.06.

Most studies of treatment effects on wildlife in pinyon-juniper habitat have focused on chaining (O'Meara 1981), a method not proposed in this EA. However, one study (Crow 2010) showed that thinned pinyon-juniper units in Grand Staircase-Escalante National Monument led to a reduction in the presence of pinyon-juniper obligate species. It should be noted that the level of thinning on the treatment units in this study was very high (92% average reduction in tree density).

Bird species that prefer more open habitat may benefit from the proposed treatments. Rosenstock and Van Riper (2001) found that ground-nesters in grassland communities of northern Arizona decreased as juniper increased, as expected.

The proposed vegetation treatments would reduce tree density and canopy cover in pinyon-juniper and sagebrush habitat. These treatments would increase vegetative and structural diversity within the units and allow opportunities for a variety of nesting and foraging habitat. Adequate untreated habitat in the project area would remain to allow for successful breeding and foraging for species dependent on persistent pinyon-juniper woodlands.

Retreatment of units over time would be accomplished using the same type of treatment method (manual and/or mechanical), and with the same design features as the original treatment. Impacts from retreatment would therefore be the same as those identified above.

Bats

Adverse effects to sensitive bats common to all treatment methods include injury and loss of life, noise and other disruptions associated with treatment applications, and short- and long-term habitat effects. In addition, the use of vehicles and treatment equipment for restoration poses a risk of injury or death by crushing animals or their roosts.

The proposed vegetation treatments may have slight impacts to insect prey species, with some benefiting from treatments and others losing habitat. Thinning of trees would open foraging habitat for bats but may reduce roost site availability. Allen's big-eared bats are known to roost under exfoliating bark of pine trees (Rabe 1998) and may be the most impacted of the sensitive bat species. The Arizona Bat Conservation Strategic Plan states that "Logging and forestry practices that leave mixed-aged stands and/or preserve older trees and snags should be encouraged. Snags that are, or could be, used as roosts should be preserved" (AZGFD 2003d). Retaining existing large snags, as proposed, in vegetation treatment units would help avoid adverse impacts to bat species.

Peregrine Falcon, Golden Eagle, Ferruginous Hawk

None of these species nest within dense forest, therefore nest sites would not be impacted by vegetation treatments. Thinning of pinyon-juniper forests could open more foraging habitat for peregrine falcons, ferruginous hawks, and golden eagles since these species prefer to hunt in open terrain.

Northern Goshawk

Ponderosa pine habitat is the preferred habitat for this species on the Arizona Strip. Therefore, prescribed fire treatments would likely have the most impact. However, nesting in pinyon-juniper forest has been documented in other locations. Canopy cover would be reduced on up to 770 acres of pinyon-juniper forest, reducing the suitability of these areas as nesting or post-fledgling habitat for northern goshawks. Human disturbances from work crews and machinery can also displace goshawks from otherwise appropriate habitat (Morrison 2011).

To avoid adverse impacts to nesting northern goshawks, proposed treatment areas would be surveyed prior to implementation and any identified northern goshawk nest sites would be protected by a no-treatment buffer of 200 meters (650 feet) (Reynolds 1992).

Retreatment of units over time would be accomplished using the same type of treatment method, and with the same design features as the original treatment. Impacts from retreatment would therefore be the same as those identified above.

Pinyon Jay

The proposed vegetation treatments would consist of reducing tree density within pinyon-juniper forests. Pinyon-dominated habitats, especially those with many mature, uncrowded pinyon trees, are areas of greatest seed production (Johnson and Smith 2008). Pinyon jay flocks need very large areas (approximately 8,600 acres) of productive pinyon pines for harvesting and caching of pinyon seeds, and these areas should contain large trees for maximum cone productivity (Johnson et al. 2015). Likewise, Latta et al. (1999) called for maintaining large, cone-bearing pinyon pines in mature pinyon-juniper woodlands and Johnson et al. (2011) recommended that when managing habitat for pinyon jays, clearing of juniper and pinyon trees should be avoided when possible.

The proposed vegetation treatments would reduce tree density and canopy cover in pinyon-juniper habitat. Small scale openings may provide additional cache sites or attract alternate food sources such as insects or lizards. Pinyon jays tend to return year after year to traditional colony sites. Strong site fidelity could limit the ability of a pinyon jay flock to pioneer new, available habitat (Johnson 2011). To avoid adverse impacts to nesting pinyon jays, the proposed treatment areas would be surveyed prior to implementation and any identified nest colonies would be delineated and protected from tree removal (Latta 1999), as described in the design features. A 500-meter buffer around nesting colony sites would be observed as per the wildlife design features in the proposed action should treatments take place during the nesting season (February 1-July 31).

Retreatment of units over time would be accomplished using the same type of treatment method, and with the same design features as the original treatment. Impacts from retreatment would therefore be the same as those identified above.

Monarch Butterfly

Specific guidelines regarding the impacts to monarch butterflies from pinyon-juniper or sagebrush removal have yet to be developed. In general, forest thinning projects that result in increased forb production in the understory are thought to benefit this species (USFS 2015).

Retreatment of units over time would be accomplished using the same type of treatment method, and with the same design features as the original treatment. Impacts from retreatment would therefore be the same as those identified above.

Direct and Indirect Impacts of Alternative B – No Action

Under the No Action Alternative, none of these proposed vegetation treatments would occur. Juniper encroachment into sagebrush and grassland ecological sites would continue, reducing forage plants for mule deer and habitat for migratory birds dependent on shrublands. Pinyon-juniper dependent wildlife species such as pinyon jays or gray vireos would likely not be affected by the No Action Alternative.

The health, vigor, recruitment, age class, diversity and production of perennial grasses, forbs, and shrubs (including those preferred by mule deer) would not improve since no removal of pinyon and juniper would occur to allow grasses, forbs, and shrubs to establish and compete for sunlight, nutrients, and water, resulting in improved vegetative conditions across the project area.

3.11.3 Cumulative Impacts

The analysis area for wildlife is the proposed project area. Other activities occurring within the analysis area that contribute to the cumulative effects to wildlife, include livestock grazing, vegetation treatments, and various dispersed recreational activities. Grazing occurs throughout the analysis area on numerous allotments. Utilization is limited to 50%, providing for enough forage resources for wildlife populations to persist throughout the analysis areas.

Vegetation treatments completed over the past 60 years have occurred throughout the analysis area. These past treatments had a wide array of effects, with many projects having pervasive, long-lasting impacts to mule deer, migratory birds, Merriam's turkey, and sensitive species due to the type conversion of crucial vegetation types, as well as resulting in some areas being dominated by non-native plant species.

Recreational pursuits, including OHV use, camping, and target shooting can cause disturbance to wildlife species and their habitats. Disturbance can come from noise, wildlife collisions, or the mere presence of humans. Different species, and individuals within species, react differently to disturbances. The type of reaction also differs with the time of year, location of disturbance in relation to breeding sites, type of disturbance, and duration of disturbance. With the increase in local populations has come a dramatic increase in the level of OHV use, resulting in increased disturbance, injury, and mortality to wildlife, particularly ground dwelling species with low mobility. Transportation corridors exist through the habitat of virtually all species found within the analysis areas discussed in this EA. Impacts vary by species and by the location, level of use, and speed of travel over the road.

Chapter 4. Consultation and Coordination

4.1 Introduction

This section summarizes the process used to involve individuals, organizations, and government agencies in the preparation of this EA in compliance with various laws and policies (e.g. NEPA and NHPA).

4.2 Summary of Public Participation

Public scoping was formally initiated by the Monument on March 8, 2021, with the mailing and emailing of a scoping letter to the public, Tribes, and various agencies, and posting the same information to the NPS's PEPC and BLM's ePlanning websites. Scoping occurred for 30 days, ending on April 7, 2021. A total of ten entities or persons provided comments. Public Scoping comments and responses are found in Appendix M.

Members of the public were invited to submit comments during the public review period from June 3 to July 3, 2021. Comments were submitted by email and through the NPS PEPC and BLM ePlanning systems. Comments were received from one federal agency, one state agency, three non-profit organizations and three individual members of the public. Comments included additional information resources and requests for clarification or changes to the proposed action. For a discussion of public review comments, see Appendix N.

4.3 Preparers and Reviewers

Tables 4.1 and 4.2 list specialist and reviewers who contributed to preparation of this EA.

Table 4.1 List of federal preparers/reviewers

Name	Title	Resource Area(s) of Specialty
Jennifer Fox	Ecologist	Project Lead, Vegetation, Proposed Wilderness
David Van Alfen	Archaeologist	Cultural Resources
Jeremie Gamiao	Fire Management Specialist	Fuels, Fire Management
Cody Goff	Fire Management Specialist	Fuels, Fire Management
John Foley	Fire Management Officer (Lake Mead NRA)	Fuels, Fire Management, Forestry
Bryan Hansen	Geographic Information Systems Specialist	Geospatial Analysis and Cartography
Amber Hughes	Planning and Environmental Coordinator	NEPA Compliance
Brenda Todd	Superintendent	Project Oversight
David Fireman	Superintendent (Acting)	Project Oversight

Name	Title	Resource Area(s) of Specialty
Mark Wimmer	Monument Manager	Project Oversight
Roger Semler	Chief, Division of Wilderness Stewardship	Proposed Wilderness
Michael Cutler	Rangeland Management Specialist	Rangeland
Jannice Cutler	Rangeland Management Specialist	Rangeland, Wild Horse and Burro
Greg Page	Outdoor Recreation Planner	Recreation, Visual Resources
Eathan McIntyre	Physical Scientist	Soils, Water Quality
Gloria Benson	Tribal Liaison	Tribal Liaison
Jeff Young	Wildlife Biologist	Wildlife, Threatened and Endangered Animal Species

Table 4.2 List of non-federal reviewers

Name	Title	Agency/Organization
Rob Nelson	Habitat Evaluation and Lands Program Manager	Arizona Game & Fish Department
Tim Shurtliff	Wildlife Manager	Arizona Game & Fish Department

4.4 Cooperating Agencies

The Council on Environmental Quality NEPA regulations [40 CFR 1508.5] define a cooperating agency as any federal agency (other than the lead agency) and any state or local agency or Indian tribe with jurisdictional authority or special expertise with respect to any environmental impact involved in a proposal. Federal and state agencies, tribal governments, and county governments with jurisdiction by law or with special expertise relevant to the SPLRP were solicited at the beginning of the NEPA process to determine their interest in participating as a cooperating agency.

Twenty-seven agencies, including tribal agencies, were invited to collaborate for this project. Mohave County Board of Supervisors and AZGFD are cooperating agencies for this project, resulting in an agreed upon MOU.

4.5 Tribal Consultation

The Monument consults with federally recognized tribes before making decisions or undertaking activities that will influence federally recognized tribes, their assets, rights, services, or programs. The Monument initiated consultation with the following 18 tribes at the beginning of the NEPA process and invited each to participate as a cooperating agency if desired. While no tribes elected to become cooperating agencies, the Monument continues to inform these tribes as the project progresses.

Formal tribal consultation was initiated April 8, 2021 to specifically address the question of presence of places with religious or other cultural significance under 36 CFR Part 800.4. Three tribes responded, including two who provided feedback regarding consultation during public scoping. One tribe requested consultation should any prehistoric cultural resources be adversely affected by planned activities; the SPLRP contains design features to directly avoid all adverse effects to cultural resources. One tribe requested notification, but not consultation, prior to conducting prescribed fire and outcomes of Class III cultural inventories prior to ground disturbance. No tribes chose to engage in formal consultation as of August 16, 2021.

Tribal entities consulted are:

- Bodaway Gap Chapter
- Cameron Chapter
- Chemehuevi Indian Tribe
- Coalmine Canyon Chapter
- Colorado River Indian Tribe
- Havasupai Indian Tribe
- Hualapai Cultural Resources
- Hualapai Indian Tribe
- Kaibab Band of Paiute Indians
- Las Vegas Paiute Tribe
- LeChee Chapter
- Moapa Band of Paiute Indians
- Navajo Nation Heritage & Historic Preservation
- Pahrump Band of Paiutes
- Paiute Indian Tribe of Utah
- San Juan Southern Paiute Tribe
- The Hopi Tribe
- To Nanees Dizi Chapter

4.6 Section 106 Consultation

The Monument began informal discussions with the Arizona State Historic Preservation Officer (SHPO) regarding the SPLRP in mid-summer 2020. Formal consultation with SHPO was determined to be unnecessary as both the BLM and NPS have existing programmatic agreements regarding Section 106 compliance valid in the state of Arizona. The notification to "share with you [SHPO] how Grand Canyon-Parashant National Monument (GCPNM/PARA) intends to meet legal responsibilities under Section 106 of the National Historic Preservation Act..." was sent to SHPO by letter dated June 2, 2021.

On August 2, 2021, SHPO agreed with the determination the SPLRP would operate using two programmatic agreements based on primary land management as defined in the Monument Proclamation (2000) following all relevant protocols in the programmatic agreements and the design features included in Alternative A.

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- On BLM managed lands: Programmatic Agreement Among the Bureau of Land Management, Southwestern Region Three U.S. Forest Service, U.S. Fish and Wildlife Service, Interior Region Eight, Arizona State Historic Preservation Officer, and Advisory Council on Historic Preservation Regarding the Effects of Vegetation and Range Management Activities in Arizona
 - On NPS managed lands: NPS Nationwide PA for Compliance with Section 106 Programmatic Agreement Among the National Park Service (U.S. Department of the Interior), the Advisory Council on Historic Preservation, the National Conference of State Historic Preservation Officers for Compliance with Section 106 of the National Historic Preservation Act

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Appendix A. Conformance with Grand Canyon-Parashant National Monument General Management Plan and Resource Management Plan

The following decisions are from Table 2.1 regarding Air, Water, and Soils Management.

DFC-WS-06: The natural hydrologic functions of all watersheds will be intact.

MA-WS-07 (in part): Surface disturbance and reclamation activities will proceed...subject to the following:

Activities will be the minimum necessary to accomplish the task.

Measures to stabilize soils and minimize surface water runoff will be required, both during project activities and following project completion.

MA-WS-08: Restoration and reclamation actions will be consistent with vegetation management decisions for each Ecological Zone.

The following decisions are from Table 2.3 regarding Vegetation and Fire and Fuels Management.

DFC-VM-01 (in part): All BLM watersheds will meet, or will be progressing towards meeting, the Standards for Rangeland Health for BLM-administered lands and NPS Vital Signs standards on NPS-administered lands.

DFC-VM-02: NPS watersheds will meet, or will be in improving condition toward meeting, NPS Vital Signs objectives and BLM Standards for Rangeland Health.

DFC-VM-03: Native vegetative communities will be protected, including those considered Monument objects. A mosaic of native perennial and noninvasive annual vegetative communities will be present across the landscape with diversity of species, canopy, density, and age class reflecting its local ecological site potential and naturally occurring habitat conditions.

DFC-VM-04: Vegetative communities will provide sufficient plant cover and litter accumulation to protect soils from wind and water erosion and enhance nutrient cycling and productivity, even during drought years.

DFC-VM-05: Ecological processes and functions will be protected, enhanced, and/or restored by allowing tools that are necessary and appropriate to mitigate adverse impacts of allowable uses and undesirable disturbances, and contribute to meeting the Standards for Rangeland Health and NPS Vital Signs and enhance Monument values.

DFC-VM-06: Invasive plant species will be contained, controlled, or eliminated and native species restored to meet Desired Plant Community (DPC) objectives.

DFC-VM-07: Each vegetation community is maintained within its natural range of variation in plant composition, structure, and function.

DFC-VM-08: In addition to the above, vegetation communities on NPS-administered lands retain ecological integrity where natural processes maintain native plants and plant communities and are the principal influence on community and population fluctuation.

DFC-FM-02: Fire return intervals and natural disturbances will be appropriate for the ecological site.

DFC-FM-03: Fire is recognized as a natural process in fire-adapted ecosystems and is used to achieve objectives for other resources.

LA-FM-01(in part): In Wildland Fire Use: Areas Suitable for Wildland Fire Use for Resource Management Benefit where fuel loading is high and current conditions constrain the use of fire (prescribed fire and fire use), prevention and mitigation programs will be emphasized to reduce unwanted ignitions and use mechanical, manual, chemical, or biological treatments to reduce fuel loads and meet resource objectives. Where conditions allow, consistent with land use allocations, naturally ignited wildland fire, prescribed fire, and a combination of mechanical, manual, chemical, and biological treatments will be used to maintain non-hazardous fuel levels, reduce the hazardous effects of unplanned wildland fires, achieve DFCs, and meet resource objectives.

Wildland Fire Use areas will include Riparian, Great Basin, Grassland, Interior Chaparral, Ponderosa Pine, Colorado Plateau Transition, and Mojave Transition (NPS-Andrus Plain only) ecological zones, and WUI areas (BLM only, depending on the surrounding vegetation, fuel loads, and other factors as determined in the BLM Fire Amendment and BLM and NPS Fire Management Plans). Wildland fire use in the riparian ecological zone will only be considered in areas where riparian restoration is planned, where fire use will help meet restoration objectives (e.g., reduce exotic vegetation), and where subsequent restoration work will be implemented (e.g., planting native vegetation).

LA-FM-06 (in part): Prescribed fire and fire use will be used in areas classified as Wildland Fire Use within...NPS proposed wilderness to achieve DFCs and wilderness area management objectives described in each agency's Fire Management Plan. Vegetation can also be treated manually if minimum tool requirements are met.

LA-FM-07: Minimum impact suppression tactics will be used in... designated and proposed wilderness.

LA-FM-08: Conservation measures described in Appendix G [of the GMP/RMP] will be implemented for all fire suppression, restoration and rehabilitation, fuels treatments, prescribed burning, and other fire related actions in special status species habitats.

LA-FM-09: Suppression tactics that limit damage or disturbance to sensitive vegetation, soils, and wildlife habitat will be used. The use of heavy equipment, such as dozers, on BLM-administered lands will require approval from the BLM authorized officer. The use of heavy equipment on NPS-administered lands will require approval from the NPS Park Superintendent.

LA-FM-10 (in part): Prescribed fire and fire use can be used within designated and proposed wilderness areas where the areas have been classified as Wildland Fire Use to achieve DFCs and wilderness management objectives. Selection of vegetation treatment methods in designated and proposed wilderness will be consistent with minimum tool requirements and non-impairment standards.

MA-VM-01: Seasonal restrictions, temporary reductions, or elimination of authorized activities will be implemented in conjunction with vegetation treatment projects to protect sensitive resources and/or ensure attainment of DPC objectives or Vital Sign standards.

MA-VM-02: Restoration and vegetation treatments will be authorized where protection of sensitive resources is ensured. Priority areas for restoration or vegetative treatment projects will be defined by ecological zone and major vegetation type and based on the following criteria:

To increase indigenous rare or uncommon species;

Where soil productivity has been reduced due to removal of soil organic matter or active erosion;

Where vegetative cover is inadequate to prevent soil erosion;

To improve habitat conditions for wildlife and/or special status species;

To restore degraded, drought-stricken, weed infested, or otherwise unhealthy areas;

To maintain previously treated areas;

To achieve DPC objectives; and

To meet activity plan objectives.

MA-VM-03 (in part): On BLM-administered lands, the use and perpetuation of native species will be emphasized. However, when restoring or rehabilitating disturbed or degraded rangelands, non-intrusive, non-native plant species may be used where native species:

Are not available,

Are not economically feasible,

Cannot achieve DFCs, DPCs, or other ecological objectives as well as non-native species, and/or

Cannot compete with already established non-native species.

Non-native forbs and perennial grasses can be used in preference to monocultures of non-native annuals.

On NPS-administered lands, vegetation management objectives will be developed through Vital Signs monitoring. Monitoring vegetation communities will demonstrate retention of ecological integrity where natural processes maintain native plants and plant communities and are the principal influence on community and population fluctuation. When natural processes have been disrupted, DPC objectives will be achieved through vegetation treatments and managing resource uses, as appropriate.

MA-VM-04: Treatment methods and tools appropriate to the land use allocation and protection of Monument objects can be authorized to achieve DFCs, DPCs, or Vital Sign standards. Treatment methods can include, but are not limited to mechanical, chemical, biological, and fire or any combination thereof. Vegetation treatments and uses will be monitored as part of an adaptive management process. Seed priming and other enhancement techniques can be used to increase germination rates. Treatments will be designed so that they do not encourage an increase in any invasive species. Minimum requirement analysis will be used in BLM designated wilderness and in NPS proposed wilderness.

On NPS-administered lands, chaining and other methods that cause substantial surface disturbance will not be permitted.

On NPS land, authorization of non-native seed use must be consistent with NPS policy, which states that revegetation efforts will use seeds, cuttings, or transplants representing species and gene pools native to the ecological portion of the park in which the restoration project is occurring. Where a natural area has become so degraded that restoration with native gene pools has proven unsuccessful, improved varieties or closely related native species may be used.

The following decisions are from Table 2.3 specific to the Ponderosa Pine Ecological Zone

DFC-VM-09 (in part): The Ponderosa Pine Ecological Zone will consist of a mosaic of tree densities, age classes, and openings (which may contain scattered trees), with healthy, diverse under stories of native shrubs, grasses, and forbs.

DFC-VM-12: Patches of old and/or large trees and standing and fallen dead trees will be maintained and protected.

MA-VM-16: Vegetation treatments can be used in the Ponderosa Pine Ecological Zone to enhance vegetative diversity, restore native plant communities, maintain or increase wildlife habitat, and reduce or eliminate hazardous fuels. Treatment objectives in ponderosa pine vegetation communities will focus on restoring natural disturbance processes such as fire; increasing vegetative ground cover of native grasses, forbs,

and shrubs; enhancing forest structure, function, and composition; and removing invasive, non-native species.

MA-VM-17 (in part): Stands of ponderosa pine will be managed for a balanced mosaic between tree, shrub, and perennial grass cover to support a healthy ecosystem while providing habitat for Merriam's turkey...and mule deer. The mosaics will include stands of old-growth ponderosa to support white-breasted nuthatch; a component of Gambel oak with grass and forb understory to provide foraging habitat for mule deer; large openings of grasses, forbs, and shrubs to provide foraging habitat for raptors such as sharp-shinned hawk, northern goshawk, Coopers hawk, American kestrel, and red-tailed hawk; and areas of sparse to dense tree canopy cover with an understory of grasses, forbs, and shrubs to provide nesting habitat for Merriam's turkey, hiding cover for mule deer....

The following decisions are from Table 2.3 specific to the Great Basin Ecological Zone (Sagebrush Communities).

DFC-VM-14 (in part): Sagebrush (primarily *Artemisia tridentata*) communities will consist of a healthy, diverse mosaic of different height and age structures with a thriving community of native grasses and forbs. Mosaics may include stands of young and old sagebrush, openings (ranging from bare ground to short or sparse vegetation to high-density grasslands), wet meadows, seeps, healthy streamside (riparian) vegetation, and other interspersed shrub and woodland habitats.

DFC-VM-15: There will be no net loss of total acres within sagebrush communities (i.e., long-term or permanent removal from the landscape). A no net loss objective will not preclude restoration, rehabilitation, or related management actions.

DFC-VM-16: Treatment objectives in sagebrush communities will focus on restoring natural disturbance processes, such as by using fire, increasing vegetative ground cover of native grasses and forbs, and removing invasive non-native plants.

DFC-VM-17: Sagebrush communities on NPS-administered lands will retain ecological integrity where natural processes maintain native plants and plant communities and are the principal influence on community and population fluctuation.

DFC-VM-18: Existing stands of sagebrush will have a balance between shrub and perennial grass cover, for open to moderate shrub canopy cover (5 to 25%), and multiple height classes. This mosaic will include young, sparse stands to support Vesper sparrows and lark sparrows, and older, dense stands to benefit Brewer's sparrows, sage sparrows, black-throated sparrows, gray flycatchers, and sage thrashers.

DFC-VM-19: Sagebrush communities will include small, grassy openings to support long-billed curlews and burrowing owls.

DFC-VM-20: Sagebrush communities will include large, continuous blocks (>300 acres) of unfragmented sagebrush habitat, including mosaics of open to moderate shrub canopy cover (5 to 25%) and multiple age and height classes to benefit sage-dependent species.

DFC-VM-21: Sagebrush communities will include openings of short vegetation surrounded by sagebrush for ground foraging by sage thrashers, loggerhead shrikes, Brewer's sparrows, and sage sparrows.

DFC-VM-22 (in part): Sagebrush communities will include openings of short vegetation (2 to 8 in.) with wide visibility to provide breeding habitat for longbilled curlews, and burrowing owls.

DFC-VM-23: Sagebrush communities will include native grass and forb cover in balance with open to moderate (5 to 25%) shrub canopy cover and within ecological site potential. Perennial grass components will be at or above 10%. Native forb composition will be at or above 5%.

DFC-VM-24: Fragmentation of sagebrush habitat will be less than 50% of the treatment area.

MA-VM-19: Vegetation treatments can be used in the Great Basin Ecological Zone to enhance vegetative diversity, restore native plant communities, maintain or increase wildlife habitat, and reduce or eliminate hazardous fuels. Treatment priority areas will be where sagebrush canopy cover exceeds 20%, perennial grasses and forbs are less than 5%, and bare ground exceeds 40%.

MA-VM-20: A combination of wildland fire, fire use, prescribed fire, and chemical treatment methods will be used in preference to, but not to the exclusion of, other available tools in the Great Basin Ecological Zone sagebrush communities.

MA-FM-06: On NPS-administered lands, all acres can be considered for Wildland Fire Use, prescribed fire, fire suppression, and mechanical and chemical treatments to achieve resource objectives, consistent with land use allocations, minimum tool requirement for NPS proposed wilderness, and to protect Monument values.

The following decisions are from Table 2.3 specific to the Great Basin Ecological Zone (Pinyon-Juniper Community).

DFC-VM-25 (in part): Healthy, diverse woodland communities will consist of a mosaic of trees, shrubs, grasses, and forbs. Mosaic patches can include stands of young and old pinyon-juniper, openings, wet meadows, seeps, and other interspersed shrub habitats. The communities will be composed of a variety of different height structures and age classes, with a thriving understory community of native grasses, forbs, and shrubs.

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- DFC-VM-26: To reduce the threat of catastrophic fire, ladder fuels and downed woody debris will be limited or not present. Woody debris will be present to stabilize soil and enhance vegetation recovery in restoration areas.
- DFC-VM-27: Treatment objectives in the pinyon-juniper vegetation communities will focus on restoring the natural disturbance regime; increasing vegetative ground cover of native grasses, forbs, and shrubs; and removing non-native invasive species.
- DFC-VM-28 (in part): Stands of pinyon-juniper will include a balance between tree, shrub, and perennial grass cover to support pinyon jay and mule deer. This mosaic will include stands of old growth pinyon-juniper to support juniper titmouse; large openings of grasses, forbs and shrubs to support mule deer and provide foraging habitat for raptors such as sharp-shinned hawk, northern goshawk, Coopers hawk, American kestrel, and red-tailed hawk; and areas of sparse to dense tree canopy cover to support pinyon jay.
- DFC-VM-29: Individual old growth trees will be present and will be protected during treatment implementation.
- MA-VM-22: Vegetation treatments can be used in the Great Basin Ecological Zone to enhance vegetative diversity, restore native plant communities, maintain or increase wildlife habitat, and reduce or eliminate hazardous fuels. Treatment priority areas will be where juniper canopy cover exceeds 40%, perennial grasses and forbs are less than 5%, and bare ground exceeds 50%.
- MA-VM-23: Treatment preferences will be to use a combination of wildland fire, fire use, prescribed fire, mechanical, and chemical methods.
- MA-FM-08: On NPS-administered lands, all acres can be considered for Wildland Fire Use, prescribed fire, fire suppression, and mechanical and chemical treatment to achieve resource objectives consistent with land use allocations, minimum tool requirement for proposed wilderness, and to protect Monument values.

The following decisions are from Table 2.4 regarding Wildlife and Fish.

- DFC-WF-12: The natural biological diversity of fish, wildlife, and plant species will be maintained or, where necessary and feasible, restored throughout the Monument. Habitats will be managed on an ecosystem basis, ensuring that all parts of the ecosystem and natural processes are functional.
- MA-WF-07 (in part): On BLM-administered lands, construction of wildlife habitat improvement projects, including water developments and vegetation treatments, can be authorized to meet DFCs, assuming compliance with NEPA, the Endangered Species Act (ESA), Monument proclamation, and other applicable laws, regulations, and policies. DPC objectives for wildlife will be incorporated into all

habitat improvement projects including restoration and vegetation treatment projects. Specific projects will be listed in HMPs.

DFC-WF-17: Mule deer habitat in pinyon-juniper woodland sites will include a healthy diverse mosaic of trees, shrubs, grasses, and forbs.

MA-WF-16: On BLM-administered lands, crucial summer mule deer habitat will be managed for at least 10% grasses and forbs and at least 30% palatable browse species CBW, where consistent with site potential. Crucial winter mule deer habitat will be managed to include at least 30% palatable browse species, where consistent with site potential. Palatable browse species will be maintained and enhanced through vegetation conversion. Palatable browse species can include, but is not limited to cliffrose, bitterbrush, ceanothus, four-wing saltbush, desert holly, Mormon tea, and mountain mahogany.

DFC-WF-42: On BLM-administered lands, forage composition in turkey habitat will include at least 20% grasses and forbs, and 20% mast-producing species at all key areas CBW, where consistent with site potential.

MA-WF-36: On BLM-administered lands, Merriam's Turkey habitat will be managed for at least 20% grasses and forbs and at least 20% mast producing species CBW, where consistent with site potential. On BLM and NPS-administered lands, old growth in the ponderosa pine ecological zone will be protected to ensure roost sites for Merriam's Turkey.

The following decisions are from Table 2.5 regarding Special Status Species.

DFC-TE-04: There will be no net loss in the quality or quantity of special status species habitat throughout the Monument.

MA-TE-08: Conservation measures described in Appendix G [of the GMP/RMP] will be implemented for all vegetation management actions including restoration and rehabilitation, fuels treatments, prescribed burning, and other related actions in special status species habitats.

MA-TE-10: Conservation measures described in Appendix G [of the GMP/RMP] will be implemented for all fire suppression, restoration and rehabilitation, fuels treatments, prescribed burning, and other fire related actions in special status species habitats.

MA-TE-21 (in part): Restoration and vegetation treatments will not be authorized in special status plant habitat, unless doing so will provide benefits to the species.

The impact of herbicide/pesticide use on special status plant species will be determined. The use of harmful herbicides in areas where special status plants can be affected will be limited or eliminated.

Conservation measures will be implemented for all vegetation management actions in special status plant habitats as described in Appendix G [of the GMP/RMP].

MA-TE-22: Impacts to special status plants and their habitats from surface disturbing activities will be reduced or eliminated.

Proposed actions will be evaluated to ensure that trampling or crushing of special status plants will be minimized or eliminated. The BLM and NPS will continue to coordinate with USFWS to delineate buffer areas around special status plant populations. Use restrictions can be developed to minimize or eliminate trampling and/or crushing of special status plants within buffer areas.

Conservation measures will be implemented for special status plants for all surface disturbing activities as described in Appendix G [of the GMP/RMP].

The following decision is from Table 2.8 regarding Visual Resources.

MA-VR-02: Ecosystem restoration projects will ensure that visual impacts are minimized in the short term (5 years) and that VRM objectives in the project area are met in the long term (life of the project) when such projects are a) considered essential for public safety, achieving DFCs, or reducing hazardous fuels buildups and b) expected to be visually prominent.

The following decisions are from Table 2.10 regarding Wilderness Characteristics.

DFC-WC-02 (in part): Areas where wilderness characteristics will be maintained will be ecologically sustainable and resilient to natural and human-caused disturbances.

DFC-WC-03: Wildlife populations and habitat are important aspects of the ecosystem and are an important component of naturalness.

MA-WC-03 (in part): Restoration, vegetation treatments, wildlife management projects on BLM-administered lands, and other surface disturbing actions can be authorized in areas managed to maintain wilderness characteristics to achieve DFCs.

MA-WC-04: New projects or maintenance of existing projects that enhance wildlife habitat or other resources can be allowed, provided they can be designed to be substantially unnoticeable over time.

It has also been determined that the alternatives would not conflict with other decisions throughout the plan.

Appendix B. Maps

[illegible]

