Uinkaret Mountains
Landscape Restoration Project

Environmental Assessment

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List of Acronyms

ADEQ	Arizona Department of Environmental Quality
AGFD	Arizona Game and Fish Department
AMP	Allotment management plan
AUM	Animal use month
BLM	Bureau of Land Management
CA	Cooperating Agency
CFR	Code of Federal Regulations
DBH	Diameter at breast height
DFC	Desired future condition
DPC	Desired plant community
DR	Decision Record
DRC	Diameter at root crown
EA	Environmental assessment
EIS	Environmental impact statement
EPA	Environmental Protection Agency
FLPMA	Federal Land Policy and Management Act
FONSI	Finding of No Significant Impact
FMP	Fire management plan
FRCC	Fire Regime Condition Class
GHG	Greenhouse gas
GPS	Global Positioning System
KOP	Key observation point
MIST	Minimum impact suppression techniques
MOU	Memorandum of Understanding
MRDG	Minimum Requirements Decision Guide
NAAQS	National Ambient Air Quality Standards
NAU	Northern Arizona University
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NOT	Notice of Termination
NPCP	Notice of Public Comment Period
NPS	National Park Service

NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OHV	Off-highway vehicle
RAWS	Remote automatic weather station
RMP	Resource management plan
UMLRP	Uinkaret Mountains Landscape Restoration Project
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VRM	Visual Resource Management

Chapter 1. Purpose and Need for Action

1.1 Introduction

The Uinkaret Mountains Landscape Restoration Project (UMLRP) area is approximately 60 miles southwest of Fredonia, Arizona, and 35 miles southeast of St. George, Utah. The project area consists of approximately 128,500 acres of public land in the Uinkaret Mountains (including Mount Trumbull and Mount Logan) of Mohave County, Arizona (Figure 1-1). Approximately 81 percent of the area is within Grand Canyon-Parashant National Monument and about 19 percent is within the Arizona Strip Field Office. The project area is comprised primarily of pinyon-juniper woodland, sagebrush, and ponderosa pine vegetation communities. The Bureau of Land Management (BLM) has identified the need to restore vegetation in this area, at a landscape scale, to improve biodiversity, ecosystem function, and fire resiliency.

Portions of the project area are at increased risk of high-intensity wildland fire, lack species diversity and desired wildlife habitat conditions, and have accelerated rates of soil erosion. This project is designed to address the above concerns and implement direction contained in the Grand Canyon-Parashant National Monument and Arizona Strip Field Office Resource Management Plans (RMPs), both approved on January 29, 2008 (BLM 2008a and BLM 2008b).

The BLM is proposing to address resource needs in the project area using an adaptive management approach and a combination of treatment methods that include mechanical, chemical, 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 and desired outcomes for the specific treatment area.

This EA has been prepared to disclose and analyze the environmental consequences of the proposed vegetation and soil erosion control treatments within the UMLRP area. This analysis provides information as required by the BLM implementing regulations for the National Environmental Policy Act (NEPA) and the Federal Land Policy Management Act (FLPMA) to determine whether to authorize these treatments. This EA also serves as a tool to help the authorized officer make an informed decision that is in conformance with the Grand Canyon-Parashant National Monument Resource Management Plan (RMP) (BLM 2008a) and the Arizona Strip Field Office RMP (BLM 2008b). The EA is a site-specific analysis of potential impacts that could result with the implementation of a proposed action or alternatives to the proposed action. The EA assists the BLM in project planning and ensuring compliance with the NEPA, and in making a determination as to whether any "significant" impacts could result from the analyzed actions. "Significance" is defined by NEPA and is found in the Code of Federal Regulations (CFR) at 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an environmental impact statement (EIS) or a statement of "Finding of No Significant Impact" (FONSI). If the decision maker determines that this project has "significant" impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a decision record (DR) in accordance with 43 CFR 4160 may be signed for the EA approving the selected alternative. A DR, including a FONSI statement, documents the reasons why implementation of the selected alternative would not result in "significant" environmental impacts (effects) beyond those already addressed in the Grand Canyon-Parashant National Monument and Arizona Strip Field Office RMPs (BLM 2008a and BLM 2008b).

1.2 Background

As discussed in more detail in the next section, the BLM used results of land health evaluations in the project area, RMP direction, site visits and district staff information on current conditions in the project area, along with input from the public, other agencies, and interested groups to develop and design this project.

The earliest land use in the project area by western European settlers included grazing by domestic livestock and logging of the ponderosa pine forest. Management activities within the project area have not always been consistent with stable ecological function. Past management practices, such as logging, grazing, fire suppression and off-highway vehicle (OHV) activity, have affected vegetation, altering species composition and density and facilitated noxious weed invasion.

Historically (pre-European settlement), the natural fire regime in grasslands, woodlands and ponderosa pine forests involved frequent, generally low intensity fires that helped to maintain the ecological diversity of these vegetation communities. Disruption of the natural fire regime with over 100 years of fire suppression has contributed to the degradation of the ecosystems within the project area (e.g., grasslands are being outcompeted by shrubs, understories of pinyon-juniper woodlands and mature juniper woodlands are species-poor, ponderosa pine forests are unnaturally dense). In addition, fire suppression kept most fires small, resulting in accumulated fuels and exacerbating the overstocking of the ponderosa pine stands.

Since 1996, the Mount Trumbull Ecological Restoration Project, a cooperative effort centered on restoring the southwestern ponderosa pine ecosystem, has successfully treated approximately 3,000 acres within the project area. Treatments were designed using a scientific protocol developed by the Ecological Restoration Institute at Northern Arizona University (NAU) and implemented by the BLM. Scientists have conducted monitoring to determine treatment effectiveness at recreating ponderosa pine forests of estimated pre-European settlement structure, and have measured effects of those treatments on associated plant and animal species.

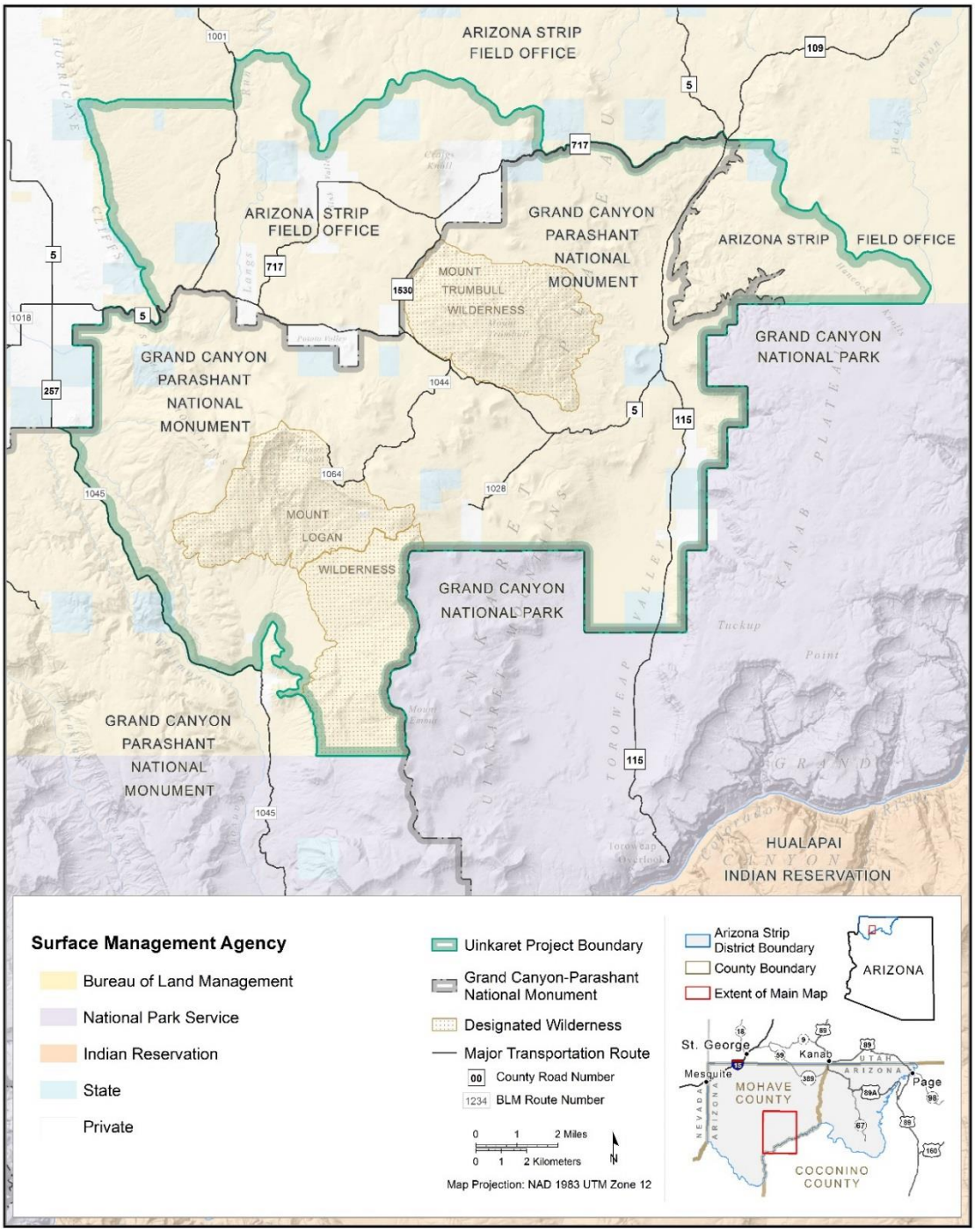


Figure 1-1. Project Vicinity Map

1.3 Purpose and Need

1.3.1 Purpose of the Action

Using information from land health evaluations and field studies conducted across the UMLRP, the BLM determined that vegetation across much of the project area is not meeting desired conditions. Based on this information, the BLM identified several purposes for the UMLRP including:

- Improving woodland, rangeland, and forest health and functionality.
- Managing pinyon-juniper woodlands, ponderosa pine forests, and sagebrush vegetation communities that provide sufficient plant cover and litter accumulation to protect soils from accelerated rates of wind and water erosion, and to enhance soil nutrient cycling and productivity.
- Continuing to move vegetation communities toward more natural ranges of composition, structure, and function.
- Managing and enhancing wildlife habitat to provide the necessary forage and cover for healthy self-sustaining wildlife populations.
- Protecting life, property, and infrastructure, and protecting wildlife habitat from deleterious wildfire effects.
- Continuing to restore wildfire as an integral part of the ecosystem, particularly in the ponderosa pine forest.
- Improving plant community resilience to, or capacity to recover from, wildland fire, drought and other disturbances due to reducing stand densities and ladder fuels.

These purposes help to meet objectives in the Grand Canyon-Parashant National Monument RMP (BLM 2008a) and Arizona Strip Field Office RMP (BLM 2008b). Management of the monument must be done in a manner that ensures the long-term protection of a wide variety of biological objects and a long rich human history. Treatment purposes would be met by implementing land restoration treatments in areas where resource management goals are not being met, and the likelihood of treatments improving resource conditions is great. These treatments would provide a foundation for developing a coordinated management strategy with partner agencies, stakeholders, American Indian tribes, and the public across the landscape within the project area.

1.3.2 Need for the Action

Existing conditions in portions of the project area – resulting from the effects of past land uses, changes to the natural fire regime, establishment and spread of invasive and noxious weed species, and expansion and increased density of pinyon-juniper woodlands and sagebrush communities – threaten biodiversity. Collectively, these conditions have caused substantial changes in the native vegetation communities and loss of important ecosystem components, and some of the project area resources (including monument objects) are now at risk. Alteration of land cover types and past use and management practices have contributed to erosion problems exhibited by sheet flow, rill, and gully features. The project area is an important use area for wildlife (including BLM sensitive species and Arizona Game and Fish Department (AGFD) Species of Greatest Conservation Need). Based on these factors, the BLM has determined that there is a need to improve land health in some areas, and to provide sustainable habitat for wildlife.

1.4 Grand Canyon-Parashant National Monument

Proposed actions within the national monument portion of the project area are designed to also ensure the long-term protection of a wide variety of biological objects and a long rich human history, as guided by Presidential Proclamation 7265 (BLM 2008a). This presidential proclamation explains that Grand Canyon-Parashant National Monument was created because of its "vast, biologically diverse, impressive landscape encompassing an array of scientific and historic objects." The analysis of impacts to specific resources constitutes the analysis of impacts to monument objects in this EA.

1.5 Conformance with Land Use Plans

The project area lies within lands managed under the Grand Canyon-Parashant National Monument RMP (BLM 2008a) and Arizona Strip Field Office RMP (BLM 2008b). The alternatives conform to decisions contained within these plans. Specifically, the alternatives are in conformance with the following decisions.

Grand Canyon-Parashant National Monument RMP

The following decision is from Table 2.1 in the RMP regarding Air Management:

- **MA-WS-01:** Impacts to air quality will be prevented or reduced through the application of specific mitigation measures identified in activity-level planning and NEPA review.

The following decisions are from Table 2.1 in the RMP regarding Soil Management:

- **DFC-WS-07**: Soils will exhibit infiltration, permeability, and erosion rates appropriate for the soil type, climate, and landform.
- **MA-WS-09 (which states in part):** The following watersheds will be priority for assessment, treatments and/or restrictions on use to reduce erosion: Upper Lang's Run…

The following decisions are from Table 2.3 in the RMP regarding Vegetation Management:

- **DFC-VM-01 (which states in part):** All BLM watersheds will meet, or will be progressing towards meeting, the Standards for Rangeland Health for BLM-administered lands.
- **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 enhance Monument values.
- **DFC-FM-06**: Fuel loads are [to be] maintained below levels that are considered to be hazardous.
- **DFC-VM-07:** Each vegetation community is maintained within its natural range of variation in plant composition, structure, and function.
- **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 reflect the language from the RMP.
  - To meet activity plan objectives
- **MA-VM-04 (which states in part):** Treatment methods and tools appropriate to the land use allocation and protection of Monument objects can be authorized to achieve DFCs [and] DPCs… 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 may 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.
- **DFC-WM-06 (which states in part):** BLM wilderness areas…will be managed to be ecologically sustainable and resilient to natural and human caused perturbations. (See Vegetation and Fire and Fuels Management decisions.)
- **DFC-VM-10:** Ponderosa pine vegetation communities will be resilient to natural or human-caused disturbances, and losing key wildlife habitat components to wildfire will be minimized.
- **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.
- **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.
- **MA-VM-18**: Up 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 percent of available habitat).
- **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.
- **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.
- **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-29:** Individual old-growth trees will be present and will be protected during treatment implementation.
- **MA-VM-23:** Treatment preferences will be to use a combination of wildland fire, fire use, prescribed fire, mechanical, and chemical methods.

The following decision is from Table 2.3 in the RMP regarding Fire and Fuels Management:

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

The following decisions are from Table 2.4 in the RMP regarding Wildlife and Fisheries:

- **DFC-WF-01:** Ecological conditions will be within the range of natural variability and will be functional for dependent animal species.
- **MA-WF-08:** Existing vegetation treatment projects that benefit wildlife can be maintained.

The following decisions are from Table 2.10 in the RMP regarding Wilderness Characteristics:

- **DFC-WC-02:** Areas where wilderness characteristics will be maintained will be ecologically sustainable and resilient to natural and human-caused disturbances.
- **MA-WC-03:** Restoration, vegetation treatments, wildlife management projects, and other surface disturbing actions may 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.

The following decision is from Table 2.16 in the RMP regarding Designated Wilderness:

- **DFC-WM-06 (which states in part):** BLM wilderness areas will be managed to be ecologically sustainable and resilient to natural and human-caused perturbations (see Vegetation Management and Fire Management decisions).

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

Arizona Strip Field Office RMP

The following decision is from Table 2.1 in the RMP regarding Air Management:

- **MA-WS-01:** Impacts to air quality will be prevented or reduced through the application of specific mitigation measures identified in activity level planning and NEPA review.

The following decisions are from Table 2.1 in the RMP regarding Soil Management:

- **DFC-WS-07:** Soils will exhibit infiltration, permeability, and erosion rates appropriate for the soil type, climate, and landform.
- **MA-WS-09 (which states in part):** The following [watershed] will be priority for assessment, treatments, and/or restrictions on use to reduce erosion, control flooding, and reduce salt contributions to the Colorado River: Upper Lang's Run.

The following decisions are from Table 2.3 in the RMP regarding Vegetation Management:

- **DFC-VM-01:** All watersheds will meet, or will be progressing towards meeting, the Standards for Rangeland Health.

- **DFC-VM-04:** 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.
- **DFC-VM-06:** Each vegetation community is maintained within its natural range of variation in plant composition, structure, and function, and fuel loads are maintained below levels that are considered to be hazardous.
- **DFC-VM-13:** 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.
- **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
    - To meet activity plan objectives
- **MA-VM-04:** Treatment methods and tools appropriate to the land use allocation will be authorized to achieve DFCs and DPCs. Treatment methods may 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 may be used to increase germination rates. Treatments will be designed so that they do not encourage an increase in any invasive species.
- **MA-VM-18 (which states in part):** 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.
- **MA-VM-19:** 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.
- **DFC-VM-23:** 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-25:** Individual old-growth trees will be present and will be protected during treatment implementation.
- **MA-VM-22:** Treatment preferences will be to use a combination of wildland fire, fire use, prescribed fire, mechanical, and chemical methods.