Figure B.2 Wildfire History

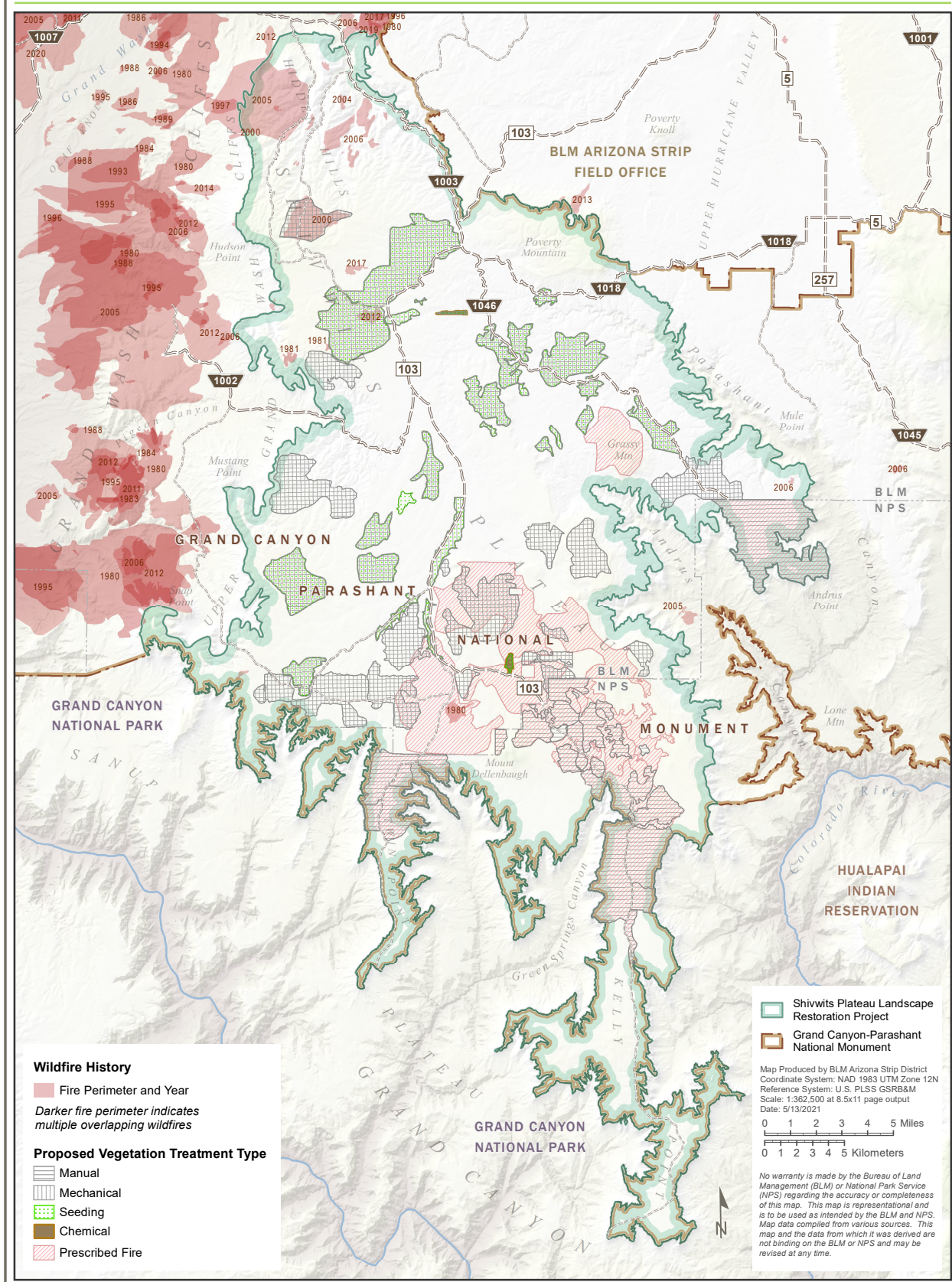


Figure B.3 Fire Regime

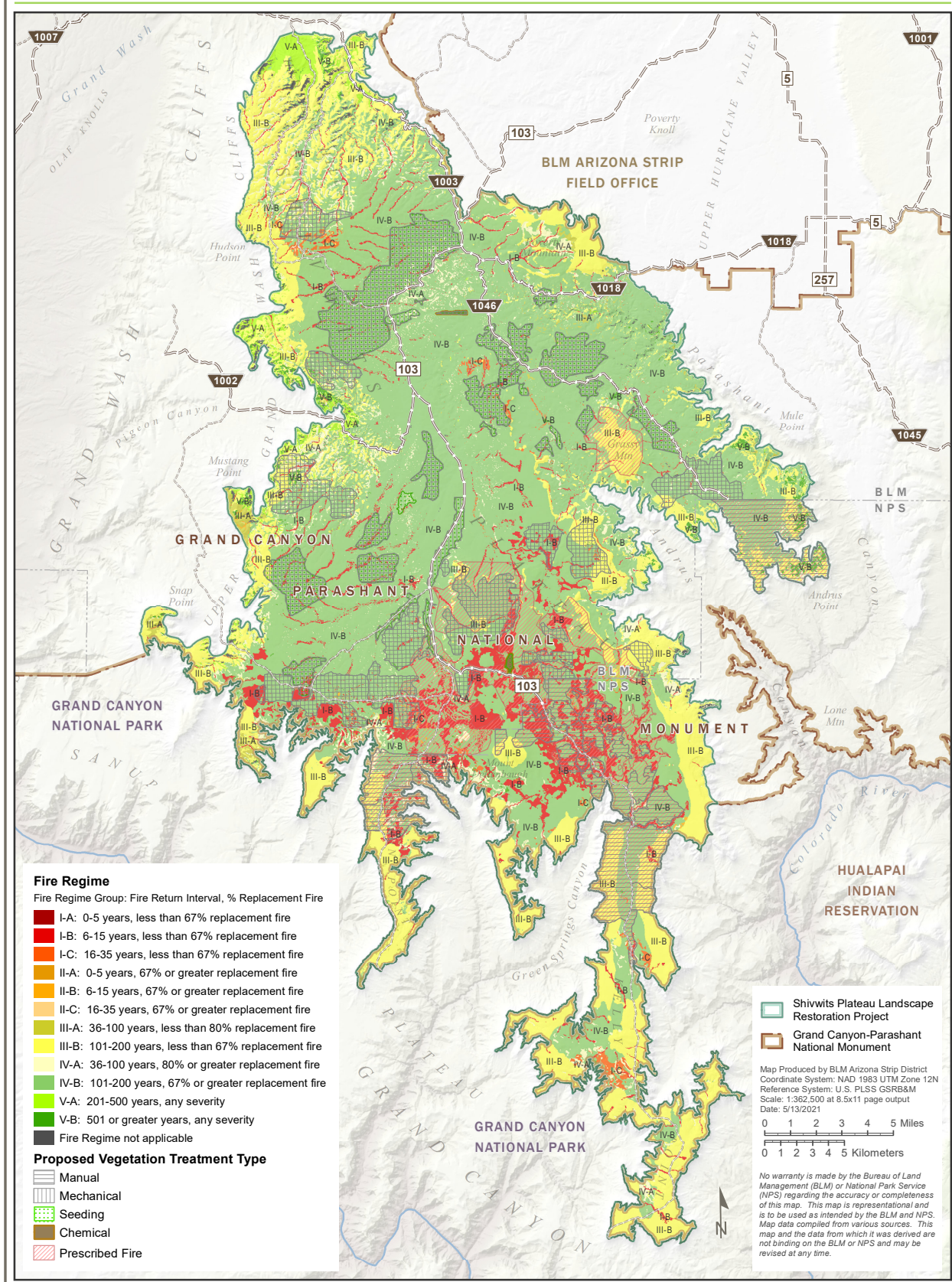


Figure B.4 Vegetation Condition Class

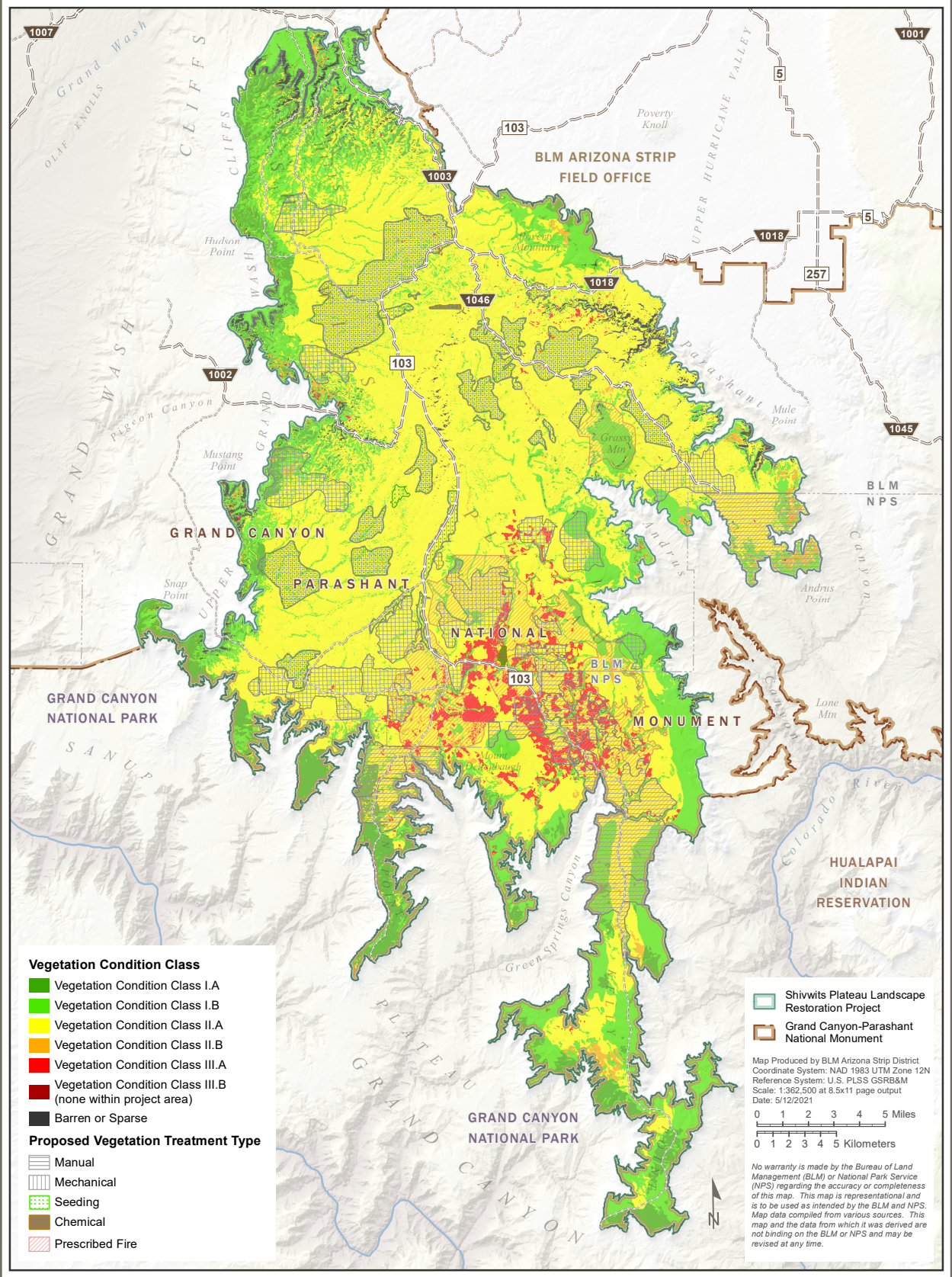


Figure B.5 Grazing Allotments

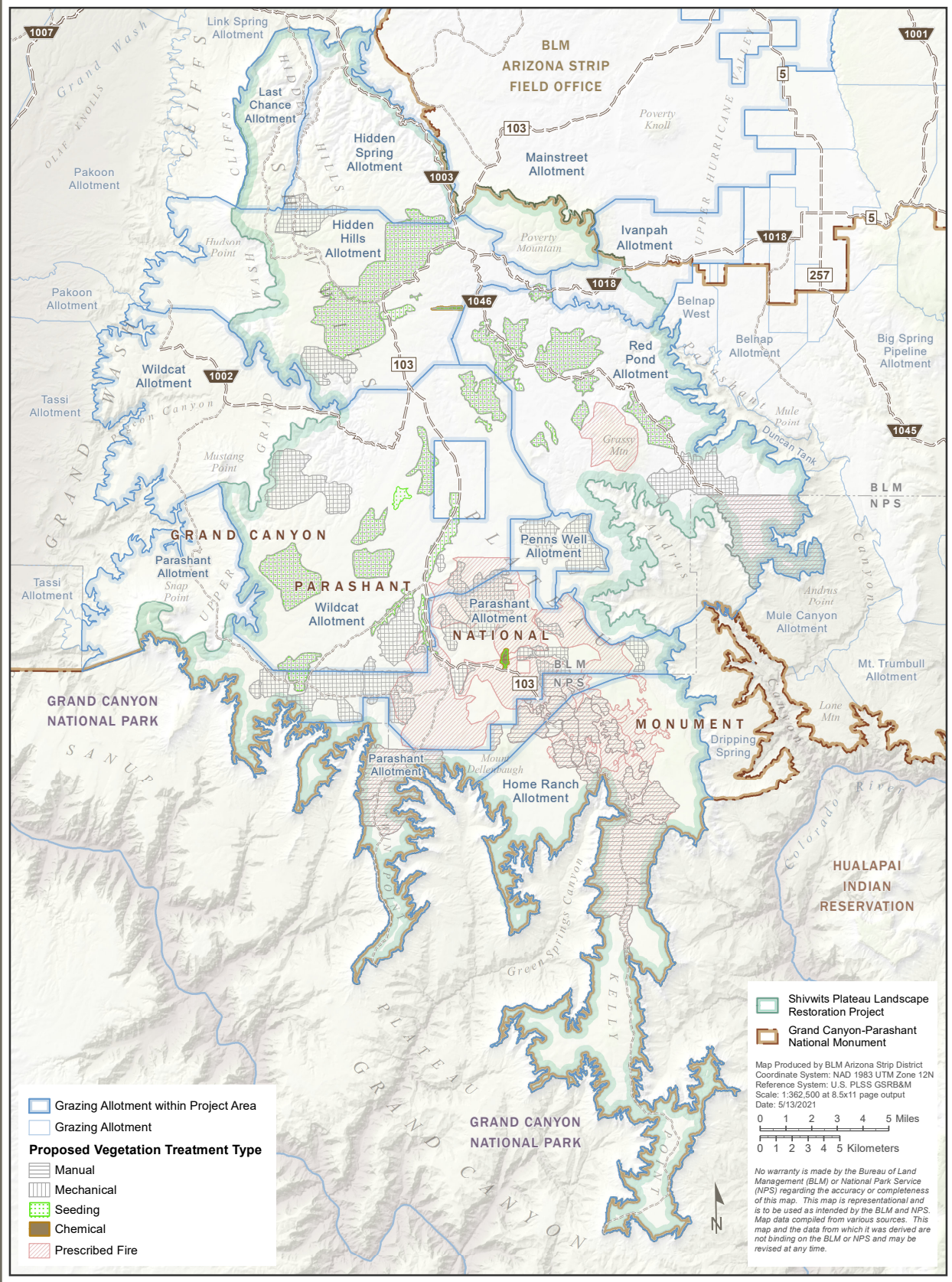


Figure B.6 Soil K Factor - Erosion by Water

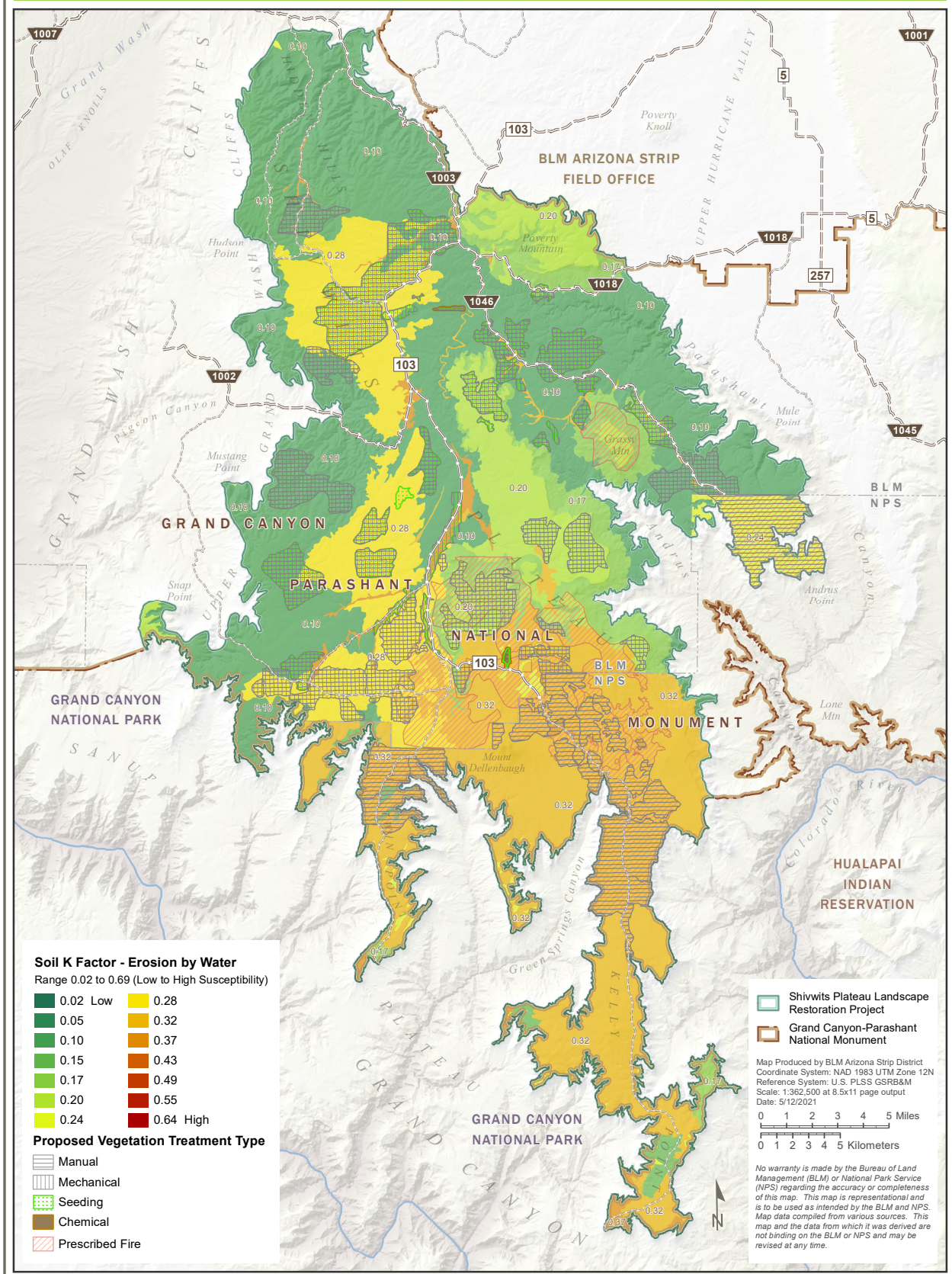


Figure B.7 Soil Depth

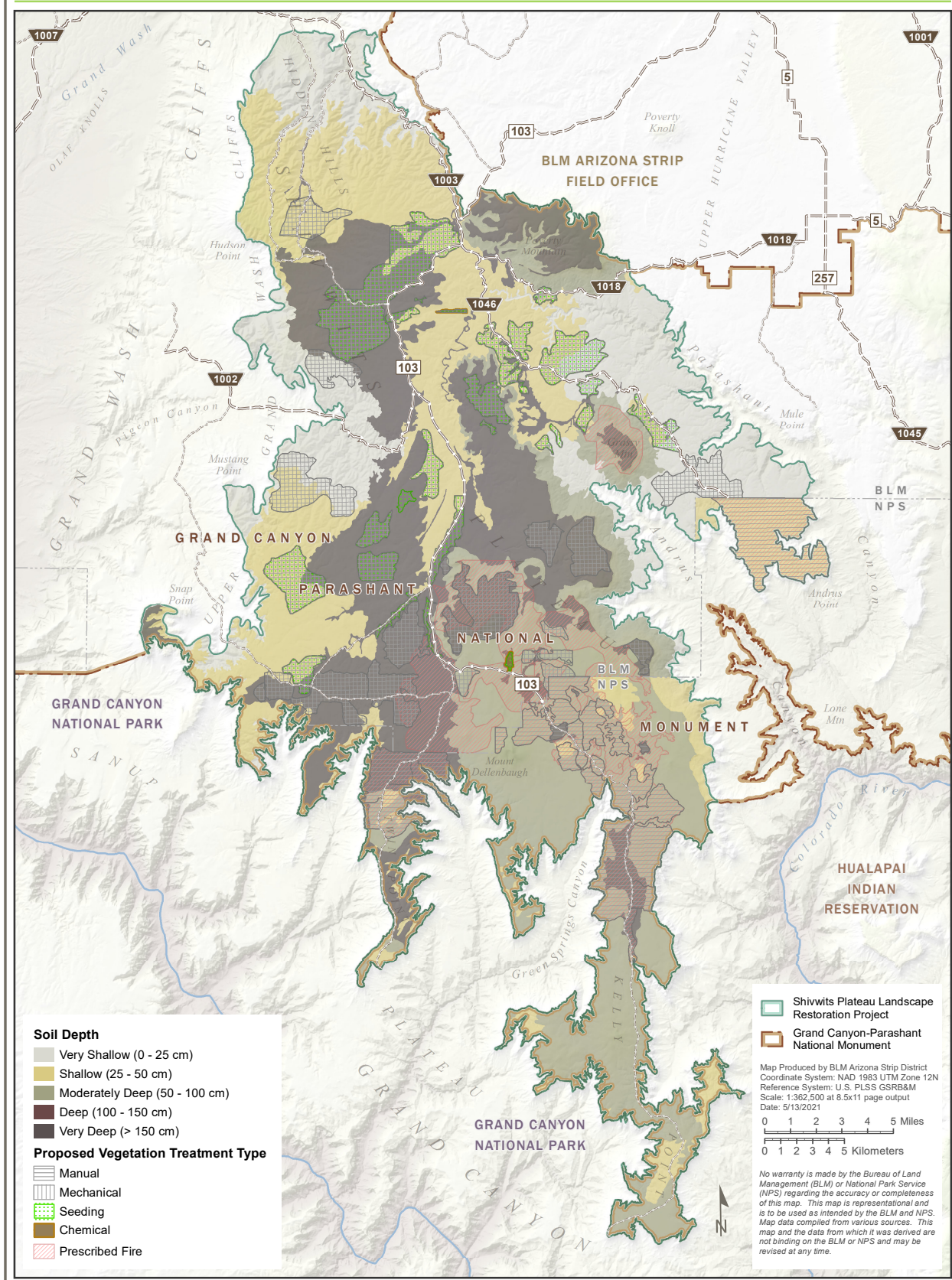


Figure B.8 Vegetation Type

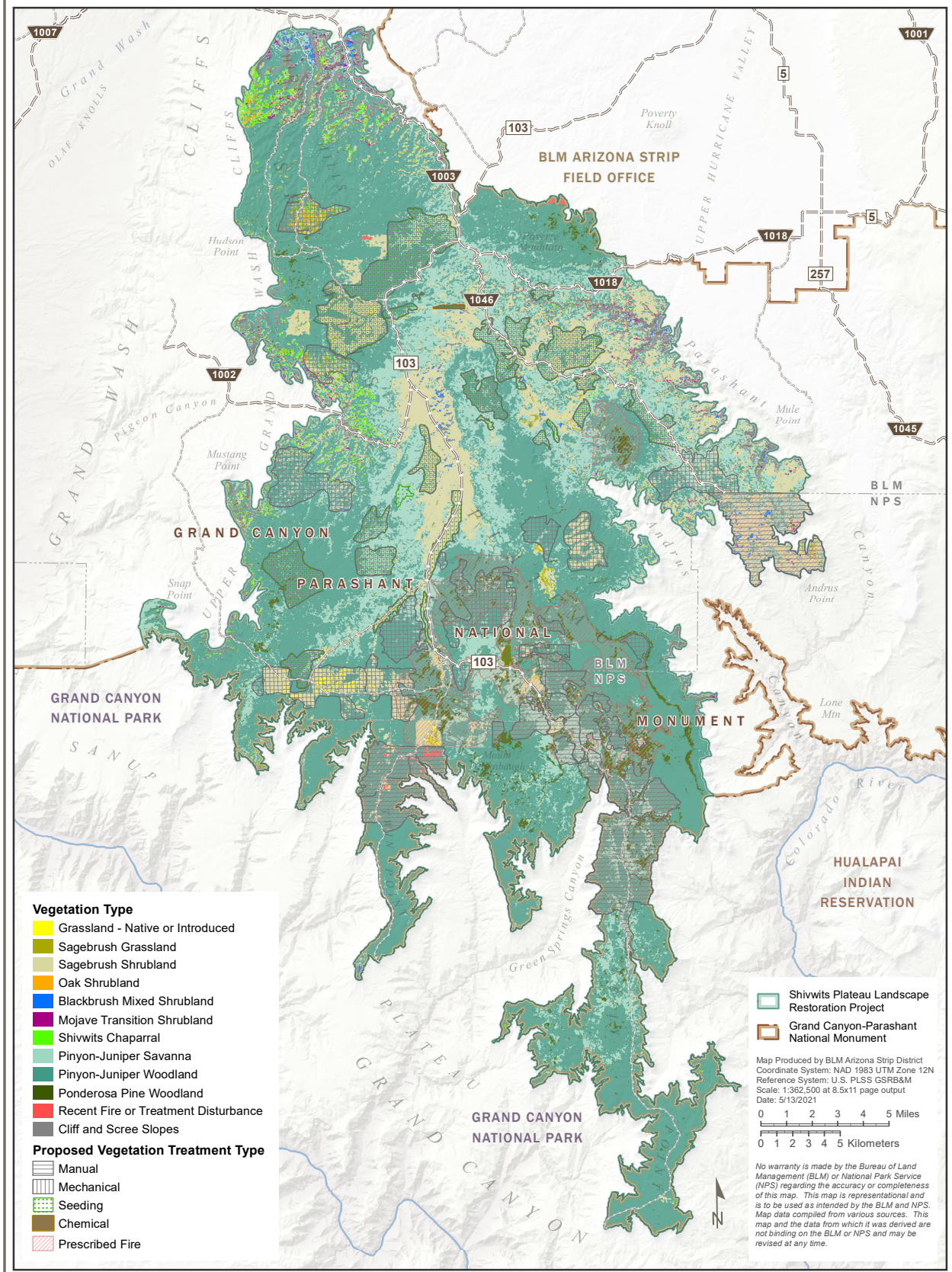


Figure B.9 Ecological Site Descriptions

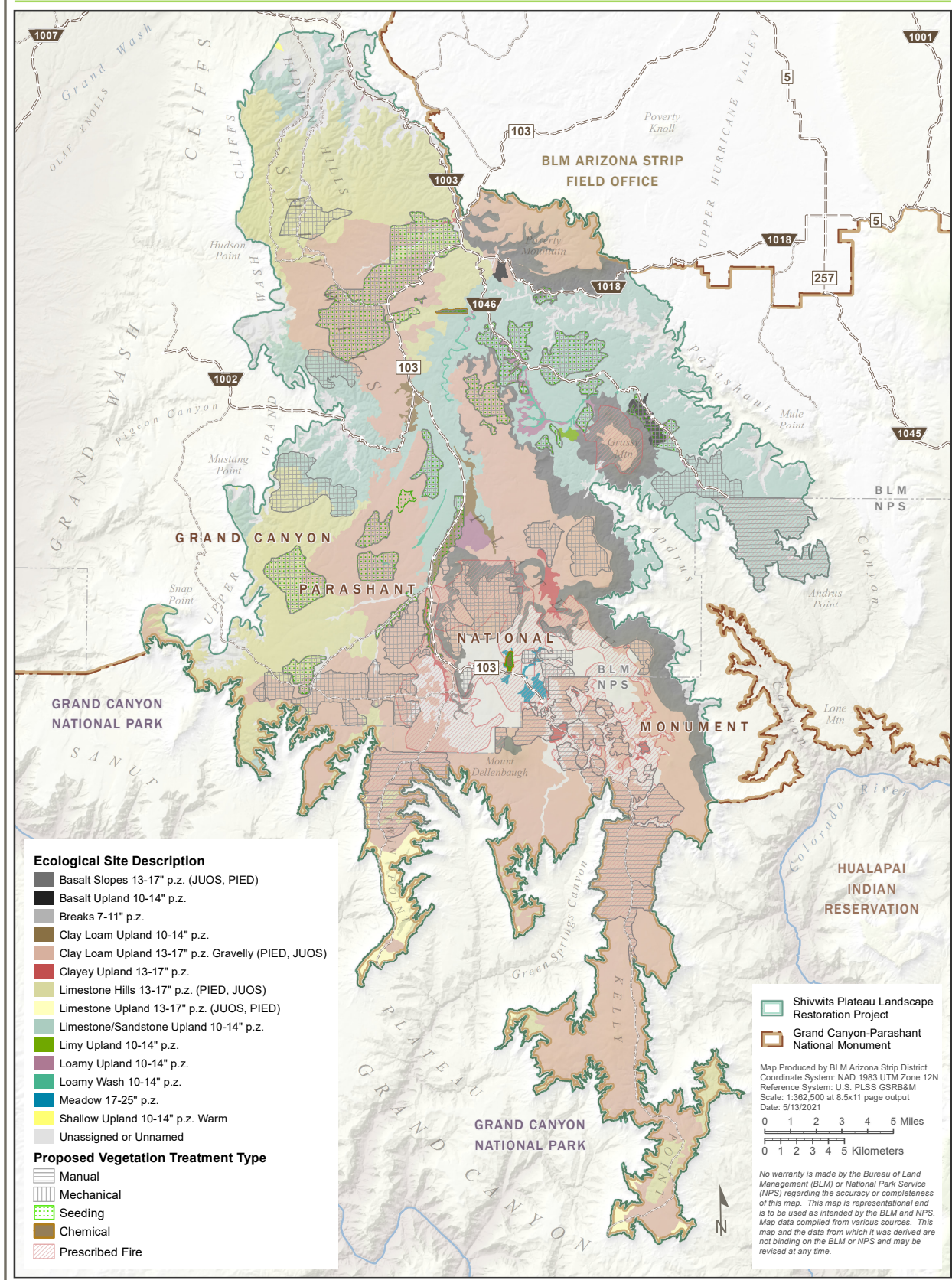


Figure B.10 Completed Vegetation Treatments

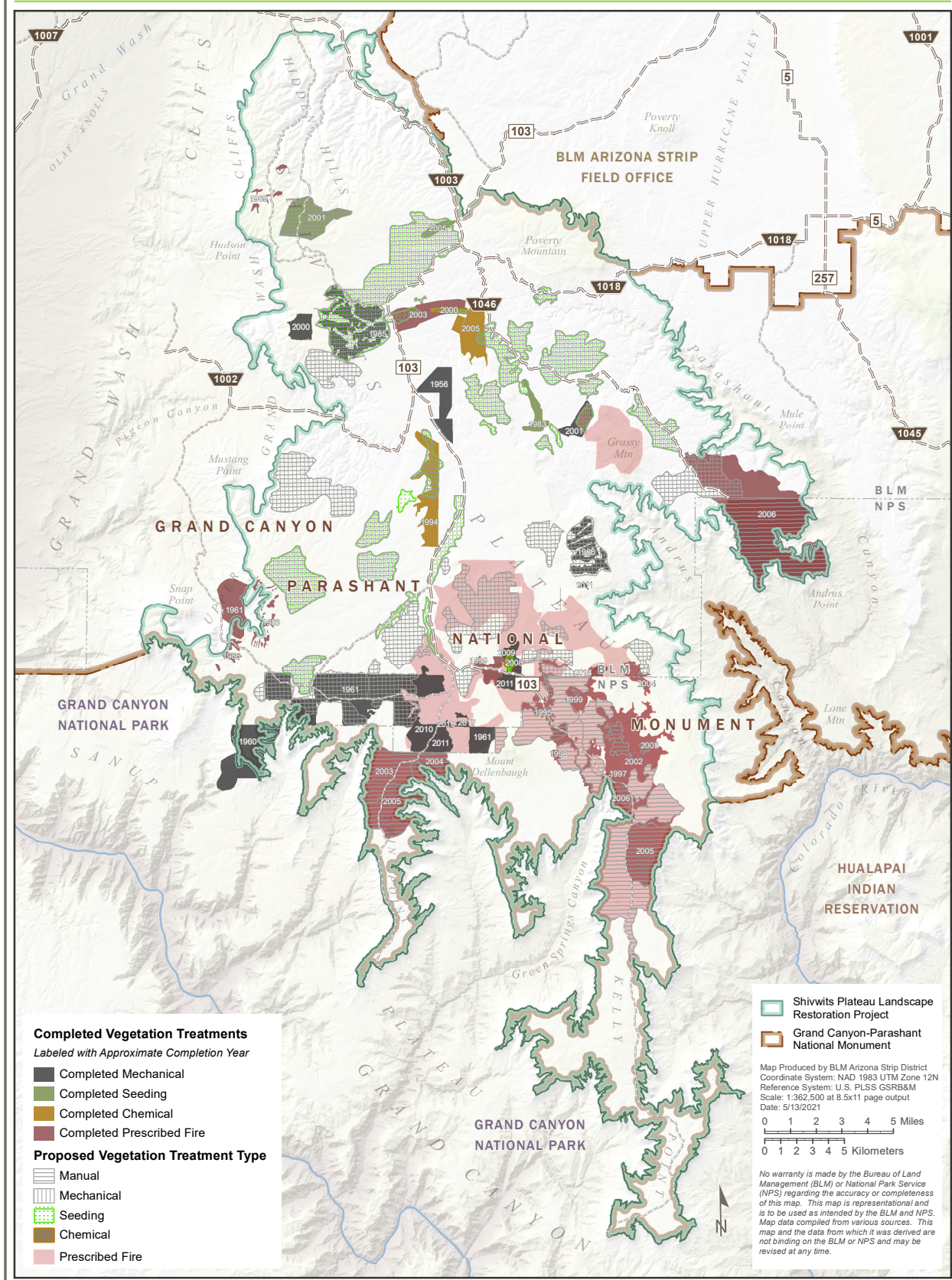


Figure B.11 Visual Resource Management (VRM) Class

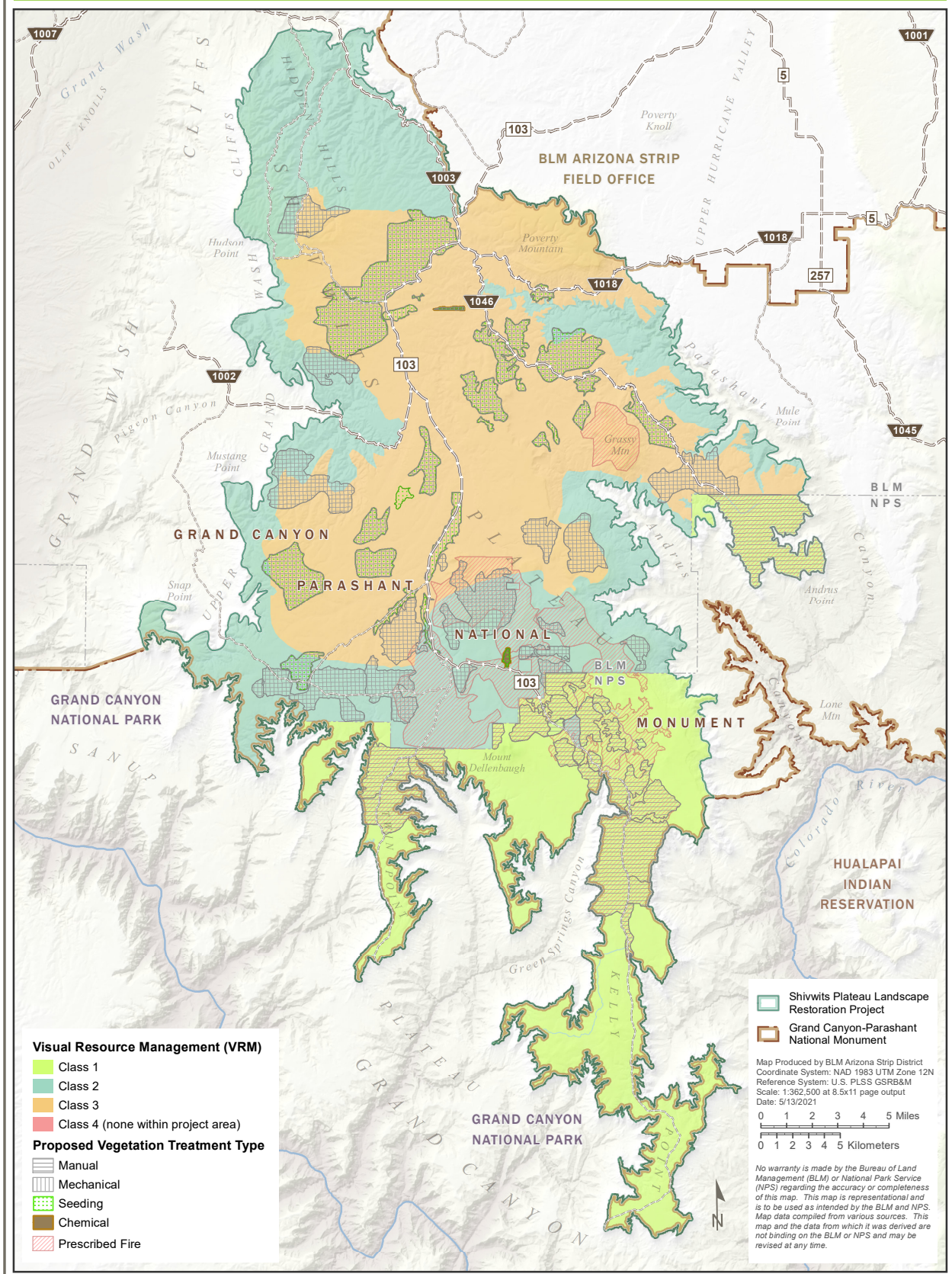


Figure B.12 Areas Excluded from Treatment Due to Slope

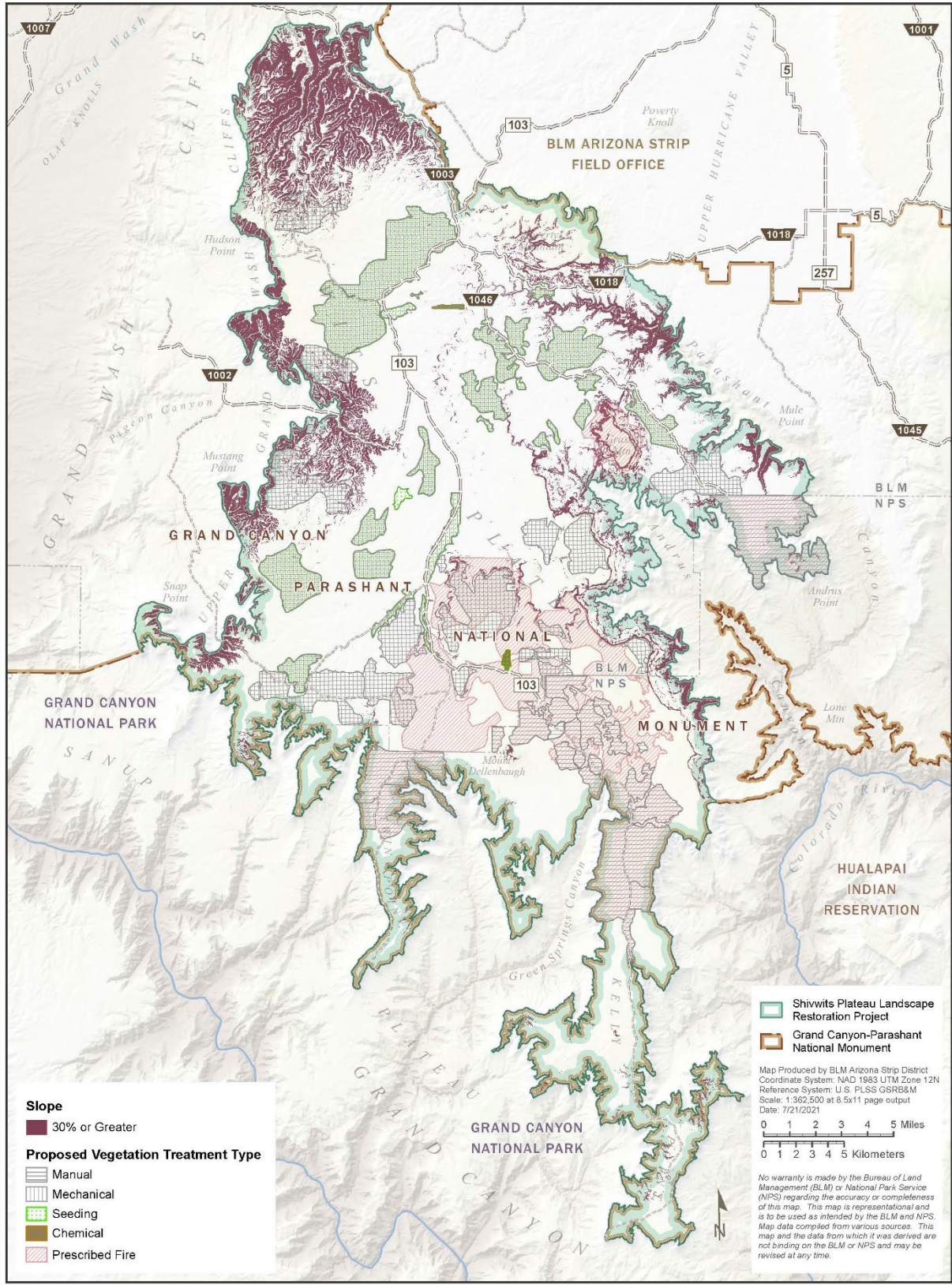
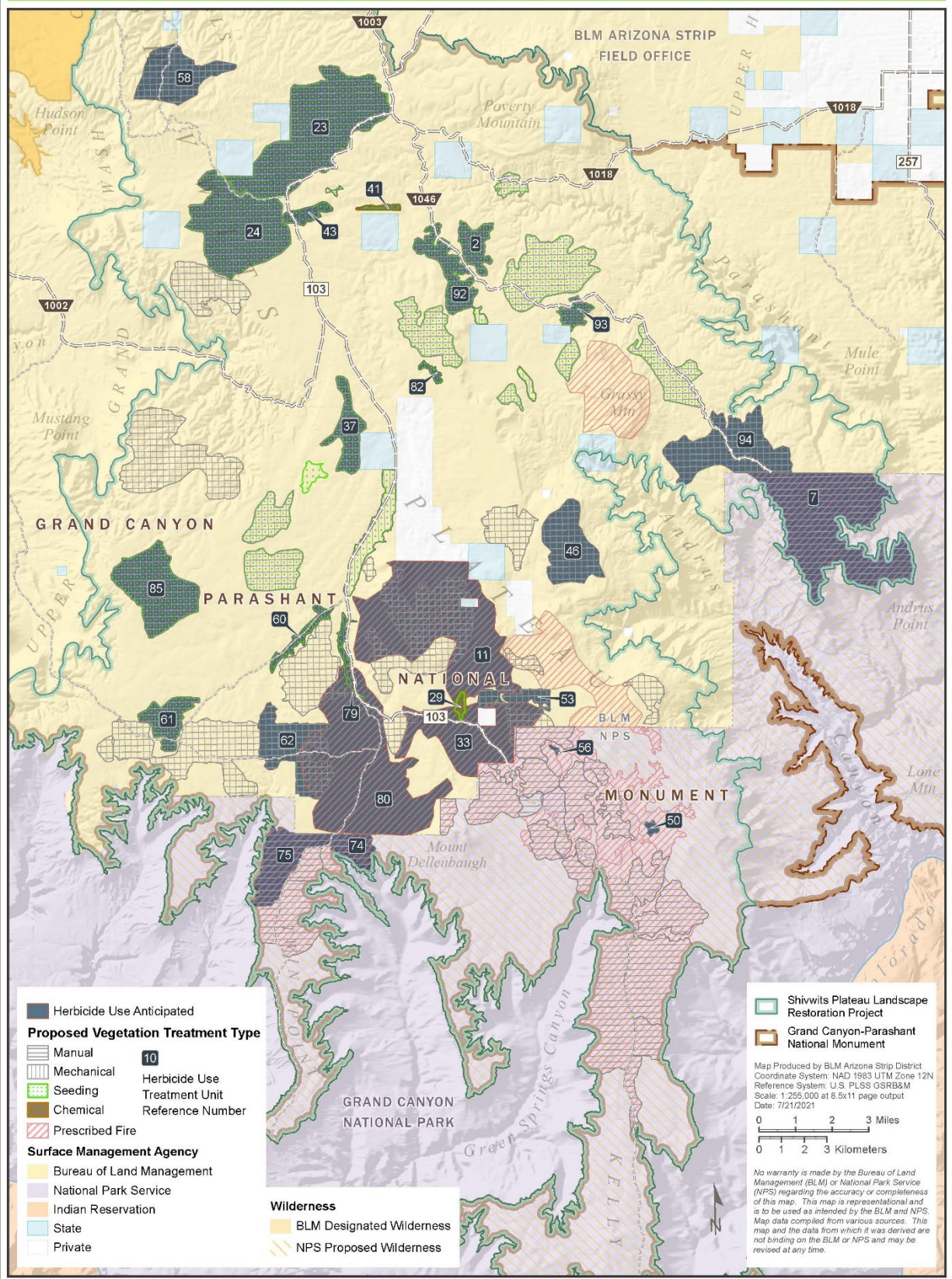


Figure B.13 Treatment Units where Herbicide Use is Anticipated



Appendix C. Diagrams and Images



Figure C.1. Example area where sagebrush would be treated. Note the majority of the above ground biomass appears senescent or dead.



Figure C.2. Example area where sagebrush would be treated. Note the majority of the sagebrush appears to be the same age class and the wide spacing in a soil type that should be supporting both younger sagebrush and missing grasses and forbs.



Figure C.3. Example area where sagebrush would be treated. Note the majority of the of the above ground biomass appears senescent or dead and the wide spacing in a soil type that should be supporting both younger sagebrush and missing grasses and forbs.



Figure C.4. Example sagebrush shrubland vegetation type where sagebrush would be treated. Note the majority of the sagebrush appears to be the same age class. Treatment would promote a more uneven age class structure.



Figure C.5. Example area where pinyon pine trees would be treated in conjunction with juniper trees. Note the several thin gray stems in the center of the image. These are high density pinyon trees. The brown trunk is an older pinyon tree. By leaving the older tree and removing the clustered younger trees, more resources would be available for the more mature pinyon.



Figure C.6. Example area where pinyon pine trees would be treated in conjunction with juniper trees. Note the several small trees under the tall tree in the center of the image. These are high density pinyon trees.



Figure C.7. Unit 29. This unit would be treated with herbicide in the areas classified as sagebrush grassland, sagebrush shrubland, recent fire or treatment disturbance, and grassland-native or introduced to remove *Convolvulus arvensis* prior to seeding with native plants.

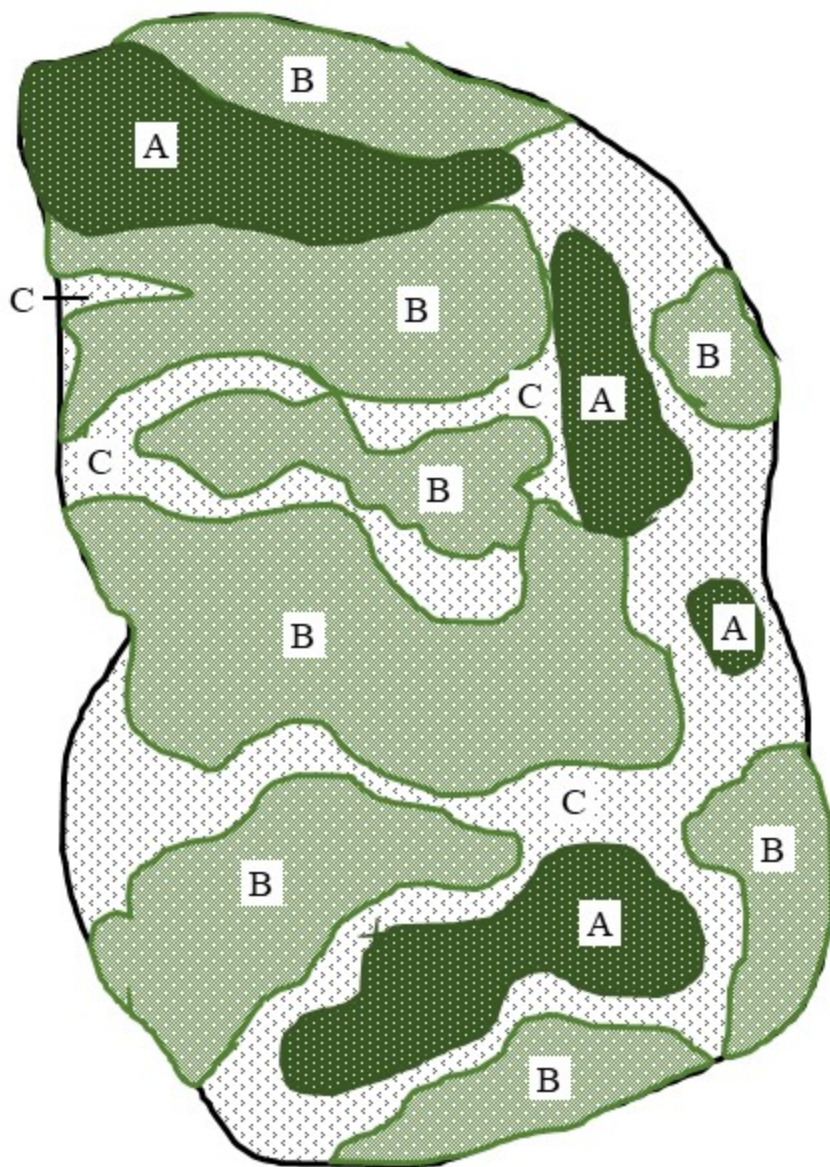


Figure C.8. Hypothetical pinyon-juniper woodland (NRCS F type) unit treatment mosaic. Not to scale. A = untreated area (25% of unit), B = area treated to leave 8 trees/acre (50% of unit), C = areas where all trees removed unless diameters exceed pinyon and juniper leave tree cutoff dimensions (25% of unit).

Appendix D. Shivwits Plateau Landscape Restoration Project Objectives for Resumption of Livestock Grazing in Areas Treated for Restoration

Livestock grazing permittees have partnered with the Monument to develop and implement the SPLRP. The following objectives and a strategy to attain these are an agreement between permittees and the Monument to ensure successful restoration of allotments/pastures with proposed vegetation treatments. The criteria stated below will be met prior to resuming livestock grazing on affected allotments and/or pastures. This will be documented in a Cooperative Agreement signed by both parties prior to treatment implementation. Objectives apply to drill/mechanical and aerial seeding and to natural recovery, with herbicide treatment. All treatment-specific objectives must be met before grazing can resume as authorized by your grazing permit. Objectives will be monitored at the pasture scale. Monitoring for these objectives will begin in year one and continue for the five years of the project. Although monitoring will occur the first year after treatment, the efforts will be observational to provide a baseline of post-treatment vegetative condition and/or treatment progress. Any pastures not meeting objectives by the end of the second growing season, post-treatment, will likely require rest the following year, and monitoring efforts will continue to determine when objectives are met.

If grazing resumption objectives are not met, it is also likely that treatment objectives are not being met. The BLM and NPS will determine if follow-up treatments are needed. Objectives for treatment success may be re-evaluated upon re-treatment. Any additional closure requirements will also be addressed at the time re-treatment occurs, and closure periods for these areas will be addressed through a revised closure document. When livestock grazing resumes, conservative utilization limits (light use) may be necessary, on a site-specific basis, to further promote treatment success. This will be achieved by temporarily adjusting livestock numbers or the length of time that livestock graze a specific pasture.

Aerial and Drill Seeding (may include mastication or similar)

Monitoring will occur in random, representative sites throughout treatment-seeded areas. The treatment-seeded areas will be available for grazing two growing seasons after the seeding and when the following objectives are met:

1. Foliar cover of perennial grasses and forbs (shrubs where applicable) is an average of greater than or equal to 20%.
2. Density of perennial grasses and forbs (and shrubs where applicable) is an average of greater than or equal to 3 plants per meter square.
3. A qualitative assessment of the fitness and vigor of native and seeded perennial plant species will be evaluated and will include at a minimum the following factors:
 - Seed head and seed production
 - Root mass, and lateral and vertical growth

-
- Precipitation during germination and growing season

The specific key perennial grass and forb species are dependent on ecological site descriptions and site conditions. Typical key grass species include, but are not limited to, Galleta, blue grama, needlegrass species, wheatgrass species, squirreltail, Indian ricegrass, and Sandberg bluegrass. Typical forbs species may include practically any native forb species. A few representative families include Scrophulariaceae, Asteraceae, Apiaceae, Fabaceae, Polemoniaceae, Polygonaceae, etc.

Natural Recovery

Natural Recovery is defined as an area where no aerial or drill seeding is occurring, but herbicide treatment may have occurred (may include treatment for invasive annual grasses). Natural recovery areas may require rest and will need to meet the above livestock resumption criteria prior to livestock grazing.

Within the proposed treatment areas, there is the potential that some treatments may not be successful. In these cases, the BLM and NPS may consider re-treatments. If the BLM and NPS determines that re-treatment is unlikely to succeed and contribute to a more resistant and resilient vegetative community, the BLM shall resume livestock grazing at the permitted level.

Rationale

Woody vegetation encroachment into historic open grass and forb communities has resulted in a loss of vegetation understory that increases both soil susceptibility to accelerated erosion and the opportunity for invasive and noxious weeds to establish. In order to stabilize watersheds, protect important resources, and achieve or continued achievement of Arizona Standards for Rangeland Health, it is necessary to establish healthy plant communities. Prematurely grazing treated areas will further increase the potential for resource damage and decrease perennial plant recovery (Miller et al. 2015).

Grazing closure duration is determined pre-treatment conditions including ESD, amount of bare ground/current desired ground cover, historic erosion, prior restoration treatments, as well as post-treatment variables including primarily post-fire weather and proper duration of livestock exclusion (Miller et al. 2015).

Literature Cited

Developing the Shivwits LRP Objectives for Resumption of Livestock Grazing in Areas Treated for Restoration, the following was used as a template for creation of these guidelines: Owyhee Field Office, Idaho. 2017a. *Soda Fire Livestock Closure Agreement for Junayo Ranch*. https://eplanning.blm.gov/public_projects/nepa/52963/106817/130637/Junayo_Ranch_Hardtri_gger_and_Reynolds_Creek_Agreement_013117.pdf (accessed 05/04/2021)

Our thanks to BLM Boise District.

Appendix E. Summary of Livestock Allotments

The following summarizes the number of livestock, kind of livestock, season of use, percent public land, authorized grazing preference (expressed in animal unit months, or AUMs) and the grazing system that was identified through each allotments management plan.

Table E.1. Current Authorized Livestock Grazing by Allotment

Allotment Name	Number of Livestock	Kind of Livestock	Season of Use	Percent Public Land ¹¹	AUMs ¹²
Hidden Hills	281	Cattle	5/16 – 12/30	90	1904
	3	Cattle	5/16 – 6/16		3
Hidden Spring	106	Cattle	3/1 – 2/28	96	1221
	3	Horse	3/1 – 2/28		35
Parashant AMP	260	Cattle	6/1 – 11/30	100	1556
Forage Reserve	125	Cattle	12/1 – 5/31		752
Penn’s Well	64	Cattle	6/1 – 10/31	93	299
Red Pond	242	Cattle	3/1 – 2/28	96	2788
	1	Cattle	5/1 – 11/05		6
Wildcat	447	Cattle	12/1 – 11/30	91	4882
	8	Horse	12/1 – 11/30		88

¹¹ Percent public land is based on AUMs.

¹² An AUM is a unit of measurement indicating how much forage is eaten by a cow/calf pair in one month.

Appendix F. Rangeland Health Evaluation

Hidden Hills Allotment (AZ04825)

A rangeland health assessment was completed on the Hidden Hills Allotment in 2010 (BLM 2010a). Recommendations from the assessment include the following:

- Maintenance of the Hidden Hills chaining to maintain vegetation species diversity.
- Maintain the vigor, percent composition and overall health of cliffrose in the Gardner Breaks area of the Gulch Point Pasture. This area is considered to be high quality mule deer habitat particularly as winter range. Maintenance could include “topping” the more decadent plants to stimulate new growth to provide browse for deer and other wildlife species.
- Thin select areas of pinyon and juniper woodland to allow herbaceous understory of grasses and brush species to repopulate and protect the soils from future erosion. Seeding of desirable species should be done where deemed feasible and necessary.
- Include previously identified treatment areas of Hidden Hills Allotment in future vegetation management plans.

Hidden Spring Allotment (AZ04803)

A rangeland health assessment was completed on the Hidden Spring Allotment in 2010 (BLM 2010b). Recommendations from the assessment include the following:

- There is encroachment of woody species, pinyon and juniper trees into sagebrush range sites.
- There are areas of large pinyon and juniper trees with no understory vegetation.
- Identify potential vegetative treatment areas.
- 125 acres of stream terrace soils in the southeastern part of the allotment, which would require a vegetation treatment to reduce sagebrush and trees to increase grass composition and to reduce erosion. Erosion occurring in the bottoms of the large canyons.

Parashant AMP Forage Reserve (AZ04829)

A rangeland health assessment was completed on the Parashant AMP Forage Reserve Allotment in 2019 (BLM 2019). Recommendations from the assessment include the following:

- Twin Point Pasture: PIPO dominates this pasture. PJ present throughout the PIPO stands in this pasture. Cited that fire return interval within the PIPO stands is overdue.
- West Salt House Pasture: Areas throughout this pasture should be evaluated for mechanical treatment. Likely adequate understory, treatments would not require seeding at this time.
- East Salt House Pasture: Much of this pasture was chained and seeded in 1960s and 1980s. PJ dominates this pasture, with increasing ponderosa pine to the east. Evaluate the woody areas for re-treatment or maintenance.

-
- Tinncanebitts Pasture: PJ throughout this pasture. Portions of this pasture chained and seeded in 1960s and 1980s. PJ areas should be evaluated for re-treatment. Scattered ponderosa pine within this pasture.
 - Kelly Pasture: Key area represents meadow openings within the PIPO and PJs. PJ areas should be evaluated for treatment in this pasture.

Penn's Well Allotment (AZ04852)

A rangeland health assessment was completed on the Penn's Well Allotment in 2002 (BLM 2002). Recommendations from the assessment include the following:

- Maintain vegetation species diversity in the Penn's Well chaining.
- Encourage vegetative treatment projects in pinyon and juniper habitat to benefit mule deer habitat using prescriptions developed in habitat management plans. Leave debris piles unburned for small animals where practical. Leave as many snags as possible for raptor perches, cavity nesting birds, and bats.
- A 500-acre area with soils of high production potential on Penn's Well was identified for restoration treatment. Reduction of pinyon and juniper trees composition. Increase grasses, forbs, and browse species composition and diversity to better stabilize a portion of the Parashant Canyon drainage. Refer to Desired Plant Community objectives for that area (BLM 2002).

Red Pond Allotment (AZ04806)

Rangeland health assessment was completed on the Red Pond Allotment in 2007 and an amendment was completed in 2013 (BLM 2007a, BLM 2013a). Recommendations from the assessment include the following:

- Give priority to Grassy Mountain vegetation treatment project to restore vegetation diversity. At the time of the assessment there was a lack of understory vegetation in the area on the northeast side of Grassy Mountain. Nine hundred acres of mechanical vegetation treatment proposed in the Parashant Interdisciplinary Management Plan (1997). Three hundred acres on the west side of Grassy Mountain have been fully implemented. The project would benefit watershed and wildlife resources. The NEPA documentation and cultural clearances were completed for the entire project area.
- Continue using the herbicide Tebuthiuron "Spike 20P" as a tool to reduce the composition of sagebrush in areas identified for treatment.

Wildcat Allotment (AZ04854)

A rangeland health assessment was completed on the Wildcat Allotment in 2007 and an amendment was completed in 2013 (BLM 2007b, BLM 2013b). Recommendations from the assessment include the following:

- Prioritize the Salt House pinyon and juniper removal treatment project (1,000 acres) to restore vegetation diversity, ground cover abundance, and assist in watershed functionality in the West Fork of the Parashant drainage. This project was developed

under the Parashant Interdisciplinary Management Plan (1997) and NEPA was completed. The project area could be expanded. This project has been identified as an action in BLM's five-year fuels reduction plan which would be implemented as a multi-discipline project.

- There is a lack of vegetative diversity, lack of understory in north part of Salt House pasture. This is the result of those upland acres being dominated by pinyon and juniper trees.
- On approximately 2,000 acres woody species dominate (mainly pinyon and juniper trees) have increased on upland sites resulting in a decrease of understory species such as sagebrush, cliffrose, and desert holly, and an increase in bare ground. Increases in bare ground may result in soil movement, small rills, and gully cutting.
- Continue using the herbicide Tebuthiuron "Spike 20P" as a tool to reduce the composition of sagebrush or other woody species in identified treatment areas to meet desired plant community objectives.

Appendix G. Arizona Standards for Rangeland Health and Guidelines for Grazing Administration (BLM 1997)

INTRODUCTION

The Department of the Interior's final rule for Grazing Administration, issued on February 22, 1995, and effective August 21, 1995, requires that Bureau of Land Management (BLM) State Directors develop State or regional standards and guidelines for grazing administration in consultation with BLM Resource Advisory Councils (RAC), other agencies and the public. The final rule provides that fallback standards and guidelines be implemented, if State standards and guidelines are not developed by February 12, 1997. Arizona Standards and Guidelines and the final rule apply to grazing administration on public lands as indicated by the following quotation from the Federal Register, Volume 60, Number 35, page 9955.

"The fundamentals of rangeland health, guiding principles for standards and the fallback standards address ecological components that are affected by all uses of public rangelands, not just livestock grazing. However, the scope of this final rule, and therefore the fundamentals of rangeland health of §4180.1, and the standards and guidelines to be made effective under §4180.2, are limited to grazing administration."

Although the process of developing standards and guidelines applies to grazing administration, present rangeland health is the result of the interaction of many factors in addition to grazing by livestock. Other contributing factors may include, but are not limited to, past land uses, land use restrictions, recreation, wildlife, rights-of-way, wild horses and burros, mining, fire, weather, and insects and disease.

With the commitment of BLM to ecosystem and interdisciplinary resource management, the standards for rangeland health as developed in this current process will be incorporated into management goals and objectives. The standards and guidelines for rangeland health for grazing administration, however, are not the only considerations in resolving resource issues.

The following quotations from the Federal Register, Vol. 60, No. 35, page 9956, February 22, 1995, describe the purpose of standards and guidelines and their implementation:

"The guiding principles for standards and guidelines require that State or regional standards and guidelines address the basic components of healthy rangelands. The Department believes that by implementing grazing-related actions that are consistent with the fundamentals of §4180.1 and the guiding principles of §4180.2, the long-term health of public rangelands can be ensured.

"Standards and guidelines will be implemented through terms and conditions of grazing permits, leases, and other authorizations, grazing-related portions of

activity plans (including Allotment Management Plans), and through range improvement-related activities.

"The Department anticipates that in most cases the standards and guidelines themselves will not be terms and conditions of various authorizations but that the terms and conditions will reflect the standards and guidelines.

"The Department intends that assessments and corrective actions will be undertaken in priority order as determined by BLM.

"The Department will use a variety of data including monitoring records, assessments, and knowledge of the locale to assist in making the "significant progress" determination. It is anticipated that in many cases it will take numerous grazing seasons to determine direction and magnitude of trend. However, actions will be taken to establish significant progress toward conformance as soon as sufficient data are available to make informed changes in grazing practices."

FUNDAMENTALS AND DEFINITION OF RANGELAND HEALTH

The Grazing Administration Regulations, at §4180.1 (43 Code of Federal Regulation [CFR] 4180.1), Federal Register Vol. 60, No. 35, pg. 9970, direct that the authorized officer ensures that the following conditions of rangeland health exist:

- (a) Watersheds are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components; soil and plant conditions support infiltration, soil moisture storage, and the release of water that are in balance with climate and landform and maintain or improve water quality, water quantity, and timing and duration of flow.
- (b) Ecological processes, including the hydrologic cycle, nutrient cycle, and energy flow, are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities.
- (c) Water quality complies with State water quality standards and achieves, or is making significant progress toward achieving, established BLM management objectives such as meeting wildlife needs.
- (d) Habitats are, or are making significant progress toward being, restored or maintained for Federal threatened and endangered species, Federal Proposed, Category 1 and 2 Federal candidate and other special status species.

These fundamentals focus on sustaining productivity of a rangeland rather than its uses. Emphasizing the physical and biological functioning of ecosystems to determine rangeland health is consistent with the definition of rangeland health as proposed by the Committee on

Rangeland Classification, Board of Agriculture, National Research Council (Rangeland Health, 1994, pg. 4 and 5 [NRC 1994]). This Committee defined Rangeland Health ". . . as the degree to which the integrity of the soil and the ecological processes of rangeland ecosystems are sustained." This committee emphasized ". . . the degree of integrity of the soil and ecological processes that are most important in sustaining the capacity of rangelands to satisfy values and produce commodities." The Committee also recommended that "The determination of whether a rangeland is healthy, at risk, or unhealthy should be based on the evaluation of three criteria: degree of soil stability and watershed function, integrity of nutrient cycles and energy flow, and presence of functioning mechanisms" (Rangeland Health, 1994, pg. 97-98[NRC 1994]).

Standards describe conditions necessary to encourage proper functioning of ecological processes on specific ecological sites. An ecological site is the logical and practical ecosystem unit upon which to base an interpretation of rangeland health. Ecological site is defined as:

". . . a kind of land with specific physical characteristics which differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its response to management" (Journal of Range Management, 48:279, 1995 [Adams 1995]). Ecological sites result from the interaction of climate, soils, and landform (slope, topographic position). The importance of this concept is that the "health" of different kinds of rangeland must be judged by standards specific to the potential of the ecological site. Acceptable erosion rates, water quality, productivity of plants and animals, and other features are different on each ecological site.

Since there is wide variation of ecological sites in Arizona, standards and guidelines covering these sites must be general. To make standards and guidelines too specific would reduce the ability of BLM and interested publics to select specific objectives, monitoring strategies, and grazing permit terms and conditions appropriate to specific landforms.

Ecological sites have the potential to support several different plant communities. Existing communities are the result of the combination of historical and recent uses and natural events. Management actions may be used to modify plant communities on a site. The desired plant community for a site is defined as follows: "Of the several plant communities that may occupy a site, the one that has been identified through a management plan to best meet the plan's objectives for the site. It must protect the site as a minimum." (Journal of Range Management, 48:279, 1995. [Adams 1995])

Fundamentals (a) and (b) define physical and biological components of rangeland health and are consistent with the definition of rangeland health as defined by the Committee on Rangeland Classification, Board on Agriculture, National Research Council, as discussed in the paragraph above. These fundamentals provide the basis for sustainable rangelands.

Fundamentals (c) and (d) emphasize compliance with existing laws and regulation and, therefore, define social and political components of rangeland health. Compliance with Fundamentals (c) and (d) is accomplished by managing to attain a specific plant community and associated wildlife

species present on ecological sites. These desired plant communities are determined in the BLM planning process, or, where the desired plant community is not identified, a community may be selected that will meet the conditions of Fundamentals (a) and (b) and also adhere to laws and regulations. Arizona Standard 3 is written to comply with Fundamentals (c) and (d) and provide a logical combination of Standards and Guidelines for planning and management purposes.

STANDARD AND GUIDELINE DEFINITIONS

Standards are goals for the desired condition of the biological and physical components and characteristics of rangelands. Standards:

- (1) are measurable and attainable; and
- (2) comply with various Federal and State statutes, policies, and directives applicable to BLM Rangelands.

Guidelines are management approaches, methods, and practices that are intended to achieve a standard. Guidelines:

- (1) typically identify and prescribe methods of influencing or controlling specific public land uses;
- (2) are developed and applied consistent with the desired condition and within site capability; and
- (3) may be adjusted over time.

IMPLEMENTING STANDARDS AND GUIDELINES

The authorized officer will review existing permitted livestock use, allotment management plans, or other activity plans which identify terms and conditions for management on public land. Existing management practices, and levels of use on grazing allotments will be reviewed and evaluated on a priority basis to determine if they meet, or are making significant progress toward meeting, the standards and are in conformance with the guidelines. The review will be interdisciplinary and conducted under existing rules which provide for cooperation, coordination, and consultation with affected individuals, federal, state, and local agencies, tribal governments, private landowners, and interested publics.

This review will use a variety of data, including monitoring records, assessments, and knowledge of the locale to assist in making the significant progress determination. Significance will be determined on a case-by-case basis, considering site potential, site condition, weather and financial commitment. It is anticipated there will be cases where numerous years will be needed to determine direction and magnitude of trend.

Upon completion of review, the authorized officer shall take appropriate action as soon as practicable but no later than the start of the next grazing year upon determining that the existing grazing management practices or level of use on public land are significant factors contributing to failure to achieve the standards and conform with the guidelines that are made effective under 43 CFR 4180.2. Appropriate action means implementing actions that will result in significant

progress toward fulfillment of the standards and significant progress toward conformance with guidelines.

Livestock grazing will continue where significant progress toward meeting standards is being made. Additional activities and practices would not be needed on such allotments. Where new activities or practices are required to assure significant progress toward meeting standards, livestock grazing use can continue contingent upon determinations from monitoring data that the implemented actions are effective in making significant progress toward meeting the standards. In some cases, additional action may be needed as determined by monitoring data over time.

New plans will incorporate an interdisciplinary team approach (Arizona BLM Interdisciplinary Resource Management Handbook, April 1995). The terms and conditions for permitted grazing in these areas will be developed to comply with the goals and objectives of these plans which will be consistent with the standards and guidelines.

ARIZONA STANDARDS AND GUIDELINES

Arizona Standards and Guidelines (S&G) for grazing administration have been developed through a collaborative process involving the Bureau of Land Management State S&G Team and the Arizona Resource Advisory Council. Together, through meetings, conference calls, correspondence, and Open Houses with the public, the BLM State Team and RAC prepared Standards and Guidelines to address the minimum requirements outlined in the grazing regulations. The Standards and Guidelines, criteria for meeting Standards, and indicators are an integrated document that conforms to the fundamentals of rangeland health and the requirements of the regulations when taken as a whole.

Upland sites, riparian-wetland areas, and desired resource conditions are each addressed by a standard and associated guidelines.

Standard 1: Upland Sites

Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).

Criteria for meeting Standard 1:

Soil conditions support proper functioning of hydrologic, energy, and nutrient cycles. Many factors interact to maintain stable soils and healthy soil conditions, including appropriate amounts of vegetative cover, litter, and soil porosity and organic matter. Under proper functioning conditions, rates of soil loss and infiltration are consistent with the potential of the site.

Ground cover in the form of plants, litter or rock is present in pattern, kind, and amount sufficient to prevent accelerated erosion for the ecological site; or ground cover is increasing as determined by monitoring over an established period of time.

Signs of accelerated erosion are minimal or diminishing for the ecological site as determined by monitoring over an established period of time.

As indicated by such factors as:

Ground Cover

litter

live vegetation, amount and type (e.g. grass, shrubs, trees, etc.)

rock

Signs of erosion

flow pattern

gullies

rills

plant pedestaling

Exceptions and exemptions (where applicable): none

Guidelines:

1-1. Management activities will maintain or promote ground cover that will provide for infiltration, permeability, soil moisture storage, and soil stability appropriate for the ecological sites within management units. The ground cover should maintain soil organisms and plants and animals to support the hydrologic and nutrient cycles, and energy flow. Ground cover and signs of erosion are surrogate measures for hydrologic and nutrient cycles and energy flow.

1-2. When grazing practices alone are not likely to restore areas of low infiltration or permeability, land management treatments may be designed and implemented to attain improvement.

Standard 2: Riparian-Wetland Sites

Riparian-wetland areas are in properly functioning condition.

Criteria for meeting Standard 2:

Stream channel morphology and functions are appropriate for proper functioning condition for existing climate, landform, and channel reach characteristics. Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows.

Riparian-wetland functioning condition assessments are based on examination of hydrologic, vegetative, soil and erosion-deposition factors. BLM has developed a standard checklist to address these factors and make functional assessments. Riparian-wetland areas are functioning properly as indicated by the results of the application of the appropriate checklist.

The checklist for riparian areas is in Technical Reference 1737-9 "Process for Assessing Proper Functioning Condition." The checklist for wetlands is in Technical Reference 1737-11 "Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas."

As indicated by such factors as:

Gradient
Width/depth ratio
Channel roughness and sinuosity of stream channel
Bank stabilization
Reduced erosion
Captured sediment
Ground-water recharge
Dissipation of energy by vegetation

Exceptions and exemptions (where applicable):

- Dirt tanks, wells, and other water facilities constructed or placed at a location for the purpose of providing water for livestock and/or wildlife and which have not been determined through local planning efforts to provide for riparian or wetland habitat are exempt.
- Water impoundments permitted for construction, mining, or other similar activities are exempt.

Guidelines:

2-1. Management practices maintain or promote sufficient vegetation to maintain, improve or restore riparian-wetland functions of energy dissipation, sediment capture, groundwater recharge and stream bank stability, thus promoting stream channel morphology (e.g. gradient, width/depth ratio, channel roughness and sinuosity) and functions appropriate to climate and landform.

2-2. New facilities are located away from riparian-wetland areas if they conflict with achieving or maintaining riparian-wetland function. Existing facilities are used in a way that does not conflict with riparian-wetland functions or are relocated or modified when incompatible with riparian-wetland functions.

2-3. The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect ecological functions and processes.

Standard 3: Desired Resource Conditions

Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

Criteria for meeting Standard 3:

Upland and riparian-wetland plant communities meet desired plant community objectives. Plant community objectives are determined with consideration for all multiple uses. Objectives also address native species, and the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and appropriate laws, regulations, and policies.

Desired plant community objectives will be developed to assure that soil conditions and ecosystem function described in Standards 1 and 2 are met. They detail a site-specific plant community, which when obtained, will assure rangeland health, State water quality standards, and habitat for endangered, threatened, and sensitive species. Thus, desired plant community objectives will be used as an indicator of ecosystem function and rangeland health.

As indicated by such factors as:

Composition
Structure
Distribution

Exceptions and exemptions (where applicable):

- Ecological sites or stream reaches on which a change in existing vegetation is physically, biologically, or economically impractical.

Guidelines:

3-1. The use and perpetuation of native species will be emphasized. However, when restoring or rehabilitating disturbed or degraded rangelands, non-intrusive, non-native plant species are appropriate for use where native species (a) are not available, (b) are not economically feasible, (c) cannot achieve ecological objectives as well as non-native species, and/or (d) cannot compete with already established non-native species.

3-2. Conservation of Federal threatened or endangered, proposed, candidate, and other special status species is promoted by the maintenance or restoration of their habitats.

3-3. Management practices maintain, restore, or enhance water quality in conformance with State or Federal standards.

3-4. Intensity, season and frequency of use, and distribution of grazing use should provide for growth and reproduction of those plant species needed to reach desired plant community objectives.

3-5. Grazing on designated ephemeral (annual and perennial) rangeland may be authorized if the following conditions are met:

- ephemeral vegetation is present in draws, washes, and under shrubs and has grown to useable levels at the time grazing begins;

-
- sufficient surface and subsurface soil moisture exists for continued plant growth;
 - serviceable waters are capable of providing for proper grazing distribution;
 - sufficient annual vegetation will remain on site to satisfy other resource concerns, (i.e., watershed, wildlife, wild horses and burros); and
 - monitoring is conducted during grazing to determine if objectives are being met.

3-6. Management practices will target those populations of noxious weeds which can be controlled or eliminated by approved methods.

3-7. Management practices to achieve desired plant communities will consider protection and conservation of known cultural resources, including historical sites, and prehistoric sites and plants of significance to Native American peoples.

Appendix H. Minimum Requirements Analysis

Under NPS policy (2006), proposed wilderness management will follow four main precepts.

1. The National Park Service will take no action that would diminish the wilderness eligibility of an area possessing wilderness characteristics until the legislative process of wilderness designation has been completed.
2. All management decisions affecting wilderness will further apply the concept of “minimum requirement” for the administration of the area regardless of wilderness category.
3. Management should seek to sustain the natural distribution, numbers, population composition, and interaction of indigenous species.
4. Management intervention should only be undertaken to the extent necessary to correct past mistakes, the impacts of human use...

Minimum Requirement Analysis (MRA) uses a different standard of “impact” than that used in the NEPA process. The idea of impact or impairment in the Wilderness Act is based on the casual visitor’s expectations of “wildness” and “naturalness”, regardless of the ecological health of the landscape. Thus, a grassland dominated by an invasive plant may appear natural and wild to the casual visitor while a botanist familiar with grasslands in the area may instead experience a degraded landscape. All Wilderness Act type impacts, no matter how minor or transitory, are considered with the same weight in minimum requirement analysis. The following MRA uses this different interpretation of “impact” for analysis. Negligible and significant impacts, as defined in the NEPA process, will be further discussed in Section 3.7.

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MINIMUM REQUIREMENTS DECISION GUIDE WORKBOOK

“...except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act...”

-- The Wilderness Act of 1964

Project Title: Shivwits Plateau Landscape Restoration Project

MRDG Step 1: Determination

*Determine if Administrative Action is **Necessary***

Description of the Situation

What is the situation that may prompt administrative action?

Parashant Monument staff have identified portions of the proposed wilderness (PW) where desired conditions for species diversity, vegetative cover, and wildlife habitat are not being achieved based on rangeland health evaluations, survey plots, trend state, and field observations. These conditions are the result of the effects of past land uses, changes to the natural fire regime, and establishment and spread of invasive non-native plant species. Restoring ecosystem health and reducing hazardous fuel loading is integral to achieving the vegetation management objectives and goals for wildlife habitat and vegetation resources in the 2008 GMP/RMP (Appendix A) for the SPLRP.

Options Outside of Wilderness

Can action be taken outside of wilderness that adequately addresses the situation?

☐ YES

STOP – DO NOT TAKE ACTION IN WILDERNESS

☒ NO

EXPLAIN AND COMPLETE STEP 1 OF THE MRDG

Explain:

While vegetation treatments (i.e. a combination of manual, mechanical, chemical, and prescribed fire) occur outside of the PW to restore ecosystem health, actions taken outside the PW will not address the management objectives to restore conditions inside the PW. Hazardous fuel loads and reduced vegetative diversity will continue unless treatments are conducted.

Criteria for Determining Necessity

Is action necessary to meet any of the criteria below?

A. Valid Existing Rights or Special Provisions of Wilderness Legislation

*Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that **requires** action? Cite law and section.*

☒ YES ☐ NO

Explain:

The Wilderness Act, Special Provisions, Section 4(d)(1) allows that “such measure may be taken as may be necessary to control fire, insects, and diseases, subject to such conditions as the Secretary deems desirable.” Within ponderosa pine woodland areas that have not been previously treated, fire regimes do not conform to historic information. These areas are more prone to catastrophic wildfire instead of single stand, or single tree, fires than expected. Appropriate treatment would reduce the risk of large-scale fire.

B. Requirements of Other Legislation

*Is action necessary to meet the requirements of **other federal laws**? Cite law and section.*

☐ YES ☒ NO

Explain:

There are no other legislation requirements that require action in the project area.

C. Wilderness Character

Is action necessary to preserve one or more of the five qualities of wilderness character?

UNTRAMMELED

☐ YES ☒ NO

Explain:

This project is not necessary to preserve the untrammeled wilderness character.

UNDEVELOPED

☐ YES ☒ NO

Explain:

This project is not necessary to preserve the undeveloped wilderness character.

NATURAL

Explain:

This project is necessary to maintain the natural quality of wilderness character by reintroducing a natural fire regime to the woodlands. Current conditions within ponderosa pine woodlands are the result of overgrazing and nearly 100 years of fire suppression. This has allowed ladder fuels to build up and increase the likelihood that a natural fire start in ponderosa pine woodland would result in a catastrophic stand-replacing fire instead of the relatively low intensity burn 3-4 year (small fire) or 7-16 year (large fire) fire interval (Ireland 2012).

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

☐ YES ☒ NO

Explain:

This project is not necessary to preserve the solitude or primitive and unconfined recreation wilderness character.

OTHER FEATURES OF VALUE

☐ YES ☒ NO

Explain:

No other features of value were identified in the Monument's Proclamation for this proposed wilderness area. Therefore, this project is not necessary to preserve other features of value.

Step 1 Determination

*Is administrative action **necessary** in wilderness?*

Criteria for Determining Necessity

A. Existing Rights or Special	☒ YES	☐ NO
B. Requirements of Other Legislation	☐ YES	☒ NO
C. Wilderness Character		
Untrammelled	☐ YES	☒ NO
Undeveloped	☐ YES	☒ NO
Natural	☒ YES	☐ NO
Solitude/Primitive/Unconfined	☐ YES	☒ NO
Other Features of Value	☐ YES	☒ NO

Is administrative action **necessary** in wilderness?

☒ YES

EXPLAIN AND COMPLETE STEP 1 OF THE MRDG

☐ NO

STOP – DO NOT TAKE ACTION IN WILDERNESS

Explain:

Action is necessary to preserve the Natural Quality of wilderness character by making stands more fire resilient, increasing the currently depauperate understory community components, protecting mature trees and snags and promoting a mosaic of ecosystems.

MRDG Step 2

Determine the **Minimum** Activity

Other Direction

*Is there “special provisions” language in legislation (or other Congressional direction) that explicitly **allows** consideration of a use otherwise prohibited by Section 4(c)?*

AND/OR

Has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?

☒ YES

DESCRIBE OTHER DIRECTION

☐ NO

SKIP AHEAD TO TIME CONSTRAINTS BELOW

Describe Other Direction:

Direction exists in the Grand Canyon-Parashant National Monument General Management Plan/Resource Management Plan (2008).

LA-FM-06 and MA-WM-07: Prescribed fire and fire use will (or can) be used in areas classified as Wildland Fire Use within...NPS proposed wilderness to achieve DFCs and wilderness area management objectives described in each agency's Fire Management Plan. Vegetation can also be treated manually if minimum tool requirements are met.

LA-FM-10 (in part): Selection of vegetation treatment methods in designated and proposed wilderness will be consistent with minimum tool requirements and non-impairment standards.

MA-VM-04: Treatment methods and tools appropriate to the land use allocation and protection of Monument objects can be authorized to achieve DFCs, DPCs, or Vital Sign standards.

Treatment methods can include, but are not limited to mechanical, chemical, biological, and fire or any combination thereof. Vegetation treatments and uses will be monitored as part of an adaptive management process. Seed priming and other enhancement techniques can be used to increase germination rates. Treatments will be designed so that they do not encourage an increase in any invasive species. Minimum requirement analysis will be used in.... NPS proposed wilderness.

MA-FM-04 (ponderosa pine ecological zone) and MA-FM-06 (great basin ecological zone (sagebrush communities: vm)) and MA-FM-08 (Great Basin ecological zone (pinyon-juniper community: vm)): On NPS-administered lands, all acres can be considered for Wildland Fire Use, prescribed fire, fire suppression, and mechanical and chemical treatment to achieve resource objectives, consistent with land use allocations, minimum tool requirement for proposed wilderness, and to protect Monument values.

MA-FM-12: On NPS-administered lands, the Andrus Plain area is currently described as Mojave Transition. All acres can be considered for Wildland Fire Use, prescribed fire, fire suppression, and mechanical and chemical treatment to achieve resource objectives, consistent with land use allocations, minimum tool requirement for proposed wilderness, and to protect Monument values.

DFC-WM-06: ...NPS proposed wilderness will be managed to be ecologically sustainable and resilient to natural and human caused perturbations. The NPS and BLM will strive to preserve or restore the natural quiet and natural sounds associated with the physical and biological resources of...proposed wilderness.

MA-WM-01: Lands within...NPS proposed wilderness can be restored where ecological integrity is outside the range of natural variability and where compatible with wilderness objectives....

The Minimum Requirement Decision Guide (Arthur Carhart National Wilderness Training Center, most recent version) will be used by the BLM and NPS in all decisions, giving greatest weight to accomplishing objectives via natural processes and non-mechanized/nonmotorized means. When fire will be managed in...NPS proposed wilderness, MIST will be used. Fire management actions will be consistent with the wilderness management objectives and guidelines described in the BLM and Lake Mead Fire Management Plans.

MA-WM-08: Natural processes will be primarily relied on to restore areas of pre-existing human imprints in...NPS proposed wilderness. Where proactive restoration of wilderness conditions is desirable, BLM and NPS will require conformance with...NPS Director's Order 41, and may require restoration plans to address restoration of preexisting human impacts.

MA-WM-09: In conformance with...NPS policies (NPS Director's Order 41) for proposed wilderness, the best mix of manual, chemical, biological, or mechanical means, with fire and natural processes, will be determined in order to restore ecological functions and structure in wilderness.

NPS Vegetation Treatment Tools and Methods

On NPS-administered lands, individual restoration plans will be prepared, and compliance conducted, for each restoration project. Tools that may be considered include;

1. Manual – as written for BLM lands, including chain saws and power brush saws.
2. Chemical – as written for BLM lands, except NPS will use EPA and NPS approved pesticides in accordance with NPS Integrated Pest Management (IPM) Policy and Guidelines.
3. Biological – as written for BLM lands, except the use of cattle, sheep, and goats. NPS use will be in accordance with NPS IPM Policy and Guidelines.
4. Fire – as written for BLM lands, except in accordance with NPS policies.
5. Seeding – As written for BLM, except only native species will be applied to NPS lands in accordance with NPS policies.
6. Mechanical -- As written for BLM, except no disk plowing, chaining or cabling will be used on NPS lands. Appropriateness of the tool and method may be required on a project-to-project basis.

Time Constraints

What, if any, are the time constraints that may affect the action?

None.

Components of the Action

What are the discrete components or phases of the action?

Component Number	Description
1	Transportation of personnel to site
2	Transportation of materials to site
3	Treatment Part A – vegetation type X
4	Treatment Part B - vegetation type X
5	Treatment Part C - vegetation type X
6	Transportation of unused materials from sites
7	Transportation of personnel from site

Proceed to the alternatives.

MRDG Step 2: Alternatives

Alternative 1: Natural Fire Ignitions with limited management intervention

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

Naturally ignited fires would be allowed to play their role in the wilderness ecosystems except where these activities threaten human life, property, historic structures, or high value resources on adjacent non-wilderness lands. Natural fire ignitions caused by lightning strikes generally take place between May and September. Natural fires usually require on the ground activity to monitor risks of fire escaping onto neighboring lands and may include suppression activities due to unnaturally intense fires burning as a result of excess fuel buildup from past suppression efforts. In some instances, management-ignited fire is used to control natural fire from impacting lands within and outside wilderness boundaries. In all cases of naturally ignited fires, environmental conditions including weather, fire danger, and other biological, and geographical variables will be monitored to determine if the fire will be allowed to burn for ecosystem benefit.

See Glossary of Prescribed Fire Terminology Used in MRA for definitions of tools and techniques.

Component Activities

How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
1	Transportation of personnel to project sites.	Personnel travel on established routes and then by foot to fire monitoring sites.
2	Transportation of materials to project site.	Materials are transported by vehicle to closest point and then moved by personnel to fire monitoring sites.
3	Treatment Part A – all vegetation types	Fire management tactics used by firefighting personnel may include: Direct attack using fire personnel. Helicopter bucket drops. Indirect attack using fire lines and back burning Tools to be used: Cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, and axe, chain saws.
4	Treatment Part B – all vegetation types	none

Comp #	Component of the Action	Activity for this Alternative
5	Treatment Part C – all vegetation types	none
6	Transportation of unused materials from project sites	Materials are moved by personnel on foot from fire monitoring sites and then transported by vehicle on established routes.
7	Transportation of personnel from project sites	Personnel travel by foot to established routes and then by vehicle.

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to fire monitoring sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to fire monitoring sites.	☐	☐	☒
3	Fire management tactics used by firefighting personnel may include: Direct attack using fire personnel. Helicopter bucket drops. Indirect attack using fire lines and back burning Tools to be used: Cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, and axe, chain saws.	☐	☒	☐
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel on foot from fire monitoring sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle.	☐	☐	☒
Total Number of Effects		0	1	NE
Untrammeled Total Rating		-1		

Explain:

Direct attack fire management tactics, such as bucket drops, back burning, and constructing fire lines affects the untrammelled quality because it includes using mechanized transportation and fire lines may affect the natural quality of the ecosystem. The Untrammelled quality is impacted when there is manipulation or control of the natural processes in wilderness.

As defined in Keeping It Wild 2 (2015): Agency-authorized trammeling actions

2. Actions taken inside the wilderness on a physical resource or natural process to intentionally affect "the earth and its community of life." Example...

a. Suppressing naturally ignited fire.

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to fire monitoring sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to fire monitoring sites.	☐	☐	☒
3	Fire management tactics used by firefighting personnel may include: Direct attack using fire personnel. Helicopter bucket drops. Indirect attack using fire lines and back burning Tools to be used: Cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, and axe, chain saws.	☐	☒	☐
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel on foot from fire monitoring sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle.	☐	☐	☒
Total Number of Effects		0	1	NE
Undeveloped Total Rating		-1		

Explain:

Fire lines can be permanent or temporary installations and have a negative impact on this quality. Allowing the use of chainsaws for fire suppression decreases the undeveloped quality by leaving evidence of landscape manipulation in the form of sawn tree trunks.

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to fire monitoring sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to fire monitoring sites.	☐	☐	☒
3	Fire management tactics used by firefighting personnel may include: Direct attack using fire personnel. Helicopter bucket drops. Indirect attack using fire lines and back burning Tools to be used: Cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, and axe, chain saws.	☒	☒	☐
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel on foot from fire monitoring sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle.	☐	☐	☒
Total Number of Effects		1	1	NE
Natural Total Rating		0		

Explain:

Cutting trees, constructing fire lines, and using back burning tactics adversely impact the natural quality. Limiting natural fire in all three ecosystems would decrease the natural effects of fire (including 400-600 year interval complete stand replacement in pinyon-juniper woodlands and savannas) but may also preserve the naturalness by reducing the potential of burned areas to be dominated by invasive non-native species.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to fire monitoring sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to fire monitoring sites.	☐	☐	☒

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
3	Fire management tactics used by firefighting personnel may include: Direct attack using fire personnel. Helicopter bucket drops. Indirect attack using fire lines and back burning Tools to be used: Cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, and axe, chain saws.	☒	☒	☐
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel on foot from fire monitoring sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle.	☐	☐	☒
Total Number of Effects		1	1	NE
Solitude or Primitive & Unconfined Rec. Total		0		

Explain:

Solitude is impacted by the use of helicopters in direct firefighting management and transportation of crews and supplies. Large fire crews and the use of power tools would impact the sense of solitude in the proposed wilderness. Closures to parts of the wilderness during wildfires also limit and impact the ability for visitors to engage in primitive and unconfined recreation. Allowing natural fire to restore natural ecosystem processes and remove exotic and invasive species may improve recreation experiences in a more natural environment.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to fire monitoring sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to fire monitoring sites.	☐	☐	☒
3	Fire management tactics used by firefighting personnel may include: Direct attack using fire personnel. Helicopter bucket drops. Indirect attack using fire lines and back burning	☐	☐	☒

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
	Tools to be used: Cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, and axe, chain saws.			
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel on foot from fire monitoring sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle.	☐	☐	☒
Total Number of Effects		0	0	NE
Other Features of Value Total Rating		NE		

Explain:

No other features of value were specifically identified in conjunction with vegetation treatments.

Summary Ratings for Alternative 1

Wilderness Character	Rating Summary
Untrammeled	-1
Undeveloped	-1
Natural	0
Solitude or Primitive & Unconfined Recreation	0
Other Features of Value	NE
Wilderness Character Summary Rating	-2

MRDG Step 2: Alternatives

Alternative 2: Ponderosa Pine Woodland Treatment with Motorized Equipment

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

In addition to the activities described in Alternative 1, this alternative includes the following actions.

Ponderosa Pine Woodland

Prescribed fire (B), including pile burns(C), preceded by thinning treatment (A) to protect non-target vegetation. Target vegetation are ladder fuels: Pinyon pine, juniper, thick small stem ponderosa pine (>1 tree/ft²). During thinning treatment duff and heavy dead and down maybe be removed from boles of trees to reduce fire intensity. Drip line of save trees (also known as old-growth trees, for a description of this type of tree see Section 2.2.1 Prescribed Fire Treatment) will be cleared of vegetation that could impact the crown. Large snags suitable as habitat trees will also receive pre-treatment preparation. Some units would also have Pile Burning.

Generally, one crew of 5 to 7 personnel for thinning. Occasionally, 2 crews of up to 14 personnel maybe employed for thinning.

Prescribed fire operations will consist of up to 20 personnel. A team of 20 or less personnel can treat approximately 300 acres per day with prescribed fire.

Generally, one crew of 3-5 for pile burn operations. One crew of 3-5 personnel can burn approximately 100 piles (6'x 6' x 6') in three days.

Schedule three treatments for Ponderosa units approximately 10 years apart (natural return interval is 3-15 years). Duff/woody debris layer must be monitored before reentry to ensure there is enough biomass to spread ground fire. Similarly, the duff/woody debris layer must not be so deep that, when burned, it "cooks" the root system. If there is a heavy duff layer, more entries need to be made with a higher duff fuel moisture to limit duff smoldering and heat transfer.

General practices:

The goal is to return stand densities to their natural range of variability (NRV) through a combination of mechanical and prescribed fire means. After a unit is within its NRV natural ignitions can be allowed to maintain the stand density and composition.

Areas that have a high concentration of non-native annuals should not be treated with prescribed fire or treated with prescribed fire before the seed is allowed set- usually late spring.

Herbicide may be applied using a backpack sprayer or hand spreader prior to or following a treatment to minimize the spread of invasive non-native plant species within and adjoining a treatment unit.

See Table H.1 for treatment unit specifics. See Glossary of Prescribed Fire Terminology Used in MRA and EA section 2.2.1 for definitions of tools and techniques.

Component Activities

How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
1	Transportation of personnel to project sites.	Personnel travel on established routes and then by foot to treatment sites.
2	Transportation of materials to project site.	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites.
3	Treatment Part A – Ponderosa Pine Woodland	Mechanical thinning treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.
4	Treatment Part B – Ponderosa Pine Woodland	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.
5	Treatment Part C – Ponderosa Pine Woodland	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.
6	Transportation of unused materials from project sites	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.
7	Transportation of personnel from project sites	Personnel travel by foot to established routes and then by vehicle

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites.	☐	☐	☒
3	Mechanical thinning treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	3	NE
Untrammed Total Rating		-3		

Explain:

Large scale vegetation manipulation would inherently negatively impact the untrammelled nature of the area. The Untrammelled quality is impacted when there is manipulation or control of the natural processes in wilderness. As defined in Keeping It Wild 2 (2015): Agency-authorized trammeling actions

1. Actions taken inside the wilderness on a biological resource to intentionally affect "the earth and its community of life." Example...
 - a. Removing or killing indigenous or non-indigenous vegetation....
 - c. Using chemicals ... to control ... non-indigenous vegetation.
2. Actions taken inside the wilderness on a physical resource or natural process to intentionally affect "the earth and its community of life." Example...
 - b. Lighting fire (under management prescription) for any purpose.

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites.	☐	☐	☒
3	Mechanical thinning treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	3	NE

Undeveloped Total Rating	-3
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Explain:

The use of motor vehicles and/or motorized equipment negatively impacts the undeveloped quality of wilderness character. The effect should be relatively short term and highly localized as the work would only occur in small stands of ponderosa pine woodland and the appearance of mechanized work would be disguised once Activity 5 is complete.

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites.	☐	☐	☒
3	Mechanical thinning treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☒	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☒	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☒	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		3	3	NE
Natural Total Rating		0		

Explain:

In the short term, especially in the time between steps 3 and 4 or 5, the woodland would be unnatural with piled tree trimmings and cleared areas under tree driplines. Pile burns (activity 5) would create unnatural high intensity fire areas with likely decreases in viable native seeds, mycorrhizae and altered soil chemistry if the burn intensity is not limited (Korb 2004). Over time, however, the reintroduction of fire into a fire adapted ecosystem by artificial means would allow natural ignitions to behave in a manner where minimal monitoring or suppression would be necessary. Natural ignitions are expected to result in relatively low intensity burn 3-4 year (small fire) or 7-16 year (large fire) fire interval (Ireland 2012) in the Mt. Dellenbaugh region.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites.	☐	☐	☒
3	Mechanical thinning treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	3	NE
Solitude or Primitive & Unconfined Rec. Total		-3		

Explain:

During operations, the sense of solitude would be negatively impacted by loud noises during Activities 3, 4 and 5, and large crews. During Activity 3, chainsaw noise would carry to a distance where the person operating the chainsaw would not be seen. However, this would not continue after Activity 7 was complete. Also, during operations, access to the area may be limited, reducing recreation opportunities.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites.	☐	☐	☒
3	Mechanical thinning treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☐	☒
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☐	☒
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	0	NE
Other Features of Value Total Rating		NE		

Explain:

No other features of value were specifically identified in conjunction with vegetation treatments.

Summary Ratings for Alternative 2
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Wilderness Character	Rating Summary
Untrammeled	-3
Undeveloped	-3
Natural	0
Solitude or Primitive & Unconfined Recreation	-3
Other Features of Value	NE
Wilderness Character Summary Rating	-9

MRDG Step 2: Alternatives

Alternative 3:

Ponderosa Pine Woodland Treatment with Minimized Motorized Equipment

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

In addition to the activities described in Alternative 1, this alternative includes the following actions.

Ponderosa Pine Woodland

Prescribed fire (B), including pile burns(C), preceded by thinning treatment (A) to protect non-target vegetation. Target vegetation are ladder fuels: Pinyon pine, juniper, thick small stem ponderosa pine (>1 tree/ft²). During thinning treatment duff and heavy dead and down maybe be removed from boles of trees to reduce fire intensity. Drip line of save trees (also known as old-growth trees, for a description of this type of tree see Section 2.2.1 Prescribed Fire Treatment) will be cleared of vegetation that could impact the crown. Large snags suitable as habitat trees will also receive pre-treatment preparation. Some units would also have Pile Burning.

Generally, one crew of 5 to 7 personnel for thinning. Occasionally, 2 crews of up to 14 personnel maybe employed for thinning.

Prescribed fire operations will consist of up to 20 personnel. A team of 20 or less personnel can treat approximately 300 acres per day with prescribed fire.

Generally, one crew of 3-5 for pile burn operations. One crew of 3-5 personnel can burn approximately 100 piles (6'x 6' x 6') in three days.

Length of time for thinning activities likely 3-4 times the length using powered tools.

Schedule three treatments for Ponderosa units approximately 10 years apart (natural return interval is 3-15 years). Duff/woody debris layer must be monitored before reentry to ensure there is enough biomass to spread ground fire. Similarly, the duff/woody debris layer must not be so deep that, when burning, it "cooks" the root system. If there is a heavy duff layer, more entries need to be made with a higher duff fuel moisture to limit duff smoldering and heat transfer.

General practices:

The goal is to return stand densities to their natural range of variability (NRV) through a combination of mechanical and prescribed fire means. After a unit is within its NRV natural ignitions can be allowed to maintain the stand density and composition.

Areas that have a high concentration of non-native annuals should not be treated with prescribed fire or treated with prescribed fire before the seed is allowed set- usually late spring.

Herbicide may be applied using a backpack sprayer or hand spreader prior to or following a treatment to minimize the spread of invasive non-native plant species within and adjoining a treatment unit.

See Table H.1 for treatment unit specifics. See Glossary of Prescribed Fire Terminology Used in MRA and EA section 2.2.1 for definitions of tools and techniques.

Component Activities

How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
1	Transportation of personnel to project sites.	Personnel travel on established routes and then by foot to treatment sites
2	Transportation of materials to project site.	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites
3	Treatment Part A – Ponderosa Pine Woodland	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.
4	Treatment Part B – Ponderosa Pine Woodland	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.
5	Treatment Part C – Ponderosa Pine Woodland	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.
6	Transportation of unused materials from project sites	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.
7	Transportation of personnel from project sites	Personnel travel by foot to established routes and then by vehicle

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	3	NE
Untrammed Total Rating		-3		

Explain:

Large scale vegetation manipulation would inherently negatively impact the untrammelled nature of the area. The Untrammelled quality is impacted when there is manipulation or control of the natural processes in wilderness. As defined in Keeping It Wild 2 (2015):

Agency-authorized trammeling actions

1. Actions taken inside the wilderness on a biological resource to intentionally affect “the earth and its community of life.” Example...

a. Removing or killing indigenous or non-indigenous vegetation....

c. Using chemicals ... to control ... non-indigenous vegetation.

2. Actions taken inside the wilderness on a physical resource or natural process to intentionally affect “the earth and its community of life.” Example...

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☐	☒
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	2	NE

Undeveloped Total Rating	-2
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Explain:

The use of motor vehicles and/or motorized equipment negatively impacts the undeveloped quality of wilderness character. The effect should be relatively short term and highly localized as the work would only occur in small stands of ponderosa pine woodland and mechanized work would be only occur during Activities 4 and 5.

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☒	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☒	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☒	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		3	3	NE
Natural Total Rating		0		

Explain:

In the short term, especially in the time between steps 3 and 4 or 5, the woodland would be unnatural with piled tree trimmings and cleared areas under tree driplines. Pile burns (activity 5) would create unnatural high intensity fire areas with likely decreases in viable native seeds, mycorrhizae and altered soil chemistry if the burn intensity is not limited (Korb 2004). Over time, however, the reintroduction of fire into a fire adapted ecosystem by artificial means would allow natural ignitions to behave in a manner where minimal monitoring or suppression would be necessary. Natural ignitions are expected to result in relatively low intensity burn 3-4 year (small fire) or 7-16 year (large fire) fire interval (Ireland 2012) in the Mt. Dellenbaugh region.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	3	NE
Solitude or Primitive & Unconfined Rec. Total		-3		

Explain:

During operations, the sense of solitude would be negatively impacted by loud noises during Activities 4 and 5, and large crews. However, this would not continue after Activity 7 was complete. During Activities 4 and 5 access to the area may be limited, reducing recreation opportunities.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☐
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☐	☒
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☐	☒
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	0	NE
Other Features of Value Total Rating		NE		

Explain:

No other features of value were specifically identified in conjunction with vegetation treatments.

Summary Ratings for Alternative 3
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Wilderness Character	Rating Summary
Untrammeled	-3
Undeveloped	-2
Natural	0
Solitude or Primitive & Unconfined Recreation	-3
Other Features of Value	NE
Wilderness Character Summary Rating	-8

MRDG Step 2: Alternatives

Alternative 4: Pinyon-juniper Woodland and Savanna with Motorized Equipment

Description of the Alternative

*What are the details of this alternative? When, where, and how will the action occur?
What mitigation measures will be taken?*

In addition to the activities described in Alternative 1, this alternative includes the following actions.

Pinyon-juniper Woodland and Savanna

Prescribed fire (B), including pile burns(C), preceded by thinning treatment (A) to protect non-target vegetation and carry fire through ecosystem. Target vegetation: Pinyon pine, juniper. Typical unit would have 2 years of thinning prior to prescribed fire.

Generally, one crew of 5 to 7 personnel for thinning. Occasionally, 2 crews of up to 14 personnel maybe employed for thinning.

Prescribed fire operations will consist of up to 20 personnel. A team of 20 or less personnel can treat approximately 300 acres per day with prescribed fire.

Generally, one crew of 3-5 for pile burn operations. One crew of 3-5 personnel can burn approximately 100 piles (6'x 6' x 6') in three days.