The following decision is from Table 2.3 in the RMP regarding Fire and Fuels Management:

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

The following decisions are from Table 2.4 in the RMP regarding Wildlife and Fisheries:

- **DFC-WF-01:** Ecological conditions will be within the range of natural variability and will be functional for dependent animal species.
- **MA-WF-08:** Existing vegetation treatment projects that benefit wildlife can be maintained.

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

1.6 Relationship to Statutes, Regulations, or Other Plans

Numerous federal laws, regulations, and policies guide BLM management activities on public lands, with the most prominent laws being listed in this section. FLPMA (43 United States Code [U.S.C.] 1707 et seq.), 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 BLM has prepared this EA for the UMLRP in compliance with NEPA and FLPMA.

The BLM is using a Coordinated NEPA/NHPA public participation process to assist the agency in satisfying the public involvement requirements under Section 106 of the National Historic Preservation Act (NHPA) (16 U.S.C. 470(f)) pursuant to 36 CFR 800.2(d)(3) and 36 CFR 800.8(a). The information about historic and cultural resources within the area potentially affected by the proposed Uinkaret Mountains Landscape Restoration Project will assist the BLM in identifying and evaluating impacts to such resources in the context of both NEPA and Section 106 of the NHPA.

The BLM is consulting with Indian tribes on a government-to-government basis in accordance with the NHPA, Executive Order 13175 and other policies.

The alternatives are 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.

The Arizona Strip Fire Management Plan (FMP) reflects and integrates fire management direction from the Grand Canyon-Parashant National Monument RMP (BLM 2008a), and the Arizona Strip Field Office RMP (BLM 2008b). Management direction allows for fire to be restored as an integral part of the ecosystem to meet resource management objectives on BLM-administered lands. The FMP identifies and directs fire strategies to provide for firefighter safety, the protection of human life, and the safeguarding of private property through suppression, reduction of hazardous fuels, and restoration of fire-damaged ecosystems. Fire and fuels management activities in the project area are described in the FMP, which is updated regularly. The plan also addresses values to be protected and public health issues, describes fuels and restoration projects, and is consistent with resource management objectives.

Executive Order 13186 requires the BLM and other federal agencies to work with the U.S. Fish and Wildlife Service (USFWS) to provide protection for migratory birds.

The project area is in Mohave County, Arizona. The alternatives are consistent with the Mohave County General Plan (originally adopted in 1995, and most recently revised in September 2015). While vegetation management is not specifically addressed in the Mohave County General Plan (Mohave County 2015), this proposed project does not conflict with decisions contained within 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.

- Endangered Species Act of 1973, as amended
- The National Historic Preservation Act of 1966, as amended
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001–3013; 104 Stat. 3048-3058)
- Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755), as amended
- Clean Air Act of 1970 (42 U.S.C. 7401 et seq.)
- Public Rangelands Improvement Act of 1978 (43 U.S.C. 1901)
- Taylor Grazing Act of 1934 (43 U.S.C. 315)

1.7 Cooperating Agencies

The Council on Environmental Quality 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 UMLRP were solicited at the beginning of the NEPA process to determine their interest in participating as a cooperating agency.

The cooperating agencies assisted with EA preparation in a number of ways, including conducting or providing relevant information, reviewing baseline condition reports, identifying issues, assisting with the formulation of alternatives, and reviewing EA text and other EA materials. Not all of the cooperating agencies participated in all aspects of the EA preparation. As lead agency, the BLM is responsible for the content of the EA.

Agencies that formally accepted the BLM's invitation and have been granted cooperating agency status for preparation of this EA are:

- ***Arizona Game and Fish Department (AGFD):*** AGFD has jurisdictional authority over fish and wildlife conservation and management, as well as public uses and recreation relating to fish and wildlife conservation and management. AGFD is tasked with conserving, enhancing, and restoring Arizona's diverse wildlife resources and habitats and therefore has special expertise with respect to Arizona's wildlife. Because the proposed vegetation management actions have the potential to impact wildlife, AGFD is a cooperating agency for the EA.

- ***Washington County:*** Because of its proximity to the project area and its historic dependence on the Arizona Strip as a source of income, employment and recreational opportunities for its residents, Washington County is participating as a cooperating agency in the EA process.
- ***Mohave County:*** The project area is located entirely within Mohave County. Because the proposed vegetation management actions have the potential to impact resources and residents of this portion of the county, Mohave County is a cooperating agency in the EA process.

1.8 Tribal Consultation

The BLM consults with federally recognized tribes before making decisions or undertaking activities that will have an effect on federally recognized tribes, their assets, rights, services, or programs. The BLM 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 BLM continues to inform these tribes as the project progresses.

- Chemehuevi Indian Tribe
- Colorado River Indian Tribe
- Havasupai Indian Tribe
- The Hopi Tribe
- Hualapai Indian Tribe
- Kaibab Band of Paiute Indians
- Las Vegas Paiute Tribe
- Moapa Band of Paiute Indians
- Navajo Nation
- Pahrump Band of Paiutes
- Paiute Indian Tribe of Utah
- Indian Peak Band of Paiutes
- Cedar Band of Paiutes
- Shivwits Band of Paiutes
- Koosharem Band of Paiutes
- Kanosh Band of Paiutes
- San Juan Southern Paiute Tribe
- Pueblo of Zuni

1.9 Identification of Issues

As described in the BLM's NEPA (H-1790-1) Handbook (BLM 2008c), "scoping is the process that is used to solicit input on potential issues, impacts, and alternatives, as well as the extent to which those potential issues and impacts will be analyzed. Scoping can also assist in identifying actions by others in and around a project area that may have a cumulative effect with the proposed action. Scoping helps to begin identifying incomplete and unavailable information and evaluating whether that information is essential to make a reasoned choice among alternatives."

The scoping process commenced on October 21, 2014. The public scoping period concluded on December 18, 2014. During the scoping period, the BLM held two public meetings, one in St. George, Utah (November 12) and one in Flagstaff, Arizona (December 3).

Letters and email notifications were sent to the project mailing list and news releases were published in local newspapers announcing the scoping period and public meetings. The BLM's Grand Canyon-Parashant and Arizona Strip Field Office websites were updated with links directing the public to the Notice of Intent (NOI) to Prepare an Environmental Impact Statement (EIS). After the public scoping process ended, the BLM decided to terminate the EIS in favor of preparation of an EA. The Notice of Termination (NOT) of Uinkaret Mountains Landscape Restoration Project EIS was published in the Federal Register on August 2, 2016, concluding the EIS process (for more information see Section 5.1.4). The BLM determined that the previous scoping input on the EIS was sufficient for the preparation of this EA.

The public scoping meetings were conducted in an open house format designed for attendees to view informational displays, ask specialists about the proposed action and the EIS process, and submit written or verbal comments. Meeting attendees signed in upon entering, at which time they were provided with handouts and informed of the meeting format and how to comment. The handouts and displays provided the following information:

- NEPA process and project schedule
- Existing conditions in the project area and resource information (vegetation, wildlife, soils)
- Fire regimes, fire history, and fire condition classes
- Past vegetation treatments in the project area
- Recreation, wilderness, and scenery information
- Purpose and need for action
- Preliminary issues to be analyzed in the EIS, and
- How to provide comments.

The BLM received a total of 43 comment submittals (letters, comment forms, emails, and faxes) during the scoping period. The BLM identified 376 individual comments among the comment submittals. Comments were then sorted into subject categories, entered into a database, and reviewed by BLM resource specialists to determine issues for analysis and help guide development of alternatives in this EA. The comments were organized for presentation to the public in a formal scoping report (BLM 2015) available at: https://eplanning.blm.gov/epl-front-office/eplanning/projectSummary.do?methodName=renderDefaultProjectSummary&projectId=54543

1.9.1 Issues for Analysis

An important outcome of scoping is clearly defining issues for analysis, and determining how these issues should be used to generate alternatives to the proposed action, develop project design features, and provide the Responsible Official with a reasoned choice among alternatives via the analysis presented in the EA.

The interdisciplinary team and the Responsible Official further reviewed and considered preliminary concerns and suggestions identified in the scoping report as the project progressed past the scoping period. The interdisciplinary team used the concerns and suggestions to refine the purpose and need for action, to develop alternatives and project design features, and to finalize the list of relevant issues that are analyzed in detail in this EA.

Based on the results of public scoping and continued internal dialog regarding this project and its potential for resource impacts, the BLM identified 11 issues for analysis. These issues are listed and described below. Each issue is described by associated indicators that will be used to compare and contrast environmental impacts within and between the various alternatives discussed in Chapter 4.

1.9.1.1 Air Resources (Including Greenhouse Gas Emissions)

Vegetation treatments have the potential to impact air quality and visibility through the: (1) generation of dust from increased vehicle and equipment use on dirt roads and in areas of treatment; (2) generation of exhaust and emissions through vehicle and equipment use; and (3) production of smoke through prescribed fire.

Vegetation treatments have the potential to impact climate change through the release of greenhouse gas (GHG) emissions. Conversely, vegetation treatments have the potential to increase carbon dioxide and other GHG retention (sequestration) through new biomass growth. Similarly, erosion control treatments have the potential to improve soil productivity and reduce soil carbon losses, thereby offsetting some of the initial vegetation treatment emissions.

1.9.1.2 American Indian Resources

Vegetation treatments have the potential to impact American Indian resources through the: (1) removal of traditional use plants; (2) disturbance to traditional cultural properties; and (3) removal of or disturbance to traditional use areas, including spirit trees (large trees).

1.9.1.3 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.

1.9.1.4 Cultural Resources

Vegetation treatments have the potential to impact cultural resources through: (1) direct disturbance or damage to archeological and historic resources during treatment activities; and (2) indirect disturbance through increased vandalism or visitation to sites made more obvious due to treatment activities.

1.9.1.5 Designated Wilderness

Vegetation treatments have the potential to impact the wilderness characteristics (untrammeled, undeveloped, naturalness, outstanding opportunities for solitude, and opportunities for primitive and unconfined recreation) within designated wilderness areas.

1.9.1.6 Fire and Fuels

Vegetation treatments have the potential to impact fire and fuels through: (1) reduction in fuel loading and ladder fuels; (2) changes in fire regime condition class; (3) changes in risk of high-intensity wildland fire; and (4) protection of structures in the wildland-urban interface.

1.9.1.7 Livestock Grazing

Vegetation treatments have the potential to impact livestock grazing through: (1) short-term displacement of livestock and disruption of livestock operations; (2) short-term reduction in available forage; and (3) short-term alteration of pasture rotation and reduced pasture rotation options.

1.9.1.8 Soils

Vegetation treatments have the potential to impact soils through: (1) changes in soil erosion potential; (2) ground disturbance and soil compaction; and (3) disturbance or removal of biological soil crusts.

1.9.1.9 Vegetation (Including Noxious Weeds and Invasive, Non-Native Species)

Vegetation treatments have the potential to impact sagebrush, pinyon-juniper woodland, and ponderosa pine communities through: (1) changes in productivity and species diversity; (2) changes in extent and distribution of invasive species and noxious weeds; and (3) changes in overall ecological health and resilience to high-intensity fire, drought or insect outbreaks.

1.9.1.10 Visual Resources

Vegetation treatments have the potential to impact visual resources in the project area through visual changes in: (1) the form of the landscape; (2) diagonal, horizontal, and vertical lines created by vegetation patterns and soils; (3) colors of vegetation and soils; and (4) texture of the landscape.

1.9.1.11 Wildlife (Including BLM Sensitive Species, Species of Greatest Conservation Need, and Migratory Birds)

Vegetation treatments have the potential to impact wildlife populations and habitat in the project area through: (1) direct disturbance to species during treatments (including disruption of foraging, migration, and reproductive behavior as well as injury/mortality to individuals); (2) disturbance to wildlife habitats during or as a result of treatments; and (3) short- and long-term changes in habitat quantity and quality as a result of treatments.

1.9.2 Comments Not Evaluated in the EA

Most concerns and suggestions raised by the public during scoping had relevance to the project and were considered by the interdisciplinary team in developing issues (see Section 1.9), alternatives, and project design features. However, several comments were clearly not within the scope of the analysis or did not clearly point to environmental effects, project objectives, or alternatives. These comments are listed below. Additional detail on these comments is available in the project's Scoping Report.

Table 1-1. Public Comments Not Evaluated in the EA

Comment	Response
Obliterating all roads within the project area	No decisions on changing the designations of existing roads are proposed as part of this project and road-related activities are outside the scope of this project identified in the purpose and need, so this comment was not considered further.
Conduct a GIS (geographical information system)-based roadless analysis in the project area to determine if an updated Lands with Wilderness Characteristics inventory is necessary	No decisions on changing the designations of existing roads are proposed as part of this project, so this comment was not considered further.
Vegetation treatment goals should focus on the attainment of potential natural communities (PNC) as a benchmark of success	The BLM uses desired plant community (DPC) objectives to establish vegetation composition objectives, which may include PNC but also includes a mosaic of lower seral stages in order to provide a diversity of vegetation communities.
Livestock grazing use levels	Decisions on permitted levels of use are outside the scope of this analysis; those decisions are made during the grazing permit renewal process.
Development of additional artificial water sources for wildlife	No new water sources are proposed as part of this project.

Chapter 2. Proposed Action and Alternatives

2.1 Introduction

NEPA and its implementing regulations require that an agency rigorously explore and objectively evaluate a reasonable range of alternatives. Reasonable alternatives are those that meet the purpose of and need for action and that are feasible to implement, taking into consideration regulatory, technical, economic, environmental, and other factors. In addition to reasonable alternatives, the EA should also analyze the no action alternative, which provides a baseline against which to compare the potential environmental impacts for the action alternatives.

Alternatives are the heart of the EA, as they present other possible courses of action that could achieve the underlying purpose of and need for action to which the agency is responding. In this case, as described in Chapter 1, the underlying purpose of and need for action is to improve woodland, range, and forest health; reduce erosion; enhance wildlife habitat; restore fire; and improve plant community resilience.

In response to the purpose and need and the relevant issues identified during scoping, the BLM developed the proposed action, which includes a combination of manual, mechanical, chemical, and fire treatments. These treatments (described below) are based on extensive individual visits and interdisciplinary team visits to the project area, as well as resource and specialist input. This chapter of the EA explores other options to the proposed action in the form of alternatives that could be used to address the purpose and need, as well as the no action alternative. How the proposed action and alternatives achieve the underlying purpose of and need for action is assessed by the decision-maker based in part on the environmental effects of each alternative, which are described in detail in Chapter 4. This comparative analysis of alternatives provides the decision-maker, as well as the public, with a clear picture of the distinctions between the alternatives from the standpoint of environmental effects, which contributes to providing a clear basis for making an informed choice among alternatives.

2.2 Development of the Alternatives

An important outcome of scoping is clearly defining issues for analysis, and determining how these issues should be used to develop or revise preliminary proposed actions and project design features, and to generate alternatives to the proposed action. The BLM used the input from the public during the October to December 2014 scoping period, and continued internal discussions with the interdisciplinary team to develop a detailed proposed action and alternatives to the proposed action that would meet the purpose and need for action and that would address identified issues.

The BLM held a workshop in February 2015, with the interdisciplinary team, BLM managers, and cooperating agencies to review public scoping results and develop preliminary issues and alternatives for analysis. On May 12, 2015, the BLM conducted a field trip to the project area to review and confirm the results of the February workshop and proposed vegetation treatments. These results were used to develop the details of the alternatives described in the next section.

2.3 Description of the Alternatives

The BLM developed three alternatives that will be considered in detail in this EA.

The interdisciplinary team developed Alternative A, the proposed action, to respond to the purpose and need for action, the project objectives, and to address relevant issues identified during scoping. Alternative B was also developed to respond to project objectives and address issues raised during scoping, but would meet project objectives using fire treatments, seeding, and erosion control only. Alternative C, the no action alternative, is a baseline for comparing the action alternatives.

2.3.1 Alternative A – Proposed Action

The BLM would use a combination of manual, mechanical, chemical, and prescribed fire treatments, as well as erosion-control structures, to address the purpose and need for action and move the project area toward desired conditions. Proposed treatments are described below, listed by treatment unit in Table 2-1, Table 2-2, and Table 2-3 and displayed on the map in Figure 2-1.

This landscape-scale project is intended to improve woodland, range, and forest health; reduce erosion; enhance wildlife habitat; restore fire; and improve plant community resilience. Projects proposed include approximately 18,648 acres of manual, mechanical (mastication and seed/harrow), and chemical treatments and 38,713 acres of prescribed fire (Table 2-1) across the 128,500-acre project area. Some of these acres overlap, so the total acres proposed for treatment are not the total of the individual treatments. Erosion-control measures would be implemented to protect soils and reduce erosion and soil loss.