General practices:

The goal is to return stand densities to their natural range of variability (NRV) through a combination of mechanical and prescribed fire means. After a unit is within its NRV natural ignitions can be allowed to maintain the stand density and composition.

Areas that have a high concentration of non-native annuals should not be treated with prescribed fire or treated with prescribed fire before the seed is allowed set- usually late spring.

Herbicide may be applied using a backpack sprayer or hand spreader prior to or following a treatment to minimize the spread of invasive non-native plant species within and adjoining a treatment unit.

See Table H.1 for treatment unit specifics. See Glossary of Prescribed Fire Terminology Used in MRA and EA section 2.2.1 for definitions of tools and techniques.

Component Activities

How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
1	Transportation of personnel to project sites.	Personnel travel on established routes and then by foot to treatment sites.
2	Transportation of materials to project site.	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites.
3	Treatment Part A – Pinyon-Juniper Woodland and Savanna	Mechanical thinning treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.
4	Treatment Part B – Pinyon-Juniper Woodland and Savanna	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.
5	Treatment Part C – Pinyon-Juniper Woodland and Savanna	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.
6	Transportation of unused materials from project sites	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.
7	Transportation of personnel from project sites	Personnel travel by foot to established routes and then by vehicle

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites.	☐	☐	☒
3	Mechanical thinning treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	3	NE
Untrammed Total Rating		-3		

Explain:

Large scale vegetation manipulation would inherently negatively impact the untrammelled nature of the area. The Untrammelled quality is impacted when there is manipulation or control of the natural processes in wilderness. As defined in Keeping It Wild 2 (2015): Agency-authorized trammeling actions

1. Actions taken inside the wilderness on a biological resource to intentionally affect “the earth and its community of life.” Example...

a. Removing or killing indigenous or non-indigenous vegetation....

c. Using chemicals ... to control ... non-indigenous vegetation.

2. Actions taken inside the wilderness on a physical resource or natural process to intentionally affect “the earth and its community of life.” Example...

b. Lighting fire (under management prescription) for any purpose.

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites.	☐	☐	☒
3	Mechanical thinning treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	3	NE

Undeveloped Total Rating	-3
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Explain:

The use of motor vehicles and/or motorized equipment negatively impacts the undeveloped quality of wilderness character. The effect of Activity 3 would be visible for approximately 2 years before it would be disguised by Activities 4 or 5.

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites.	☐	☐	☒
3	Mechanical thinning treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	3	NE
Natural Total Rating		-3		

Explain:

Tree ring data for the interval 1460-2008 found a high degree of asynchronous fire within the ponderosa pine woodlands in the pinyon-juniper savanna and woodland (PJWS) matrix of the Mount Dellenbaugh and Kelly Point area, indicating that natural fire did not carry often through the PJWS. Increased fire frequency in the PJWS Proposed Action would not mimic a natural fire regime for the area. Anecdotal evidence from fire lookouts found typical natural fire in the PJWS is single tree. In PJWS in the Southwest, the alternate natural fire regime is complete stand replacement, not a mosaic of low intensity burned and unburned areas (Romme 2009). Two years of Activity 3 is proposed to build enough fuel to force fire to move beyond single tree burns.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites.	☐	☐	☒
3	Mechanical thinning treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
	Total Number of Effects	0	3	NE
Solitude or Primitive & Unconfined Rec. Total		-3		

Explain:

During operations, the sense of solitude would be negatively impacted by loud noises during Activities 3, 4 and 5, and large crews. During Activity 3, chainsaw noise would carry to a distance where the person operating the chainsaw would not be seen. However, this would not continue after Activity 7 was complete. Also, during operations, access to the area may be limited, reducing recreation opportunities.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites.	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites.	☐	☐	☒
3	Mechanical thinning treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☐	☒
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☐	☒
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
	Total Number of Effects	0	0	NE
Other Features of Value Total Rating		NE		

Explain:

No other features of value were specifically identified in conjunction with vegetation treatments.

Summary Ratings for Alternative 4
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Wilderness Character	Rating Summary
Untrammeled	-3
Undeveloped	-3
Natural	-3
Solitude or Primitive & Unconfined Recreation	-3
Other Features of Value	NE
Wilderness Character Summary Rating	-12

MRDG Step 2: Alternatives

Alternative 5: Pinyon-juniper Woodland and Savanna with Minimized Motorized Equipment

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

In addition to the activities described in Alternative 1, this alternative includes the following actions.

Pinyon-juniper Woodland and Savanna

Prescribed fire (B), including pile burns(C), preceded by thinning treatment (A) to protect non-target vegetation and carry fire through ecosystem. Target vegetation: Pinyon pine, juniper. Generally, one crew of 5 to 7 personnel for thinning. Occasionally, 2 crews of up to 14 personnel maybe employed for thinning.

Prescribed fire operations will consist of up to 20 personnel. A team of 20 or less personnel can treat approximately 300 acres per day with prescribed fire.

Generally, one crew of 3-5 for pile burn operations. One crew of 3-5 personnel can burn approximately 100 piles (6'x 6' x 6') in three days.

General practices:

The goal is to return stand densities to their natural range of variability (NRV) through a combination of mechanical and prescribed fire means. After a unit is within its NRV natural ignitions can be allowed to maintain the stand density and composition.

Areas that have a high concentration of non-native annuals should not be treated with prescribed fire or treated with prescribed fire before the seed is allowed set- usually late spring.

Herbicide may be applied using a backpack sprayer or hand spreader prior to or following a treatment to minimize the spread of invasive non-native plant species within and adjoining a treatment unit.

See Table H.1 for treatment unit specifics. See Glossary of Prescribed Fire Terminology Used in MRA and EA section 2.2.1 for definitions of tools and techniques.

Component Activities

How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
1	Transportation of personnel to project sites.	Personnel travel on established routes and then by foot to treatment sites
2	Transportation of materials to project site.	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites
3	Treatment Part A – Pinyon-Juniper Woodland and Savanna	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.
4	Treatment Part B – Pinyon-Juniper Woodland and Savanna	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.
5	Treatment Part C – Pinyon-Juniper Woodland and Savanna	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.
6	Transportation of unused materials from project sites	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.
7	Transportation of personnel from project sites	Personnel travel by foot to established routes and then by vehicle

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	3	NE
Untrammed Total Rating		-3		

Explain:

Large scale vegetation manipulation would inherently negatively impact the untrammelled nature of the area. The Untrammelled quality is impacted when there is manipulation or control of the natural processes in wilderness. As defined in Keeping It Wild 2 (2015): Agency-authorized trammeling actions

1. Actions taken inside the wilderness on a biological resource to intentionally affect “the earth and its community of life.” Example...

a. Removing or killing indigenous or non-indigenous vegetation....

c. Using chemicals ... to control ... non-indigenous vegetation.

2. Actions taken inside the wilderness on a physical resource or natural process to intentionally affect “the earth and its community of life.” Example...

b. Lighting fire (under management prescription) for any purpose.

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☐	☒
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	2	NE

Undeveloped Total Rating	-2
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Explain:

The use of motor vehicles and/or motorized equipment negatively impacts the undeveloped quality of wilderness character. The effect should be relatively short term and highly localized as the work would only occur in small stands of ponderosa pine woodland and mechanized work would be only occur during Activities 4 and 5.

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	-3	NE
Natural Total Rating		-3		

Explain:

Tree ring data for the interval 1460-2008 found a high degree of asynchronous fire within the ponderosa pine woodlands in the pinyon-juniper savanna and woodland (PJWS) matrix of the Mount Dellenbaugh and Kelly Point area, indicating that natural fire did not carry often through the PJWS. Increased fire frequency in the PJWS Proposed Action would not mimic a natural fire regime for the area. Anecdotal evidence from fire lookouts found typical natural fire in the PJWS is single tree. In PJWS in the Southwest, the alternate natural fire regime is complete stand replacement, not a mosaic of low intensity burned and unburned areas (Romme 2009). Two years of Activity 3 is proposed to build enough fuel to force fire to move beyond single tree burns.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☒	☐
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☒	☐
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	3	NE
Solitude or Primitive & Unconfined Rec. Total		-3		

Explain:

During operations, the sense of solitude would be negatively impacted by loud noises during Activities 4 and 5, and large crews. However, this would not continue after Activity 7 was complete. During Activities 4 and 5 access to the area may be limited, reducing recreation opportunities.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☐	☒
4	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☐	☒
5	Prescribed fire using drip torch, fusee, very pistol, helitorch, PSD or UTV torch (from road system). Fire Engines and/or UTVs/ATVs will be operated only from the road system. Gasoline powered portable pumps operated from portable water tanks to supply water to hose lays within the fire area.	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	0	NE
Other Features of Value Total Rating		NE		

Explain:

No other features of value were specifically identified in conjunction with vegetation treatments.

Summary Ratings for Alternative 5
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Wilderness Character	Rating Summary
Untrammeled	-3
Undeveloped	-2
Natural	-3
Solitude or Primitive & Unconfined Recreation	-3
Other Features of Value	NE
Wilderness Character Summary Rating	-11

MRDG Step 2: Alternatives

Alternative 6: Sagebrush Shrubland and Grassland with Motorized Equipment

Description of the Alternative

*What are the details of this alternative? When, where, and how will the action occur?
What mitigation measures will be taken?*

Sagebrush Shrubland and Grassland

Cut, buck and scatter (lop and scatter) (A) of all pinyon trees and juniper trees less than 15". Generally, one crew of 5 to 7 personnel for thinning. Occasionally, 2 crews of up to 14 personnel maybe employed for thinning. Due to a lower stand density, one crew of 5-7 personnel can typically thin 75 acres of a meadow to a 0% stand density in 7 days.

General practices:

The goal is to return stand densities to their natural range of variability (NRV) through a combination of mechanical and prescribed fire means. After a unit is within its NRV natural ignitions can be allowed to maintain the stand density and composition.

Herbicide may be applied using a backpack sprayer or hand spreader prior to or following a treatment to minimize the spread of invasive non-native plant species within and adjoining a treatment unit.

See Table H.1 for treatment unit specifics.

Component Activities

How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
1	Transportation of personnel to project sites.	Personnel travel on established routes and then by foot to treatment sites
2	Transportation of materials to project site.	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites
3	Treatment Part A – Sagebrush Shrubland and Grassland	Mechanical treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.
4	Treatment Part B – Sagebrush Shrubland and Grassland	none
5	Treatment Part C – Sagebrush Shrubland and Grassland	none

Comp #	Component of the Action	Activity for this Alternative
6	Transportation of unused materials from project sites	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.
7	Transportation of personnel from project sites	Personnel travel by foot to established routes and then by vehicle

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Mechanical treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☒	☐
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	1	NE
Untrammed Total Rating		-1		

Explain:

Large scale, long term vegetation manipulation would inherently negatively impact the untrammed nature of the area. The Untrammed quality is impacted when there is manipulation or control of the natural processes in wilderness. As defined in Keeping It Wild 2 (2015): Agency-authorized trampling actions

1. Actions taken inside the wilderness on a biological resource to intentionally affect "the earth and its community of life." Example...

- a. Removing or killing indigenous or non-indigenous vegetation....
- c. Using chemicals ... to control ... non-indigenous vegetation.

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Mechanical treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☒	☐
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	1	NE
Undeveloped Total Rating		-1		

Explain:

The use of motor vehicles and/or motorized equipment negatively impacts the undeveloped quality of wilderness character. The effect should be relatively short term and highly localized as the work would only occur when pinyon or juniper trees were detected within the sagebrush shrubland or grassland area.

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Mechanical treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☒	☐	☐
4	none	☐	☐	☒
5	none	☐	☐	☒

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		1	0	NE
Natural Total Rating		1		

Explain:

Treatments to maintain vegetation to align with the Ecological Site Description using techniques that would mimic natural wind disturbance would maintain and enhance the natural character of sagebrush areas.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☒	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Mechanical treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☒	☐
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	1	NE
Solitude or Primitive & Unconfined Rec. Total		-1		

Explain:

Chainsaw noise would carry to a distance where the person operating the chainsaw would not be seen, impacting the sense of solitude.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Mechanical treatment utilizing gas or electric powered chainsaws, pole saws, leaf blowers and/or brush cutter/weed eater.	☐	☐	☒
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
Total Number of Effects		0	0	NE
Other Features of Value Total Rating		0		

Explain:

No other features of value were specifically identified in conjunction with vegetation treatments.

Summary Ratings for Alternative 6

Wilderness Character	Rating Summary
Untrammeled	-1
Undeveloped	-1
Natural	1
Solitude or Primitive & Unconfined Recreation	-1
Other Features of Value	NE
Wilderness Character Summary Rating	-2

MRDG Step 2: Alternatives

Alternative 7: Sagebrush Shrubland and Grassland without Motorized Equipment

Description of the Alternative

*What are the details of this alternative? When, where, and how will the action occur?
What mitigation measures will be taken?*

Sagebrush Shrubland and Grassland

Cut, buck and scatter (lop and scatter) (A) of all pinyon trees and juniper trees less than 15". Generally, one crew of 5 to 7 personnel for thinning. Occasionally, 2 crews of up to 14 personnel maybe employed for thinning. Due to a lower stand density, one crew of 5-7 personnel can typically thin 75 acres of a meadow to a 0% stand density in 7 days.

General practices:

The goal is to return stand densities to their natural range of variability (NRV) through a combination of mechanical and prescribed fire means. After a unit is within its NRV natural ignitions can be allowed to maintain the stand density and composition.

Herbicide may be applied using a backpack sprayer or hand spreader prior to or following a treatment to minimize the spread of invasive non-native plant species within and adjoining a treatment unit.

See Table H.1 for treatment unit specifics.

Component Activities

How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
1	Transportation of personnel to project sites.	Personnel travel on established routes and then by foot to treatment sites
2	Transportation of materials to project site.	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites
3	Treatment Part A – Sagebrush Shrubland and Grassland	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.
4	Treatment Part B – Sagebrush Shrubland and Grassland	none
5	Treatment Part C – Sagebrush Shrubland and Grassland	none

Comp #	Component of the Action	Activity for this Alternative
6	Transportation of unused materials from project sites	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.
7	Transportation of personnel from project sites	Personnel travel by foot to established routes and then by vehicle

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☒	☐
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
	Total Number of Effects	0	1	NE
Untrammed Total Rating		-1		

Explain:

Large scale, long term vegetation manipulation would inherently negatively impact the untrammed nature of the area. The Untrammed quality is impacted when there is manipulation or control of the natural processes in wilderness. As defined in Keeping It Wild 2 (2015): Agency-authorized trammeling actions

1. Actions taken inside the wilderness on a biological resource to intentionally affect "the earth and its community of life." Example...

- a. Removing or killing indigenous or non-indigenous vegetation....
- c. Using chemicals ... to control ... non-indigenous vegetation.

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☐	☒
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
	Total Number of Effects	0	0	NE
Undeveloped Total Rating		NE		

Explain:

Vegetation treatment without mechanized tools or installations does not negatively impact the undeveloped quality.

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☒	☐	☐
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
	Total Number of Effects	1	0	NE
Natural Total Rating		1		

Explain:

Treatments to maintain vegetation to align with the Ecological Site Description using techniques that would mimic natural wind disturbance would maintain and enhance the natural character of sagebrush areas.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☒	☐
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
	Total Number of Effects	0	1	NE
Solitude or Primitive & Unconfined Rec. Total		-1		

Explain:

For a short time, while treatment is occurring, visitors in close proximity to the work site would notice a group of people. This would diminish the sense of solitude.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Personnel travel on established routes and then by foot to treatment sites	☐	☐	☒
2	Materials are transported by vehicle to closest point and then moved by personnel to treatment sites	☐	☐	☒
3	Manual treatment with cross-cut saws, shovels, pulaskis, brush hooks, scraping tools, loppers, and ax.	☐	☐	☒
4	none	☐	☐	☒
5	none	☐	☐	☒
6	Materials are moved by personnel from treatment sites and then transported by vehicle on established routes.	☐	☐	☒
7	Personnel travel by foot to established routes and then by vehicle	☐	☐	☒
	Total Number of Effects	0	0	NE
Other Features of Value Total Rating		0		

Explain:

No other features of value were specifically identified in conjunction with vegetation treatments.

Summary Ratings for Alternative 7

Wilderness Character	Rating Summary
Untrammeled	-1
Undeveloped	NE
Natural	1
Solitude or Primitive & Unconfined Recreation	-1
Other Features of Value	NE
Wilderness Character Summary Rating	-1

MRDG Step 2: Alternatives Not Analyzed

Alternatives Not Analyzed

What alternatives were considered but not analyzed? Why were they not analyzed?

Alternatives not analyzed include different combinations of treatment types based on vegetation type. These were not analyzed because they were already considered in the alternatives considered – reaction to natural fire starts, vegetation treatment using motorized equipment and vegetation treatment minimizing the use of motorized equipment.

A fully non-motorized alternative was considered for the three vegetation types. In the case of prescribed fire in ponderosa pine woodland and pinyon-juniper woodland and savanna, fire safety required the use of gasoline powered pumps, therefore no prescribed fire treatment could be entirely without the use of motorized equipment. Alternatives 3 and 5 represent this minimized motorized equipment approach. A fully non-motorized alternative was possible in the sagebrush areas, Alternative 7 describes this.

During Step 2: Determination, it is anticipated that the decision maker may choose a combination of the alternatives analyzed.

MRDG Step 2: Alternative Comparison

Alternative 1:	Natural Fire Ignitions with limited management intervention
Alternative 2:	Ponderosa Pine Woodland Treatment with Motorized Equipment
Alternative 3:	Ponderosa Pine Woodland Treatment with Minimized Motorized Equipment
Alternative 4:	Pinyon-juniper Woodland and Savanna with Motorized Equipment

	Alternative 1	Alternative 1	Alternative 2	Alternative 2	Alternative 3	Alternative 3	Alternative 4	Alternative 4
Wilderness Character	+	-	+	-	+	-	+	-
Untrammeled	0	1	0	3	0	3	0	3
Undeveloped	0	1	0	3	0	2	0	3
Natural	1	1	3	3	3	3	0	3
Solitude/Primitive/Unconfined	1	1	0	3	0	3	0	3
Other Features of Value	0	0	0	0	0	0	0	0
Total Number of Effects	2	4	3	12	3	11	0	12
Wilderness Character	-2		-9		-8		-12	

[Alternative 5:](#)

Pinyon-juniper Woodland and Savanna with Minimized Motorized Equipment

[Alternative 6:](#)

Sagebrush Shrubland and Grassland with Motorized Equipment

[Alternative 7:](#)

Sagebrush Shrubland and Grassland without Motorized Equipment

	Alternative 5	Alternative 5	Alternative 6	Alternative 6	Alternative 7	Alternative 7
Wilderness Character	+	-	+	-	+	-
Untrammeled	0	3	0	1	0	1
Undeveloped	0	2	0	1	0	0
Natural	0	3	1	0	1	0
Solitude/Primitive/Unconfined	0	3	0	1	0	1
Other Features of Value	0	0	0	0	0	0
Total Number of Effects	0	11	1	3	1	2
Wilderness Character	-11		-2		-1	

MRDG Step 2: Determination

Selected Alternative

☒ Alternative 1:	Natural Fire Ignitions with limited management intervention
☐ Alternative 2:	Ponderosa Pine Woodland Treatment with Motorized Equipment
☒ Alternative 3:	Ponderosa Pine Woodland Treatment with Minimized Motorized Equipment
☐ Alternative 4:	Pinyon-juniper Woodland and Savanna with Motorized Equipment
☒ Alternative 5:	Pinyon-juniper Woodland and Savanna with Minimized Motorized Equipment
☐ Alternative 6:	Sagebrush Shrubland and Grassland with Motorized Equipment
☒ Alternative 7:	Sagebrush Shrubland and Grassland without Motorized Equipment

Explain Rationale for Selection:

The project area incorporates three different vegetation types. Appropriate treatment design to achieve desired conditions for species diversity, vegetative cover, and wildlife habitat necessarily varies between these vegetation types. The selection of multiple alternatives reflects the complexity of the project area.

The alternatives selected best preserve wilderness character while minimizing negative effects to wilderness character. Fire operations in the area are unable to operate safely or contain severe and unusually large fire without the option to use some form of mechanized support in the wilderness (Alternative 1). The selection of Alternative 3 for ponderosa pine woodlands is in conformance with Wilderness Act section 4(d)1 to control fire while operating safely as in Alternative 1 and minimizing motorized equipment. Alternative 5 is consistent with the best available science in pinyon-juniper woodlands and savanna for the area and includes adaptive management parameters, including those in the below Monitoring and Reporting Requirements section, to use an iterative approach to ensure ecosystem restoration while again minimizing motorized equipment use. Alternative 7, fully non-motorized, protect areas that, according to best available science, should remain meadows. The meadows are natural fire breaks and an important component of the pre-settlement mosaic in the project area.

Describe Monitoring & Reporting Requirements:

All fire treatments and monitoring will be entered into the appropriate national, regional and local databases. Post fire and/or fiscal year results of treatment and monitoring will be collated into a written report and made available to appropriate staff including fire and vegetation programs personnel and the Monument Superintendent.

All units proposed for this type of treatment will be monitored using the FMH (NPS 2003) protocol. Two to five units will initially be treated after the following decision-making process is employed.

1. Determine the extent of invasive plant distribution and characterize the vegetative community of the site within one year prior to treatment.
2. (a) In areas where invasive plants are found at a greater than 10% frequency, pretreat with herbicide prior to treatment.
(b) In areas where little to no invasive plants are found (less than 10% frequency), commence prescribed fire treatment.
3. Post-fire monitor in one, two, and five years as part of the FMH protocol.
4. (a) If post fire monitoring indicates no substantial spread of invasive plants, as determined by the vegetation specialist or their designee, or the introduction of new invasive plant species and favorable regeneration of the understory, similar units may be treated.
(b) If post fire monitoring indicates substantial spread of invasive plants, as determined by the vegetation specialist or their designee, the unit would be evaluated for follow-up herbicide or other invasive plant eradication treatments and no additional prescribed fire treatment would occur in the unit. Similar units would be reevaluated for treatment and may not receive a prescribed fire treatment.
(c) If post fire monitoring indicates substantial spread of invasive plants and no to minimal regeneration of the understory, similar units would be reevaluated for treatment.

All treatments will adhere to the selected alternative and its design features as described in the Shivwits Plateau Landscape Restoration Project Environmental Assessment (PEPC-98370/DOI-BLM-AZ-A030-2021-0005-EA).

Approvals

Which of the prohibited uses found in Section 4(c) of the Wilderness Act are approved in the selected alternative and for what quantity?

Approved?	Prohibited Use	Quantity
☐	Mechanical Transport:	
☒	Motorized Equipment:	As described in selected alternative
☐	Motor Vehicles:	
☐	Motorboats:	
☐	Landing of Aircraft:	
☐	Temporary Roads:	
☐	Structures:	
☐	Installations:	

Record and report any authorizations of Wilderness Act Section 4(c) prohibited uses according to agency policies or guidance.

Refer to agency policies for the following signature authorities:

Prepared:

Name Jennifer E. Fox Position Ecologist

Signature JENNIFER FOX Digitally signed by JENNIFER FOX
Date: 2021.08.18 16:55:36 -06'00' Date _____

Recommended:

Name _____ Position _____

Signature _____ Date _____

Recommended:

Name _____ Position _____

Signature _____ Date _____

Approved:

Name Brenda K. Todd Position Superintendent

Signature BRENDA TODD Digitally signed by BRENDA TODD
Date: 2021.08.19 09:36:12 -06'00' Date _____

Glossary of Prescribed Fire Terminology Used in MRA (BLM nd, NWCG nd, NWCG 1996)

Brush Hook: A heavy cutting tool designed primarily to cut brush at the base of the stem. Used in much the same way as an axe and having a wide blade, generally curved to protect the blade from being dulled by rocks.

Drip Torch: Hand-held device for igniting fires by dripping flaming liquid fuel on the materials to be burned; consists of a fuel fount, burner arm, and igniter. Fuel used is generally a mixture of diesel and gasoline.

Fusee: A handheld disposable ground ignition device with a self-contained ignition system. A colored flare designed as a railway warning device, widely used to ignite backfires and other prescribed fires.

Helitorch: An aerial ignition device hung from or mounted on a helicopter to disperse ignited lumps of gelled gasoline. Used for backfires, burnouts, or prescribed burns. Includes: Delayed Aerial Ignition Devices; Ping-Pong Ball System; Plastic Sphere Dispenser.

Hose Lay: Arrangement of connected lengths of fire hose and accessories on the ground, beginning at the first pumping unit and ending at the point of water delivery.

Ladder Fuels: Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease.

Pile Burn: A prescribed fire used to ignite hand or machine piles of cut vegetation resulting from vegetation or fuel management activities. Piles are generally burned during the wet season to reduce damage to the residual trees and to confine the fire to the footprint of the pile. Pile burning allows time for the vegetative material to dry out and will produce less overall smoke by burning hot and clean.

Plastic Sphere Dispenser (PSD): Device installed, but jettisonable, in a helicopter, which injects glycol into a plastic sphere containing potassium permanganate, which is then expelled from the machine and aircraft. This produces an exothermic reaction resulting in ignition of fuels on the ground for prescribed or wildland fire applications.

Pulaski: A combination chopping and trenching tool widely used in fireline construction, which combines a single-bitted axe blade with a narrow adze-like trenching blade fitted to a straight handle.

UTV torch: A ground ignition device designed for mounting on the rear cargo platform of an UTV. It has a fuel tank, a system to dispense fuel, and an ignition source. The tank may be fabricated from carbon steel, stainless steel, or aluminum. Fuel may be dispensed by gravity, electric pump, or pressurized gas. The ignition source may be a lighted wick, propane torch, or electric spark.

Very Pistol: A hand pistol varying in diameter from 12 gauge to 25 mm. Most effective in dry, light, continuous ground fuels, and allows remote ignition.

Table H.1. Detailed Unit Treatment Proposal. *Pinus edulis* includes *P. monophylla*. *Juniperus osteosperma* includes *J. monosperma*.

Unit No.	Name	Acres	Predominate Fuel Types	Past Treatment Dates	Approx. Future Activity 3 Treatment Date*	Approx. Future Activity 4 or 5 Treatment Date*	Activity	Notes
5	Ambush	382	<i>Pinus ponderosa</i>	2007, 2016	2030	2031	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
6	Ambush North	557	<i>Juniperus osteosperma</i> , low density <i>Pinus edulis</i> , low density <i>P. ponderosa</i>	N/A	2029, 2030	2031	2	Two consecutive years of mechanical treatments followed up a prescribed fire treatment.
7	Andrus	5830	<i>J. osteosperma</i> , <i>Artemisia tridentata</i> , low density <i>P. edulis</i>	2007, 2017	TBD	TBD, see note.	2	Do not implement a prescribed fire treatment if unit remains an active cattle grazing allotment.
8	Boundary	127	<i>P. ponderosa</i>	2005, 2016	2030	2030	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
9	Buster	653	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low density <i>P. ponderosa</i>	N/A	2035, 2036, 2037	2038	2	Three consecutive years of mechanical treatments followed up a prescribed fire treatment.

Unit No.	Name	Acres	Predominate Fuel Types	Past Treatment Dates	Approx. Future Activity 3 Treatment Date*	Approx. Future Activity 4 or 5 Treatment Date*	Activity	Notes
12	Dellenbaugh	227	<i>J. osteosperma</i> , low density <i>P. edulis</i>	Thinning completed 2020	TBD	2022	2	Joint treatment with AZ-ASD. Cancelled Rx in FY20 over COVID concerns; rescheduled for FY21 or FY22
13	Fire Camp	85	<i>P. ponderosa</i>	1995, 1997, 2012	2032	2032	1, 4	Constantly evaluate and treat as necessary to maintain low duff/woody debris levels as defensible space for administrative facilities.
14	Fire Camp Extension	27	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low density <i>P. ponderosa</i>	N/A	2031	2032	2	Mechanical treatment followed up a prescribed fire treatment. Will require multiple implementations.
15	Fire Camp South	879	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low density <i>P. ponderosa</i>	N/A	2037, 2038, 2039, 2040	2040	2	Four consecutive years of mechanical treatments followed up a prescribed fire treatment. Unit will require multiple implementations.
19	Green Springs	59	<i>P. ponderosa</i>	199, 720, 112, 017	TBD	TBD	1	Evaluate before future implementations are scheduled.

Unit No.	Name	Acres	Predominate Fuel Types	Past Treatment Dates	Approx. Future Activity 3 Treatment Date*	Approx. Future Activity 4 or 5 Treatment Date*	Activity	Notes
20	Green Springs East	326	<i>P. ponderosa</i>	2002, 2014	2028	2029	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
21	Green Springs North	680	<i>P. ponderosa</i>	2003, 2015	2028	2029	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
22	Halfway	200	<i>P. ponderosa</i>	2012, 2012	2025	2026	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
25	Horse Valley	67	<i>P. ponderosa</i>	19,982,011	2027	2028	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
26	Horse Valley Meadow	211	<i>A. tridentata</i> , <i>J. osteosperma</i>	2015/2011	2026	N/A	3	No fire treatment
27	Horse Valley North	532	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low density <i>P. ponderosa</i>	N/A	2028, 2029	2030	2	Two consecutive years of mechanical treatments followed up a prescribed fire treatment. Unit will

Unit No.	Name	Acres	Predominate Fuel Types	Past Treatment Dates	Approx. Future Activity 3 Treatment Date*	Approx. Future Activity 4 or 5 Treatment Date*	Activity	Notes
								require multiple implementations.
28	Kelly	2776	<i>J. osteosperma</i> , low density <i>P. edulis</i>	N/A	2031, 2032, 2033, 2034	2035	2	New unit west of Kelly East, Kelly East Extension, and Shanley units
30	Kelly East	1954	<i>J. osteosperma</i> , low density <i>P. edulis</i>	2011, 2019	2031, 2032, 2033, 2034	2034	2	Unit will require multiple implementations.
31	Kelly East Extension	540	<i>J. osteosperma</i> , low density <i>P. edulis</i>	2011, 2019	2031, 2032, 2033, 2034	2034	2	Complete as part of Kelly East. Unit will require multiple implementations.
32	Kelly West	526	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low density <i>P. ponderosa</i>	2019	2031, 2032, 2033, 2034	2034	2	Four consecutive years of mechanical treatments followed up a prescribed fire treatment. Unit will require multiple implementations.
38	Middle Ambush	1078	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low density <i>P. ponderosa</i>	N/A	2029, 2030, 2031	2031	2	Three consecutive years of mechanical treatments followed up a prescribed fire treatment. Unit will require multiple implementations.

Unit No.	Name	Acres	Predominate Fuel Types	Past Treatment Dates	Approx. Future Activity 3 Treatment Date*	Approx. Future Activity 4 or 5 Treatment Date*	Activity	Notes
40	Nutter	425	<i>J. osteosperma</i> , low density <i>P. edulis</i>	N/A	2037, 2038	2039	2	Two consecutive years of mechanical treatments followed up a prescribed fire treatment. Unit will require multiple implementations.
47	Peter's Pocket	537	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low density <i>P. ponderosa</i>	N/A	2024, 2025	2026	2	Two consecutive years of mechanical treatments followed up a prescribed fire treatment. Unit will require multiple implementations.
48	Pine Valley East	1213	<i>P. ponderosa</i>	2018, 2017	2032	2033	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
49	Pine Valley Loop	41	<i>P. ponderosa</i>	1999, 2011, 2009	2032	2033	1	Constantly evaluate and treat as necessary to maintain low duff/woody debris levels as defensible space for historic cabin
50	Pine Valley Meadow	66	<i>A. tridentata</i> , <i>J. osteosperma</i>	2014, 2011	2024	N/A	3	No fire treatment

Unit No.	Name	Acres	Predominate Fuel Types	Past Treatment Dates	Approx. Future Activity 3 Treatment Date*	Approx. Future Activity 4 or 5 Treatment Date*	Activity	Notes
51	Pine Valley Ranch	293	<i>P. ponderosa</i>	2002, 2014	2032	2033	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
52	Pine Valley West	170	<i>P. ponderosa</i>	1999, 2012	2032	2033	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
54	Pleasant Valley	174	<i>P. ponderosa</i>	1999, 2012	2026	2027	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
55	Pleasant Valley East	146	<i>P. ponderosa</i>	2002, 2014	2026	2027	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
56	Pleasant Valley Meadow	21	<i>A. tridentata, J. osteosperma</i>	2012	2026	N/A	3	No fire treatment

Unit No.	Name	Acres	Predominate Fuel Types	Past Treatment Dates	Approx. Future Activity 3 Treatment Date*	Approx. Future Activity 4 or 5 Treatment Date*	Activity	Notes
57	Pleasant Valley South	849	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low density <i>P. ponderosa</i>	N/A	2035, 2036, 2037	2038	2	New unit southeast of Pleasant Valley. Three consecutive years of mechanical treatments followed up a prescribed fire treatment. Unit will require multiple implementations
64	Sawmill	30	<i>P. ponderosa</i>	1995, 2016	2030	2030	2	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
65	Sawmill Meadow	16	<i>A. tridentata</i> , <i>J. osteosperma</i>	2016	2030	N/A	3	No fire treatment
66	Sawmill South	82	<i>P. ponderosa</i>	2005, 2016	2030	2030	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
67	Shanley	358	<i>J. osteosperma</i> , <i>A. tridentata</i> , low density <i>Pinus ponderosa</i>	N/A	2023	2024	2, 4	Unit will require multiple implementations.
68	Slim	199	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low	N/A	2022	2023	2	Unit will require multiple implementations.

Unit No.	Name	Acres	Predominate Fuel Types	Past Treatment Dates	Approx. Future Activity 3 Treatment Date*	Approx. Future Activity 4 or 5 Treatment Date*	Activity	Notes
			density <i>P. ponderosa</i>					
70	Twin I	407	<i>J. osteosperma</i> , low density <i>P. edulis</i>	1995, 2018	2034, 2035, 2036, 2037	2037	2	Unit will require multiple implementations.
71	Twin Creek	429	<i>J. osteosperma</i> , low density <i>P. edulis</i>	1999, 2015, 2019	TBD	2022	2	Unit will require multiple implementations.
72	Twin II	1759	<i>J. osteosperma</i> , low density <i>P. edulis</i>	1997, 2016	2023, 2024, 2025	2025	2	Unit will require multiple implementations.
73	Twin North	1215	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low density <i>P. ponderosa</i>	2015, 2019	TBD	2022	2	Part of Twin Boundary, Twin Creek and north portion of Twin II, acres not reflected in total treatment PARA acreage.
74	Twin Spring Boundary	622	<i>J. osteosperma</i> , low density <i>P. edulis</i>	1999, 2007 mechanical treatment, 2013/2019 mechanical treatment	TBD	2022	2	Unit will require multiple implementations.
75	Twin West	1385	<i>J. osteosperma</i> , low density <i>P. edulis</i>	1999, 2018	2034, 2035, 2036, 2037	2037	2	Unit will require multiple implementations.

Unit No.	Name	Acres	Predominate Fuel Types	Past Treatment Dates	Approx. Future Activity 3 Treatment Date*	Approx. Future Activity 4 or 5 Treatment Date*	Activity	Notes
76	Waring	168	<i>P. ponderosa</i>	1997, 2005, 2014	2027	2028	1, 4	Constantly evaluate and treat as necessary to maintain low duff/woody debris levels as defensible space for historic Waring Ranch
77	Waring Ranch East	327	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low density <i>P. ponderosa</i>	Thin complete 2021	TBD	2022	2	Mechanically treated in 2020, 2021. Need to complete with prescribed burn. Unit will require multiple implementations.
78	Waring South	432	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low density <i>P. ponderosa</i>	N/A	2038, 2039	2039	2	Two consecutive years of mechanical treatments followed up a prescribed fire treatment. Unit will require multiple implementations.
86	Yellow John East(NPS)	143	<i>P. ponderosa</i>	2006, 2017	TBD	TBD	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled
89	Yellow John South	175	<i>J. osteosperma</i> , low density <i>P. edulis</i> , low density <i>P. ponderosa</i>	N/A	2032	2033	2	One mechanical treatment followed up a prescribed fire treatment. Unit will require multiple implementations.

Unit No.	Name	Acres	Predominate Fuel Types	Past Treatment Dates	Approx. Future Activity 3 Treatment Date*	Approx. Future Activity 4 or 5 Treatment Date*	Activity	Notes
90	Yellow John West	211	<i>P. ponderosa</i>	2004, 2015	2027	2027	1	After next (3 rd implementation) unit should be evaluated before future treatments are scheduled. Was completed as a joint project with the BLM on last two implementations.

* Prior to implementation date, conditions must be evaluated on site to confirm target date or possible extend into the future as necessary

Appendix I. Additional Soil Information

Table I.1. Woodland Soils.

Soil Map Unit No.	Soil Map Unit Name	Acres	Ecological Site Description
93	Yumtheska-Katzine-Rock outcrop complex, 2-30% slopes	20,210	F035XF619AZ Limestone Upland 13-17" p.z.
95	Yumtheska-Natank complex, 10-45% slopes	61,040	F035XF619AZ Limestone Upland 13-17" p.z.

Table I.2. Rangeland/Non-Woodland Soils.

Soil Map Unit No.	Soil Map Unit Name	Acres	Ecological Site Description
2	Albers silty clay, 0-1% slopes	2,320	R035XC313AZ Loamy Upland 10-14" p.z.
8	Barx fine sandy loam, 1-5% slopes	460	R035XC313AZ Loamy Upland 10-14" p.z.
14	Boquillas family-Showlow complex, 25-50% slopes	12,010	R035XC307AZ Clay Loam Upland 10-14" p.z.
21	Disterheff-Natank-Yumtheska complex, 2-15% slopes	122,540	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.
25	Goesling loam, 1-5% slopes	5,510	R035XC313AZ Loamy Upland 10-14" p.z.
45	Mellenthin-Rock outcrop-Torriorthents complex, 10-70% slopes	29,920	R035XC319AZ Limestone/ Sandstone Upland 10-14" p.z.
46	Mellenthin-Strych complex, 4-25% slopes	17,600	R035XC319AZ Limestone/ Sandstone Upland 10-14" p.z.
52	Meriwhitica-Rock outcrop-Strych complex, 35-70% slopes	7,450	R035XC319AZ Limestone/ Sandstone Upland 10-14" p.z.
59	Padilla silt loam, 1-5% slopes	4,460	R035XC313AZ Loamy Upland 10-14" p.z.
63	Radnik loam, 1-5% slopes	800	R035XC307AZ Clay Loam Upland 10-14"
69	Showlow-Thunderbird complex, 2-25% slopes	20,140	R035XC319AZ Limestone/ Sandstone Upland 10-14" p.z.
71	Sponiker loam, 1-10% slopes	7,710	R035XC307AZ Clay Loam Upland 10-14" p.z.

Soil Map Unit No.	Soil Map Unit Name	Acres	Ecological Site Description
73	Strych very gravelly loam, 2-10% slopes	5,490	R035XC307AZ Clay Loam Upland 10-14" p.z.
76	Tassi-Rizno complex, 5-35% slopes	250	R035XC319AZ Limestone/ Sandstone Upland 10-14" p.z.
92	Yellowhorse-Luzena family complex, 1-10% slopes	2,320	F035XF619AZ Limestone Upland 13-17" p.z.

Appendix J. Additional Vegetation Information

Table J.1. Vegetation Types and NRCS Ecological Sites and Acres Within Each Vegetation Type. Vegetation types includes areas where no Ecological Site number (Unassigned) or name (Unnamed) has been assigned by NRCS.