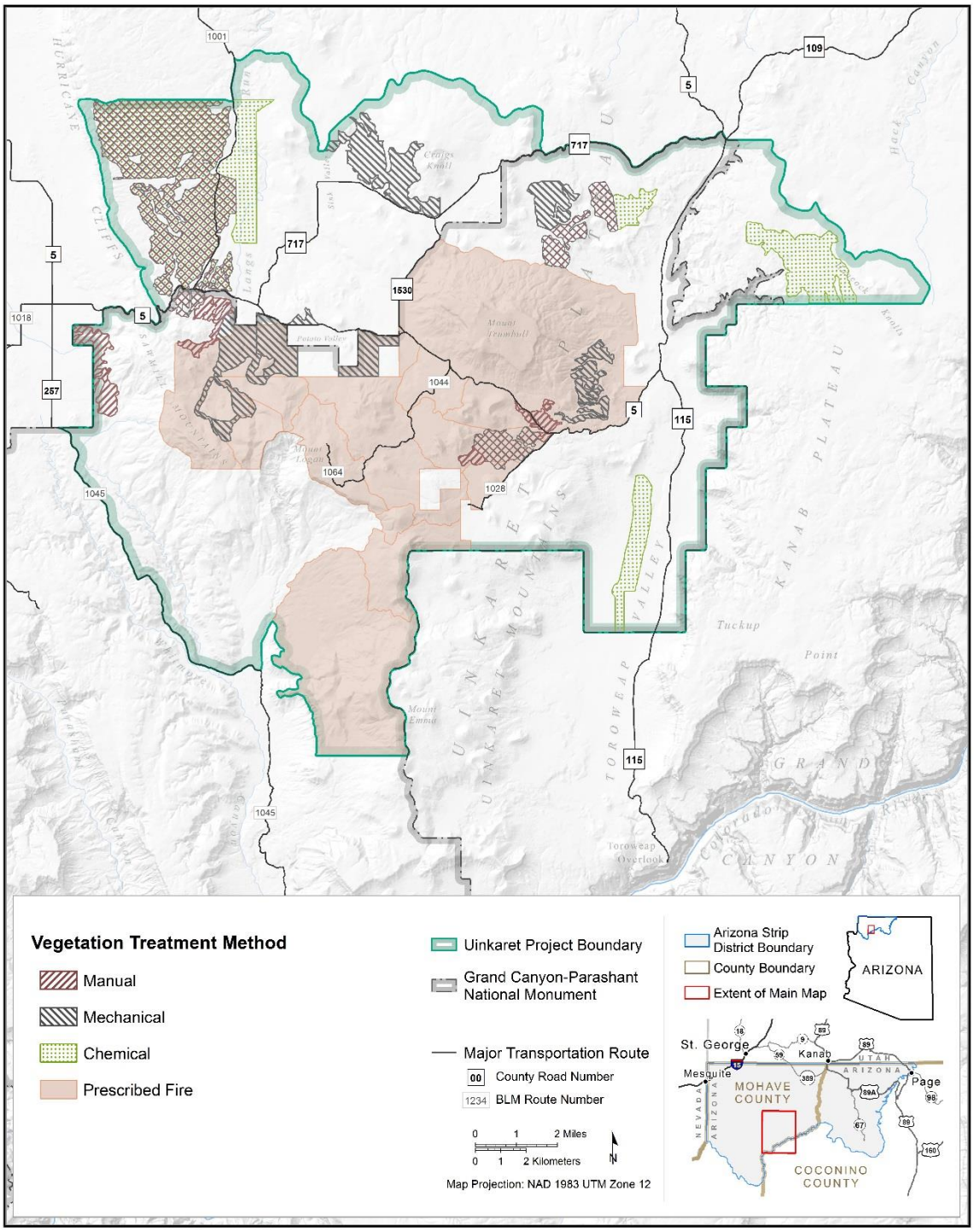


Figure 2-1. All Proposed Vegetation Treatments, Alternative A

2.3.1.1 Manual Treatments

Under this alternative, 9,166 acres of manual treatments are proposed. Manual treatment involves the use of hand tools and hand-operated power tools to cut, clear, or prune vegetation. Treatments typically include cutting undesired plants and trees above ground level, and pulling, grubbing, or digging out root systems of undesired plants to prevent sprouting and regrowth below ground level. Manual treatments are highly selective and can be used in sensitive areas or areas inaccessible to vehicles.

The 'lop and scatter' technique proposed as part of the proposed action is considered a type of manual treatment if hand-held saws are used. If a manual lop and scatter method is selected as most appropriate for the unit, small trees would be cut with chainsaws or hand saws (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. Some of the harvested biomass (i.e., straight sections of "poles," log ends, and branches) would be retained for use as construction material for check dams to mitigate existing rill and gully erosion. Scattered branches and slash could also be piled along roadways and trails or burned to reduce visual impacts and maintain prescribed fire treatment boundaries.

2.3.1.2 Mechanical Treatments

Under this alternative, 13,037 acres of mechanical treatments are proposed. Mechanical treatments are designed to kill or reduce the cover of undesirable vegetation, and thus, encourage growth of desirable vegetation. Mechanical treatments involve the use of vehicles such as wheeled tractors, crawler-type tractors and specially designed vehicles with attached mulching/chipping implements that cut, uproot, 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 and terrain, soil characteristics, and weather conditions.

The lop and scatter technique proposed as part of the proposed action is considered a mechanical treatment if small equipment, such as a skid-steer vehicle, are used. If a mechanical lop and scatter method is selected as most appropriate for the unit, small skid-steer vehicles would be used to shear small trees (less than 15 inches diameter at breast height (DBH) for ponderosa pine trees, 6 inches DBH for pinyon pine trees, and 15 inches diameter at root crown (DRC) for juniper trees) (Sink 2003) at ground level and strategically place those cut trees on the ground to aid in water retention, herbaceous species growth, and to reduce erosion. Scattered branches and slash could also be piled along roadways and trails and burned to reduce visual impacts and maintain prescribed fire treatment boundaries. This material (logs, branches, and slash) may also be utilized in the construction of erosion control structures, such as brush check dams and gully plugs.

Harrow seeding would be used in one of the treatment units (White Spring, Unit 32). Harrow seeding is a broadcast method of applying seed, followed by pulling a series of spikes (usually attached in rows to a metal frame) along the ground to cover the seed and smooth the soil. This action improves the seed to soil contact and is typically used in larger treatment units.

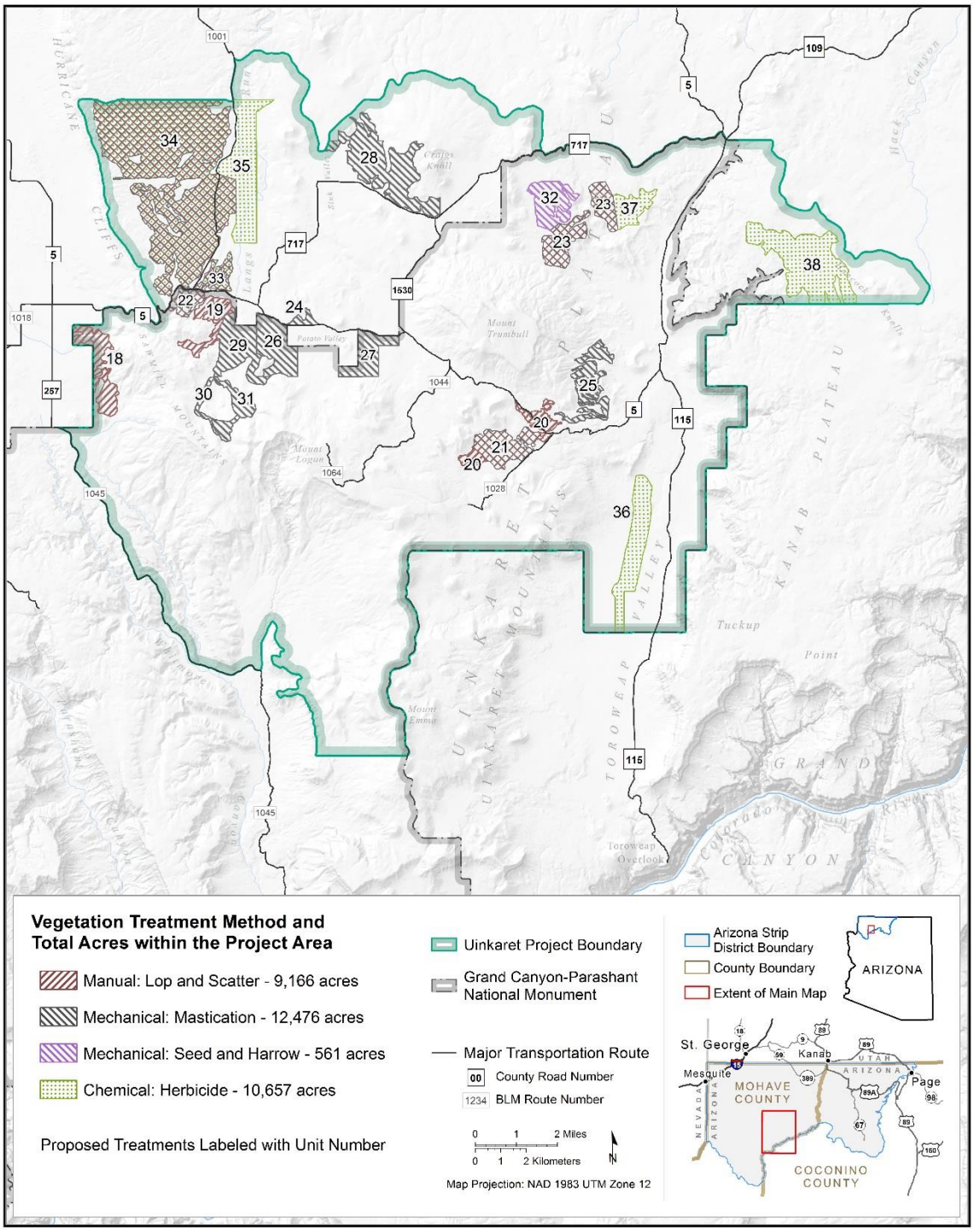


Figure 2-2. Proposed Mechanical and Chemical Vegetation Treatments, Alternative A

2.3.1.3 Chemical Treatments

Under this alternative, 10,657 acres of chemical treatments are proposed. The BLM would use the Programmatic EIS on Vegetation Treatments Using Herbicides on BLM lands in 17 Western States (BLM 2007b) to guide actions for this project. 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.

Herbicide applications are designed to minimize potential for impacts to non-target plants and animals, while achieving project objectives. They can be applied using a variety of techniques (including aerial or hand application using backpack blowers) under carefully controlled rates of application. Treatment objectives, site topography, vegetation conditions, and other factors would be considered prior to any chemical application.

The chemical treatments proposed as part of the proposed action would include the use of Tebuthiuron, designed to specifically target sage brush. Portions of the project area are shifting to a shrub-dominated system with little understory (i.e., grasses and forbs). Chemical treatments are proposed in selected areas to remove a percentage of sagebrush and allow grass and forb composition to increase, thereby, increasing plant cover, while reducing runoff and erosion and increasing infiltration during precipitation events.

2.3.1.4 Prescribed Fire Treatments

Under the alternative, approximately 38,713 acres would be treated with prescribed fire (see Figure 2-3). Of that, approximately 16,854 acres would be within designated wilderness. The fire treatment methods described below were selected to move the project area toward desired conditions (Fire Regime Condition Class (FRCC) 3 to 1 – see Chapter 3 for FRCC definitions) and are accepted methods of vegetation treatment for the whole project area, as described in detail in the Arizona Strip FMP and Appendix F of the Grand Canyon-Parashant National Monument RMP (BLM 2008a), and analyzed in the corresponding FEIS. Fire-related treatment methods are described briefly below. Table 2-1 lists the proposed fire treatment units.

Fire line would be established through the use of natural barriers, existing roads and trails, and existing hand lines. No new fire lines would be developed as a part of the proposed action. Prior to initiating the Mount Emma burn, the BLM would coordinate with the National Park Service (NPS) to ensure adjacent NPS lands are adequately considered and protected. Fire staff would keep the public and other BLM staff informed before, during, and after burning to ensure burn objectives are relayed and public safety is emphasized.

The BLM would develop burn plans that use an interdisciplinary team approach and that retain and create mosaics of tree densities, age classes, and openings; create and promote understories of native shrubs, grasses, and forbs; and improve the quality and connectivity of wildlife habitat.

Treatments would emphasize maintenance and improvement of habitat for turkey, Kaibab squirrel, mule deer, pygmy nuthatch, and raptors.

The manipulation of the amount, composition, and structure of biomass for the purpose of modifying potential fire behavior and effects is an important component of any proposed prescribed fire; how biomass would be manipulated in any particular treatment unit is developed as part of site-specific burn plans; this is discussed in more detail later in this section.

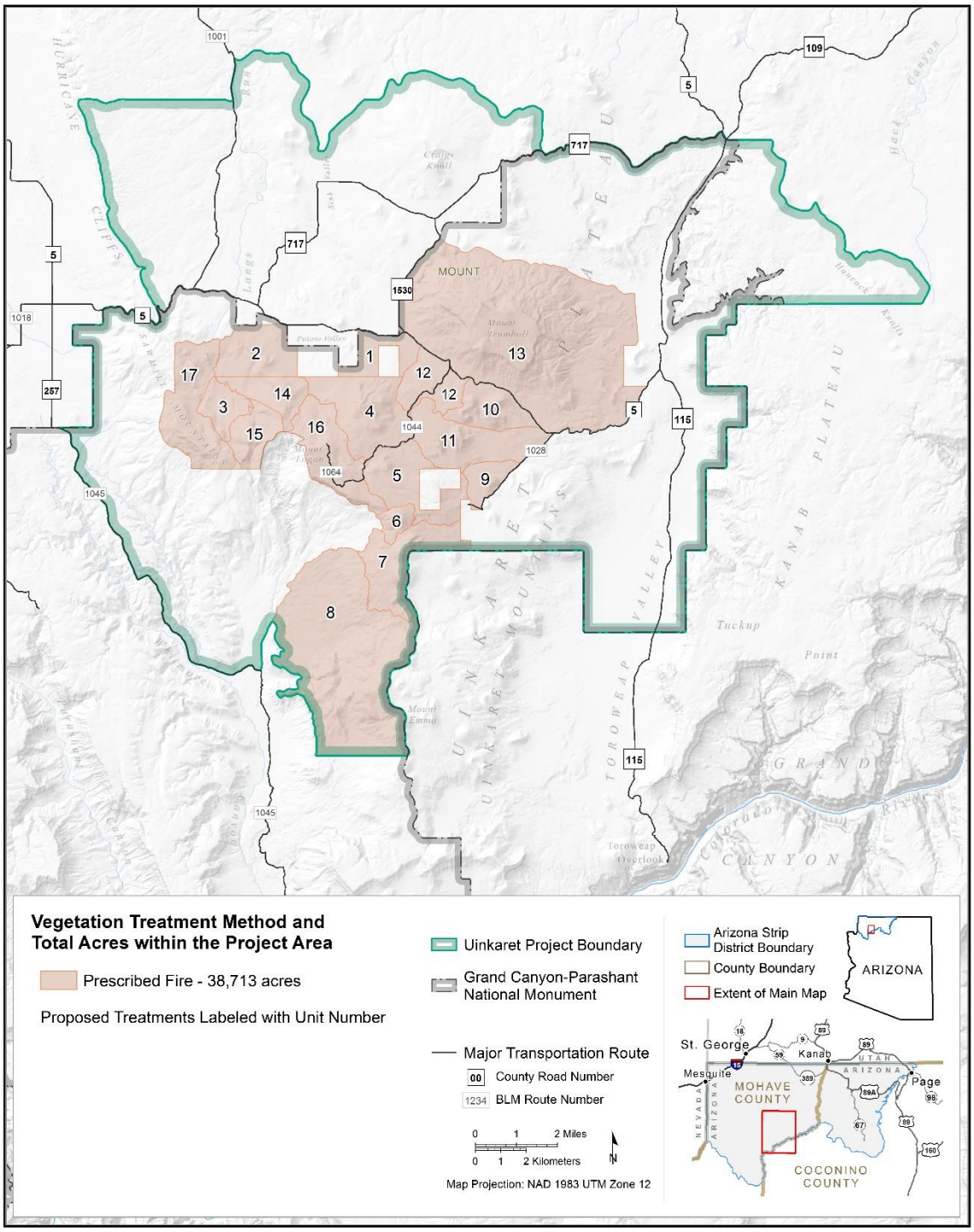


Figure 2-3. Proposed Fire Treatments for Alternatives A and B

Prescribed fire is the intentional application of fire to vegetation under specified conditions related to fuel moisture, weather, and other environmental variables The intent for using prescribed fire is to achieve site-specific resource management objectives. Prescribed fire treatments include broadcast burning and burning of hand-stacked piles. 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.

2.3.1.5 Actions to Stabilize Drainages and Reduce Soil Loss

The erosion-control measures proposed as part of the proposed action would use a variety of techniques designed to stabilize drainage banks and reduce the movement of soil. These techniques include, but are not limited to, bank shaping, construction of wood or rock structures (e.g., check dams or gabions), planting of vegetation, installation of fiber erosion control blankets, or any combination of these methods. Erosion and sediment control can also be achieved through more "passive" measures, such as revegetation and amending soils with materials that improve levels of soil organic matter. Soil amendments may include, but are not limited to, compost and soil organic matter supplements, pH conditioners such as lime or gypsum, moisture holding materials such as polyacrylamide gels, nutrient enhancers, and carbonaceous mediums such as biochar. Finally, small wire-mesh structures called "ConMods" (Connectivity Modifiers) could be installed to provide microsites for wind protection and seedling establishment to mitigate soil loss and re-vegetation challenges owing to the forces of wind.