Vegetation Type	NRCS Ecological Site
Blackbrush Mixed Shrubland	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 60 acres
Blackbrush Mixed Shrubland	F035XF614AZ Unnamed <1 acre
Blackbrush Mixed Shrubland	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED) 106 acres
Blackbrush Mixed Shrubland	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 10 acres
Blackbrush Mixed Shrubland	R035XC307AZ Clay Loam Upland 10-14" p.z. 2 acres
Blackbrush Mixed Shrubland	R035XC311AZ Limy Upland 10-14" p.z. 9 acres
Blackbrush Mixed Shrubland	R035XC312AZ Loamy Wash 10-14" p.z. 26 acres
Blackbrush Mixed Shrubland	R035XC313AZ Loamy Upland 10-14" p.z. 35 acres
Blackbrush Mixed Shrubland	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 852 acres
Blackbrush Mixed Shrubland	R035XC331AZ Shallow Upland 10-14" p.z. Warm 4 acres
Blackbrush Mixed Shrubland	R035XD401AZ Breaks 7-11" p.z. <1 acre
Blackbrush Mixed Shrubland	R035XF604AZ Clayey Upland 13-17" p.z. <1 acre
Blackbrush Mixed Shrubland	Unassigned Unnamed 544 acres
Cliff and Scree Slopes	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 318 acres
Cliff and Scree Slopes	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 521 acres
Cliff and Scree Slopes	F035XF614AZ Unnamed 13 acres
Cliff and Scree Slopes	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED) 144 acres
Cliff and Scree Slopes	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 158 acres
Cliff and Scree Slopes	F035XH805AZ Unnamed 1 acre
Cliff and Scree Slopes	F035XH820AZ Unnamed 1 acre
Cliff and Scree Slopes	R035XC307AZ Clay Loam Upland 10-14" p.z. <1 acre
Cliff and Scree Slopes	R035XC312AZ Loamy Wash 10-14" p.z. 14 acres

Vegetation Type	NRCS Ecological Site
Cliff and Scree Slopes	R035XC313AZ Loamy Upland 10-14" p.z. 12 acres
Cliff and Scree Slopes	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 1622 acres
Cliff and Scree Slopes	R035XC331AZ Shallow Upland 10-14" p.z. Warm 2 acres
Cliff and Scree Slopes	R035XD401AZ Breaks 7-11" p.z. 34 acres
Cliff and Scree Slopes	R035XF604AZ Clayey Upland 13-17" p.z. 2 acres
Cliff and Scree Slopes	Unassigned Unnamed 7011 acres
Grassland – Native or Introduced	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 506 acres
Grassland – Native or Introduced	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 31 acres
Grassland – Native or Introduced	F035XF614AZ Unnamed 2 acres
Grassland – Native or Introduced	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED) <1 acre
Grassland – Native or Introduced	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 4 acres
Grassland – Native or Introduced	F035XH805AZ Unnamed <1 acre
Grassland – Native or Introduced	F035XH806AZ Unnamed 2 acres
Grassland – Native or Introduced	F035XH820AZ Unnamed <1 acre
Grassland – Native or Introduced	R035XC307AZ Clay Loam Upland 10-14" p.z. 2 acres
Grassland – Native or Introduced	R035XC312AZ Loamy Wash 10-14" p.z. 10 acres
Grassland – Native or Introduced	R035XC313AZ Loamy Upland 10-14" p.z. 2 acres
Grassland – Native or Introduced	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 35 acres
Grassland – Native or Introduced	R035XF604AZ Clayey Upland 13-17" p.z. 57 acres
Grassland – Native or Introduced	R035XH821AZ Meadow 17-25" p.z. 13 acres

Vegetation Type	NRCS Ecological Site
Grassland – Native or Introduced	Unassigned Unnamed 32 acres
Mojave Transition Shrubland	F035XF611AZ Clay Loam Upland 13-17” p.z. Gravelly (PIED, JUOS) 21 acres
Mojave Transition Shrubland	F035XF613AZ Limestone Hills 13-17” p.z. (PIED, JUOS) 230 acres
Mojave Transition Shrubland	F035XF614AZ Unnamed 4 acres
Mojave Transition Shrubland	F035XF619AZ Limestone Upland 13-17” p.z. (JUOS, PIED) 37 acres
Mojave Transition Shrubland	F035XF624AZ Basalt Slopes 13-17” p.z. (JUOS, PIED) 45 acres
Mojave Transition Shrubland	F035XH820AZ Unnamed 5 acres
Mojave Transition Shrubland	R035XC301AZ Basalt Upland 10-14” p.z. 1 acre
Mojave Transition Shrubland	R035XC313AZ Loamy Upland 10-14” p.z. 13 acres
Mojave Transition Shrubland	R035XC319AZ Limestone/Sandstone Upland 10-14” p.z. 770 acres
Mojave Transition Shrubland	R035XC331AZ Shallow Upland 10-14” p.z. Warm 16 acres
Mojave Transition Shrubland	R035XD401AZ Breaks 7-11” p.z. 2 acres
Mojave Transition Shrubland	R035XF604AZ Clayey Upland 13-17” p.z. 13 acres
Mojave Transition Shrubland	R035XH821AZ Meadow 17-25” p.z. <1 acre
Mojave Transition Shrubland	Unassigned Unnamed 921 acres
Oak Shrubland	F035XF611AZ Clay Loam Upland 13-17” p.z. Gravelly (PIED, JUOS) 38 acres
Oak Shrubland	F035XF613AZ Limestone Hills 13-17” p.z. (PIED, JUOS) 341 acres
Oak Shrubland	F035XF614AZ Unnamed 25 acres
Oak Shrubland	F035XF624AZ Basalt Slopes 13-17” p.z. (JUOS, PIED) 1 acre
Oak Shrubland	F035XH805AZ Unnamed 2 acres
Oak Shrubland	F035XH806AZ Unnamed <1 acre
Oak Shrubland	F035XH820AZ Unnamed 1 acre
Oak Shrubland	R035XC319AZ Limestone/Sandstone Upland 10-14” p.z. 9 acres
Oak Shrubland	R035XF604AZ Clayey Upland 13-17” p.z. 2 acres

Vegetation Type	NRCS Ecological Site
Oak Shrubland	R035XH821AZ Meadow 17-25" p.z. 1 acre
Oak Shrubland	Unassigned Unnamed 1 acre
Pinyon-Juniper Savanna	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 24335 acres
Pinyon-Juniper Savanna	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 7113 acres
Pinyon-Juniper Savanna	F035XF614AZ Unnamed 419 acres
Pinyon-Juniper Savanna	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED) 190 acres
Pinyon-Juniper Savanna	F035XF620AZ Unnamed 87 acres
Pinyon-Juniper Savanna	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 4268 acres
Pinyon-Juniper Savanna	F035XH805AZ Unnamed 1131 acres
Pinyon-Juniper Savanna	F035XH806AZ Unnamed 51 acres
Pinyon-Juniper Savanna	F035XH820AZ Unnamed 2888 acres
Pinyon-Juniper Savanna	R035XC301AZ Basalt Upland 10-14" p.z. 516 acres
Pinyon-Juniper Savanna	R035XC307AZ Clay Loam Upland 10-14" p.z. 155 acres
Pinyon-Juniper Savanna	R035XC311AZ Limy Upland 10-14" p.z. 40 acres
Pinyon-Juniper Savanna	R035XC312AZ Loamy Wash 10-14" p.z. 71 acres
Pinyon-Juniper Savanna	R035XC313AZ Loamy Upland 10-14" p.z. 808 acres
Pinyon-Juniper Savanna	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 14821 acres
Pinyon-Juniper Savanna	R035XC331AZ Shallow Upland 10-14" p.z. Warm 17 acres
Pinyon-Juniper Savanna	R035XD401AZ Breaks 7-11" p.z. <1 acre
Pinyon-Juniper Savanna	R035XF604AZ Clayey Upland 13-17" p.z. 195 acres
Pinyon-Juniper Savanna	R035XH821AZ Meadow 17-25" p.z. 68 acres
Pinyon-Juniper Savanna	Unassigned Unnamed 1987 acres
Pinyon-Juniper Woodland	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 87807 acres
Pinyon-Juniper Woodland	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 41319 acres
Pinyon-Juniper Woodland	F035XF614AZ Unnamed 581 acres

Vegetation Type	NRCS Ecological Site
Pinyon-Juniper Woodland	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED) 4301 acres
Pinyon-Juniper Woodland	F035XF620AZ Unnamed 1572 acres
Pinyon-Juniper Woodland	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 17325 acres
Pinyon-Juniper Woodland	F035XH805AZ Unnamed 2508 acres
Pinyon-Juniper Woodland	F035XH806AZ Unnamed 624 acres
Pinyon-Juniper Woodland	F035XH820AZ Unnamed 7052 acres
Pinyon-Juniper Woodland	R035XC301AZ Basalt Upland 10-14" p.z. 360 acres
Pinyon-Juniper Woodland	R035XC307AZ Clay Loam Upland 10-14" p.z. 37 acres
Pinyon-Juniper Woodland	R035XC311AZ Limy Upland 10-14" p.z. 9 acres
Pinyon-Juniper Woodland	R035XC312AZ Loamy Wash 10-14" p.z. 35 acres
Pinyon-Juniper Woodland	R035XC313AZ Loamy Upland 10-14" p.z. 298 acres
Pinyon-Juniper Woodland	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 15249 acres
Pinyon-Juniper Woodland	R035XC331AZ Shallow Upland 10-14" p.z. Warm 23 acres
Pinyon-Juniper Woodland	R035XD401AZ Breaks 7-11" p.z. 3 acres
Pinyon-Juniper Woodland	R035XF604AZ Clayey Upland 13-17" p.z. 454 acres
Pinyon-Juniper Woodland	R035XH821AZ Meadow 17-25" p.z. 240 acres
Pinyon-Juniper Woodland	Unassigned Unnamed 8263 acres
Ponderosa Pine Woodland	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 3340 acres
Ponderosa Pine Woodland	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 484 acres
Ponderosa Pine Woodland	F035XF614AZ Unnamed <1 acre
Ponderosa Pine Woodland	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED) 4 acres
Ponderosa Pine Woodland	F035XF620AZ Unnamed 78 acres
Ponderosa Pine Woodland	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 940 acres
Ponderosa Pine Woodland	F035XH805AZ Unnamed 1462 acres
Ponderosa Pine Woodland	F035XH806AZ Unnamed 692 acres
Ponderosa Pine Woodland	F035XH820AZ Unnamed 766 acres

Vegetation Type	NRCS Ecological Site
Ponderosa Pine Woodland	R035XC301AZ Basalt Upland 10-14" p.z. <1 acre
Ponderosa Pine Woodland	R035XC307AZ Clay Loam Upland 10-14" p.z. <1 acre
Ponderosa Pine Woodland	R035XC313AZ Loamy Upland 10-14" p.z. <1 acre
Ponderosa Pine Woodland	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 44 acres
Ponderosa Pine Woodland	R035XF604AZ Clayey Upland 13-17" p.z. 83 acres
Ponderosa Pine Woodland	R035XH821AZ Meadow 17-25" p.z. 56 acres
Ponderosa Pine Woodland	Unassigned Unnamed 171 acres
Recent Fire or Treatment Disturbance	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 321 acres
Recent Fire or Treatment Disturbance	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 22 acres
Recent Fire or Treatment Disturbance	F035XF620AZ Unnamed <1 acre
Recent Fire or Treatment Disturbance	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 14 acres
Recent Fire or Treatment Disturbance	F035XH805AZ Unnamed 16 acres
Recent Fire or Treatment Disturbance	F035XH820AZ Unnamed 37 acres
Recent Fire or Treatment Disturbance	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 8 acres
Recent Fire or Treatment Disturbance	R035XF604AZ Clayey Upland 13-17" p.z. 14 acres
Recent Fire or Treatment Disturbance	R035XH821AZ Meadow 17-25" p.z. 2 acres
Recent Fire or Treatment Disturbance	Unassigned Unnamed 14 acres
Sagebrush Grassland	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 189 acres
Sagebrush Grassland	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 399 acres
Sagebrush Grassland	F035XF614AZ Unnamed 27 acres
Sagebrush Grassland	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED) 23 acres

Vegetation Type	NRCS Ecological Site
Sagebrush Grassland	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 12 acres
Sagebrush Grassland	F035XH805AZ Unnamed <1 acre
Sagebrush Grassland	F035XH806AZ Unnamed 1 acre
Sagebrush Grassland	F035XH820AZ Unnamed <1 acre
Sagebrush Grassland	R035XC301AZ Basalt Upland 10-14" p.z. <1 acre
Sagebrush Grassland	R035XC307AZ Clay Loam Upland 10-14" p.z. 37 acres
Sagebrush Grassland	R035XC311AZ Limy Upland 10-14" p.z. 12 acres
Sagebrush Grassland	R035XC312AZ Loamy Wash 10-14" p.z. 83 acres
Sagebrush Grassland	R035XC313AZ Loamy Upland 10-14" p.z. 74 acres
Sagebrush Grassland	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 632 acres
Sagebrush Grassland	R035XF604AZ Clayey Upland 13-17" p.z. 118 acres
Sagebrush Grassland	R035XH821AZ Meadow 17-25" p.z. 62 acres
Sagebrush Grassland	Unassigned Unnamed 84 acres
Sagebrush Shrubland	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 8365 acres
Sagebrush Shrubland	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 2646 acres
Sagebrush Shrubland	F035XF614AZ Unnamed 622 acres
Sagebrush Shrubland	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED) 68 acres
Sagebrush Shrubland	F035XF620AZ Unnamed 4 acres
Sagebrush Shrubland	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 166 acres
Sagebrush Shrubland	F035XH805AZ Unnamed 34 acres
Sagebrush Shrubland	F035XH806AZ Unnamed 84 acres
Sagebrush Shrubland	F035XH820AZ Unnamed 253 acres
Sagebrush Shrubland	R035XC301AZ Basalt Upland 10-14" p.z. 28 acres
Sagebrush Shrubland	R035XC307AZ Clay Loam Upland 10-14" p.z. 1517 acres
Sagebrush Shrubland	R035XC311AZ Limy Upland 10-14" p.z. 98 acres
Sagebrush Shrubland	R035XC312AZ Loamy Wash 10-14" p.z. 414 acres

Vegetation Type	NRCS Ecological Site
Sagebrush Shrubland	R035XC313AZ Loamy Upland 10-14" p.z. 1122 acres
Sagebrush Shrubland	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 23297 acres
Sagebrush Shrubland	R035XC331AZ Shallow Upland 10-14" p.z. Warm 1 acre
Sagebrush Shrubland	R035XD401AZ Breaks 7-11" p.z. <1 acre
Sagebrush Shrubland	R035XF604AZ Clayey Upland 13-17" p.z. 626 acres
Sagebrush Shrubland	R035XH821AZ Meadow 17-25" p.z. 289 acres
Sagebrush Shrubland	Unassigned Unnamed 2658 acres
Shivwits Chaparral	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS) 79 acres
Shivwits Chaparral	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS) 1152 acres
Shivwits Chaparral	F035XF614AZ Unnamed 13 acres
Shivwits Chaparral	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED) 69 acres
Shivwits Chaparral	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED) 58 acres
Shivwits Chaparral	F035XH805AZ Unnamed <1 acre
Shivwits Chaparral	F035XH806AZ Unnamed 1 acre
Shivwits Chaparral	F035XH820AZ Unnamed <1 acre
Shivwits Chaparral	R035XC301AZ Basalt Upland 10-14" p.z. 1 acre
Shivwits Chaparral	R035XC307AZ Clay Loam Upland 10-14" p.z. 1 acre
Shivwits Chaparral	R035XC311AZ Limy Upland 10-14" p.z. <1 acre
Shivwits Chaparral	R035XC312AZ Loamy Wash 10-14" p.z. <1 acre
Shivwits Chaparral	R035XC313AZ Loamy Upland 10-14" p.z. 4 acres
Shivwits Chaparral	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z. 1641 acres
Shivwits Chaparral	R035XC331AZ Shallow Upland 10-14" p.z. Warm 1 acre
Shivwits Chaparral	R035XD401AZ Breaks 7-11" p.z. 1 acre
Shivwits Chaparral	R035XF604AZ Clayey Upland 13-17" p.z. 1 acre
Shivwits Chaparral	R035XH821AZ Meadow 17-25" p.z. <1 acre
Shivwits Chaparral	Unassigned Unnamed 965 acres

Table J.2. Invasive Non-Native Plants Detected During Invasive Plant Monitoring 2014-2020, Roadside Survey 2020 and SPLRP EA Survey Plot Survey.

USDA PLANTS code	Scientific Name	Common name
AGCR*	<i>Agropyron cristatum</i>	crested wheatgrass
BASC5	<i>Bassia scoparia</i>	burningbush
BRAR2	<i>Bromus arvensis</i>	field brome
BRDI3	<i>Bromus diandrus</i>	ripgut brome
BRIN2*	<i>Bromus inermis</i>	smooth brome
BRJA	<i>Bromus japonicus/Bromus arvensis</i>	field brome
BRRU2	<i>Bromus rubens.</i>	red brome
BRTE	<i>Bromus tectorum</i>	cheatgrass
BRT0	<i>Brassica tournefortii</i>	Asian mustard
CADR	<i>Cardaria draba</i>	whitetop
CETE5	<i>Ceratocephala testiculata</i>	curveseed butterwort
CHTE2	<i>Chorispora tenella</i>	crossflower
CIAR4	<i>Cirsium arvense</i>	Canada thistle
CIVU	<i>Cirsium vulgare</i>	bull thistle
COAR4	<i>Convolvulus arvensis</i>	field bindweed
ERCI6	<i>Erodium cicutarium</i>	redstem stork's bill
HORDE	<i>Hordeum sp.</i>	barley
LASE	<i>Lactuca serriola</i>	prickly lettuce
MEOF	<i>Melilotus officinalis</i>	sweetclover
ONAC	<i>Onopordum acanthium</i>	Scotch cottonthistle
SALSO	<i>Salsola sp.</i>	Russian thistle
SATR12	<i>Salsola tragus</i>	prickly Russian thistle
SCHIS	<i>Schismus sp.</i>	Mediterranean grass
SIAL2	<i>Sisymbrium altissimum</i>	tall tumbled mustard
SIIR	<i>Sisymbrium irio</i>	London rocket
TACH2	<i>Tamarix chinensis</i>	five-stamen tamarisk
TRDU	<i>Tragopogon dubius</i>	yellow salsify
TRTE	<i>Tribulus terrestris</i>	puncturevine

USDA PLANTS code	Scientific Name	Common name
VETH	<i>Verbascum thapsus</i>	common mullein
THIN6*	<i>Thinopyrum intermedium</i>	intermediate wheatgrass

* Species not considered invasive on Monument. USDA PLANTS codes from NRCS (2018).

Table J.3. Detailed Treatment Acreage for Alternative A – Proposed Action. Vegetation types includes areas where no Ecological Site number (Unassigned) or name (Unnamed) has been assigned by NRCS. Vegetation Type Acres area calculated based on treatment unit acres, not actual acres treated (less than treatment unit acres).

Treatment	ESD	ESD Acres	Vegetation Type	Vegetation Type Acres
Herbicide	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	6	Grassland - Native or Introduced	8
Herbicide	F035XH820AZ	9	Oak Shrubland	1
Herbicide	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	77	Pinyon-Juniper Savanna	18
Herbicide	R035XH821AZ Meadow 17-25" p.z.	95	Pinyon-Juniper Woodland	26
Herbicide	-	-	Ponderosa Pine Woodland	12
Herbicide	-	-	Recent Fire or Treatment Disturbance	6
Herbicide	-	-	Sagebrush Grassland	42
Herbicide	-	-	Sagebrush Shrubland	73
Herbicide	-	-	Shivwits Chaparral	1
Manual	R035XC307AZ Clay Loam Upland 10-14" p.z.	>1	Blackbrush Mixed Shrubland	321
Manual	R035XC312AZ Loamy Wash 10-14" p.z.	34	Cliff and Scree Slopes	343
Manual	R035XH821AZ Meadow 17-25" p.z.	45	Grassland - Native or Introduced	467
Manual	R035XF604AZ Clayey Upland 13-17" p.z.	77	Mojave Transition Shrubland	226
Manual	F035XH806AZ	131	Oak Shrubland	308
Manual	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED)	141	Pinyon-Juniper Savanna	13622
Manual	R035XC313AZ Loamy Upland 10-14" p.z.	280	Pinyon-Juniper Woodland	38914
Manual	F035XH805AZ	419	Ponderosa Pine Woodland	1084

Treatment	ESD	ESD Acres	Vegetation Type	Vegetation Type Acres
Manual	F035XF614AZ	487	Recent Fire or Treatment Disturbance	312
Manual	R035XC301AZ Basalt Upland 10-14" p.z.	522	Sagebrush Grassland	591
Manual	Unassigned Unnamed	534	Sagebrush Shrubland	13344
Manual	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	736	Shivwits Chaparral	405
Manual	F035XH820AZ	1168	-	-
Manual	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	8052	-	-
Manual	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	16232	-	-
Manual	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	29716	-	-
Mechanical	F035XH805AZ	6	Blackbrush Mixed Shrubland	47
Mechanical	Unassigned Unnamed	10	Cliff and Scree Slopes	29
Mechanical	R035XC311AZ Limy Upland 10-14" p.z.	15	Grassland - Native or Introduced	446
Mechanical	R035XC312AZ Loamy Wash 10-14" p.z.	37	Mojave Transition Shrubland	78
Mechanical	R035XH821AZ Meadow 17-25" p.z.	45	Oak Shrubland	306
Mechanical	F035XH806AZ	131	Pinyon-Juniper Savanna	9257
Mechanical	R035XF604AZ Clayey Upland 13-17" p.z.	186	Pinyon-Juniper Woodland	24314
Mechanical	R035XC313AZ Loamy Upland 10-14" p.z.	411	Ponderosa Pine Woodland	490
Mechanical	R035XC301AZ Basalt Upland 10-14" p.z.	522	Recent Fire or Treatment Disturbance	6
Mechanical	R035XC307AZ Clay Loam Upland 10-14" p.z.	540	Sagebrush Grassland	466
Mechanical	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	644	Sagebrush Shrubland	10812
Mechanical	F035XF614AZ	683	Shivwits Chaparral	284
Mechanical	F035XH820AZ	1156	-	-

Treatment	ESD	ESD Acres	Vegetation Type	Vegetation Type Acres
Mechanical	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	7768	-	-
Mechanical	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	11316	-	-
Mechanical	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	23075	-	-
Prescribed Fire	R035XC313AZ Loamy Upland 10-14" p.z.	4	Blackbrush Mixed Shrubland	277
Prescribed Fire	F035XF620AZ	80	Cliff and Scree Slopes	387
Prescribed Fire	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED)	141	Grassland - Native or Introduced	115
Prescribed Fire	R035XF604AZ Clayey Upland 13-17" p.z.	367	Mojave Transition Shrubland	156
Prescribed Fire	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	439	Oak Shrubland	5
Prescribed Fire	Unassigned Unnamed	555	Pinyon-Juniper Savanna	8650
Prescribed Fire	R035XH821AZ Meadow 17-25" p.z.	686	Pinyon-Juniper Woodland	33714
Prescribed Fire	F035XH805AZ	1103	Ponderosa Pine Woodland	4564
Prescribed Fire	F035XH806AZ	1455	Recent Fire or Treatment Disturbance	351
Prescribed Fire	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	4895	Sagebrush Grassland	305
Prescribed Fire	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	5455	Sagebrush Shrubland	5547
Prescribed Fire	F035XH820AZ	7569	Shivwits Chaparral	139
Prescribed Fire	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	16740	-	-
Seeding	Unassigned Unnamed	2	Blackbrush Mixed Shrubland	23

Treatment	ESD	ESD Acres	Vegetation Type	Vegetation Type Acres
Seeding	F035XH820AZ	9	Cliff and Scree Slopes	8
Seeding	R035XC311AZ Limy Upland 10-14" p.z.	15	Grassland - Native or Introduced	43
Seeding	R035XC312AZ Loamy Wash 10-14" p.z.	37	Mojave Transition Shrubland	11
Seeding	R035XH821AZ Meadow 17-25" p.z.	95	Oak Shrubland	7
Seeding	R035XF604AZ Clayey Upland 13-17" p.z.	179	Pinyon-Juniper Savanna	6568
Seeding	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	263	Pinyon-Juniper Woodland	10899
Seeding	R035XC313AZ Loamy Upland 10-14" p.z.	373	Ponderosa Pine Woodland	68
Seeding	F035XF614AZ	460	Recent Fire or Treatment Disturbance	7
Seeding	R035XC301AZ Basalt Upland 10-14" p.z.	522	Sagebrush Grassland	211
Seeding	R035XC307AZ Clay Loam Upland 10-14" p.z.	540	Sagebrush Shrubland	5686
Seeding	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	4520	Shivwits Chaparral	20
Seeding	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	6391	-	-
Seeding	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	10164	-	-

Table J.4. Unit-specific Treatment and Acreages of Vegetation Types Within Unit.

Unit No.	Name	Treatment	Vegetation Type	Acres
1	Agway Valley East	Mechanical, Seed	Pinyon-Juniper Savanna	93
1	Agway Valley East	Mechanical, Seed	Pinyon-Juniper Woodland	17
1	Agway Valley East	Mechanical, Seed	Sagebrush Shrubland	16
2	Agway Valley North	Manual, Mechanical, Seed	Blackbrush Mixed Shrubland	2
2	Agway Valley North	Manual, Mechanical, Seed	Grassland - Native or Introduced	<1

Unit No.	Name	Treatment	Vegetation Type	Acres
2	Agway Valley North	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	419
2	Agway Valley North	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	111
2	Agway Valley North	Manual, Mechanical, Seed	Sagebrush Grassland	1
2	Agway Valley North	Manual, Mechanical, Seed	Sagebrush Shrubland	66
3	Agway Valley Southwest	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	143
3	Agway Valley Southwest	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	17
3	Agway Valley Southwest	Manual, Mechanical, Seed	Sagebrush Grassland	1
3	Agway Valley Southwest	Manual, Mechanical, Seed	Sagebrush Shrubland	3
4	Agway Wash	Manual, Mechanical, Seed	Blackbrush Mixed Shrubland	<1
4	Agway Wash	Manual, Mechanical, Seed	Mojave Transition Shrubland	4
4	Agway Wash	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	179
4	Agway Wash	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	38
4	Agway Wash	Manual, Mechanical, Seed	Sagebrush Grassland	7
4	Agway Wash	Manual, Mechanical, Seed	Sagebrush Shrubland	44
4	Agway Wash	Manual, Mechanical, Seed	Shivwits Chaparral	13
5	Ambush	Prescribed Fire	Pinyon-Juniper Savanna	73
5	Ambush	Prescribed Fire	Pinyon-Juniper Woodland	172
5	Ambush	Prescribed Fire	Ponderosa Pine Woodland	119
5	Ambush	Prescribed Fire	Recent Fire or Treatment Disturbance	1
6	Ambush North	Manual, Prescribed Fire	Pinyon-Juniper Savanna	100
6	Ambush North	Manual, Prescribed Fire	Pinyon-Juniper Woodland	454
6	Ambush North	Manual, Prescribed Fire	Ponderosa Pine Woodland	2
6	Ambush North	Manual, Prescribed Fire	Sagebrush Shrubland	1

Unit No.	Name	Treatment	Vegetation Type	Acres
7	Andrus	Manual, Prescribed Fire	Blackbrush Mixed Shrubland	274
7	Andrus	Manual, Prescribed Fire	Cliff and Scree Slopes	210
7	Andrus	Manual, Prescribed Fire	Grassland - Native or Introduced	14
7	Andrus	Manual, Prescribed Fire	Mojave Transition Shrubland	132
7	Andrus	Manual, Prescribed Fire	Oak Shrubland	<1
7	Andrus	Manual, Prescribed Fire	Pinyon-Juniper Savanna	1072
7	Andrus	Manual, Prescribed Fire	Pinyon-Juniper Woodland	686
7	Andrus	Manual, Prescribed Fire	Ponderosa Pine Woodland	4
7	Andrus	Manual, Prescribed Fire	Sagebrush Grassland	159
7	Andrus	Manual, Prescribed Fire	Sagebrush Shrubland	3243
7	Andrus	Manual, Prescribed Fire	Shivwits Chaparral	86
8	Boundary	Prescribed Fire	Pinyon-Juniper Savanna	25
8	Boundary	Prescribed Fire	Pinyon-Juniper Woodland	48
8	Boundary	Prescribed Fire	Ponderosa Pine Woodland	59
8	Boundary	Prescribed Fire	Recent Fire or Treatment Disturbance	<1
9	Buster	Manual, Prescribed Fire	Pinyon-Juniper Savanna	93
9	Buster	Manual, Prescribed Fire	Pinyon-Juniper Woodland	577
9	Buster	Manual, Prescribed Fire	Ponderosa Pine Woodland	5
9	Buster	Manual, Prescribed Fire	Sagebrush Shrubland	<1
10	Castle Peak	Manual, Mechanical	Pinyon-Juniper Savanna	458
10	Castle Peak	Manual, Mechanical	Pinyon-Juniper Woodland	2858
10	Castle Peak	Manual, Mechanical	Ponderosa Pine Woodland	336
10	Castle Peak	Manual, Mechanical	Sagebrush Shrubland	1
11	Castle Peak II	Prescribed Fire	Grassland - Native or Introduced	<1
11	Castle Peak II	Prescribed Fire	Pinyon-Juniper Savanna	701

Unit No.	Name	Treatment	Vegetation Type	Acres
11	Castle Peak II	Prescribed Fire	Pinyon-Juniper Woodland	5650
11	Castle Peak II	Prescribed Fire	Ponderosa Pine Woodland	704
11	Castle Peak II	Prescribed Fire	Recent Fire or Treatment Disturbance	13
11	Castle Peak II	Prescribed Fire	Sagebrush Grassland	<1
11	Castle Peak II	Prescribed Fire	Sagebrush Shrubland	31
12	Dellenbaugh	Manual, Prescribed Fire	Pinyon-Juniper Savanna	2
12	Dellenbaugh	Manual, Prescribed Fire	Pinyon-Juniper Woodland	194
12	Dellenbaugh	Manual, Prescribed Fire	Ponderosa Pine Woodland	51
12	Dellenbaugh	Manual, Prescribed Fire	Sagebrush Shrubland	<1
13	Fire Camp	Prescribed Fire	Oak Shrubland	<1
13	Fire Camp	Prescribed Fire	Pinyon-Juniper Savanna	34
13	Fire Camp	Prescribed Fire	Pinyon-Juniper Woodland	36
13	Fire Camp	Prescribed Fire	Ponderosa Pine Woodland	23
13	Fire Camp	Prescribed Fire	Recent Fire or Treatment Disturbance	<1
13	Fire Camp	Prescribed Fire	Sagebrush Shrubland	1
14	Fire Camp Extension	Manual, Prescribed Fire	Pinyon-Juniper Savanna	24
14	Fire Camp Extension	Manual, Prescribed Fire	Pinyon-Juniper Woodland	4
14	Fire Camp Extension	Manual, Prescribed Fire	Sagebrush Shrubland	1
15	Fire Camp South	Manual, Prescribed Fire	Pinyon-Juniper Savanna	426
15	Fire Camp South	Manual, Prescribed Fire	Pinyon-Juniper Woodland	458
15	Fire Camp South	Manual, Prescribed Fire	Ponderosa Pine Woodland	15
15	Fire Camp South	Manual, Prescribed Fire	Recent Fire or Treatment Disturbance	<1
15	Fire Camp South	Manual, Prescribed Fire	Sagebrush Shrubland	<1
16	Gardner Canyon North	Manual, Mechanical	Blackbrush Mixed Shrubland	1
16	Gardner Canyon North	Manual, Mechanical	Cliff and Scree Slopes	1

Unit No.	Name	Treatment	Vegetation Type	Acres
16	Gardner Canyon North	Manual, Mechanical	Grassland - Native or Introduced	2
16	Gardner Canyon North	Manual, Mechanical	Mojave Transition Shrubland	29
16	Gardner Canyon North	Manual, Mechanical	Oak Shrubland	11
16	Gardner Canyon North	Manual, Mechanical	Pinyon-Juniper Savanna	98
16	Gardner Canyon North	Manual, Mechanical	Pinyon-Juniper Woodland	567
16	Gardner Canyon North	Manual, Mechanical	Recent Fire or Treatment Disturbance	5
16	Gardner Canyon North	Manual, Mechanical	Sagebrush Grassland	87
16	Gardner Canyon North	Manual, Mechanical	Sagebrush Shrubland	325
16	Gardner Canyon North	Manual, Mechanical	Shivwits Chaparral	103
17	Grassy Mountain	Prescribed Fire	Blackbrush Mixed Shrubland	1
17	Grassy Mountain	Prescribed Fire	Cliff and Scree Slopes	69
17	Grassy Mountain	Prescribed Fire	Mojave Transition Shrubland	8
17	Grassy Mountain	Prescribed Fire	Pinyon-Juniper Savanna	601
17	Grassy Mountain	Prescribed Fire	Pinyon-Juniper Woodland	2030
17	Grassy Mountain	Prescribed Fire	Ponderosa Pine Woodland	321
17	Grassy Mountain	Prescribed Fire	Sagebrush Grassland	1
17	Grassy Mountain	Prescribed Fire	Sagebrush Shrubland	20
17	Grassy Mountain	Prescribed Fire	Shivwits Chaparral	12
18	Grassy Mountain East	Manual, Mechanical, Seed	Mojave Transition Shrubland	4
18	Grassy Mountain East	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	627
18	Grassy Mountain East	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	349
18	Grassy Mountain East	Manual, Mechanical, Seed	Sagebrush Grassland	1
18	Grassy Mountain East	Manual, Mechanical, Seed	Sagebrush Shrubland	63
18	Grassy Mountain East	Manual, Mechanical, Seed	Shivwits Chaparral	1
19	Green Springs	Prescribed Fire	Cliff and Scree Slopes	<1
19	Green Springs	Prescribed Fire	Pinyon-Juniper Savanna	1
19	Green Springs	Prescribed Fire	Pinyon-Juniper Woodland	36

Unit No.	Name	Treatment	Vegetation Type	Acres
19	Green Springs	Prescribed Fire	Ponderosa Pine Woodland	16
19	Green Springs	Prescribed Fire	Recent Fire or Treatment Disturbance	5
20	Green Springs East	Prescribed Fire	Pinyon-Juniper Savanna	42
20	Green Springs East	Prescribed Fire	Pinyon-Juniper Woodland	118
20	Green Springs East	Prescribed Fire	Ponderosa Pine Woodland	166
21	Green Springs North	Prescribed Fire	Oak Shrubland	<1
21	Green Springs North	Prescribed Fire	Pinyon-Juniper Savanna	120
21	Green Springs North	Prescribed Fire	Pinyon-Juniper Woodland	375
21	Green Springs North	Prescribed Fire	Ponderosa Pine Woodland	170
21	Green Springs North	Prescribed Fire	Sagebrush Shrubland	15
22	Halfway	Prescribed Fire	Pinyon-Juniper Savanna	94
22	Halfway	Prescribed Fire	Pinyon-Juniper Woodland	43
22	Halfway	Prescribed Fire	Ponderosa Pine Woodland	59
22	Halfway	Prescribed Fire	Sagebrush Shrubland	4
23	Hidden Hills North	Manual, Mechanical, Seed	Blackbrush Mixed Shrubland	1
23	Hidden Hills North	Manual, Mechanical, Seed	Cliff and Scree Slopes	<1
23	Hidden Hills North	Manual, Mechanical, Seed	Grassland - Native or Introduced	1
23	Hidden Hills North	Manual, Mechanical, Seed	Mojave Transition Shrubland	1
23	Hidden Hills North	Manual, Mechanical, Seed	Oak Shrubland	<1
23	Hidden Hills North	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	1120
23	Hidden Hills North	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	3364
23	Hidden Hills North	Manual, Mechanical, Seed	Sagebrush Grassland	9
23	Hidden Hills North	Manual, Mechanical, Seed	Sagebrush Shrubland	223
23	Hidden Hills North	Manual, Mechanical, Seed	Shivwits Chaparral	2
24	Hidden Hills West	Manual, Mechanical, Seed	Blackbrush Mixed Shrubland	1
24	Hidden Hills West	Manual, Mechanical, Seed	Cliff and Scree Slopes	5
24	Hidden Hills West	Manual, Mechanical, Seed	Grassland - Native or Introduced	33

Unit No.	Name	Treatment	Vegetation Type	Acres
24	Hidden Hills West	Manual, Mechanical, Seed	Mojave Transition Shrubland	1
24	Hidden Hills West	Manual, Mechanical, Seed	Oak Shrubland	5
24	Hidden Hills West	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	158
24	Hidden Hills West	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	1369
24	Hidden Hills West	Manual, Mechanical, Seed	Ponderosa Pine Woodland	1
24	Hidden Hills West	Manual, Mechanical, Seed	Recent Fire or Treatment Disturbance	<1
24	Hidden Hills West	Manual, Mechanical, Seed	Sagebrush Grassland	40
24	Hidden Hills West	Manual, Mechanical, Seed	Sagebrush Shrubland	1807
24	Hidden Hills West	Manual, Mechanical, Seed	Shivwits Chaparral	3
25	Horse Valley	Prescribed Fire	Pinyon-Juniper Savanna	21
25	Horse Valley	Prescribed Fire	Pinyon-Juniper Woodland	19
25	Horse Valley	Prescribed Fire	Ponderosa Pine Woodland	27
25	Horse Valley	Prescribed Fire	Recent Fire or Treatment Disturbance	1
26	Horse Valley Meadow	Manual	Grassland - Native or Introduced	2
26	Horse Valley Meadow	Manual	Mojave Transition Shrubland	<1
26	Horse Valley Meadow	Manual	Pinyon-Juniper Savanna	35
26	Horse Valley Meadow	Manual	Pinyon-Juniper Woodland	16
26	Horse Valley Meadow	Manual	Ponderosa Pine Woodland	4
26	Horse Valley Meadow	Manual	Recent Fire or Treatment Disturbance	11
26	Horse Valley Meadow	Manual	Sagebrush Grassland	<1
26	Horse Valley Meadow	Manual	Sagebrush Shrubland	131
27	Horse Valley North	Manual, Prescribed Fire	Pinyon-Juniper Savanna	201
27	Horse Valley North	Manual, Prescribed Fire	Pinyon-Juniper Woodland	315

Unit No.	Name	Treatment	Vegetation Type	Acres
27	Horse Valley North	Manual, Prescribed Fire	Ponderosa Pine Woodland	12
27	Horse Valley North	Manual, Prescribed Fire	Recent Fire or Treatment Disturbance	<1
27	Horse Valley North	Manual, Prescribed Fire	Sagebrush Shrubland	4
28	Kelly	Manual, Prescribed Fire	Cliff and Scree Slopes	1
28	Kelly	Manual, Prescribed Fire	Mojave Transition Shrubland	2
28	Kelly	Manual, Prescribed Fire	Pinyon-Juniper Savanna	545
28	Kelly	Manual, Prescribed Fire	Pinyon-Juniper Woodland	2134
28	Kelly	Manual, Prescribed Fire	Ponderosa Pine Woodland	80
28	Kelly	Manual, Prescribed Fire	Recent Fire or Treatment Disturbance	<1
28	Kelly	Manual, Prescribed Fire	Sagebrush Shrubland	11
29	Kelly Dam	Herbicide, Seed	Grassland - Native or Introduced	6
29	Kelly Dam	Herbicide, Seed	Oak Shrubland	1
29	Kelly Dam	Herbicide, Seed	Pinyon-Juniper Savanna	6
29	Kelly Dam	Herbicide, Seed	Pinyon-Juniper Woodland	21
29	Kelly Dam	Herbicide, Seed	Ponderosa Pine Woodland	12
29	Kelly Dam	Herbicide, Seed	Recent Fire or Treatment Disturbance	6
29	Kelly Dam	Herbicide, Seed	Sagebrush Grassland	41
29	Kelly Dam	Herbicide, Seed	Sagebrush Shrubland	10
29	Kelly Dam	Herbicide, Seed	Shivwits Chaparral	<1
30	Kelly East	Manual, Prescribed Fire	Cliff and Scree Slopes	1
30	Kelly East	Manual, Prescribed Fire	Mojave Transition Shrubland	<1
30	Kelly East	Manual, Prescribed Fire	Oak Shrubland	1
30	Kelly East	Manual, Prescribed Fire	Pinyon-Juniper Savanna	579
30	Kelly East	Manual, Prescribed Fire	Pinyon-Juniper Woodland	1054

Unit No.	Name	Treatment	Vegetation Type	Acres
30	Kelly East	Manual, Prescribed Fire	Ponderosa Pine Woodland	307
30	Kelly East	Manual, Prescribed Fire	Recent Fire or Treatment Disturbance	7
30	Kelly East	Manual, Prescribed Fire	Sagebrush Shrubland	6
31	Kelly East Extension	Manual, Prescribed Fire	Cliff and Scree Slopes	4
31	Kelly East Extension	Manual, Prescribed Fire	Pinyon-Juniper Savanna	35
31	Kelly East Extension	Manual, Prescribed Fire	Pinyon-Juniper Woodland	487
31	Kelly East Extension	Manual, Prescribed Fire	Ponderosa Pine Woodland	13
32	Kelly West	Manual, Prescribed Fire	Cliff and Scree Slopes	<1
32	Kelly West	Manual, Prescribed Fire	Pinyon-Juniper Savanna	35
32	Kelly West	Manual, Prescribed Fire	Pinyon-Juniper Woodland	453
32	Kelly West	Manual, Prescribed Fire	Ponderosa Pine Woodland	15
33	Lake Flat	Prescribed Fire	Grassland - Native or Introduced	13
33	Lake Flat	Prescribed Fire	Mojave Transition Shrubland	1
33	Lake Flat	Prescribed Fire	Oak Shrubland	1
33	Lake Flat	Prescribed Fire	Pinyon-Juniper Savanna	1079
33	Lake Flat	Prescribed Fire	Pinyon-Juniper Woodland	1417
33	Lake Flat	Prescribed Fire	Ponderosa Pine Woodland	350
33	Lake Flat	Prescribed Fire	Recent Fire or Treatment Disturbance	26
33	Lake Flat	Prescribed Fire	Sagebrush Grassland	60
33	Lake Flat	Prescribed Fire	Sagebrush Shrubland	354
33	Lake Flat	Prescribed Fire	Shivwits Chaparral	<1
34	Lake Flat East	Manual, Mechanical	Pinyon-Juniper Savanna	82
34	Lake Flat East	Manual, Mechanical	Pinyon-Juniper Woodland	258
34	Lake Flat East	Manual, Mechanical	Ponderosa Pine Woodland	6
35	Lundell Tank	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	679
35	Lundell Tank	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	334

Unit No.	Name	Treatment	Vegetation Type	Acres
35	Lundell Tank	Manual, Mechanical, Seed	Sagebrush Shrubland	7
36	McDonald Flat	Mechanical, Seed	Pinyon-Juniper Savanna	38
36	McDonald Flat	Mechanical, Seed	Pinyon-Juniper Woodland	27
36	McDonald Flat	Mechanical, Seed	Sagebrush Grassland	<1
36	McDonald Flat	Mechanical, Seed	Sagebrush Shrubland	846
36	McDonald Flat	Mechanical, Seed	Shivwits Chaparral	1
37	McDonald Flat West	Manual, Mechanical, Seed	Blackbrush Mixed Shrubland	5
37	McDonald Flat West	Manual, Mechanical, Seed	Cliff and Scree Slopes	1
37	McDonald Flat West	Manual, Mechanical, Seed	Grassland - Native or Introduced	0
37	McDonald Flat West	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	83
37	McDonald Flat West	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	56
37	McDonald Flat West	Manual, Mechanical, Seed	Sagebrush Shrubland	686
38	Middle Ambush	Manual, Prescribed Fire	Pinyon-Juniper Savanna	220
38	Middle Ambush	Manual, Prescribed Fire	Pinyon-Juniper Woodland	849
38	Middle Ambush	Manual, Prescribed Fire	Ponderosa Pine Woodland	9
38	Middle Ambush	Manual, Prescribed Fire	Sagebrush Shrubland	1
39	Mociac Well	Manual, Mechanical	Mojave Transition Shrubland	<1
39	Mociac Well	Manual, Mechanical	Pinyon-Juniper Savanna	135
39	Mociac Well	Manual, Mechanical	Pinyon-Juniper Woodland	247
39	Mociac Well	Manual, Mechanical	Ponderosa Pine Woodland	1
39	Mociac Well	Manual, Mechanical	Sagebrush Shrubland	<1
40	Nutter	Manual, Prescribed Fire	Mojave Transition Shrubland	2
40	Nutter	Manual, Prescribed Fire	Oak Shrubland	<1
40	Nutter	Manual, Prescribed Fire	Pinyon-Juniper Savanna	57
40	Nutter	Manual, Prescribed Fire	Pinyon-Juniper Woodland	358
40	Nutter	Manual, Prescribed Fire	Ponderosa Pine Woodland	1

Unit No.	Name	Treatment	Vegetation Type	Acres
40	Nutter	Manual, Prescribed Fire	Sagebrush Shrubland	8
41	Overnight Draw East	Herbicide, Mechanical, Seed	Grassland - Native or Introduced	2
41	Overnight Draw East	Herbicide, Mechanical, Seed	Pinyon-Juniper Savanna	12
41	Overnight Draw East	Herbicide, Mechanical, Seed	Pinyon-Juniper Woodland	5
41	Overnight Draw East	Herbicide, Mechanical, Seed	Sagebrush Grassland	<1
41	Overnight Draw East	Herbicide, Mechanical, Seed	Sagebrush Shrubland	63
41	Overnight Draw East	Herbicide, Mechanical, Seed	Shivwits Chaparral	<1
42	Overnight Draw North	Mechanical, Seed	Pinyon-Juniper Savanna	22
42	Overnight Draw North	Mechanical, Seed	Pinyon-Juniper Woodland	9
42	Overnight Draw North	Mechanical, Seed	Sagebrush Shrubland	4
43	Overnight Draw West	Mechanical, Seed	Blackbrush Mixed Shrubland	<1
43	Overnight Draw West	Mechanical, Seed	Pinyon-Juniper Savanna	86
43	Overnight Draw West	Mechanical, Seed	Pinyon-Juniper Woodland	221
43	Overnight Draw West	Mechanical, Seed	Sagebrush Grassland	1
43	Overnight Draw West	Mechanical, Seed	Sagebrush Shrubland	14
44	Parashant Wash East	Manual, Mechanical	Pinyon-Juniper Savanna	45
44	Parashant Wash East	Manual, Mechanical	Pinyon-Juniper Woodland	79
44	Parashant Wash East	Manual, Mechanical	Sagebrush Shrubland	<1
45	Penn Valley Hills East	Manual, Mechanical	Cliff and Scree Slopes	<1
45	Penn Valley Hills	Manual, Mechanical	Grassland - Native or Introduced	<1
45	Penn Valley Hills	Manual, Mechanical	Pinyon-Juniper Savanna	78
45	Penn Valley Hills	Manual, Mechanical	Pinyon-Juniper Woodland	830
45	Penn Valley Hills	Manual, Mechanical	Ponderosa Pine Woodland	1
45	Penn Valley Hills	Manual, Mechanical	Sagebrush Shrubland	2

Unit No.	Name	Treatment	Vegetation Type	Acres
46	Penn Valley Hills East	Manual, Mechanical	Grassland - Native or Introduced	8
46	Penn Valley Hills East	Manual, Mechanical	Mojave Transition Shrubland	3
46	Penn Valley Hills East	Manual, Mechanical	Pinyon-Juniper Savanna	45
46	Penn Valley Hills East	Manual, Mechanical	Pinyon-Juniper Woodland	768
46	Penn Valley Hills East	Manual, Mechanical	Ponderosa Pine Woodland	7
46	Penn Valley Hills East	Manual, Mechanical	Sagebrush Grassland	4
46	Penn Valley Hills East	Manual, Mechanical	Sagebrush Shrubland	804
47	Peter's Pocket	Manual, Prescribed Fire	Cliff and Scree Slopes	2
47	Peter's Pocket	Manual, Prescribed Fire	Pinyon-Juniper Savanna	174
47	Peter's Pocket	Manual, Prescribed Fire	Pinyon-Juniper Woodland	354
47	Peter's Pocket	Manual, Prescribed Fire	Ponderosa Pine Woodland	6
47	Peter's Pocket	Manual, Prescribed Fire	Sagebrush Shrubland	<1
48	Pine Valley East	Prescribed Fire	Cliff and Scree Slopes	<1
48	Pine Valley East	Prescribed Fire	Mojave Transition Shrubland	1
48	Pine Valley East	Prescribed Fire	Pinyon-Juniper Savanna	23
48	Pine Valley East	Prescribed Fire	Pinyon-Juniper Woodland	716
48	Pine Valley East	Prescribed Fire	Ponderosa Pine Woodland	468
48	Pine Valley East	Prescribed Fire	Recent Fire or Treatment Disturbance	<1
48	Pine Valley East	Prescribed Fire	Sagebrush Shrubland	5
48	Pine Valley East	Prescribed Fire	Shivwits Chaparral	<1
49	Pine Valley Loop	Prescribed Fire	Cliff and Scree Slopes	1
49	Pine Valley Loop	Prescribed Fire	Mojave Transition Shrubland	<1
49	Pine Valley Loop	Prescribed Fire	Pinyon-Juniper Savanna	5
49	Pine Valley Loop	Prescribed Fire	Pinyon-Juniper Woodland	12
49	Pine Valley Loop	Prescribed Fire	Ponderosa Pine Woodland	22
49	Pine Valley Loop	Prescribed Fire	Recent Fire or Treatment Disturbance	1
49	Pine Valley Loop	Prescribed Fire	Sagebrush Shrubland	1

Unit No.	Name	Treatment	Vegetation Type	Acres
50	Pine Valley Meadow	Manual	Mojave Transition Shrubland	8
50	Pine Valley Meadow	Manual	Pinyon-Juniper Savanna	5
50	Pine Valley Meadow	Manual	Pinyon-Juniper Woodland	10
50	Pine Valley Meadow	Manual	Ponderosa Pine Woodland	1
50	Pine Valley Meadow	Manual	Sagebrush Shrubland	43
51	Pine Valley Ranch	Prescribed Fire	Pinyon-Juniper Savanna	17
51	Pine Valley Ranch	Prescribed Fire	Pinyon-Juniper Woodland	182
51	Pine Valley Ranch	Prescribed Fire	Ponderosa Pine Woodland	92
51	Pine Valley Ranch	Prescribed Fire	Recent Fire or Treatment Disturbance	2
51	Pine Valley Ranch	Prescribed Fire	Sagebrush Shrubland	<1
52	Pine Valley West	Prescribed Fire	Oak Shrubland	<1
52	Pine Valley West	Prescribed Fire	Pinyon-Juniper Savanna	12
52	Pine Valley West	Prescribed Fire	Pinyon-Juniper Woodland	90
52	Pine Valley West	Prescribed Fire	Ponderosa Pine Woodland	63
52	Pine Valley West	Prescribed Fire	Recent Fire or Treatment Disturbance	5
52	Pine Valley West	Prescribed Fire	Sagebrush Shrubland	<1
53	Pine Well	Manual, Mechanical	Grassland - Native or Introduced	<1
53	Pine Well	Manual, Mechanical	Pinyon-Juniper Savanna	18
53	Pine Well	Manual, Mechanical	Pinyon-Juniper Woodland	376
53	Pine Well	Manual, Mechanical	Ponderosa Pine Woodland	5
53	Pine Well	Manual, Mechanical	Sagebrush Shrubland	91
54	Pleasant Valley	Prescribed Fire	Cliff and Scree Slopes	<1
54	Pleasant Valley	Prescribed Fire	Pinyon-Juniper Savanna	25
54	Pleasant Valley	Prescribed Fire	Pinyon-Juniper Woodland	126
54	Pleasant Valley	Prescribed Fire	Ponderosa Pine Woodland	63
54	Pleasant Valley	Prescribed Fire	Sagebrush Shrubland	1
55	Pleasant Valley East	Prescribed Fire	Grassland - Native or Introduced	<1
55	Pleasant Valley East	Prescribed Fire	Oak Shrubland	2
55	Pleasant Valley East	Prescribed Fire	Pinyon-Juniper Savanna	3
55	Pleasant Valley East	Prescribed Fire	Pinyon-Juniper Woodland	109
55	Pleasant Valley East	Prescribed Fire	Ponderosa Pine Woodland	17