Barring emergency situations (i.e., major precipitation or geologic events), construction of erosion control features would be accomplished primarily through manual labor, hand tools, or small-engine equipment, such as augers or chainsaws. Motorized vehicle use to aid in the construction of and transport of requisite materials would be limited primarily to vehicles such as pickup trucks and utility vehicles commonly referred to as UTVs; in some cases, a small skid loader (i.e., Bobcats, skidsteers) may be used. No "heavy" equipment that are more likely to cause major ground disturbance (i.e., bulldozers, excavators, motograders) would be used for the construction of the aforementioned erosion control and mitigation features.

2.3.1.6 Implementation and Phasing

Proposed treatments would be implemented in phases over time; some proposed treatments would be implemented upon, or soon after, the decision record is approved (phase 1), while others would be implemented over time, as cultural resource inventories are completed and funds become available (phase 2). FRCC 3 areas would generally be prioritized as the greatest need for treatment, though FRCC 1 and 2 areas may realistically be the least expensive, logistically effective, and have larger burn windows. Therefore, some of the FRCC 1 and 2 areas could be the first to be treated.

Prior to implementing prescribed fire treatment, the BLM would develop a unit-specific prescription (i.e., burn plan) that would guide the treatment activity. This prescription would be developed for the specific unit based on vegetation type, aspect, terrain, and season, and allows for variation in such things as topography, moisture, slope, wind, and access to be considered immediately before treatment to maximize success. The prescription also takes into consideration existing conditions (including amount of fuel, fuel moisture, temperatures, terrain, and weather forecasts); identifies personnel responsible for overseeing the prescribed fire; and identifies the most appropriate manual, mechanical, or aerial ignition method.

It is important to note that not every acre within a treatment unit boundary would be treated; the unit-specific treatment prescription, as presented in Table 2-1, as well as limitations described within RMP decisions, would be used to determine the areas within the larger unit boundary that would benefit from treatment. Unit boundaries were developed based upon vegetation type, topography, and the existing road network or other physical features.

Treatment crews would access each treatment unit using the existing designated transportation network; no new permanent or temporary roads would be constructed as part of this project. It is possible that access for implementing prescribed fire treatments may be via helicopter if terrain is difficult or conditions warrant.

- Prescribed Fire treatments may include:
    - Selective understory thinning using hand tools or chainsaws to reduce ladder fuels in some areas to ensure fire intensity meets unit objectives and minimizes overstory mortality.
    - Raking or manual removal of litter and duff around resources (e.g., cultural sites and ponderosa pine trees) and infrastructure (e.g., fences, corrals, etc.) to minimize the potential for adverse impacts from fire.
- For prescribed fire treatments, the methods for igniting the fire are varied and depend on the conditions at the time of implementation and the treatment objectives. Methods for ignition can influence the intensity and severity of fire treatment. Ignition patterns are used to modify or control fire intensity and can be accomplished using a variety of manual, mechanized, or aerial methods, depending on terrain, fuel type, scale, etc. Ignition methods would be identified during the development of the unit-specific burn plan and may include:
    - Aerial ignition – Ignition of fuels by dropping incendiary devices or materials from aircraft. Examples include a helitorch and a plastic sphere dispenser.
    - Manual ignition – Ignition of fuels by use of ground-based, manually operated ignition devices (typically hand-held) to launch an ignition system, such as a fusee or flare.

In association with any of the vegetation treatment methods described above, seeding of the treatment areas with an approved seed mix could occur. Seeding would be applied by a variety of methods, including manual or mechanical application, as well as aerial application. 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 to meet restoration objectives. Seed selection would be based on site potential and objectives.

Project design features would be implemented as part of the proposed action to ensure the potential for resource impacts are minimized. These are described later in this chapter.

Table 2-1. Proposed Vegetation Treatments, Alternative A

Unit Number	Unit Name	Vegetation Type	Treatment Type/Description	Acres	Phase
1	Schmoot's Flat	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	743	1, 2
2	Lang's Run Fire	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,415	1, 2
3	Drainage	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	679	1, 2
4	High Meadow	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	2,129	1, 2
5	Research	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,692	1, 2
6	Petty Knoll	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	342	1, 2
7	Slide Mountain	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,854	1, 2
8	Mount Emma	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	7,646	1, 2
9	Lava Flow	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	577	1, 2
10	Saddle	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,075	1, 2
11	Cinder	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,987	1, 2
12	Ranger	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,100	1, 2
13	Mount Trumbull	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	11,691	1, 2
14	Feral Pig	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	915	1, 2
15	Hells Hole	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	889	1, 2
16	Mount Logan	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,813	1, 2
17	Death Valley	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	2,166	1, 2
18	Side of Mountain	Pinyon-juniper	Manual - Lop and scatter	569	2
19	14836 Project	Pinyon-juniper woodland	Manual - Lop and scatter	362	2
20	South Trumbull 2	Pinyon-juniper and ponderosa pine	Manual - Lop and scatter	325	2
21	South Trumbull	Pinyon-juniper and ponderosa pine	Manual - Lop and scatter and/or Mechanical - Mastication	620	1
22	10759 Project	Pinyon-juniper	Manual - Lop and scatter or Mechanical - Mastication	189	2
23	Cantalope	Pinyon-juniper	Manual - Lop and scatter and/or Mechanical - Mastication	801	2

Unit Number	Unit Name	Vegetation Type	Treatment Type/Description	Acres	Phase
24	Potato Valley	Sagebrush and pinyon-juniper	Mechanical – Mastication	86	2
25	East Trumbull	Pinyon-juniper and ponderosa pine	Mechanical – Mastication	597	1
26	West Potato Valley 1	Pinyon-juniper	Mechanical – Mastication	683	1
27	East Potato Valley	Pinyon-juniper	Mechanical – Mastication	500	2
28	Sink Valley	Pinyon-juniper	Mechanical – Mastication	1,486	2
29	West Potato Valley 2	Pinyon-juniper and ponderosa pine	Mechanical – Mastication	766	2
30	Lang's Run 1	Pinyon-juniper and ponderosa pine	Mechanical – Mastication	91	1
31	Lang's Run 2	Pinyon-juniper and ponderosa pine	Mechanical – Mastication	355	2
32	White Spring	Sagebrush and pinyon-juniper	Mechanical - Seed and harrow	561	2
33	West Crosby	Sagebrush and pinyon-juniper	Chemical – Herbicide Manual - Lop and scatter and/or Mechanical - Mastication	243	1
34	Mount Trumball Rim	Sagebrush and pinyon-juniper	Chemical – Herbicide and select Manual - Lop and scatter and/or Mechanical - Mastication	6,057	2
35	Crosby	Sagebrush	Chemical - Herbicide	1,345	1
36	Lower Kent	Sagebrush	Chemical - Herbicide	940	1
37	Witch Pool	Sagebrush and pinyon-juniper	Chemical - Herbicide	367	2
38	Tucket Point	Sagebrush and pinyon-juniper	Chemical - Herbicide	1,705	2

*Prescribed fire treatments would target ponderosa pine vegetation type, although some impacts to pinyon/juniper and/or sagebrush vegetation types may occur.

When considering all types of treatments across the project area, approximately 55 percent of the project area would be treated over at least the next 30 years, as shown in Table 2-2.

Table 2-2. Summary of All Proposed Treatments, Alternative A

Proposed Treatment	Number of Treatment Units	Total Treatment Size (All Units)	Percent of Project Area
Manual, Mechanical and/or Chemical Treatments			
Lop and scatter	3	1,256 acres	1%
Lop and scatter (mechanical treatment may be used as an option)	3	1,610 acres	1%
Mechanical - Mastication	8	4,564 acres	4%
Seed and harrow	1	561 acres	<1%
Chemical	4	4,357 acres	3%
Chemical, lop and scatter and/or mechanical (mastication)	2	6,300 acres	5%
Total – Non-Fire Treatments	**21 units**	**18,648 acres**	**14%**
Fire Treatments			
Prescribed fire	17 units	38,713 acres	30%
Total – All Treatments	**38 units**	**57,361 acres**	**45%**

2.3.2 Alternative B –Prescribed Fire

Alternative B is similar to Alternative A (proposed action), except that it would only use prescribed fire as a treatment method (see Table 2-3). This alternative was developed to address issues raised during scoping related to use of manual, mechanical, and chemical treatments.

The same prescribed fire treatments proposed as part of Alternative A would be implemented under Alternative B, but no manual, mechanical, or chemical treatments would be authorized. Seeding and erosion control measures, as outlined for Alternative A, are also a part of Alternative B.

The BLM would use only prescribed fire to treat vegetation, address the purpose and need for action, and move the project area toward desired conditions. Post-fire seeding could occur, and erosion-control measures would be implemented to protect soils and reduce erosion and soil loss. The prescribed fire treatment methods are the same as those described above in Section 2.3.1.4.

2.3.2.1 Implementation and Phasing

As with Alternative A, prior to implementation of any prescribed fire treatment, the BLM would develop a burn plan that would then guide the specific treatment activity. This prescription would be applied to the specific unit and would allow for variation in such things as topography, moisture, slope, seed source, wind, and access to be considered immediately before treatment to maximize success. The interdisciplinary team would develop each prescribed fire treatment unit prescription to ensure project objectives are considered and resource impacts are minimized.