Unit No.	Name	Treatment	Vegetation Type	Acres
55	Pleasant Valley East	Prescribed Fire	Sagebrush Shrubland	7
56	Pleasant Valley Meadow	Manual	Grassland - Native or Introduced	4
56	Pleasant Valley Meadow	Manual	Oak Shrubland	1
56	Pleasant Valley Meadow	Manual	Pinyon-Juniper Woodland	11
56	Pleasant Valley Meadow	Manual	Ponderosa Pine Woodland	2
56	Pleasant Valley Meadow	Manual	Sagebrush Grassland	2
56	Pleasant Valley Meadow	Manual	Sagebrush Shrubland	2
57	Pleasant Valley South	Manual, Prescribed Fire	Pinyon-Juniper Savanna	230
57	Pleasant Valley South	Manual, Prescribed Fire	Pinyon-Juniper Woodland	496
57	Pleasant Valley South	Manual, Prescribed Fire	Ponderosa Pine Woodland	10
57	Pleasant Valley South	Manual, Prescribed Fire	Sagebrush Shrubland	13
58	Rattlesnake	Manual, Mechanical	Blackbrush Mixed Shrubland	1
58	Rattlesnake	Manual, Mechanical	Grassland - Native or Introduced	16
58	Rattlesnake	Manual, Mechanical	Mojave Transition Shrubland	20
58	Rattlesnake	Manual, Mechanical	Oak Shrubland	288
58	Rattlesnake	Manual, Mechanical	Pinyon-Juniper Savanna	23
58	Rattlesnake	Manual, Mechanical	Pinyon-Juniper Woodland	734
58	Rattlesnake	Manual, Mechanical	Ponderosa Pine Woodland	3
58	Rattlesnake	Manual, Mechanical	Sagebrush Grassland	150
58	Rattlesnake	Manual, Mechanical	Sagebrush Shrubland	216
58	Rattlesnake	Manual, Mechanical	Shivwits Chaparral	122
59	Red Pond South	Mechanical, Seed	Pinyon-Juniper Savanna	39
59	Red Pond South	Mechanical, Seed	Pinyon-Juniper Woodland	17
59	Red Pond South	Mechanical, Seed	Sagebrush Grassland	27
60	Salt House Draw	Mechanical, Seed	Grassland - Native or Introduced	<1
60	Salt House Draw	Mechanical, Seed	Pinyon-Juniper Savanna	67
60	Salt House Draw	Mechanical, Seed	Pinyon-Juniper Woodland	35
60	Salt House Draw	Mechanical, Seed	Sagebrush Grassland	8
60	Salt House Draw	Mechanical, Seed	Sagebrush Shrubland	232

Unit No.	Name	Treatment	Vegetation Type	Acres
60	Salt House Draw	Mechanical, Seed	Shivwits Chaparral	<1
61	Salt House Draw South	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	137
61	Salt House Draw South	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	636
61	Salt House Draw South	Manual, Mechanical, Seed	Sagebrush Shrubland	3
62	Salt House East	Manual, Mechanical	Cliff and Scree Slopes	3
62	Salt House East	Manual, Mechanical	Grassland - Native or Introduced	26
62	Salt House East	Manual, Mechanical	Oak Shrubland	1
62	Salt House East	Manual, Mechanical	Pinyon-Juniper Savanna	14
62	Salt House East	Manual, Mechanical	Pinyon-Juniper Woodland	658
62	Salt House East	Manual, Mechanical	Ponderosa Pine Woodland	45
62	Salt House East	Manual, Mechanical	Sagebrush Grassland	4
62	Salt House East	Manual, Mechanical	Sagebrush Shrubland	1144
62	Salt House East	Manual, Mechanical	Shivwits Chaparral	5
63	Salt House West	Manual, Mechanical	Cliff and Scree Slopes	13
63	Salt House West	Manual, Mechanical	Grassland - Native or Introduced	355
63	Salt House West	Manual, Mechanical	Mojave Transition Shrubland	<1
63	Salt House West	Manual, Mechanical	Oak Shrubland	1
63	Salt House West	Manual, Mechanical	Pinyon-Juniper Savanna	65
63	Salt House West	Manual, Mechanical	Pinyon-Juniper Woodland	933
63	Salt House West	Manual, Mechanical	Sagebrush Grassland	27
63	Salt House West	Manual, Mechanical	Sagebrush Shrubland	1633
63	Salt House West	Manual, Mechanical	Shivwits Chaparral	4
64	Sawmill	Manual, Prescribed Fire	Pinyon-Juniper Savanna	8
64	Sawmill	Manual, Prescribed Fire	Pinyon-Juniper Woodland	8
64	Sawmill	Manual, Prescribed Fire	Ponderosa Pine Woodland	14
64	Sawmill	Manual, Prescribed Fire	Recent Fire or Treatment Disturbance	3
65	Sawmill Meadow	Manual	Mojave Transition Shrubland	1
65	Sawmill Meadow	Manual	Pinyon-Juniper Savanna	2
65	Sawmill Meadow	Manual	Pinyon-Juniper Woodland	8
65	Sawmill Meadow	Manual	Ponderosa Pine Woodland	2
65	Sawmill Meadow	Manual	Sagebrush Shrubland	3

Unit No.	Name	Treatment	Vegetation Type	Acres
66	Sawmill South	Prescribed Fire	Pinyon-Juniper Savanna	34
66	Sawmill South	Prescribed Fire	Pinyon-Juniper Woodland	23
66	Sawmill South	Prescribed Fire	Ponderosa Pine Woodland	25
66	Sawmill South	Prescribed Fire	Sagebrush Shrubland	1
67	Shanley	Manual, Prescribed Fire	Pinyon-Juniper Savanna	178
67	Shanley	Manual, Prescribed Fire	Pinyon-Juniper Woodland	163
67	Shanley	Manual, Prescribed Fire	Ponderosa Pine Woodland	11
67	Shanley	Manual, Prescribed Fire	Sagebrush Shrubland	2
67	Shanley	Manual, Prescribed Fire	Shivwits Chaparral	<1
68	Slim	Manual, Prescribed Fire	Pinyon-Juniper Savanna	138
68	Slim	Manual, Prescribed Fire	Pinyon-Juniper Woodland	59
68	Slim	Manual, Prescribed Fire	Ponderosa Pine Woodland	3
68	Slim	Manual, Prescribed Fire	Sagebrush Shrubland	<1
69	Tincanebitts	Manual, Mechanical	Pinyon-Juniper Savanna	53
69	Tincanebitts	Manual, Mechanical	Pinyon-Juniper Woodland	107
69	Tincanebitts	Manual, Mechanical	Sagebrush Shrubland	<1
69	Tincanebitts	Manual, Mechanical	Shivwits Chaparral	<1
70	Twin I	Manual, Prescribed Fire	Cliff and Scree Slopes	<1
70	Twin I	Manual, Prescribed Fire	Mojave Transition Shrubland	1
70	Twin I	Manual, Prescribed Fire	Pinyon-Juniper Savanna	8
70	Twin I	Manual, Prescribed Fire	Pinyon-Juniper Woodland	345
70	Twin I	Manual, Prescribed Fire	Ponderosa Pine Woodland	<1
70	Twin I	Manual, Prescribed Fire	Sagebrush Grassland	<1
70	Twin I	Manual, Prescribed Fire	Sagebrush Shrubland	51
70	Twin I	Manual, Prescribed Fire	Shivwits Chaparral	<1

Unit No.	Name	Treatment	Vegetation Type	Acres
71	Twin Creek	Manual, Prescribed Fire	Cliff and Scree Slopes	25
71	Twin Creek	Manual, Prescribed Fire	Mojave Transition Shrubland	1
71	Twin Creek	Manual, Prescribed Fire	Pinyon-Juniper Savanna	27
71	Twin Creek	Manual, Prescribed Fire	Pinyon-Juniper Woodland	424
71	Twin Creek	Manual, Prescribed Fire	Recent Fire or Treatment Disturbance	17
71	Twin Creek	Manual, Prescribed Fire	Sagebrush Grassland	<1
71	Twin Creek	Manual, Prescribed Fire	Sagebrush Shrubland	14
71	Twin Creek	Manual, Prescribed Fire	Shivwits Chaparral	6
72	Twin II	Manual, Prescribed Fire	Cliff and Scree Slopes	24
72	Twin II	Manual, Prescribed Fire	Mojave Transition Shrubland	<1
72	Twin II	Manual, Prescribed Fire	Pinyon-Juniper Savanna	21
72	Twin II	Manual, Prescribed Fire	Pinyon-Juniper Woodland	1780
72	Twin II	Manual, Prescribed Fire	Ponderosa Pine Woodland	4
72	Twin II	Manual, Prescribed Fire	Recent Fire or Treatment Disturbance	27
72	Twin II	Manual, Prescribed Fire	Sagebrush Shrubland	111
72	Twin II	Manual, Prescribed Fire	Shivwits Chaparral	9
73	Twin North	Manual, Prescribed Fire	Cliff and Scree Slopes	4
73	Twin North	Manual, Prescribed Fire	Grassland - Native or Introduced	<1
73	Twin North	Manual, Prescribed Fire	Mojave Transition Shrubland	1
73	Twin North	Manual, Prescribed Fire	Pinyon-Juniper Savanna	60
73	Twin North	Manual, Prescribed Fire	Pinyon-Juniper Woodland	1235
73	Twin North	Manual, Prescribed Fire	Recent Fire or Treatment Disturbance	125

Unit No.	Name	Treatment	Vegetation Type	Acres
73	Twin North	Manual, Prescribed Fire	Sagebrush Grassland	1
73	Twin North	Manual, Prescribed Fire	Sagebrush Shrubland	62
73	Twin North	Manual, Prescribed Fire	Shivwits Chaparral	14
74	Twin Spring Boundary	Manual, Prescribed Fire	Cliff and Scree Slopes	14
74	Twin Spring Boundary	Manual, Prescribed Fire	Grassland - Native or Introduced	<1
74	Twin Spring Boundary	Manual, Prescribed Fire	Pinyon-Juniper Savanna	32
74	Twin Spring Boundary	Manual, Prescribed Fire	Pinyon-Juniper Woodland	446
74	Twin Spring Boundary	Manual, Prescribed Fire	Recent Fire or Treatment Disturbance	107
74	Twin Spring Boundary	Manual, Prescribed Fire	Sagebrush Grassland	<1
74	Twin Spring Boundary	Manual, Prescribed Fire	Sagebrush Shrubland	27
74	Twin Spring Boundary	Manual, Prescribed Fire	Shivwits Chaparral	7
75	Twin West	Manual, Prescribed Fire	Cliff and Scree Slopes	29
75	Twin West	Manual, Prescribed Fire	Grassland - Native or Introduced	3
75	Twin West	Manual, Prescribed Fire	Mojave Transition Shrubland	<1
75	Twin West	Manual, Prescribed Fire	Pinyon-Juniper Savanna	6
75	Twin West	Manual, Prescribed Fire	Pinyon-Juniper Woodland	1229
75	Twin West	Manual, Prescribed Fire	Recent Fire or Treatment Disturbance	10
75	Twin West	Manual, Prescribed Fire	Sagebrush Grassland	<1
75	Twin West	Manual, Prescribed Fire	Sagebrush Shrubland	127
75	Twin West	Manual, Prescribed Fire	Shivwits Chaparral	<1
76	Waring	Prescribed Fire	Grassland - Native or Introduced	<1
76	Waring	Prescribed Fire	Mojave Transition Shrubland	1

Unit No.	Name	Treatment	Vegetation Type	Acres
76	Waring	Prescribed Fire	Oak Shrubland	<1
76	Waring	Prescribed Fire	Pinyon-Juniper Savanna	32
76	Waring	Prescribed Fire	Pinyon-Juniper Woodland	74
76	Waring	Prescribed Fire	Ponderosa Pine Woodland	59
76	Waring	Prescribed Fire	Recent Fire or Treatment Disturbance	<1
76	Waring	Prescribed Fire	Sagebrush Grassland	<1
76	Waring	Prescribed Fire	Sagebrush Shrubland	1
77	Waring East	Manual, Prescribed Fire	Oak Shrubland	<1
77	Waring East	Manual, Prescribed Fire	Pinyon-Juniper Savanna	270
77	Waring East	Manual, Prescribed Fire	Pinyon-Juniper Woodland	38
77	Waring East	Manual, Prescribed Fire	Ponderosa Pine Woodland	13
77	Waring East	Manual, Prescribed Fire	Sagebrush Grassland	<1
77	Waring East	Manual, Prescribed Fire	Sagebrush Shrubland	6
78	Waring South	Manual, Prescribed Fire	Pinyon-Juniper Savanna	261
78	Waring South	Manual, Prescribed Fire	Pinyon-Juniper Woodland	160
78	Waring South	Manual, Prescribed Fire	Ponderosa Pine Woodland	10
78	Waring South	Manual, Prescribed Fire	Sagebrush Shrubland	2
79	West Fork	Mechanical, Seed	Blackbrush Mixed Shrubland	<1
79	West Fork	Mechanical, Seed	Cliff and Scree Slopes	<1
79	West Fork	Mechanical, Seed	Pinyon-Juniper Savanna	72
79	West Fork	Mechanical, Seed	Pinyon-Juniper Woodland	30
79	West Fork	Mechanical, Seed	Sagebrush Grassland	1
79	West Fork	Mechanical, Seed	Sagebrush Shrubland	129
80	West Fork South	Prescribed Fire	Blackbrush Mixed Shrubland	2
80	West Fork South	Prescribed Fire	Cliff and Scree Slopes	3
80	West Fork South	Prescribed Fire	Grassland - Native or Introduced	85
80	West Fork South	Prescribed Fire	Mojave Transition Shrubland	6
80	West Fork South	Prescribed Fire	Oak Shrubland	1
80	West Fork South	Prescribed Fire	Pinyon-Juniper Savanna	844

Unit No.	Name	Treatment	Vegetation Type	Acres
80	West Fork South	Prescribed Fire	Pinyon-Juniper Woodland	4166
80	West Fork South	Prescribed Fire	Ponderosa Pine Woodland	862
80	West Fork South	Prescribed Fire	Recent Fire or Treatment Disturbance	<1
80	West Fork South	Prescribed Fire	Sagebrush Grassland	84
80	West Fork South	Prescribed Fire	Sagebrush Shrubland	1415
80	West Fork South	Prescribed Fire	Shivwits Chaparral	5
81	Wildcat I	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	368
81	Wildcat I	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	364
81	Wildcat I	Manual, Mechanical, Seed	Ponderosa Pine Woodland	1
81	Wildcat I	Manual, Mechanical, Seed	Sagebrush Grassland	<1
81	Wildcat I	Manual, Mechanical, Seed	Sagebrush Shrubland	<1
82	Wildcat II	Mechanical, Seed	Pinyon-Juniper Savanna	53
82	Wildcat II	Mechanical, Seed	Pinyon-Juniper Woodland	15
82	Wildcat II	Mechanical, Seed	Sagebrush Shrubland	33
83	Wildcat III	Seed	Pinyon-Juniper Savanna	194
83	Wildcat III	Seed	Pinyon-Juniper Woodland	35
83	Wildcat III	Seed	Sagebrush Shrubland	1
84	Wildcat IV	Manual, Mechanical	Pinyon-Juniper Savanna	296
84	Wildcat IV	Manual, Mechanical	Pinyon-Juniper Woodland	1391
84	Wildcat IV	Manual, Mechanical	Ponderosa Pine Woodland	<1
84	Wildcat IV	Manual, Mechanical	Sagebrush Shrubland	8
84	Wildcat IV	Manual, Mechanical	Shivwits Chaparral	<1
85	Wildcat V	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	100
85	Wildcat V	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	2033
85	Wildcat V	Manual, Mechanical, Seed	Ponderosa Pine Woodland	63
85	Wildcat V	Manual, Mechanical, Seed	Sagebrush Shrubland	<1
86	Yellow John East(NPS)	Prescribed Fire	Pinyon-Juniper Woodland	160
86	Yellow John East(NPS)	Prescribed Fire	Ponderosa Pine Woodland	7

Unit No.	Name	Treatment	Vegetation Type	Acres
86	Yellow John East(NPS)	Prescribed Fire	Recent Fire or Treatment Disturbance	<1
87	Yellow John Mountain	Prescribed Fire	Cliff and Scree Slopes	<1
87	Yellow John Mountain	Prescribed Fire	Pinyon-Juniper Savanna	59
87	Yellow John Mountain	Prescribed Fire	Pinyon-Juniper Woodland	2950
87	Yellow John Mountain	Prescribed Fire	Ponderosa Pine Woodland	282
87	Yellow John Mountain	Prescribed Fire	Recent Fire or Treatment Disturbance	1
87	Yellow John Mountain	Prescribed Fire	Sagebrush Shrubland	1
88	Yellow John Mtn East	Manual, Mechanical	Cliff and Scree Slopes	<1
88	Yellow John Mtn East	Manual, Mechanical	Pinyon-Juniper Woodland	483
88	Yellow John Mtn East	Manual, Mechanical	Ponderosa Pine Woodland	6
89	Yellow John South	Manual, Prescribed Fire	Pinyon-Juniper Savanna	3
89	Yellow John South	Manual, Prescribed Fire	Pinyon-Juniper Woodland	171
89	Yellow John South	Manual, Prescribed Fire	Ponderosa Pine Woodland	<1
89	Yellow John South	Manual, Prescribed Fire	Sagebrush Shrubland	<1
90	Yellow John West	Prescribed Fire	Pinyon-Juniper Woodland	231
90	Yellow John West	Prescribed Fire	Ponderosa Pine Woodland	5
90	Yellow John West	Prescribed Fire	Sagebrush Shrubland	<1
91	Gardner Canyon South	Manual, Mechanical	Blackbrush Mixed Shrubland	10
91	Gardner Canyon South	Manual, Mechanical	Cliff and Scree Slopes	5
91	Gardner Canyon South	Manual, Mechanical	Grassland - Native or Introduced	1
91	Gardner Canyon South	Manual, Mechanical	Mojave Transition Shrubland	15
91	Gardner Canyon South	Manual, Mechanical	Pinyon-Juniper Savanna	552
91	Gardner Canyon South	Manual, Mechanical	Pinyon-Juniper Woodland	1921

Unit No.	Name	Treatment	Vegetation Type	Acres
91	Gardner Canyon South	Manual, Mechanical	Ponderosa Pine Woodland	1
91	Gardner Canyon South	Manual, Mechanical	Sagebrush Grassland	7
91	Gardner Canyon South	Manual, Mechanical	Sagebrush Shrubland	404
91	Gardner Canyon South	Manual, Mechanical	Shivwits Chaparral	30
92	Agway Valley West	Manual, Mechanical, Seed	Mojave Transition Shrubland	<1
92	Agway Valley West	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	780
92	Agway Valley West	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	224
92	Agway Valley West	Manual, Mechanical, Seed	Sagebrush Grassland	71
93	Agway Wash North	Manual, Mechanical, Seed	Blackbrush Mixed Shrubland	1
93	Agway Wash North	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	65
93	Agway Wash North	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	87
93	Agway Wash North	Manual, Mechanical, Seed	Sagebrush Grassland	<1
93	Agway Wash North	Manual, Mechanical, Seed	Sagebrush Shrubland	199
93	Agway Wash North	Manual, Mechanical, Seed	Shivwits Chaparral	<1
94	Andrus North	Manual, Mechanical	Blackbrush Mixed Shrubland	12
94	Andrus North	Manual, Mechanical	Grassland - Native or Introduced	1
94	Andrus North	Manual, Mechanical	Mojave Transition Shrubland	1
94	Andrus North	Manual, Mechanical	Pinyon-Juniper Savanna	926
94	Andrus North	Manual, Mechanical	Pinyon-Juniper Woodland	1003
94	Andrus North	Manual, Mechanical	Ponderosa Pine Woodland	1
94	Andrus North	Manual, Mechanical	Sagebrush Grassland	17
94	Andrus North	Manual, Mechanical	Sagebrush Shrubland	509
94	Andrus North	Manual, Mechanical	Shivwits Chaparral	<1
95	Parashant Canyon North	Manual, Mechanical, Seed	Mojave Transition Shrubland	<1
95	Parashant Canyon North	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	212

Unit No.	Name	Treatment	Vegetation Type	Acres
95	Parashant Canyon North	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	29
95	Parashant Canyon North	Manual, Mechanical, Seed	Sagebrush Shrubland	8
95	Parashant Canyon North	Manual, Mechanical, Seed	Shivwits Chaparral	<1
96	Parashant Canyon South	Manual, Mechanical, Seed	Blackbrush Mixed Shrubland	13
96	Parashant Canyon South	Manual, Mechanical, Seed	Cliff and Scree Slopes	1
96	Parashant Canyon South	Manual, Mechanical, Seed	Grassland - Native or Introduced	1
96	Parashant Canyon South	Manual, Mechanical, Seed	Mojave Transition Shrubland	<1
96	Parashant Canyon South	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	537
96	Parashant Canyon South	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	529
96	Parashant Canyon South	Manual, Mechanical, Seed	Sagebrush Grassland	3
96	Parashant Canyon South	Manual, Mechanical, Seed	Sagebrush Shrubland	1228
97	Red Pond I	Manual, Mechanical, Seed	Pinyon-Juniper Savanna	279
97	Red Pond I	Manual, Mechanical, Seed	Pinyon-Juniper Woodland	927
97	Red Pond I	Manual, Mechanical, Seed	Ponderosa Pine Woodland	3
97	Red Pond I	Manual, Mechanical, Seed	Sagebrush Shrubland	1
98	Penn Valley South	Manual, Mechanical	Pinyon-Juniper Savanna	1
98	Penn Valley South	Manual, Mechanical	Pinyon-Juniper Woodland	258
98	Penn Valley South	Manual, Mechanical	Ponderosa Pine Woodland	10

Table J.5. Treatment Unit Ecological Site Descriptions with Acres.

Unit No.	Name	Ecological Site Description	ESD Acres
1	Agway Valley East	R035XC311AZ Limy Upland 10-14" p.z.	15
1	Agway Valley East	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	112

Unit No.	Name	Ecological Site Description	ESD Acres
2	Agway Valley North	R035XC313AZ Loamy Upland 10-14" p.z.	6
2	Agway Valley North	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	594
3	Agway Valley Southwest	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	15
3	Agway Valley Southwest	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	149
4	Agway Wash	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	6
4	Agway Wash	R035XC313AZ Loamy Upland 10-14" p.z.	32
4	Agway Wash	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	248
5	Ambush	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	195
5	Ambush	F035XH805AZ	187
6	Ambush North	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	292
6	Ambush North	F035XF620AZ	6
6	Ambush North	F035XH805AZ	259
7	Andrus	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	5399
7	Andrus	Unassigned Unnamed	479
8	Boundary	F035XH805AZ	113
8	Boundary	F035XH820AZ	1
8	Boundary	R035XF604AZ Clayey Upland 13-17" p.z.	17
9	Buster	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	422
9	Buster	F035XH805AZ	240
9	Buster	F035XH820AZ	9
9	Buster	R035XF604AZ Clayey Upland 13-17" p.z.	3
10	Castle Peak	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	3558
10	Castle Peak	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	47
10	Castle Peak	F035XH820AZ	47
11	Castle Peak II	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	3828
11	Castle Peak II	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	1783
11	Castle Peak II	F035XH820AZ	1438
11	Castle Peak II	R035XH821AZ Meadow 17-25" p.z.	50
12	Dellenbaugh	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	156

Unit No.	Name	Ecological Site Description	ESD Acres
12	Dellenbaugh	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	90
12	Dellenbaugh	F035XH820AZ	2
13	Fire Camp	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	20
13	Fire Camp	F035XH805AZ	65
13	Fire Camp	F035XH820AZ	0
13	Fire Camp	R035XF604AZ Clayey Upland 13-17" p.z.	10
13	Fire Camp	R035XH821AZ Meadow 17-25" p.z.	1
14	Fire Camp Extension	F035XH805AZ	25
14	Fire Camp Extension	R035XF604AZ Clayey Upland 13-17" p.z.	1
14	Fire Camp Extension	R035XF604AZ Clayey Upland 13-17" p.z.	4
14	Fire Camp Extension	R035XH821AZ Meadow 17-25" p.z.	<1
15	Fire Camp South	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	770
15	Fire Camp South	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	4
15	Fire Camp South	F035XH805AZ	118
15	Fire Camp South	F035XH820AZ	<1
15	Fire Camp South	R035XF604AZ Clayey Upland 13-17" p.z.	7
16	Gardner Canyon North	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	190
16	Gardner Canyon North	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	1038
16	Gardner Canyon North	Unassigned Unnamed	<1
17	Grassy Mountain	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	840
17	Grassy Mountain	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	2133
17	Grassy Mountain	R035XC313AZ Loamy Upland 10-14" p.z.	4
17	Grassy Mountain	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	56
17	Grassy Mountain	Unassigned Unnamed	31

Unit No.	Name	Ecological Site Description	ESD Acres
18	Grassy Mountain East	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	64
18	Grassy Mountain East	R035XC301AZ Basalt Upland 10-14" p.z.	522
18	Grassy Mountain East	R035XC313AZ Loamy Upland 10-14" p.z.	83
18	Grassy Mountain East	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	377
19	Green Springs	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	17
19	Green Springs	F035XH805AZ	39
19	Green Springs	Unassigned Unnamed	2
20	Green Springs East	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	107
20	Green Springs East	F035XH805AZ	219
21	Green Springs North	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	267
21	Green Springs North	F035XF620AZ	48
21	Green Springs North	F035XH805AZ	365
22	Halfway	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	28
22	Halfway	F035XH805AZ	172
23	Hidden Hills North	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	2609
23	Hidden Hills North	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	1856
23	Hidden Hills North	F035XF614AZ	237
23	Hidden Hills North	R035XF604AZ Clayey Upland 13-17" p.z.	19
24	Hidden Hills West	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	3424
25	Horse Valley	F035XH805AZ	84
26	Horse Valley Meadow	R035XF604AZ Clayey Upland 13-17" p.z.	182
27	Horse Valley North	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	244
27	Horse Valley North	F035XH805AZ	285

Unit No.	Name	Ecological Site Description	ESD Acres
27	Horse Valley North	R035XF604AZ Clayey Upland 13-17" p.z.	3
28	Kelly	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	2772
28	Kelly	Unassigned Unnamed	<1
29	Kelly Dam	F035XH820AZ	9
29	Kelly Dam	R035XH821AZ Meadow 17-25" p.z.	95
30	Kelly East	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	1953
30	Kelly East	F035XH805AZ	<1
30	Kelly East	Unassigned Unnamed	2
31	Kelly East Extension	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	538
31	Kelly East Extension	Unassigned Unnamed	2
32	Kelly West	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	497
32	Kelly West	F035XH805AZ	3
32	Kelly West	Unassigned Unnamed	4
33	Lake Flat	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	8
33	Lake Flat	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	96
33	Lake Flat	F035XH805AZ	12
33	Lake Flat	F035XH820AZ	2548
33	Lake Flat	R035XF604AZ Clayey Upland 13-17" p.z.	3
33	Lake Flat	R035XH821AZ Meadow 17-25" p.z.	635
34	Lake Flat East	F035XH805AZ	6
34	Lake Flat East	F035XH820AZ	337
34	Lake Flat East	R035XF604AZ Clayey Upland 13-17" p.z.	1
34	Lake Flat East	R035XH821AZ Meadow 17-25" p.z.	3
35	Lundell Tank	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	994
35	Lundell Tank	R035XC312AZ Loamy Wash 10-14" p.z.	26
36	McDonald Flat	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	32
36	McDonald Flat	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	2
36	McDonald Flat	R035XC307AZ Clay Loam Upland 10-14" p.z.	540
36	McDonald Flat	R035XC313AZ Loamy Upland 10-14" p.z.	91
36	McDonald Flat	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	248

Unit No.	Name	Ecological Site Description	ESD Acres
37	McDonald Flat West	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	14
37	McDonald Flat West	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	817
38	Middle Ambush	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	1078
38	Middle Ambush	F035XH805AZ	1
39	Mociac Well	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	4
39	Mociac Well	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	134
39	Mociac Well	F035XH820AZ	245
40	Nutter	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	416
40	Nutter	F035XH805AZ	9
41	Overnight Draw East	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	6
41	Overnight Draw East	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	77
42	Overnight Draw North	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	35
43	Overnight Draw West	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	174
43	Overnight Draw West	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	148
44	Parashant Wash East	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	117
44	Parashant Wash East	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	7
44	Parashant Wash East	R035XC307AZ Clay Loam Upland 10-14" p.z.	<1
45	Penn Valley Hills	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	912
45	Penn Valley Hills	R035XF604AZ Clayey Upland 13-17" p.z.	7
46	Penn Valley Hills East	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	1580
46	Penn Valley Hills East	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	<1
47	Peter's Pocket	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	473
47	Peter's Pocket	F035XH805AZ	58
47	Peter's Pocket	Unassigned Unnamed	5

Unit No.	Name	Ecological Site Description	ESD Acres
48	Pine Valley East	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	223
48	Pine Valley East	F035XF620AZ	170
48	Pine Valley East	F035XH805AZ	769
48	Pine Valley East	R035XF604AZ Clayey Upland 13-17" p.z.	50
49	Pine Valley Loop	F035XH805AZ	37
49	Pine Valley Loop	R035XF604AZ Clayey Upland 13-17" p.z.	5
50	Pine Valley Meadow	R035XF604AZ Clayey Upland 13-17" p.z.	66
51	Pine Valley Ranch	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	13
51	Pine Valley Ranch	F035XF620AZ	126
51	Pine Valley Ranch	F035XH805AZ	148
51	Pine Valley Ranch	R035XF604AZ Clayey Upland 13-17" p.z.	7
52	Pine Valley West	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	71
52	Pine Valley West	F035XF620AZ	<1
52	Pine Valley West	F035XH805AZ	98
53	Pine Well	F035XH820AZ	448
53	Pine Well	R035XH821AZ Meadow 17-25" p.z.	42
54	Pleasant Valley	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	26
54	Pleasant Valley	F035XH805AZ	185
54	Pleasant Valley	R035XF604AZ Clayey Upland 13-17" p.z.	4
55	Pleasant Valley East	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	27
55	Pleasant Valley East	F035XH805AZ	111
55	Pleasant Valley East	R035XF604AZ Clayey Upland 13-17" p.z.	2
56	Pleasant Valley Meadow	F035XH805AZ	<1

Unit No.	Name	Ecological Site Description	ESD Acres
56	Pleasant Valley Meadow	R035XF604AZ Clayey Upland 13-17" p.z.	21
57	Pleasant Valley South	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	577
57	Pleasant Valley South	F035XF620AZ	5
57	Pleasant Valley South	F035XH805AZ	167
58	Rattlesnake	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	25
58	Rattlesnake	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	1458
58	Rattlesnake	F035XF614AZ	92
59	Red Pond South	R035XC312AZ Loamy Wash 10-14" p.z.	2
59	Red Pond South	R035XC313AZ Loamy Upland 10-14" p.z.	41
59	Red Pond South	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	40
60	Salt House Draw	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	139
60	Salt House Draw	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	1
60	Salt House Draw	F035XF614AZ	195
60	Salt House Draw	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	7
61	Salt House Draw South	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	166
61	Salt House Draw South	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	582
61	Salt House Draw South	F035XF614AZ	27
62	Salt House East	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	1695
62	Salt House East	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	17
62	Salt House East	F035XF614AZ	58
62	Salt House East	F035XH806AZ	130
63	Salt House West	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	2667

Unit No.	Name	Ecological Site Description	ESD Acres
63	Salt House West	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	291
63	Salt House West	F035XF614AZ	72
64	Sawmill	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	2
64	Sawmill	F035XH805AZ	29
64	Sawmill	R035XF604AZ Clayey Upland 13-17" p.z.	1
65	Sawmill Meadow	F035XH805AZ	1
65	Sawmill Meadow	R035XF604AZ Clayey Upland 13-17" p.z.	14
66	Sawmill South	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	1
66	Sawmill South	F035XH805AZ	79
66	Sawmill South	R035XF604AZ Clayey Upland 13-17" p.z.	2
67	Shantly	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	354
68	Slim	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	200
69	Tincanebitts	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	160
70	Twin I	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	254
70	Twin I	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	31
70	Twin I	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED)	115
70	Twin I	Unassigned Unnamed	5
71	Twin Creek	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	507
71	Twin Creek	Unassigned Unnamed	8
72	Twin II	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	1565
72	Twin II	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	388
72	Twin II	Unassigned Unnamed	22
73	Twin North	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	1528
73	Twin North	Unassigned Unnamed	9
74	Twin Spring Boundary	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	632

Unit No.	Name	Ecological Site Description	ESD Acres
74	Twin Spring Boundary	Unassigned Unnamed	1
75	Twin West	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	1358
75	Twin West	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	21
75	Twin West	F035XF619AZ Limestone Upland 13-17" p.z. (JUOS, PIED)	26
75	Twin West	Unassigned Unnamed	<1
76	Waring	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	<1
76	Waring	F035XF620AZ	54
76	Waring	F035XH805AZ	88
76	Waring	R035XF604AZ Clayey Upland 13-17" p.z.	25
77	Waring East	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	138
77	Waring East	F035XH805AZ	156
77	Waring East	R035XF604AZ Clayey Upland 13-17" p.z.	33
78	Waring South	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	171
78	Waring South	F035XF620AZ	180
78	Waring South	F035XH805AZ	82
79	West Fork	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	71
79	West Fork	R035XF604AZ Clayey Upland 13-17" p.z.	160
80	West Fork South	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	3762
80	West Fork South	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	228
80	West Fork South	F035XH806AZ	1455
80	West Fork South	F035XH820AZ	1801
80	West Fork South	R035XF604AZ Clayey Upland 13-17" p.z.	270
81	Wildcat I	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	734
82	Wildcat II	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	100
83	Wildcat III	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	229

Unit No.	Name	Ecological Site Description	ESD Acres
84	Wildcat IV	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	1695
84	Wildcat IV	F035XH806AZ	<1
85	Wildcat V	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	269
85	Wildcat V	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	1927
86	Yellow John East(NPS)	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	91
86	Yellow John East(NPS)	F035XF620AZ	1
86	Yellow John East(NPS)	F035XH805AZ	75
86	Yellow John East(NPS)	F035XH820AZ	0
87	Yellow John Mountain	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	920
87	Yellow John Mountain	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	561
87	Yellow John Mountain	F035XH820AZ	1768
87	Yellow John Mountain	R035XF604AZ Clayey Upland 13-17" p.z.	46
88	Yellow John Mtn East	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	472
88	Yellow John Mtn East	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	<1
88	Yellow John Mtn East	F035XH820AZ	16
89	Yellow John South	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	159
89	Yellow John South	F035XF620AZ	12
89	Yellow John South	F035XH805AZ	4
90	Yellow John West	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	26
90	Yellow John West	F035XF620AZ	79
90	Yellow John West	F035XH805AZ	130
90	Yellow John West	F035XH820AZ	1

Unit No.	Name	Ecological Site Description	ESD Acres
91	Gardner Canyon South	F035XF613AZ Limestone Hills 13-17" p.z. (PIED, JUOS)	1482
91	Gardner Canyon South	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	1460
91	Gardner Canyon South	Unassigned Unnamed	3
92	Agway Valley West	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	5
92	Agway Valley West	R035XC312AZ Loamy Wash 10-14" p.z.	<1
92	Agway Valley West	R035XC313AZ Loamy Upland 10-14" p.z.	120
92	Agway Valley West	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	951
93	Agway Wash North	R035XC312AZ Loamy Wash 10-14" p.z.	8
93	Agway Wash North	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	345
94	Andrus North	R035XC313AZ Loamy Upland 10-14" p.z.	34
94	Andrus North	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	2421
94	Andrus North	Unassigned Unnamed	2
95	Parashant Canyon North	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	138
95	Parashant Canyon North	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	112
95	Parashant Canyon North	Unassigned Unnamed	<1
96	Parashant Canyon South	R035XC319AZ Limestone/Sandstone Upland 10-14" p.z.	2312
96	Parashant Canyon South	Unassigned Unnamed	2
97	Red Pond I	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	1172
97	Red Pond I	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	34
97	Red Pond I	Unassigned Unnamed	4
98	Penn Valley South	F035XF611AZ Clay Loam Upland 13-17" p.z. Gravelly (PIED, JUOS)	13
98	Penn Valley South	F035XF624AZ Basalt Slopes 13-17" p.z. (JUOS, PIED)	193
98	Penn Valley South	F035XH820AZ	63

Appendix K. Visual Contrast Ratings

The following visual contrast ratings were taken in April 2021. Each rating sheet is followed by a map indicating the KOP and vantage (if any) and an image of the view from that point.

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(June 2018)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 04/28/2021

District Office: Arizona Strip District

Field Office: Grand Canyon Parashant NM

Land Use Planning Area: Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name Shivwits Plateau Landscape Restoration Project	4. KOP Location (T.R.S)	5. Location Sketch 36.219644,-113.480004 See attached Map
2. Key Observation Point (KOP) Name Key Observation Point #1		
3. VRM Class at Project Location Class III	(Lat. Long)	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling hills and sloping valleys rising to rounded mountains in the background to the east.	Evenly distributed shrubs and grasses with patches of pinyon and juniper trees.	103 road vegetation removed to create vertical band.
LINE	Horizontal and soft rounded lines	Soft lines from changes in vegetation patterns. Indistinct to stippled patches of pinyon and juniper.	Weak line created from road on southeast.
COLOR	Reds and pinks in the foreground with gray, and yellow hues in the background	Dark gray and green colors with yellow hues and golds depending on seasonal vegetation changes	Light yellow hues
TEXTURE	Smooth in gently sloping valleys with some contrasting hills in the background	Scattered with uniform patches in the distance.	Smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

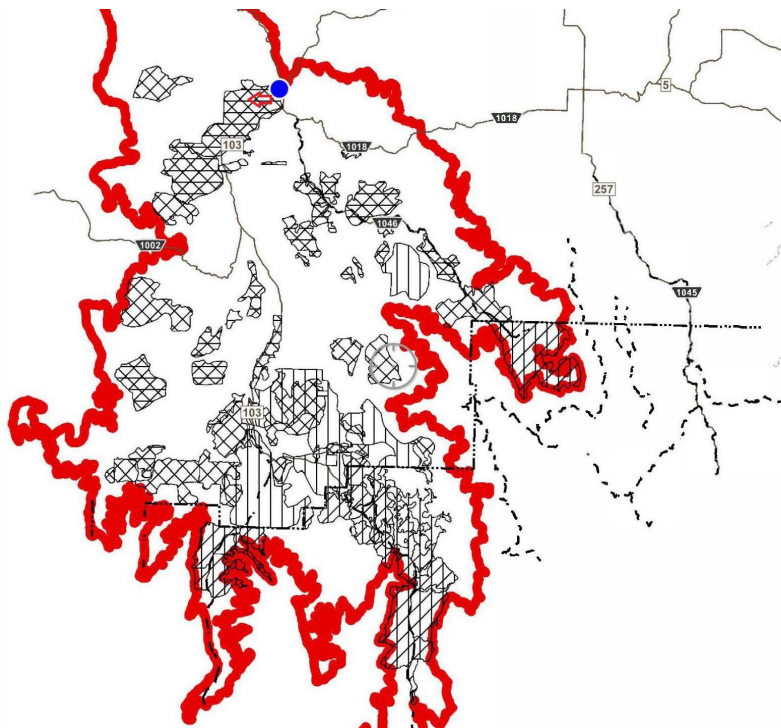
	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Mechanical/lop and scatter treatments creating low lying grass and brush with stippled pinyon and juniper trees	Same
LINE	Same	Medium horizontal lines from vegetation distinctions.	Same
COLOR	Same	Green and gray hues with gold and yellow grasses depending on seasonal changes.	Same
TEXTURE	Same	Smooth with sparse stippled objects	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverses side)	
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)					
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE		
ELEMENTS	FORM				✓		✓							✓	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverses side)
	LINE				✓		✓							✓	
	COLOR				✓	✓								✓	
	TEXTURE				✓	✓								✓	
Evaluator's Names Date Greg Page 04/30/2021															

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BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 04/28/2021

District Office: Arizona Strip District

Field Office: Grand Canyon Parashant NM

Land Use Planning Area: Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name Shivwits Plateau Landscape Restoration Project	4. KOP Location (T.R.S)	5. Location Sketch 36.285102,-113.564600 See attached Map
2. Key Observation Point (KOP) Name Key Observation Point #2		
3. VRM Class at Project Location Class III	(Lat. Long)	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling hills and sloping valleys rising to rounded plateau mountains in the background to the east.	Evenly distributed shrubs and grasses with patches of pinyon and juniper trees.	103 road vegetation removed to create vertical band.
LINE	Horizontal and soft rounded lines.	Soft lines from changes in vegetation patterns. Indistinct to stippled patches of pinyon and juniper.	Weak line created from road on southeast.
COLOR	Reds and pinks in the foreground with gray, and green hues in the background.	Dark gray and green colors with yellow hues and golds depending on seasonal vegetation changes.	Light yellow hues.
TEXTURE	Smooth in gently sloping valleys with some contrasting hills in the background.	Scattered with uniform patches in the distance.	Smooth.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

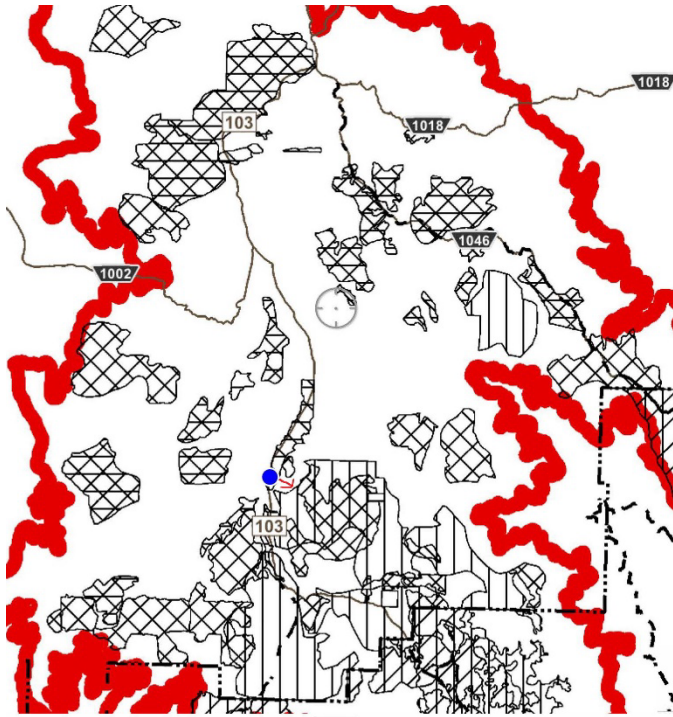
	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Mechanical and prescribed fire treatment creating low lying grass and brush with stippled pinyon and juniper trees.	Same
LINE	Same	Medium horizontal lines from vegetation distinctions.	Same
COLOR	Same	Green and gray hues with gold and yellow grasses depending on seasonal changes.	Same
TEXTURE	Same	Smooth with sparse stippled objects	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverses side)	
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)					
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE		
ELEMENTS	FORM				✓		✓							✓	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverses side)
	LINE				✓		✓							✓	
	COLOR				✓	✓								✓	
	TEXTURE				✓	✓								✓	
														Evaluator's Names Greg Page	Date 04/30/2021

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UNITED STATES
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BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 04/28/2021

District Office: Arizona Strip District

Field Office: Grand Canyon Parashant NM

Land Use Planning Area: Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name Shivwits Plateau Landscape Restoration Project	4. KOP Location (T.R.S)	5. Location Sketch 36.109702,-113.519687 See attached Map
2. Key Observation Point (KOP) Name Key Observation Point #3		
3. VRM Class at Project Location Class II	(Lat. Long)	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling hills rising to rounded plateau mountains in the background to the west.	Evenly distributed shrubs and grasses with patches of pinyon and juniper trees leading to heavy stands of ponderosa pine	103 road vegetation removed to create vertical band.
LINE	Horizontal and soft rounded lines.	Soft lines from changes in vegetation patterns. Stippled patches of pinyon and juniper leading to ponderosa on the west.	Weak line created from road on southeast.
COLOR	Reds and pinks in the foreground with gray, and green hues in the background.	Dark gray and green colors with yellow hues and golds depending on seasonal vegetation changes.	Light yellow hues.
TEXTURE	Smooth in gently sloping valleys with some contrasting hills in the background.	Scattered with uniform patches in the distance.	Smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

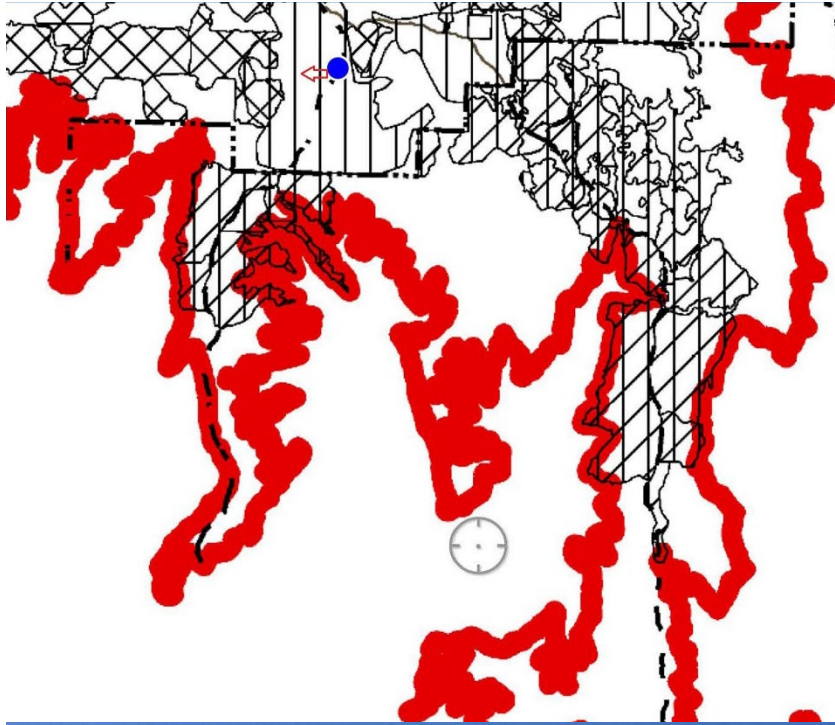
	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Prescribed fire treatment creating low lying grass and brush in the ponderosa pine, and patches of pinyon and juniper.	Same
LINE	Same	Medium horizontal lines from vegetation distinctions.	Same
COLOR	Same	Green and gray hues with gold and yellow grasses depending on seasonal changes.	Same
TEXTURE	Same	Smooth with sparse stippled objects.	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverses side)	
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)					
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE		
ELEMENTS	FORM				✓			✓						✓	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverses side)
	LINE				✓	✓								✓	
	COLOR				✓		✓							✓	
	TEXTURE				✓		✓							✓	
Evaluator's Names: Greg Page Date: 04/30/2021															

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 04/28/2021

District Office: Arizona Strip District

Field Office: Grand Canyon Parashant NM

Land Use Planning Area: Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name Shivwits Plateau Landscape Restoration Project	4. KOP Location (T.R.S)	5. Location Sketch 35.992568,-113.525648 See attached Map
2. Key Observation Point (KOP) Name Key Observation Point #4		
3. VRM Class at Project Location Class I	(Lat. Long)	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling hills on rounded plateau mountains in the background to the northeast.	Evenly distributed shrubs and grasses with patches of pinyon and juniper trees.	1019 road vegetation removed to create vertical band
LINE	Horizontal and soft rounded lines.	Soft lines from changes in vegetation patterns. Stippled patches of pinyon and juniper.	Weak line created from road on southeast.
COLOR	Reds and pinks in the foreground with gray, and green/brown hues in the background.	Dark gray and green colors with yellow hues and golds depending on seasonal vegetation changes.	Light yellow hues.
TEXTURE	Smooth landscape with some contrast to the east.	Scattered with uniform patches in the distance.	Smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

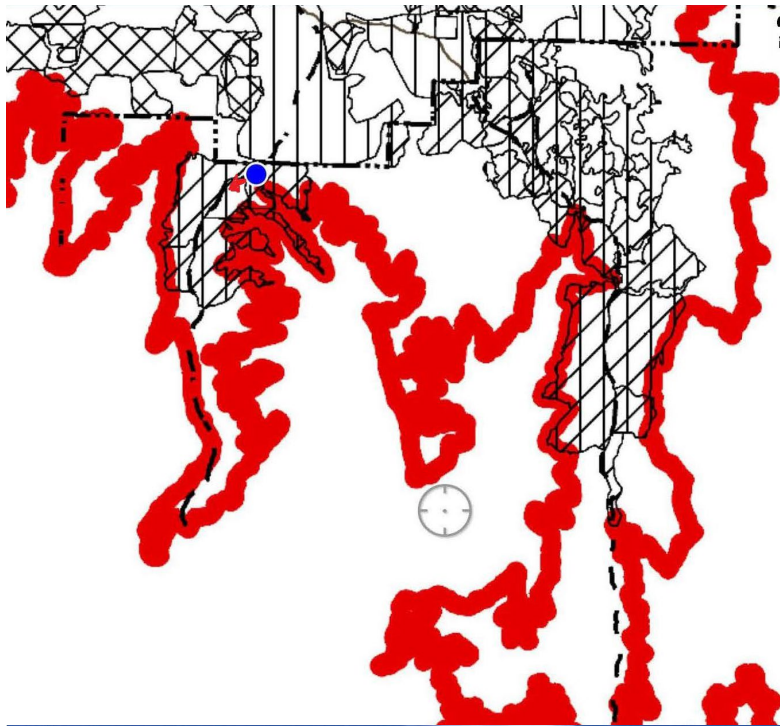
	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Manual and prescribed fire treatment creating low lying grass and brush with stippled pinyon and juniper trees.	Same
LINE	Same	Medium horizontal lines from vegetation distinctions.	Same
COLOR	Same	Green and gray hues with gold and yellow grasses depending on seasonal changes.	Same
TEXTURE	Same	Smooth with sparse stippled objects.	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverses side)	
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)					
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE		
ELEMENTS	FORM				✓			✓						✓	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverses side)
	LINE				✓	✓								✓	
	COLOR				✓		✓							✓	
	TEXTURE				✓		✓							✓	
Evaluator's Names Greg Page															Date 04/30/2021

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 04/28/2021

District Office: Arizona Strip District

Field Office: Grand Canyon Parashant NM

Land Use Planning Area: Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name Shivwits Plateau Landscape Restoration Project	4. KOP Location (T.R.S)	5. Location Sketch 36.076146,-113.534709 See attached Map
2. Key Observation Point (KOP) Name Key Observation Point #5		
3. VRM Class at Project Location Class II	(Lat. Long)	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	High mountain plateau with contrasting landscape to the southeast.	Evenly distributed shrubs and grasses with throughout the stand of ponderosa pine stands.	103 road vegetation removed to create vertical band.
LINE	Horizontal and soft rounded lines.	Soft lines from changes in vegetation patterns.	Weak line created from road on north.
COLOR	Brown hues in the foreground with gray, and green hues in the background.	Dark gray and green colors with yellow hues and golds depending on seasonal vegetation changes.	Light yellow hues.
TEX- TURE	Smooth landscape with some contrast to the south.	Smooth landscape to the east.	Smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

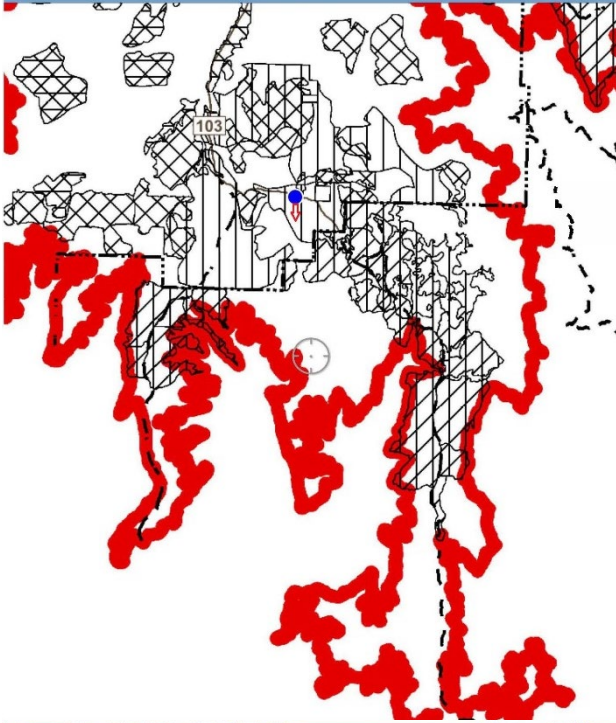
	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Prescribed fire treatment creating low lying grass and brush within the ponderosa pine stands.	Same
LINE	Same	Medium horizontal lines from vegetation distinctions.	Same
COLOR	Same	Green and gray hues with gold and yellow grasses depending on seasonal changes.	Same
TEX- TURE	Same	Smooth with sparse stippled objects	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverses side)	
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)					
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE		
ELEMENTS	FORM				✓			✓						✓	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverses side)
	LINE				✓	✓								✓	
	COLOR				✓		✓							✓	
	TEXTURE				✓		✓							✓	
Evaluator's Names Greg Page														Date 04/30/2021	

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(June 2018)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 04/28/2021

District Office: Arizona Strip District

Field Office: Grand Canyon Parashant NM

Land Use Planning Area: Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name Shivwits Plateau Landscape Restoration Project	4. KOP Location (T.R.S)	5. Location Sketch 36.111288,-113.517370 See attached Map
2. Key Observation Point (KOP) Name Key Observation Point #6		
3. VRM Class at Project Location Class I	(Lat. Long)	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Gently rolling terrain, low to medium height hills.	Medium height, continuous pinyon and juniper cover smooth, regular pattern.	Curving road 1203.
LINE	Mostly horizontal undulating lines over a horizontal landscape.	Strong horizontal lines in the foreground with other horizontal lines created by changes in vegetation patterns.	Strong bold lines created from road
COLOR	Light brown and red hues where visible.	Darkgreen and brown hues present.	Brown and red hues
TEX- TURE	Smooth and continuous.	Slightly patchy stands of pinyon and juniper in the foreground with more smooth patterns in the background.	Slightly contrasting

SECTION C. PROPOSED ACTIVITY DESCRIPTION

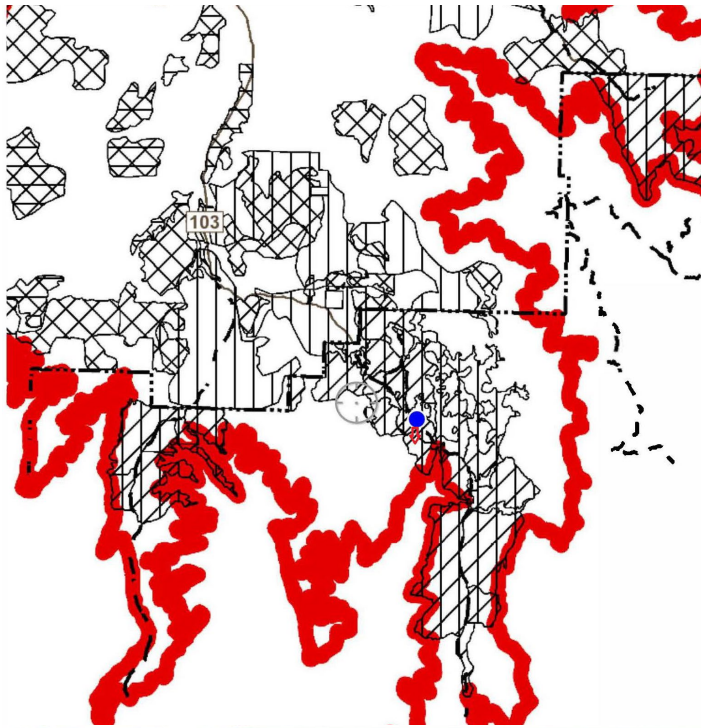
	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Pinyon and juniper trees lopped and scattered, low brush.	Same
LINE	Same	More distinct vertical lines from trees, with horizontal changes created by removed vegetation.	Same
COLOR	Same	dark green hues, with yellow and brown colors from scattered materials.	Same
TEX- TURE	Same	Stipled tree patterns in foreground becoming more smooth in the middle and background.	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverses side)	
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)					
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE		
ELEMENTS	FORM				✓		✓							✓	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverses side)
	LINE			✓			✓							✓	
	COLOR				✓		✓							✓	
	TEXTURE				✓		✓							✓	
Evaluator's Names Date Greg Page 04/30/2021															

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(June 2018)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 04/28/2021

District Office: Arizona Strip District

Field Office: Grand Canyon Parashant NM

Land Use Planning Area: Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name Shivwits Plateau Landscape Restoration Project	4. KOP Location (T.R.S)	5. Location Sketch 336.234642,-113.477946 See attached Map
2. Key Observation Point (KOP) Name Key Observation Point #7		
3. VRM Class at Project Location Class III	(Lat. Long)	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Gently rolling terrain, medium smooth mountain hills.	Medium height, continuous pinyon and juniper cover smooth, regular pattern.	Curving road 1046.
LINE	Mostly horizontal undulating lines over a horizontal landscape.	Strong horizontal lines in the foreground with other horizontal lines created by changes in vegetation patterns.	Strong bold lines created from road
COLOR	Light brown and red hues where visible.	Darkgreen and red/brown hues present.	Brown and red hues
TEXTURE	Smooth and continuous.	Slightly patchy stands of pinyon and juniper in the foreground with more smooth patterns in the background.	Slightly contrasting

SECTION C. PROPOSED ACTIVITY DESCRIPTION

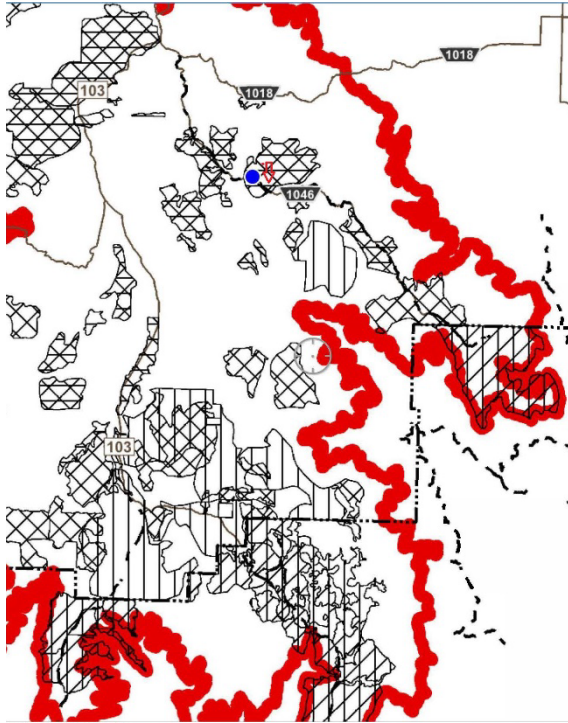
	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Mechanical/lopped and scattered, Pinyon and juniper trees and low brush.	Same
LINE	Same	More distinct vertical lines from trees, with horizontal changes created by removed vegetation.	Same
COLOR	Same	Dark green hues, with yellow and brown colors from scattered materials.	Same
TEXTURE	Same	Stippled tree patterns in foreground becoming more smooth in the middle and background.	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverses side)		
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)						
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE			
ELEMENTS	FORM				✓		✓								✓	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverses side)
	LINE			✓			✓								✓	
	COLOR				✓		✓								✓	
	TEXTURE				✓		✓								✓	
Evaluator's Names Greg Page															Date 04/30/2021	

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(June 2018)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 04/28/2021

District Office: Arizona Strip District

Field Office: Grand Canyon Parashant NM

Land Use Planning Area: Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name Shivwits Plateau Landscape Restoration Project	4. KOP Location (T.R.S)	5. Location Sketch Easting 284047 Northing 4014978 See attached Map
2. Key Observation Point (KOP) Name Key Observation Point #8		
3. VRM Class at Project Location Class III	(Lat. Long)	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Gently rolling terrain, medium smooth mountain hills.	Medium height, continuous pinyon and juniper cover smooth, regular pattern.	Curving road 1046.
LINE	Mostly horizontal undulating lines over a horizontal landscape.	Strong horizontal lines in the foreground with other horizontal lines created by changes in vegetation patterns.	Strong bold lines created from road
COLOR	Light brown and red hues where visible.	Darkgreen and red/brown hues present.	Brown and red hues
TEX- TURE	Smooth and continuous.	Slightly patchy stands of pinyon and juniper in the foreground with more smooth patterns in the background.	Slightly contrasting

SECTION C. PROPOSED ACTIVITY DESCRIPTION

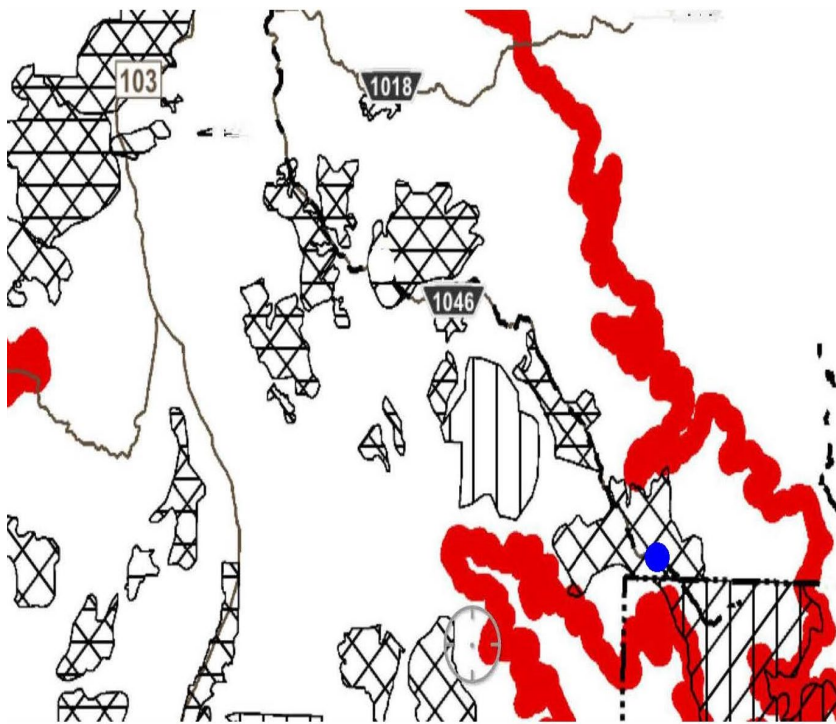
	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Mechanical/lopped and scattered, Pinyon and juniper trees and low brush.	Same
LINE	Same	More distinct vertical lines from trees, with horizontal changes created by removed vegetation.	Same
COLOR	Same	Dark green hues, with yellow/gray and brown colors from scattered materials.	Same
TEX- TURE	Same	Stipled tree patterns in foreground becoming more smooth in the middle and background.	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverses side)		
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)						
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE			
ELEMENTS	FORM				✓		✓								✓	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverses side)
	LINE			✓			✓								✓	
	COLOR				✓		✓								✓	
	TEXTURE				✓		✓								✓	
															Evaluator's Names Greg Page	Date 04/30/2021

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Form 8400-4
(June 2018)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 04/28/2021

District Office: Arizona Strip District

Field Office: Grand Canyon Parashant NM

Land Use Planning Area: Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name Shivwits Plateau Landscape Restoration Project	4. KOP Location (T.R.S)	5. Location Sketch Easting 257073 Northing 4002988 See attached Map
2. Key Observation Point (KOP) Name Key Observation Point #		
3. VRM Class at Project Location Class II	(Lat. Long)	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Gently rolling terrain, medium smooth mountain hills.	Medium height, stippled pinyon and juniper cover smooth, pattern.	Curving road 1012.
LINE	Mostly horizontal undulating lines over a horizontal landscape.	Strong horizontal lines in the foreground with other horizontal lines created by changes in vegetation patterns.	Strong bold lines created from road
COLOR	Light brown and red hues where visible.	Darkgreen and red/brown hues present.	Brown/tan and red hues
TEX- TURE	Smooth and continuous.	Slightly patchy stands of pinyon and juniper in the foreground with more smooth patterns in the background.	Slightly contrasting

SECTION C. PROPOSED ACTIVITY DESCRIPTION

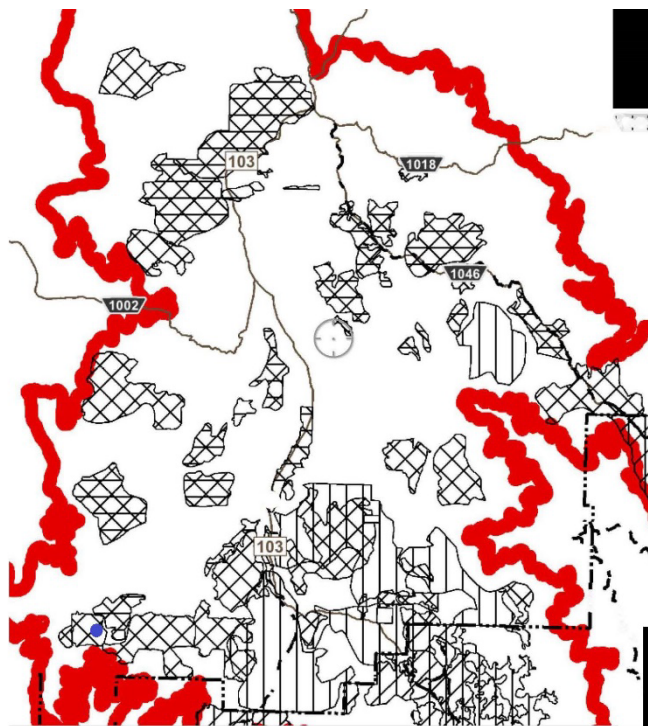
	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Mechanical/lopped and scattered, Pinyon and juniper trees and low brush.	Same
LINE	Same	More distinct vertical lines from trees, with horizontal changes created by removed vegetation.	Same
COLOR	Same	Dark green hues, with yellow/gray and brown colors from scattered materials.	Same
TEX- TURE	Same	Stipled tree patterns in foreground becoming more smooth in the middle and background.	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverses side)		
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)						
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE			
ELEMENTS	FORM				✓		✓								✓	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverses side)
	LINE			✓			✓								✓	
	COLOR				✓		✓								✓	
	TEXTURE				✓		✓								✓	
Evaluator's Names Greg Page															Date 04/30/2021	

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Appendix L. Additional Wildlife Information

Species Occurring in Project Area but Not Anticipated to be Affected by Proposed Action or No Action Alternative

Desert Bighorn Sheep (*Ovis canadensis nelsoni*)

Desert bighorn sheep habitat has been identified from habitat analysis that evaluates a combination of slope, topography, aspect, vegetation, proximity to escape cover, and water availability (Bighorn Sheep Core Team 2011). To escape predators, bighorn sheep prefer rough, rocky terrain with slopes greater than 20%. Desert bighorn sheep likely obtain some of the moisture they need from succulent vegetation. During the hot summer months, the sheep stay in shaded areas near water as much as possible and are seldom found more than three miles from dependable water sources. When rain or snowfall occurs, bighorn sheep expand their use of suitable habitat and range out from permanent waters. They also commonly drink from ephemeral pools of water found in rock pockets (Bighorn Sheep Core Team 2011).

The western side of the project area (along the Grand Wash Cliffs) is considered suitable habitat for desert bighorn sheep (*Ovis canadensis nelsoni*). This area is part of the Grand Wash Cliffs Wildlife Habitat Area (WHA); 11,946 acres of the WHA are found in the project area. However, much of this area is located within pinyon-juniper woodlands and is considered undesirable for bighorn sheep. Approximately 1,000 acres on the far west side of the project area contain habitat attributes deemed appropriate for bighorn sheep.

There is a small amount of overlap between the proposed treatments and habitat for bighorn sheep, however, the terrain in these areas is such that they would likely not receive any treatment due to project design features. Therefore, this species would not be affected by the proposed treatments.

Pronghorn (*Antilocapra americana*)

Pronghorn typically occupy grassland/desert scrub habitats; pronghorn habitat consists primarily of grasslands with areas of sagebrush, juniper and shrub encroachment (AZGFD 2009). In areas dominated by shrubs, sufficient forbs preferred by pronghorn are often lacking. This is most likely related to available precipitation. In years with adequate rainfall, sufficient forbs are produced for pronghorn. During winter months when forbs are not available, pronghorn rely on browse species for forage, such as fourwing saltbush.

The pronghorn population in Game Management Unit 13B appears stable to slightly increasing. Annual fawn production varies considerably from year to year. This variation is attributed to predation, annual differences in timing and amount of precipitation and subsequent forb production. Because there is some natural interchange between the 13A and the 13B pronghorn herds, AZGFD has periodically conducted supplemental releases of pronghorn in 13B in order to

increase numbers and to provide more genetic diversity. Approximately 8,500 acres of low to poor quality pronghorn habitat occurs in the northeast part of the project area.

A variety of factors are considered management concerns related to the pronghorn population in this unit, with three factors identified by AZGFD as being the primary reasons (AZGFD 2009).

First, water is a limited resource in the area, with few year-round waters available for use.

Pronghorn rely heavily on livestock waters; recent dry summers have shown that these waters are dry for most of the summer months, especially during fawning periods. Second, many miles of fence do not meet game standards and restrict pronghorn movement and survival (AZGFD 2009), although the BLM is working cooperatively with AZGFD to remedy this. Third, coyote predation on fawns has been identified as a probable limiting factor to pronghorn recruitment, especially during drought periods when fawning cover is limited or absent.

All vegetation treatments are proposed in areas that do not contain suitable habitat for pronghorn, therefore this species would not be affected by the proposed treatments.

Western Burrowing Owl (*Athene cunicularia hypugea*)

Burrowing owl habitat is present in the project area, but nesting attempts have not been documented. Burrowing owls would likely not be affected by vegetation treatments since they do not occupy woodland areas and prefer habitats that are more sparsely vegetated than those sites proposed for vegetation treatments.

Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagles may be found in the project area during the winter months. Carrion and easily scavenged prey items provide important sources of winter food in terrestrial habitats that are away from open water, such as in the project area. The proposed action and alternatives would have no impact on carrion food sources. No nests are located on the Arizona Strip and nesting habitat (large trees near bodies of water) is non-existent.

Table L.1 Sensitive Species Excluded from Further Analysis

Species	Rationale for Excluding from Further Analysis
Western Burrowing Owl (<i>Athene cunicularia hypugea</i>)	Burrowing owl habitat is present in the project area, but nesting attempts have not been documented. Burrowing owls would likely not be affected by vegetation treatments since they do not occupy woodland areas and prefer habitats that are more sparsely vegetated than those sites proposed for vegetation treatments.
House Rock Valley Chisel-toothed Kangaroo Rat (<i>Dipodomys microps leucotis</i>)	This species is endemic to the House Rock Valley on the eastern side of the Arizona Strip and is not present within (or near) the project area.
Northern Leopard Frog (<i>Lithobates pipiens</i>)	This species has a limited range on the Arizona Strip and currently only occupies Soap Creek Tank on the Paria Plateau and possibly Kanab Creek. Habitat for this species is not present in or near the project area.
Arizona Toad (<i>Anaxyrus microscaphus</i>)	Found on the Arizona Strip only along the Virgin River and tributaries. Habitat for this species is not present in or near the project area.
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Bald eagles may be found in the project area during the winter months. Carrion and easily scavenged prey items provide important sources of winter food in terrestrial habitats that are away from open water, such as in the project area. The proposed action and alternatives would have no impact on carrion food sources. No nests are located on the Arizona Strip and nesting habitat (large trees near bodies of water) is non-existent.
Native Fish (5 species)	These species are restricted to the Virgin River, Paria River, and Kanab Creek. Habitat for these species does not occur within or near the project area.
Spring Snails (4 species)	These species are restricted to very small ranges at spring sites along the Virgin River and are not present within or near the project area.

Appendix M. Public Scoping Comments

Substantive and other public scoping comments are organized by issue in the table. Comments in common to several groups or individuals were combined into one comment, where applicable, and subsequently addressed in one response. Comments received after the comment period closed were not considered during alternative development. All comments were considered in the Monument alternative development process.

Commenter Name	Comment Category	Comment	Response
Spotts Sierra Club WWP	Additional alternatives	Several comments were received regarding providing additional alternatives including the elimination of livestock grazing, and/or fully processed permit renewals, or any other anthropogenic uses, that are the cause of the degraded landscape conditions.	Section 2.3 addresses alternatives considered but not carried forward for analysis.
WWP	Additional Information	It is a little difficult to determine from the project area map ...allotments that overlap with the proposed vegetation treatments. We would appreciate any clarification or correction to our assessment.	See Section 3.6 and Appendix B Figure B.5 for allotments within the project area.
WWP	Additional Information	The information about the land health of the allotments that are covered by this proposed action is a necessary part of the baseline for the NEPA process. Without this information, the BLM and NPS cannot have a full understanding of how best to address the causes of the problems this project seeks to address.	See Section 3.6 and Appendices F and G for rangeland health monitoring information.
WWP	Additional Information	It is unclear how much riparian and xeroriparian area is included in the project area. This information should be disclosed in the forthcoming analysis.	No treatments are proposed in riparian areas. No areas have been defined as xeroriparian on the Monument.
AZGFD Sierra Club	Additional Information	[AZGFD] recommends that the EA specify the acreage breakdown of treatments within each ecological biome in the project footprint.	See Section 2.2.1 and Appendix J for acreages of treatment units and biomes.
AZGFD Sierra Club	Additional Information	[F]urther refinement of the stated goals, objectives, and methodologies regarding herbicide application in the EA would assist external partners in assessing potential impacts.	See Chapters 1 and 2, and Section 3.9 regarding herbicide use. Proposed herbicide use is targeted for control of invasive non-native plant species.
Spotts Sierra Club	Biological Soil Crust	Comments were received regarding protection and preservation for BSC	See Section 2.2.1 for Design Features to avoid damage to Biological Soil Crust and Section

Commenter Name	Comment Category	Comment	Response
		“These soil crusts are fragile and some proposed treatment methods would destroy them.”	3.9 for a discussion of current status and potential impacts to the component organisms.
AZSFWC	Cooperating Agency	AZGFD has requested Cooperating Agency status for this NEPA analysis. We strongly recommend their request be granted to fully leverage their expertise in planning and implementing the project.	See Section 4.3 Cooperating Agencies, BLM Handbook H1790-1-2008 chapter 12 and NPS NEPA Handbook (2015) section 4.13.B for clarification of process. AZGFD is a cooperating agency for this project.
WWP	Drought	Small-diameter ponderosa pine thinning in combination with drought and grazing, both of which are present in the project area, exacerbated cheatgrass spread	See Section 2.2.1 Design Features for clarification.
Sierra Club	External Information Sources	The agencies should utilize all of the tools at their disposal to ensure a true landscape-level analysis and process for the proposed action. This includes use of the REAs and other assessments as well as coordinating with a multitude of stakeholders on a regular basis.	No REAs cover the project area. See Section 2.2.1 Proposed Treatment Locations and Adaptive Management and Monitoring. Stakeholders are engaged through public scoping, public comments, and MOUs.
AZSFWC	Field trips	We recommend that the GCPNM provide opportunities for on-the-ground public engagement during the NEPA planning process and in the future as the project is implemented. We would welcome the opportunity to participate in field trips or similar events.	The Monument is not hosting field trips for this project. The public are welcome to visit the monument, including the project area, on their own schedule. Information for the public was incorporated in the alternative development phase of the EA. See Section 2.2.1 Proposed Treatment Locations and Adaptive Management and Monitoring. If you are interested in visiting Grand Canyon-Parashant National Monument, you can find helpful materials, including maps and directions, at <u>Grand Canyon-Parashant National Monument (U.S. National Park</u>

Commenter Name	Comment Category	Comment	Response
			Service) (nps.gov) and Grand Canyon-Parashant Bureau of Land Management (blm.gov)
WWP	Forage Reserve	[T]he BLM and NPS should not consider the use of the Parashant forage reserve to accommodate any displaced livestock grazing as a result of this project. The RMP for the GCPNM...provides only that the Tuweep forage reserve can be used to defer or rest other allotments during vegetation treatments and the Parashant reserve is not identified for that use.	The EA does not propose to use the Parashant forage reserve but may use the Tuweep forage reserve as per RMP MA-GM-14 and MA-GM-15. Future use of the forage reserve would be analyzed in a separate NEPA document.
WWP Sierra Club	Issues - Impact Analysis	“The BLM and NPS should disclose the impacts to soils, climatic change, rare plants from the proposed action as well as disclosing the cumulative impacts of nearby BLM vegetation management projects and livestock grazing on the soils in the project area.” “A partial list of objects to be protected include: a. Cultural resources – The monument proclamation identifies and details an impressive collection of cultural and historic resources as a primary purpose for the Monument. The lack of intensive human access and activity on lands with wilderness characteristics helps to protect these resources. b. Scenic values – The monument proclamation identifies the “engaging scenery” as a resource of the monument. FLPMA specifically identifies “scenic values” as a resource of BLM lands for purposes of inventory and management (43	See Chapter 3 and Table 3.1 to see resources analyzed and Section 1.5 regarding Monument Objects.

Commenter Name	Comment Category	Comment	Response
		U.S.C. § 1711(a)), and the unspoiled landscapes of lands with wilderness characteristics generally provide spectacular viewing experiences. The scenic values of these lands will be severely compromised if destructive activities or other visual impairments are permitted. d. Recreation – FLPMA also identifies “outdoor recreation” as a valuable resource to be inventoried and managed by BLM. 43 U.S.C. § 1711(a). Lands with wilderness characteristics provide opportunities for primitive recreation, such as hiking, camping, boating and wildlife viewing. Primitive recreation experiences may be foreclosed or severely impacted if the naturalness and quiet of these lands are not preserved. e. Lands with wilderness characteristics” “Moreover, the analysis must include the confounding effects of climate change.”	
Sierra Club	Issues - Special Status Plants	The potential impacts of the various proposed treatments on these [sensitive plant] species and the agencies’ proposed mitigation should be clearly delineated and analyzed in any subsequent NEPA document.	See Section 3.9 Special Status Species.
Sierra Club	Issues - Air Quality/ Climate Change	Address the implications of the increase in dust production on climate change and monument values including vegetation, nutrient cycling, soil fertility, water holding capacity, and biological soil crusts	See Section 3.3 Air Quality and Section 3.9.2 Vegetation.
AZSFWC	Issues - Burro	Feral Burro...We request they be included as an issue in the NEPA analysis	See Table 3.1 Wild Horses and Burros.

Commenter Name	Comment Category	Comment	Response
Spotts Sierra Club	Monument Object Effects	Several comments were received regarding Monument object impacts. “must analyze how each action alternative may affect one or more of the identified GCPNM “objects” and what specific design features would be required and consistently monitored to ensure that those objects remain protected.” “The most important aspect of this project is ensuring that the objects that the monument was designated to protect are conserved, protected and restored over the life of the project and beyond. These objects include “The ecological diversity resulting from the junction of two physiographic ecoregions (the Basin and Range and Colorado Plateau) and three floristic provinces (the Mojave Desert, Great Basin, and Colorado Plateau), including a diversity of wildlife” (RMP ROD at 1-21).”	See Section 1.5 and Section 2.2.1 Design Features. Impacts to Monument objects were analyzed in Chapter 3.
Spotts	NEPA process	Comments were received questioning the potential programmatic status of the EA. “Would this EA be programmatic with planned subsequent site-specific supplemental EAs?” “BLM and NPS should clarify that the Shivwits project NEPA analysis is intended to serve as a programmatic document and that subsequent tiered projects covered by any subsequent NEPA document will undergo their own rigorous NEPA analysis.”	This EA would not be programmatic. Neither NPS nor BLM guidance allows for the creation of supplemental EAs. Please note this project has treatment units and analysis of effects includes site-specific considerations. See Figures 2.1-2.3 for treatment unit locations.
WWP Sierra Club	NEPA Process	“The Preliminary Project Summary that accompanied the scoping notice for this project appears to be a preliminary Environmental	The Preliminary Project Summary was provided to the public for the purposes of background information, purpose and need for

Commenter Name	Comment Category	Comment	Response
		Analysis rather than a project summary, complete with alternatives and very cursory analysis. This brings us to urge the BLM and NPS to recognize that this project requires the preparation of an Environmental Impact Statement.” “BLM and NPS should complete an environmental impact statement (EIS) instead of an EA, given the huge scope of the project”	the project, and preliminary proposed actions, issues and alternatives developed during internal scoping. See BLM Handbook H1790-1-2008 sections 7.1 and 7.2, and NPS NEPA Handbook (2015) section 1.5.E for more information about appropriate information to be shared with the public during public scoping. See Section 2.2.1 for actual acreages for proposed treatment and design features.
Sierra Club	NEPA Process	When considering the effects of past actions as part of a cumulative effects analysis, the Responsible Official must analyze the effects in accordance with relevant guidance issued by the Council on Environmental Quality	See cumulative impacts analysis sections in Chapter 3 for each issue analyzed in depth (Sections 3.3-3.11).
Sierra Club	NEPA Process	The agencies must also analyze the full hierarchy of mitigation options for offsetting the negative effects, with avoidance of impacts being paramount. Avoidance of impact is especially important in the context of the GCPNM, where there are high densities of outstanding biological and cultural resources as recognized by the proclamation establishing the monument.	See Section 2.2.1, including Design Features where avoidance is used as a mitigating measure, for example “When in the vicinity of known cultural resources (i.e. archaeological site(s)), treatment boundaries would be designed to avoid all cultural resources and to avoid making the archaeological site more visually obvious.”
WWP	Post treatment - Post seeding	Livestock operators should be required to defer grazing their livestock on the treated areas for a sufficient amount of time to allow the restoration efforts to succeed.	Rest, or deferred grazing, is included as a design feature. See Section 2.2.1.
Sierra Club	Posttreatment - Monitoring	To avoid damaging the treatment by allowing livestock use too early, the agencies should stipulate clear objectives measures for forbs,	See Section 2.2.1 Adaptive Management and Monitoring and Design Features and Appendix D.

Commenter Name	Comment Category	Comment	Response
		perennial grass, and biological soil crust cover, as well as indicators of soil erosion such as percent cover of bare ground, that must be met before resumption of grazing.	
Spotts AZSFWC Sierra Club	Post-treatment - Rest	Several comments were received recommending different post-treatment rest durations or suggesting the “2 growing season rest period in the design features was inadequate” “GCPNM should use seeding practices that will maximize potential for success, including one or more years of post-seeding rest from grazing, when treatments occur in active livestock allotments.”	Note that while two years is listed as the length of time to exclude livestock from treatment areas in the design features (Section 2.2.1), this timeframe could be longer or shorter based upon vegetative (and other) monitoring, with the overall goal to ensure the success of treatments.
Sierra Club	Roads	No new or temporary roads should be constructed as part of this project.	No new or temporary roads are proposed in this project.
Sierra Club	Treatment - Adaptive Management	Specify what monitoring will be used to determine effectiveness and what will be done if treatments are determined to be ineffective.	Section 2.2.1 Adaptive Management and Monitoring addresses types and protocols of monitoring used to determine the efficacy of the proposed action.
Sierra Club	Treatment - Design	Protect old growth stands of ponderosa and pinyon-juniper forest. No old trees should be cut. Recognize that old trees are not “encroachment” and young trees within old growth stands are a normal part of succession and can usually be treated with fire if they are perceived as being overly dense.	See Section 2.2.1 Treatment Unit Specific Planning and Appendix A DFC-VM-28 and DFC-VM-29.
AZGFD	Treatment - Design Features	Department recommends a breakdown of the treatment of slash vs. mastication debris. As currently written, the statement suggests 24" of post mastication "mulch" could be left on the landscape.	See Section 2.2.1 Design Features for clarification.

Commenter Name	Comment Category	Comment	Response
AZGFD	Treatment - Fire	There are significant risks associated with burning P-J ecosystems in northern Arizona. They include ecotype conversion under climate change, conversion to invasive species (i.e., cheatgrass), and soil and seed bank loss. Current literature, and the Department's experience over the last 3 decades, has documented a high risk of cheatgrass expansion in P-J habitats that have experienced intense wildfire.	See Section 2.2.1 Design Features and Adaptive Management and Monitoring sections.
AZGFD Sierra Club	Treatment - Fire	“Department recommends that prescribed fire not be applied at a large scale within the P-J type. The Department believes that prescribed fire could be appropriate on a trial basis at a small scale in strategic locations (i.e. where cheatgrass expansion is unlikely, under conditions that favor a cooler fire), and recommends development of monitoring protocols conducted before and after implementation to assess effectiveness” “Recognize that ponderosa pine, pinyon-juniper, and sagebrush fire regimes are very different. Maintenance of ponderosa pine communities requires frequent low intensity fires, but pinyon-juniper and sagebrush have longer fire return intervals. Fire is not a driver of those ecosystems. These communities should have different prescribed fire regimes, and BLM and NPS should provide more detail about how they will tailor management to each community type.”	See Section 2.2.1 Design Features and Adaptive Management and Monitoring sections.
Sierra Club	Treatment - Fire	Mechanical treatments are not proposed for ponderosa pine (Project Summary at 3) but the	See Section 2.2.1 Proposed Action for clarification.

Commenter Name	Comment Category	Comment	Response
		Project Summary goes on to say, “Prescribed fire typically would follow a mechanical or manual treatment to prepare the site for favorable treatment outcomes or may take place with limited pre-treatment site preparation.” (Project Summary at 5) This is confusing and should be clarified.	
AZSFWC	Treatment - Fire	Application of Fire... this must be done in a manner that does not facilitate further spread and dominance by cheatgrass and other invasive weeds and protects fire-sensitive plant communities like blackbrush that have been severely impacted by wildfires across the Arizona Strip.	See Section 2.2.1 Treatment Unit Specific Planning and Design Features. No treatment in blackbrush communities is proposed.
AZSFWC	Treatment - Fire	We also recommend that managed wildfire (natural or anthropogenic ignitions) should be included in the toolbox along with prescribed fire.	Managed wildfire is presently allowed in the project area as per the RMP (2008) LA-FM-03: “Appropriate Management Response (AMRs) for managing wildland fires will be used by the BLM and NPS (as identified in the BLM Fire Amendment and the BLM and NPS Fire Management Plans). The AMR is based on firefighter and public safety and objectives and constraints derived from the fire management allocations (Wildland Fire Use, Non Wildland Fire Use), relative risk to natural and cultural resources, DFCs, fire management unit objectives, potential complexity, the ability to defend management boundaries, and costs of protection. AMRs will be used in areas classified as Wildland Fire Use and Non Wildland Fire Use.”

Commenter Name	Comment Category	Comment	Response
AZSFWC AZGFD	Treatment - Herbicide	Any application of herbicide within the project area should avoid areas of high value forage for wildlife, such as cliffrose and fourwing saltbush.	See Section 2.2.1 Chemical Treatments. Cliffrose and fourwing saltbush are not proposed to be treated by any herbicide.
WWP Sierra Club	Treatment - Invasive, non- native plants	Vegetation projects targeting sagebrush or pinyon-juniper woodlands, as this project proposed, risk becoming vectors for cheatgrass invasion. Do not use Tebuthiuron to treat sage in the project area.	Cheatgrass is known issue. See Section 2.2.1 Design Features, Treatment Unit Specific Planning and Adaptive Management subsections planning to minimize cheatgrass expansion. Herbicide use is targeted to non-native invasive plant species, including cheatgrass, to minimize impacts on the landscape. Tebuthiuron is not proposed to be used in this project.
AZGFD	Treatment - Mosaic	Treatment patches would be placed to avoid adverse impacts to soils and cultural resource sites, maximize desired vegetation response while retaining old growth P-J attributes, and limit long site distances within a treatment block. Such an approach would increase habitat heterogeneity, allow reasonably efficient implementation, and provide added protection for cultural resources.	See Section 2.1 Treatment Unit Specific Planning and Appendix C Figure C.8.
AZSFWC Sierra Club	Treatment - Pinyon Jay	We encourage GCPNM to adopt current recommendations developed by the Pinyon Jay Working Group facilitated by the U.S. Fish and Wildlife Service.	See Section 3.11.2 Wildlife for a discussion of potential impacts to pinyon jay and Section 2.2.1 Design Features regarding pinyon jay.
Sierra Club	Treatment – Pinyon- Juniper	BLM and NPS should make every attempt to retain all pinyon pines, in order to allow the population to recover after recent regional mortality events.	See Section 2.2.1 Treatment Unit Specific Planning that addresses pinyon pine retention.
Sierra Club	Treatment – Pinyon- Juniper	The expansion of pinyon and juniper may well be a natural process that is expensive and ultimately futile to arrest. In keeping with the Proclamation's	This project determined pinyon and juniper expansion based on ESDs, the best known approximation we have for the area of

Commenter Name	Comment Category	Comment	Response
		requirement to protect biological values, the monument should assess the presettlement range for these forests and promote recovery where deforestation had occurred and adjust the project accordingly.	“presettlement” vegetation. See Section 2.2.1 Treatment Unit Specific Planning for areas where expansion would be encouraged in the proposed action.
AZSFWC	Treatment – Pinyon-Juniper	It is important to distinguish among persistent woodlands versus those that represent encroached grasslands or areas of woodland expansion/contraction. Old-growth persistent woodlands have unique wildlife habitat value that should be fully conserved as much as possible. Treatments within the pinyon-juniper type should avoid the historical practice of large scale mechanical clearing and seeding with non-native species. These treatments are controversial, have dubious benefits to wildlife, are inconsistent with the Purpose and Need for the project, and opposed by our organization. To maximize benefits to game and nongame species, mechanical treatments should be strategically applied in a manner that mimics small-patch natural disturbances -- creating openings that allow developed understory layers. A potential strategy would be to delineate blocks <640 acres in size, within which up to 25% of the area would receive dispersed, irregularly shaped treatment patches <5 acres in size. This would increase habitat heterogeneity, allow efficient implementation, and provide added protection for cultural resources.	Woodlands on the Monument are not characterized formally as persistent, encroaching or expansion/contraction. However, using a combination of known vegetation types and ESDs, the category “pinyon-juniper woodland” is roughly equivalent to persistent woodlands, “sagebrush shrubland”, “sagebrush grassland” and “grassland-native or introduced” are roughly equivalent to encroaching and “pinyon-juniper savanna” is roughly equivalent to expansion/contraction. See Section 2.2.1 Treatment Unit Specific Planning and Appendix C Figure C.8 for a variation of your proposal.

Commenter Name	Comment Category	Comment	Response
AZSFWC Sierra Club AZGFD	Treatment - Seed Mix	Several comments received on using native seed. “recommend using locally-adapted seed of native species. Use of non-natives should be limited to situations where ecological objectives in the Purpose and Need cannot be met using available native seed.”	See Section 2.2.1 Design Features.
AZGFD	Treatment - Specific Unit Treatment Design	Department recommends some guiding concepts for consideration when planning and implementing habitat enhancement prescriptions within Ponderosa Pine ecosystems.	See Section 2.2.1 Treatment Unit Specific Planning. Each unit would have an individual implementation plan. Guidelines would be incorporated in the plan. As a cooperating agency, the AZGFD are collaborating with the Monument staff during planning and future implementation.
AZGFD Sierra Club	Treatment- Mechanical	Mechanical treatments are also appropriate where pinyon and juniper have encroached into sagebrush stands or are moving down slope into shrub-grassland, savannah, and grassland areas. In these areas, the goal should be to thin/remove encroaching trees but retain pockets of persistent woodland that are often interspersed on shallower/rocky soils.	See Section 2.1 Treatment Unit Specific Planning
WWP Sierra Club	Tribal Consultation	The scoping notice and summary indicate that some effort to reach out to Tribal governments was attempted, but this effort should be fully described.	See Section 4.4 Tribal Consultation
Sierra Club	Wilderness	Also, policy requires that “all management decisions affecting wilderness will further apply the concept of ‘minimum requirement’ for the administration of the area regardless of wilderness category,” (NPS 2006: Chapter 6.3.1), and that management conduct an adequate	See Appendix H for Minimum Tools Analysis documentation and Section 3. 7 Proposed Wilderness (NPS managed lands).

Commenter Name	Comment Category	Comment	Response
		minimum requirement analysis that is made available to the public in a timely fashion.	
Sierra Club	Wildlife	According to the monument RMP, “Self-sustaining populations of Kaibab squirrels will be enhanced or maintained within the Trumbull-Logan WHA	This project is outside the Trumbull-Logan WHA. Kaibab squirrels are not known to occur in the project area.
Sierra Club	Wildlife	The project area includes habitat of threatened MSO. Any management affecting owl habitat requires consultation with the U.S. Fish and Wildlife Service (“FWS”) to secure an exemption of the proposed action from the ESA Section 9 prohibition on take of listed species.	See Table 3.1. In Northern Arizona (including on the Arizona Strip), the Mexican spotted owl is distributed within a fragmented rocky canyon environment where steep cliffs generate microclimates and habitat structures that allow the owl to establish nest sites and locate protected roost sites (from Willey 2011). There is no suitable MSO habitat in the project area – there is no cliff habitat within the project area, and ponderosa pine communities in the project area have been evaluated by BLM Arizona Strip biologists and determined to be unsuitable. Consultation with the U.S. Fish and Wildlife Service is therefore not needed for this project.
AZSFWC	Wildlife Corridor	Wildlife Corridors.... We ask the Monument to work with the AZGFD to identify these corridors and prioritize them for treatment where needed.	Wildlife corridors have been identified for the BLM Arizona Strip District, including the entire Monument, in conjunction with AZGFD. No corridors were identified in the project area.

Appendix N. Public Comment Period Comments

Substantive comments are organized by issue in the table. Comments in common to several groups or individuals were combined into one comment, where applicable, and subsequently addressed in one response. Comments received after the comment period closed were not considered. Several comments contained non-substantive or open-ended questions. Per the BLM NEPA Handbook and NPS NEPA Handbook these were not responded to.

Commenter	Comment Number	Category	Comment	Response
Sierra Club et al	1	Alternatives	At least one alternative should forego the use of herbicides. The BLM/NPS must consider an actual IPM approach. If the BLM/NPS deployed an IPM approach in addressing noxious weed issues, it would have to include an alternative that addressed the role of grazing in the spread of weeds and other alternatives for addressing concerns around the role of exotic grasses and wildfire risk. Simply deploying herbicides while continuing to allow cows to spread noxious weeds fails to comport with IPM.	The BLM and NPS do use an IPM approach as noted in Section 2.2.1 subsection Chemical Treatment, Section 3.9.2, including subsection Invasive Non-Native Plants, and Appendix H MRDG Step 2 of the EA. The existing BLM ASDO invasive and noxious weed program and terms and conditions in grazing permits are designed to address these issues. These programs operate under their own NEPA. The grazing program is outside the scope of this project and the related NEPA documents separately. Design features in this EA have additional terms and conditions that assist the BLM and NPS in invasive non-native plant treatment.
AZGFD Sierra Club et al	2	Analysis - Birds	The EA utilizes and references the US Fish and Wildlife Service's (Service) list of "Birds of In Conservation Concern" for the project's migratory bird species analysis. In June 2021, the Service published a new "Birds of Conservation Concern". This new list includes many more migratory bird species that could require further analysis within the project footprint when compared to the 2008 version that was utilized in the creation of the EA. The Department recommends the Monument utilize the Service's 2021 version for this project, as it is the most current list that the Monument can use for analyzing migratory bird impacts. However, the EA does not adequately explain how the project would accomplish this for migratory birds. In fact, the Migratory Birds	The list "Birds of Conservation Concern" was published during public comment period. Section 3.11 was updated to reflect the changes in the list.

Commenter	Comment Number	Category	Comment	Response
			section of the EA presents outdated information. It is based on the 2008 version of the USFWS Birds of Conservation Concern, which has recently been updated.	
Sierra Club et al	3	Analysis - Goshawk	Based on the EA, we are unsure(sic) if the goshawk occurs within the project area....incorporate the findings of Dickson et al (2014) who found that across 895 nest sites northern goshawks preferred to nest in areas with high canopy-bulk density, intermediate canopy-base heights, and low variation in tree density. They theorized that higher canopy bulk densities likely occurred in areas characterized by an abundance of larger trees interspersed with dense groups of younger trees, and that goshawks preferred areas with fairly homogeneous structure. Please explain how proposed treatments in and around nest areas maintain these characteristics.	The language in the EA regarding goshawk was updated for clarity (Section 3.11.1 subsection Northern Goshawk (<i>Accipiter gentilis</i>)). See comment response #36.
Sierra Club et al	4	Analysis - Invasive Plants	Please provide justification for the statement, "Overall, the proposed action would decrease the occurrence of invasive non-native plants in the project area." (EA at p. 58).	The sentence was reworded for clarity. "Based on the above analysis, the proposed action would decrease the occurrence of invasive non-native plants in the project area."
Sierra Club et al	5	Analysis - Kaibab Squirrel	The EA deletes the portions of this Management Action that refer to the Kaibab Squirrel. We understand that it is believed that no Kaibab squirrels currently occupy the project area, although that is not proven. However, Kaibab squirrels may have occupied the project area prior to intensive historic commercial logging and hunting, and they could be restored to the project area's ponderosa pine forests which are in fact the species habitat.	The Kaibab squirrel population on the Monument is introduced. Naturally occurring populations occur only in the North Kaibab National Forest and the adjoining Grand Canyon National Park, over 20 miles away in noncontiguous habitat. Introduction of Kaibab squirrel beyond the species range is not part of this EA.

Commenter	Comment Number	Category	Comment	Response
Sierra Club et al	6	Climate Change	• BLM should explain how climate predictions are expected to impact the vegetation resources to be treated under this project. Ideally, this would include modelling. • The Purpose and Need should acknowledge the role of climate change in contributing to current landscape conditions, and the challenge that climate will play in restoring ecosystems. • The document should include a discussion of how reasonably certain climate predictions can impact the priorities for, and success of, this project. • Include an analysis of the role of climate change in creating the current conditions, and how to work with the climate to create healthy habitat conditions.	Design features such as limited treatment during drought and the adaptive management planning are included in the proposed action to respond to climatic variability, whether directly tied to climate change or other forces. Air Quality, including greenhouse gas emissions, is addressed in Section 3.3.1.
Spotts	7	Cumulative Impacts	...the cumulative effects analysis for wildlife is deficient because it does not address the serious impacts from the current prolonged drought.	See Section 2.2.1 subsection Design Features subsection Vegetation. Analysis of the impacts of current drought is speculative at this point as impacts are unknown. Cumulative effects analysis is for past, present and reasonably foreseeable actions, not conditions. Expansion of this discussion to conditions would be unwieldy.
WWP	8	Cumulative Impacts	Please disclose and analyze the cumulative impacts from any vegetation treatments in and adjacent to the project area in the past 20 years.	The cumulative impacts analysis is included in the EA at the end of each resource issue section. In NEPA, the requirement for cumulative impacts is to disclose past, present and reasonably foreseeable actions. An analysis is not required and would result in an unwieldy list. In addition, not all information is available for treatments conducted over the last 20 years

Commenter	Comment Number	Category	Comment	Response
				(40 CFR 1500.22). See pg. 61 of the BLM NEPA Handbook and 40 Most Asked Questions Concerning the CEQ's National Environmental Policy Act (energy.gov)
WWP	9	Grazing	In the same section wherein BLM and NPS state that making changes to the livestock grazing permits is outside the scope of this project, they also say that the “proposed action incorporates design features, monitoring, and adaptive management principles including temporarily removing livestock from these allotments to ensure treatment success.” Clearly, making changes to the permits is within the scope of this project.	This project is not a long-term change to the permit but serves as a short-term mitigation measure to ensure treatment success. Any short-term rest or rotation of livestock is allowed for within current grazing permits.
WWP	11	Grazing - Cumulative Effects	In our previous comments we asked the BLM to include livestock grazing authorizations surrounding the project area as part of the cumulative impacts analysis. The Mt. Logan, Lizard and Wolfhole, Mosby Nay, Mt. Trumbull and Belnap allotments have all recently been authorized and/or had range infrastructure projects approved. The impacts of these authorizations on vegetation communities must be included in the forthcoming analysis because the non-native invasive plants on these allotments will impact adjacent allotments, including those in the project area. Similarly, any vegetation management projects on lands that are adjacent to the project area must be disclosed and analyzed for cumulative effects.	None of these named allotments are adjacent to or within the project area.

Commenter	Comment Number	Category	Comment	Response
Sierra Club et al	12	Monument Object - Turkey	Other than citing components from the Monument Management Plan, the EA provides no discussion of wild turkey although they are objects of the Monument.	The Merriam's turkey is found in the project area. Subsections, entitled "Merriam's Turkey", can now be found in Sections 3.11.1 and 3.11.2. of the EA in order to address this omission.
Sierra Club et al	13	Not in Proposed Action	We urge you to eliminate harrow seeding from the project.	We are not proposing using harrow seeding in this project. The reference to Dixie harrow was removed from Appendix D for clarification.
Sierra Club et al	14	Not in Proposed Action	We are concerned that the proposed action will negatively impact these sensitive vegetation types, based on our experience in these landscapes and the EA's recognition of the sensitivity of these sites. Our concern is further warranted in that the EA does not provide assurance that the Desired Future Conditions or Management Actions for these vegetation types as specified in the Management Plan will be conformed to, including at Table 2.3, DFC-VM-34 through MA-FM- 12. In this case, it appears that the Shivwits Project does not conform to the Monument Management Plan. To make matters worse, the Management Plan clearly states at MA-VM-31 that "Up to 100 acres may be treated with prescribed fire on BLM-administered lands if associated with scientific research." Table J.3 in the EA shows that 126 acres of Mojave Transition Shrubland are targeted for prescribed fire, but no associated scientific research is discussed. In this case, it appears that the Shivwits Project does not conform to the Monument Management Plan.	See Table 2.1 and Section 2.2.1 subsection Proposed Treatment Locations. Treatment units include these types of vegetation, as indicated in Table J.3, however actual acres treated in each unit exclude Mojave transition shrubland, blackbrush mixed shrubland and cliff and scree slope vegetation.

Commenter	Comment Number	Category	Comment	Response
			Any subsequent NEPA document should eliminate treatments in the Blackbrush Mixed Shrubland and Mojave Transition Shrubland plant communities unless they are associated with scientific research.	
Belles Sierra Club et al	15	Not in Proposed Action	The description of Mechanical Treatment method in the Proposed Alternative, while not using the word “chaining” closely resemble this past practice... We would like to see any subsequent NEPA document clearly state that chaining, tipping, and grubbing will not occur as part of this project.	The proposed action does not propose chaining, tipping, and grubbing. See Section 2.2.1.
Sierra Club et al	16	Not in Proposed Action	Thinning treatments are commonly proposed in many forests as mitigation against drought and climate change with the goal to remove biomass so it is less likely to be removed by fire. Promoting massive herbicide use following thinning treatments ignores the cumulative effects of thinning and chemicals on the health of the forest and its biota.	Units 29 and 41 are the only units that appear, at this time, to need other than spot treatments with herbicide. See Section 2.2.1 subsection Prescribed Fire for a description of thinning. See sections 3.9 and 3.11 for a discussion of relevant cumulative effects.
Sierra Club et al	17	Not in Treatment Units	By failing to identify cave and karst resources, or determining their significance per 43 CFR Part 37, the EA has not shown that such resources are protected from surface disturbance, fires, or project-related management actions.	The Geology section of Table 3.1 has been updated to include a comment regarding cave and karst features. These features are not located within the proposed treatment units.
Sierra Club et al WWP	55	Project Area	the project area does not overlap the Lake Mead NRA, so this assertion in the EA is irrelevant. Furthermore, the Lake Mead Recreational Area appears to be well outside the project area and the	The Monument Proclamation clearly acknowledges the relationship to grazing and lands within the Lake Mead NRA that are administered through the Grand Canyon-

Commenter	Comment Number	Category	Comment	Response
			language regarding BLM's management of livestock grazing in the Recreational Area is completely irrelevant to the analysis in this EA.	Parashant National Monument. The proclamation states: <i>The Secretary of the Interior shall manage the monument through the Bureau of Land Management and the National Park Service, pursuant to applicable legal authorities, to implement the purposes of this proclamation. The National Park Service and the Bureau of Land Management shall manage the monument cooperatively and shall prepare an agreement to share, consistent with applicable laws, whatever resources are necessary to properly manage the monument; however, the National Park Service shall continue to have primary management authority over the portion of the monument within the Lake Mead National Recreation Area, and the Bureau of Land Management shall have primary management authority over the remaining portion of the monument.</i> <i>The Bureau of Land Management shall continue to issue and administer grazing leases within the portion of the monument within the Lake Mead National Recreation Area, consistent with the Lake Mead National Recreation Area authorizing legislation. Laws, regulations, and policies followed by the Bureau of Land Management in issuing and administering grazing leases on all lands under its jurisdiction shall continue to apply to the remaining portion of the monument</i> Consequently, the NPS managed lands on Grand Canyon-Parashant National Monument are tied to Lake Mead NRA. As such, many

Commenter	Comment Number	Category	Comment	Response
				management decisions made by Lake Mead NRA apply on the NPS managed portions of the Monument.
WWP	19	Proposed Action	Of the 52,140 acres of “actual treatment” area, the BLM has not yet identified which of those acres will be excluded from treatment because of the presence of cultural sites, topography, or sensitive habitat types.	Areas that are to be excluded from treatment apply to a variety of categories, including topography, sensitive nesting habitat for pinyon jays (should treatments be proposed during the nesting season), historic sites, cultural sites, and needed “leave” areas to be consistent with mule deer habitat guidelines as described in the Treatment Unit Specific Planning subsection of Section 2.2.1 of the EA. This iterative process results in a mosaic across the treatment areas and is represented in Figure C.8 of Appendix C of the EA. As the project implementation progresses, treatment polygons will be subject to a number of inventories to inform the final polygons selected for treatment. Cultural inventory and special status species survey results are not intended for public viewing based on the need to protect these resources. A map of topographic exclusion areas (Figure B.12) was added to the EA in Appendix B, to show areas that would not receive treatment.
Sierra Club et al	20	Proposed Action	In a comprehensive review of more than 300 sources from the published peer-reviewed literature on pinyon-juniper vegetation treatments, Jones (2019) found that: • 64% of treatments had no significant effect on perennial grasses and forbs, while more than half showed increases in non-native annuals. • While studies of the relationship between pinyon-juniper treatments and fire are rare,	Design features, to mitigate invasive non-native plant spread, are described in the Adaptive Management and Monitoring Section of 2.2.1 of the EA. Specifically, prescribed fire treatments in pinyon-juniper woodlands are being treated in small areas. These treatment plots would be monitored before and after treatment to determine the viability of future work using

Commenter	Comment Number	Category	Comment	Response
			surface disturbances may encourage cheatgrass invasion and increase fire risk. The reviewer did not find evidence to support the idea that removing pinyon and juniper decreased fire occurrence. • Mechanical removal tends to not produce statistically significant results on wildlife behavior, though pinyon-juniper dependent bird species are negatively impacted by removal of these species. Grassland dependent birds can benefit from removal of these trees, particularly in the longer term. • Most often, mechanical treatments cause no significant change to soil stability, but they can destroy soil crusts and/or increase non-native species invasions, which could lead to soil loss. • Treatments do not tend to increase water yield at a watershed scale. • “The increase in exotic annuals that has been reported from many studies may be a primary threat to persistence of ecosystems. The alarming possibility that treatments may facilitate continued expansion of these populations and degrade native communities calls for further scrutiny.”	prescribed fire in pinyon-juniper woodlands. The intent of prescribed fire treatments is not to decrease fire occurrence but to reduce the intensity of fire effects. In terms of soil crust in the area, field reconnaissance indicates that the most common types of soil crust are mosses in the rugose category, not the more fragile and well developed pinnacled or rolling types (see Section 3.9.1 subsection Biological Soil Crust). Should areas of soil crust be found (in excess of 30 percent cover), treatments would be avoided. See the soils design features subsection to Section 2.2.1 of the EA. In terms of water yield, the project is not intended to increase water yield, rather, the project is being proposed to improve vegetation conditions as described in the purpose and need in Section 1.2.
EPA	21	Proposed Action - Birds	The Draft EA states that surveys for migratory birds “would occur prior to treatment if occurring during nesting season and identified nest sites would be protected during treatment by a no-treatment” (p. 69). It is unclear if the surveys would account for other evidence of nesting observed, including mating pairs, territorial	The surveys would account for other evidence of nesting. See Section 2.2.1 subsection Design Features subsection Wildlife for clarification.

Commenter	Comment Number	Category	Comment	Response
			defense, carrying nesting material, transporting of food, etc. The EPA recommends committing to area avoidance for all disturbance activities if active nests are located and other evidence of nesting is observed.	
Sierra Club et al	22	Proposed Action - BSC	To remediate the lack of information on the impact of herbicide treatments to soil crusts, if it is determined that herbicides must be used, more research should be conducted in small study plots in the project area before it is applied on a larger scale.	See second paragraph in response to comment #20. See 40 Most Asked Questions Concerning the CEQ's National Environmental Policy Act (energy.gov)
Sierra Club et al	23	Proposed Action - BSC	- The agencies should not conduct soil surface disturbing projects in habitats of rare biological soil crust species, where biological soil crust diversity is high, or where removal of biological soil crust will degrade soil, hydrology, or biology ecosystem functions. The following management prescriptions for biocrust (Belnap et al. 2001) and newer techniques should be adopted. - Areas where biological soil crust is abundant within the Project Area should be located, mapped, and avoided. Biological soil crust in areas scheduled for treatment should be salvaged for use in posttreatment seeding (Belnap 1993). - Include a biological crust component in plant monitoring and inventory projects.	See second paragraph in response to comment #20. In addition, information regarding which biological soil crust species is rare is extremely limited worldwide. See 40 Most Asked Questions Concerning the CEQ's National Environmental Policy Act (energy.gov) regarding limited information circumstances in NEPA analysis. The disturbance associated with salvage of an entire treatment area would be much higher than the few tracks created by heavy equipment.
AZGFD AZSFWC	24	Proposed Action - Design	We further recommend that implementation focus on the smallest prescribed burn only units first for monitoring and adaptive management. By focusing and adapting treatments on the smallest units first, there will be better refinement of	Design features, to mitigate invasive non-native plant spread, are described in the Adaptive Management and Monitoring Section of 2.2.1 of the EA. Specifically, prescribed fire treatments in pinyon-juniper woodlands are being treated in

Commenter	Comment Number	Category	Comment	Response
			desired implementation results that can be used to calibrate treatments on the larger prescribed fire only units. AZSFWC recommends that initial units in pinyon-juniper be representative of variation within that type to the extent possible, and on the smaller side of those available for prescribed fire treatment.	small areas. These treatment plots would be monitored before and after treatment to determine the viability of future work using prescribed fire in pinyon-juniper woodlands.
AZGFD	25	Proposed Action - Design Feature	Department staff have verified the referenced mule deer rifle hunting season takes place over 10 days as opposed to the nine days referenced in the EA. The Department requests that this reference be corrected to 10 days to accurately capture the length of mule deer rifle season that will not overlap with active vegetation treatments.	This design feature was updated from 9 days to 10 days for accuracy in the EA.
Sierra Club et al	26	Proposed Action - Drought	Multiple studies have found that large and mature pinyons are more drought susceptible than smaller pinyons (Mueller et al. 2005; Huffman et al. 2008)...	Based on recent field observations, young pinyon and juniper seedlings and saplings appear to be negatively responding to drought at a more visible rate than mature trees.
Sierra Club et al	27	Proposed Action - Goshawk	We agree that such restrictions are commonplace for goshawk habitat management, but no specific restrictions for goshawks are mentioned in the EA. Any subsequent NEPA document should clarify that no treatment activity in goshawk habitat (ponderosa pine forest) can proceed during the breeding season unless non-breeding is confirmed by a wildlife biologist.	See Section 2.2.1 subsection Design Features subsection Wildlife.

Commenter	Comment Number	Category	Comment	Response
AZGFD EPA	28	Proposed Action - Herbicide	There are two points the Department would like to gain further clarity regarding this topic. First, the extent of cheatgrass within the project footprint is not outlined in any of the accompanying maps within the EA. The EA states that herbicide usage will predominantly occur in treatment units 29 and 41 but suggests that other areas within the project footprint where cheatgrass comprises an area above 10%, may receive herbicide application. Without knowing the extent of cheatgrass expansion within the project area, it is difficult to extrapolate the amount of herbicide usage and adaptive management requirements that may be necessary. The Department requests the Monument include a map delineating the acreage coverage of cheatgrass within the project footprint that can assist stakeholders in getting an accurate picture of how many acres may actually be treated. We recognize that surveying cheatgrass across the entire project area may be difficult, however, the use of remote sensing techniques may be helpful in gaining clarity to the cheatgrass acreage. Specifically, the Department recommends using satellite imagery such as Landsat to calculate the Normalized Difference Vegetation Index (NDVI) during cheatgrass “green up” periods. The Draft EA states that chemical treatments are proposed for up to 140 acres on Units 29 and 41 (p. 6, 11) and that “other areas within the manual, mechanical, seeding, and prescribed fire treatment units may also be treated for invasive non-native plants as part of the other treatments” (p. 6). Table	See Figure B.13 in Appendix B for a map of treatment units where cheatgrass was measured during the 2020 survey at over 10 percent cover and/or known invasive non-native plant locations. Canopy cover in the treatment units makes accurate mapping of cheatgrass difficult using current technology. Units 29 and 41 are the only units that appear, at this time, to need other than spot treatments with herbicide. However, units would be surveyed prior to treatment implementation to determine unit-specific herbicide application needs.

Commenter	Comment Number	Category	Comment	Response
			2.1 indicates that these other areas comprise 22,821 acres across 25 units (p. 10-13); however, it is unclear how many acres of these units may receive chemical treatments. The EPA recommends providing an estimated treatment acreage for each of the 25 units in the Final EA.	
AZGFD AZSFWC	29	Proposed Action - Herbicide	Second, with the duration of this project being unclear, the Department recommends the Monument be adaptive in the availability of different herbicides for future treatments. Currently, the programmatic EIS for herbicide usage referenced in the EA does a good job in covering many of the herbicide needs for invasive species control for this project. New herbicides are always becoming available to treat invasive weeds. When the best available science dictates, the Department requests that future herbicides not included in this EIS be considered for application on this project; especially if the duration of this project has a long time horizon that makes it likely that new herbicides/science will lend itself to more effective treatments. In the final EA, it would be helpful to indicate if there is a mechanism by which new herbicide products that are not included in the cited 2007 EIS could [be] used in the future.	See Section 2.2.1 subsection Chemical Treatment for clarification.
EPA	30	Proposed Action - Herbicide	In the Final EA, we encourage including the Programmatic EIS Record of Decision from 2016 (1) which additionally approves aminopyralid, fluroxypyr, and rimsulfuron for use on public lands, if applicable.	See Section 2.2.1 subsection Chemical Treatment and References for addition and amended link in References for the 2007 document.

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			(1) Bureau of Land Management. December 2016. BLM National NEPA Register: Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Lands in 17 Western States PEIS. Available at https://eplanning.blm.gov/eplanning-ui/project/70301/570 .	
Sierra Club et al	31	Proposed Action - Herbicide	The EA states that “Herbicide treatment would be incorporated into any treatment unit planning where cheatgrass or red brome (<i>Bromus tectorum</i> or <i>rubens</i>) exceeds 10 percent cover.” Please justify this apparently arbitrary benchmark in the final EA.	Based on local field observations over several years by vegetation specialists on the Monument, cheatgrass and red brome appear to either occur in fairly stable populations of 5-10 percent cover or be the dominant understory species. In areas above 10 percent cover, large-scale disturbance of any type tends to result in <i>Bromus</i> spp. dominance of the understory component of the ecosystem.
Sierra Club et al	32	Proposed Action - Herbicide	Any subsequent NEPA document should disclose the types of herbicides to be used, and the types and abundance of non-target vegetative species present in each of the proposed treatment areas and the degree to which they will be reduced by the proposed herbicide applications.	See Section 2.2.1 subsection Chemical Treatment for documents and procedures to determine appropriate herbicides for this project. Herbicides used will vary based on approved herbicides, target invasive non-native plants, season of use, and other treatments paired with herbicide treatment.
Sierra Club et al	10	Proposed Action - Monitoring	...Clear standards for vegetation recovery will be essential because the agencies will have overwhelming pressure from some permittees to let livestock back on after the end of the two-year period, regardless of the stage of recovery, unless specific, measurable parameters are established to define recovery. - To avoid damaging the treatment by allowing livestock use too early, the agencies should	See Section 2.2.1 subsections Adaptive Management and Design Features, Chapter 3, and Appendices D through G for objectives.

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			stipulate clear objectives measures for forbs, perennial grass, and biological soil crust cover, as well as indicators of soil erosion such as percent cover of bare ground, that must be met before resumption of grazing.	
AZSFWC Sierra Club et al	33	Proposed Action - Pinyon Jay	AZSFWC recommends that the final EA incorporate the most current information and recommendations for this species, as outlined in the Partners in Flight "Conservation Strategy for the Pinyon Jay (<i>Gymnorhinus cyanocephalus</i>)" which can be found at: https://partnersinflight.org/resources/conservation-strategy-for-pinyon-jay/ As guidance to prevent loss of pinyon jay colonies, the EA states on page 21, "Surveys for pinyon jays would be necessary prior to treatment if occurring during nesting season (February 1 to July 31). Identified nest sites would be protected during treatment by a no-treatment buffer of 200 meters (650 feet.) (Reynolds 1992)."....However, more recent scientific sources suggest strongly that the 200 meters buffer is inadequate. For example, Johnson et al. (2017, 2018) and Somershoe et al. (2020) recommend 500-meter buffers around colony sites to allow for future shifting of the colony to suitable nearby habitat. The Great Basin Bird Observatory, in its "Recommendations for Avoiding Impacts to Pinyon Jay Colonies in Nevada" recommends a 1,200-meter buffer free of vegetation treatment (cite).	See Section 2.2.1 subsection Design Features subsection Wildlife for an updated buffer size to 500 meters to reflect updated scientific information.

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Sierra Club et al	34	Proposed Action - Pinyon Jay	Another concern raised in our scoping comments and not addressed in the EA, is that not only should existing colonies be protected by buffers, but so should recently active but currently abandoned sites. Researchers have recommended that colony sites inactive during the previous ten years also be protected because jays may return to previous colony sites as resource conditions change (Marzluff and Balda 1992, Johnson et al. 2018).	Information regarding past pinyon jay colony sites was not available. Design features (Section 2.2.1 subsection Design Features subsection Wildlife) were included to account for this lack of information. See 40 Most Asked Questions Concerning the CEQ's National Environmental Policy Act (energy.gov) regarding limited information circumstances in NEPA analysis.
Sierra Club et al	35	Proposed Action – Pinyon Juniper areas	The Monument Management Plan (DFC-VM-29) states that “Individual old growth trees will be present and will be protected during treatment implementation” but we are concerned that the EA fails to define the age for old growth pinyon and juniper trees, and the prescribed diameter limits are not adequate to ensure old trees are protected. In this regard the EA does not provide the guidelines needed to ensure that old growth woodland structure and individual old trees are retained for their biodiversity, habitat, fire-resistance, and cultural values.	The proposed diameter limits apply in areas where treatment would occur within a treatment unit. No trees, regardless of diameter or age, would be treated in 25 percent of the unit.
Sierra Club et al	36	Proposed Action – Ponderosa areas	Therefore, any tree that is approximately 150 years or older should be retained. Forest restoration practitioners in Arizona generally agree that 150 years is the threshold of an old tree, and many NEPA projects on US Forest Service lands include protections for trees over 150 years old. Because it is difficult and time consuming to age trees during treatment design, any tree that exhibits morphological characteristics of advanced age (yellow/red bark, large diameter,	Agreed, older ponderosa trees would be retained with these characteristics. See Section 2.2.1 subsection Prescribed Fire for clarification. Ponderosa pine trees expected to be removed would be during pre-treatment of the areas expected to be burned and would be limited to thick small stem ponderosa pine (>1 tree/ft ²) and hazard trees.

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			deeply furrowed bark, large bark pates (sic), broad flattened crown, drooping branches, cat-face fire scars, and other features) should be retained regardless of diameter. We ask that any subsequent NEPA document clearly state that “old trees (>150 years) will be retained” and that “old trees (>150 years) will not be cut.” In addition, the EA should be clear that no large trees will be cut. Large trees are generally those 16” dbh and larger.	
AZSFWC Sierra Club et al	37	Proposed Action – Ponderosa areas	We request that the final EA include language indicating that large, old ponderosa pine trees (which are particularly important to wildlife and greatly valued by monument visitors) will not be removed during manual treatments. Our second concern with ponderosa pine forest treatments is that the EA is not totally clear on what treatments are proposed. In the section under the heading “Treatment Unit Specific Planning,” the EA’s only statement specifying what trees will be cut is this, at page 9: “Trees targeted for removal would be smaller diameter junipers (up to 20-inch diameter at root crown (DRC)) and pinyon trees (up to 10 inches diameter at breast height (DBH)). Larger diameter trees would be left in place (junipers over 20-inch DRC and pinyon trees over 10 inches DBH) in the entire treatment unit.” This statement makes it seem like the only trees to be cut following this decision will be junipers and pinyons, and not ponderosa pine. Further, reviewing Table 2.1 seems to indicate that	Ponderosa pine treatments are prescribed fire treatments. Pre-treatment of the areas expected to be burned include thinning of ladder fuels to minimize the possibility of crown fire, vegetation clearing around mature ponderosa pine trees, and pretreatment to protect large snags and habitat trees. Thinning can be defined as removal of pinyon pine, juniper, and thick small stem ponderosa pine (>1 tree/ft²). During thinning treatment duff and heavy dead and down maybe be removed from boles of trees to reduce fire intensity (Appendix H). Note that in Appendix H the use of the term “mechanical” is in reference to power tools, not mastication, as the description of the alternative in the MRDG is in relation to wilderness character, comparing powered and unpowered tools and actions. The statement on Page 37 of the EA (“The thinning of the canopy, both by mechanical and prescribed fire...”) applies as appropriate to ponderosa pine woodlands and pinyon-juniper woodlands and savanna. Mechanical or

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			prescribed fire is the only proposed treatment for ponderosa pine. We ask that any subsequent NEPA document clearly describe the proposed ponderosa pine treatments; if they are fire-only or include tree cutting; what trees (species, size, age, canopy position, etc.) are targeted for cutting and if they are to be removed as wood products; what equipment would be used for ponderosa pine treatments; and what restrictions apply (old and large tree retention guidelines, diameter caps, for example). However, elsewhere the EA states that small diameter ladder fuel thinning may be coupled with prescribed fire. For example, at page 23 the EA states: “In the ponderosa pine woodlands project area, using only prescribed fire, if preceded by thinning or ladder fuel reduction is recommended.” This suggests that maybe there is thinning in ponderosa pine? Then, on page 44-45, the EA states: “In ponderosa pine woodlands, ladder fuel reductions would precede prescribed fire.” This certainly implies that only small diameter thinning would occur. But then the EA sows confusion. At page 37, the EA states that “The thinning of the canopy, both by mechanical and prescribed fire, would create a more open stand that will not support crown fire, even if the fire could climb from the surface into isolated trees throughout the stand post-treatment.” This statement mentions mechanical thinning of canopy, which clearly implies much more intensive operations than hand thinning of small	prescribed fire treatments are proposed in different pinyon-juniper woodland and savanna treatment units within the project area. Prescribed fire treatments are proposed in ponderosa pine woodland. Timber harvest on the Monument is restricted by the Proclamation (2000) - “Sale of vegetative material is permitted only if part of an authorized science-based ecological restoration project”. There is no commercial logging of any trees proposed in this EA.

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			diameter ladder fuels. This section in fact implies that there would be commercial logging in the ponderosa pine, which seems to contradict the statement on page 9 that the only trees targeted for removal are pinyons and pines.	
Sierra Club et al	38	Proposed Action – Ponderosa areas	Our confusion should not come as a surprise, as we said this in our scoping comments: “Mechanical treatments are not proposed for ponderosa pine (Project Summary at 3) but the Project Summary goes on to say, “Prescribed fire typically would follow a mechanical or manual treatment to prepare the site for favorable treatment outcomes or may take place with limited pre-treatment site preparation.” (Project Summary at 5) This is confusing and should be clarified. (Table J.4).”	The project summary provided during public scoping was a preliminary proposed action summary. Since public scoping, the proposed action was refined and clarified.
Sierra Club et al	39	Proposed Action – Ponderosa areas	Plan component DFC-VM-11, which states “There will be no net loss of total acres within the ponderosa pine plant communities (i.e., long-term or permanent removal from the landscape).” This DFC is not listed as a plan component that the project is in accordance with. This suggests to us that the proposed fire treatments may result in a net loss of ponderosa pine.	Note Section 1.4 Conformance with Land Use Plans. The alternatives are required to be in conformance with all decisions in the GMP/RMP. Omission of a DFC or Management Action from Appendix A does not imply it will not be adhered to.
EPA	40	Proposed Action - Seeding	The EPA appreciate that “[s]eed mixes would primarily be composed of native species” (p. 8). We further recommend obtaining seeds from local sources, to the extent practicable, to reflect the evolutionary and adaptive capability of plants in the area. (2) (2) Plant Conservation Alliance. 2014. National Seed Strategy for Rehabilitation and Restoration	Agreed. The BLM seed warehouse generally works with BLM and NPS offices/contractors throughout the west to collect native seeds and make them available to then reseed BLM and NPS lands. GCPNM does not have a seed collecting program specific to this Monument so the next best option is to use what is available through the BLM seed warehouse.

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			2015-2020. Available at https://www.blm.gov/sites/blm.gov/files/program_natural%20resources_seed%20strategy_quick%20link_seed%20stregy.pdf .	
Sierra Club et al	41	Proposed Action - Seeding	The EA states (at p. 8) that “Seed mixes would primarily be composed of native species, although non-native species may be used per NPS and BLM policy (Appendix A).” As we expressed in scoping, this project must use only native seed, or risks violating agency direction and the use of the best available science.	See Appendix A MA-VM-04 for further guidance as to seed mix policy.
Sierra Club et al	42	Proposed Action - Snag	This quoted statement also suggests large snags will be retained but the size of “large” is never actually proposed anywhere. The EA (at p. 21) says: “Existing snags would be retained within the project area. Criteria for retention would be larger juniper, pinyon or ponderosa snags, particularly any with existing cavities suitable for nesting (NRCS 2013), and those not presenting a hazard to personnel in the treatment area.” But what is “larger” defined as? Is it just 24” diameter and up?	See Section 2.2.1 subsection Design Features subsection Wildlife for clarification. Existing snags would be kept except in the rare circumstances where they pose a hazard to personnel or in areas with dense snags in a similar state of decay and where mastication is the preferred treatment. In the latter case, snags that would not be partially masticated are larger juniper, pinyon or ponderosa snags, particularly any with existing cavities suitable for nesting. According to the cited NRCS (2013) resource, large snags are defined as 21 inches or greater DBH.
AZGFD AZSFWC Sierra Club et al	43	Proposed Action - Timeline	However, the EA is still ambiguous as to the duration of this project. For example, the EA does not stipulate how long the NEPA analysis will cover various implementation activities. The Department requests that the Monument state the expected duration that this EA and the other supporting NEPA documents would be valid, to	See Section 2.2.1 subsection Proposed Treatment Locations for clarification.

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			facilitate funding and other implementation planning logistics for this project. We note that it would be helpful for the final EA to indicate the expected duration of the project. The EA is not clear on the timeframe for implementation, suggesting that this decision would be implemented over a minimum of 30 years. Any subsequent NEPA document should narrow the project implementation timeframe to fifteen years, as that is a reasonable period to be able to evaluate the environmental effects of the proposed treatments. Only seven of the treatment areas described in Table H.1 have proposed treatments past the fifteen-year date, so there does not appear to be a real need to provide such broad discretion in such a long duration for the entire project area. In fifteen years, the landscape is likely to have changed dramatically as a result of long-term climate changes and the current acute megadrought and the proposed treatments. A new NEPA analysis and evaluation of site-specific conditions must happen at that time....By reducing the timeframe to 15 years, it is much more likely to stay within the bounds of the current management plan.	
Sierra Club et al	44	Proposed Action - Trees	The EA sows some confusion as to the details of the proposed treatments and whether the treatments would preserve old and large trees. Any subsequent NEPA document must ensure that the Shivwits Project conforms to the Monument Management Plan objective “to	See comment responses to #35, 36 and 37.

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			remove brush and small diameter trees while maintaining, or contributing to the restoration of, the structure and composition of old-growth forest stands.”	
Sierra Club et al	45	Proposed Action - Trees	Any subsequent NEPA document must provide data to support the diameter limits proposed.	Experience has shown that leaving smaller trees does not meet the purpose and need for providing heterogeneous mule deer and sagebrush-dwelling bird habitat (see Section 2.2.1 subsection Treatment Unit Specific Planning). The purpose and need for this project considered multiple resource issues. See also comment response #35.
AZSFWC	46	Proposed Action - Unit Design	If circumstances permit, we encourage GPCNM (sic) to include some treatment units with a larger proportion of untreated woodland (e.g., 50%) and include them in post-treatment monitoring. We also note and appreciate that the EA includes cutting criteria for pinyon and juniper that should effectively retain old growth trees.	Per individual treatment unit planning, some units may have larger proportions of untreated areas. Wildlife presence, cultural resources, topography, higher proportions of large diameter trees, and target vegetation distribution within the unit may result in less than 75% of a unit being treated, consistent with design features in Bender (2012). See Appendix C Figure C.8 for a potential treatment design.
Sierra Club et al	47	Proposed Action - Vegetation	Because the EA does not clearly describe treatments in ponderosa pine habitats, we are concerned that reducing canopy cover, eliminating old and large trees, and increasing stand openness and the proportion of small/young trees will harm northern goshawk in the project area by eliminating preferred habitat features and reducing nest productivity.	See comment response #36.

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Sierra Club et al	48	Proposed Action - Vegetation	The EA fails to determine if the project conforms to Management Plan component MA-VM-18, which states that “[u]p to 13,800 BLM acres and 7,000 NPS acres of Ponderosa Pine Ecological Zone will be treated over the life of this Approved Plan (approx. 75% of available habitat).” Extensive treatments have already occurred around Mount Trumbull. Table H.1 in the EA also lists areas in the project area which have been treated. Nowhere, however, confirms that the maximum acreage given in the Monuments (sic) Management Plan have or have not been met.	Using available GIS data, approximately 2,335 acres of BLM managed lands and no acres on NPS managed lands on areas defined as Ponderosa Pine in the GMP/RMP (2008) have been treated to date. This project proposes treatment units composed of approximately 0 acres of NPS managed lands and 1,585 acres of BLM managed lands defined as Ponderosa Pine in the GMP/RMP (2008). The treatment unit acreage includes areas modern mapping has defined as a different vegetation type than mapping available in 2008 and areas that would not be treated per the individual treatment unit design planning in Section 2.2.1. Note modern mapping reveals ponderosa pine woodlands in areas mapped in 2008 as Pinyon-Juniper.
Sierra Club et al	49	Proposed Action - Vegetation	The EA fails to determine if the project conforms to Management Plan component MA-VM-21 which states that “[u]p to 25,000 BLM acres of sagebrush habitat can be treated over the life of this Approved Plan (approx. 15% of available habitat).” The EA does not evaluate if the proposed treatments are within the bounds of the Plan, meaning we cannot know if the project is within the bounds of the Plan.	Using available GIS data, approximately 210 acres of areas defined as Sagebrush in the GMP/RMP (2008) have been treated to date. This project proposes treatment units composed of approximately 19,900 acres of lands defined as Sagebrush in the GMP/RMP (2008). The treatment unit acreage includes areas modern mapping has defined as a different vegetation type than mapping available in 2008 and areas that would not be treated per the individual treatment unit design planning in Section 2.2.1.

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Sierra Club et al	50	Proposed Action - Vegetation	The EA fails to determine if the project conforms to Management Plan component MA-VM-24 that “Up to 102,000 BLM acres and 34,000 NPS acres of pinyon-juniper habitat can be treated over the life of this Approved Plan (approx. 50% of available habitat).”	Using available GIS data, approximately 18,100 acres of BLM managed lands and no acres on NPS managed lands on areas defined as Pinyon-Juniper in the GMP/RMP (2008) have been treated to date. This project proposes treatment unit composed of approximately 21,800 acres of NPS managed lands and 56,700 acres of BLM managed lands defined as Pinyon-Juniper in the GMP/RMP (2008). The treatment unit acreage includes areas modern mapping has defined as a different vegetation type than mapping available in 2008 and areas that would not be treated per the individual treatment unit design planning in Section 2.2.1.
Sierra Club et al	51	Proposed Action - Vegetation	... the Management Plan at MA-VM-34 states that “Up to 1,500 BLM acres of Interior Chaparral Ecological Zone will be treated over the life of this Approved Plan (approx. 15% of available habitat),” but the EA does not address the overall tally of treatment across the Monument during the life of the Plan.	Using available GIS data, no areas defined as Interior Chaparral in the GMP/RMP (2008) have been treated, nor are they proposed to be treated in this project. The treatment unit acreage includes areas modern mapping has defined as a different vegetation type than mapping available in 2008 and areas that would not be treated per the individual treatment unit design planning in Section 2.2.1.
Sierra Club et al	52	Proposed Action - Wildlife	The EA fails to assure that the project conforms to most Desired Future Conditions for wildlife, only identifying one out of 12 DFC’s. (sic)	Appendix A lists more decisions with regard to Wildlife and Fish. This list includes DFCs and Management Actions. The most applicable decisions have been listed in the EA and Appendix A. It is also listed in the EA that the project is in conformance with the plan (see Section 1.4 Conformance with Land Use Plans).

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Sierra Club et al	53	Proposed Action- Herbicide	Adoption of any herbicide use as contemplated in the EA triggers the need for Section 7 consultation for the unique threatened and endangered plants and animals that cling to existence across the vast project area.	The only known ESA Threatened and Endangered species in the project area is California condor. The use of herbicide does not in itself trigger Section 7 consultation.
Sierra Club et al	54	Proposed Action- Herbicide	We strongly object to the aerial application of herbicides...	Aerial application was removed from the Proposed Action as no need for this method was identified during alternative development.
Sierra Club et al	18	Purpose and Need - Herbicide	...the BLM/NPS must establish a purpose or need for the herbicide spraying proposals. A proposal to use herbicides when there isn't even an established problem necessitating their use would be arbitrary, capricious, and contrary to the law.	Herbicide use is within the scope of the purpose and need for the project. Section 1.2 of the EA describes the purpose and need of moving vegetation toward a more natural range of composition, structure, and function. Invasive plant/noxious weed control measures are proposed in Section 2.2.1 to work toward meeting the purpose and need. The EA also references existing herbicide use procedures that were analyzed and disclosed to the public in the Arizona Strip District Herbicide Application Plan for the Control and Eradication of Noxious and Invasive Species (DOI-BLM-AZ-A000-2016-001-EA), and the Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Lands in 17 Western States (PEIS DOI-BLM-WO-WO2100-2012-0002-EIS).