As with Alternative A, not every acre within a treatment unit boundary would be treated; the unit-specific treatment prescriptions as presented in Table 2-3 would be used to determine the areas within the larger unit boundary that would benefit from treatment. Unit boundaries were developed based upon vegetation type, topography, and the existing road network or other physical features that dictated logical prescribed fire boundaries that could be safely managed.

The overall amount of proposed prescribed fire treatment is the maximum estimate of treatment within the project area and it is likely that actual treatment acreage would be less.

Proposed treatments would be implemented over time, in phases; some proposed treatments would be implemented upon, or soon after, decision (phase 1) while others would be implemented over time, after decision, as cultural resource inventories are completed and funds become available. FRCC 3 areas would be prioritized as the greatest need for treatment, though FRCC 1 and 2 areas may realistically be the least expensive, logistically effective, and have larger burn windows. Therefore, some of the FRCC 1 and 2 areas could be the first to be treated.

In association with any prescribed fire treatment, it is possible that seeding could also be implemented to encourage development of DPCs, mitigate erosion, establish effective ground cover, and encourage development of desirable wildlife habitat attributes. Using an approved and appropriate seed mix, seed would be scattered by hand without the use of tools by using hand-held broadcast spreaders, or with a harrow. Harrow seeding is the application of seed using a broadcast method, followed by pulling a series of spikes (usually attached in rows to a metal frame) along the ground to cover the seed and smooth the soil. This action improves the ground-to-seed effect and is typically used in larger treatment units. Seeding is 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; however, non-native species may be used to meet restoration objectives in areas where interim measures associated with site stabilization are required. Seed selection would be based on site potential and objectives.

Implementing this alternative would result in treatment of up to approximately 40 percent of the project area, as shown in Table 2-3.

All standard operating procedures and project design features (see Section 2.3.4) would apply to this alternative.

Table 2-3. Alternative B, Prescribed Fire Units

Unit Number	Unit Name	Vegetation Type	Treatment Description	Acres
1	Schmoot's Flat	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	743
2	Lang's Run Fire	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,415
3	Drainage	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	679
4	High Meadow	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	2,129
5	Research	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,692
6	Petty Knoll	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	342
7	Slide Mountain	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,854
8	Mount Emma	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	7,646
9	Lava Flow	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	577
10	Saddle	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,075
11	Cinder	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,987
12	Ranger	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,100
13	Mount Trumbull	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	11,693
14	Feral Pig	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	915
15	Hells Hole	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	889
16	Mount Logan	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	1,813
17	Death Valley	Ponderosa pine*, pinyon-juniper, and sagebrush	Prescribed fire	2,166
Total Prescribed Fire-Only Treatments				38,713

*Prescribed fire treatments would target ponderosa pine vegetation type, although some impacts to pinyon/juniper and/or sagebrush vegetation types may occur.

2.3.3 Adaptive Management – Alternatives A and B

Alternatives A and B include adaptive management, which provides a menu of management options that may be needed to adjust management decisions and actions to meet desired conditions as determined through monitoring. Adaptive management is a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of

natural variability in contributing to ecological resilience and productivity. It is not a "trial and error" process; rather, it emphasizes learning while doing. Adaptive management does not represent an end in itself: it represents a means to more effective decisions and enhanced benefits.

The principles of adaptive management would be used to: (1) ensure proposed treatments are meeting objectives and minimizing adverse impacts, over the course of project implementation; (2) consider climate change and other factors in the success of treatments and any adjustments in treatment methods that may be needed for future treatments to ensure success; and (3) identify new units within the project area boundary for future treatment.

These potential new areas within the project boundary would be considered for future treatment as long as:

- They have similar characteristics (e.g., vegetation type, soil type, and elevation) to units already treated;
- Monitoring results from similar units already treated indicate success, or a treatment adjustment is identified based on monitoring that would ensure success;
- Cultural resource inventories and the Section 106 process are completed prior to treatment; and
- A NEPA review process is conducted to ensure that the existing environmental analysis is adequate and that there are no new resource issues or concerns raised by the interdisciplinary team.

2.3.4 Project Design Features – Alternatives A and B

The following project design features would be implemented under alternatives A and B to ensure that risk to human health and the environment from treatments would be kept to a minimum. These project design features were also developed to reduce or eliminate adverse impacts from specific project activities.

Features listed below are tiered to management actions listed in both the Grand Canyon-Parashant National Monument RMP (Tables 2.1 through 2.10, 2.14, and 2.16) (BLM 2008a) and the Arizona Strip Field Office RMP (BLM 2008b) (Tables 2.1 through 2.9, 2.13, and 2.15). Additional features specific to this project are listed below.

Project design features are based upon standard practices and operating procedures that have been employed and proved effective in similar circumstances and conditions.

2.3.4.1 American Indian Resources

- Spirit trees – utilize appropriate soil layers and other sources of information to locate and identify areas of old-growth pinyon, juniper, and ponderosa pine trees. Protect these (considered spirit trees by some American Indians) during project implementation; avoid removal of all ponderosa pine trees greater than 15 inches DBH.

2.3.4.2 Areas Managed to Maintain Wilderness Characteristics

- Vegetation treatments and other surface-disturbing actions can be authorized in areas managed to maintain wilderness characteristics, provided that the areas' wilderness character would be protected and preserved.

2.3.4.3 Cultural Resources

- No treatment would be undertaken until an appropriate level of cultural inventory for the proposed treatment has been completed.
- When in the vicinity of known archeological sites, treatment boundaries would be designed to avoid making the site more visually obvious. No ground-disturbing treatments are allowed within site boundaries.
- If in connection with this project 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 Grand Canyon-Parashant National Monument Manager or Arizona Strip Field Office Manager (or their designee) would be immediately notified. The immediate area of the discovery would be protected until notified by the Grand Canyon-Parashant National Monument Manager or Arizona Strip Field Office Manager (or their designee) that operations may resume.

2.3.4.4 Designated Wilderness

- The minimum requirements analysis and minimum impact suppression techniques (MIST) tactics would be used in the Mount Trumbull Wilderness and Mount Logan Wilderness to ensure that prescribed fire treatments used are appropriate and do not impact the wilderness character of these areas.
- The areas' wilderness character would be protected and preserved. This includes ensuring that these areas are affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable (i.e., naturalness).
- Arizona Strip fire resource advisors and wilderness specialists would be consulted during vegetation treatments to follow guidelines outlined in the Minimum Requirements Decision Guide (MRDG).

2.3.4.5 Fire and Fuels

- Use lighting techniques to reduce smoke, if necessary.
- Some live and dead fuels may be removed from below and to the drip line of old-growth ponderosa pines to follow developed guidelines for protecting ponderosa pines from torching and root damage.
- The main tool for removal would be rakes, but chainsaws may be necessary as the minimum tool to:
    - remove trees that fall across fire breaks
    - protect wildlife snags from accidental ignition during prescribed fire
    - protect monument objects, such as old-growth trees and cultural or historical sites
    - protect experimental blocks, fences or range improvements, structures,
    - thinning in lava/thin soils for hand pile burning
- The implementation of a prescribed burn will follow the Interagency Prescribed Fire Planning and Implementation Procedures Guide including the BLM supplement to this guide.

2.3.4.6 Geology, Minerals, and Paleontological Resources

- Arizona Strip cave specialists and geologists would be consulted during the preparation of unit-specific burn plans to ensure any necessary cave, karst, and paleontological resource inventories are conducted and any known locations are considered; protective measures would be implemented, as necessary (e.g., delineation of no-treatment buffer zones, or seasonal restrictions on activities).

2.3.4.7 Livestock Grazing

- Project scheduling and implementation would include consultation, cooperation, and coordination with affected grazing permittees. Annual operations and pasture rotations 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 BLM 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 and permittee normal operations.
    - Use forage reserves to mitigate allotment/pasture displacement due to treatments in the short term. Two forage reserves administered by Grand Canyon-Parashant National Monument are available if normal allotment/pasture rotations are not possible or practicable due to proposed vegetation treatments and subsequent reseeding efforts (if necessary).
    - Ensure that livestock are not permitted to enter a treated unit for at least 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 (see above for livestock/permittee project design features).

2.3.4.8 Soil and Water

- In order to minimize soil compaction, treatment activities that involve use of vehicles or equipment off of designated routes would be limited to periods when the soil and ground surface are not excessively wet.
- Mechanical work would not take place when ruts greater than 4 inches form on roadways adjacent to work areas.
- On volcanic-derived or shallow soils, consider pile burning or select chainsaw thinning instead of broadcast burning.
- Prior to implementation, treatment units would be surveyed at the project level, where practicable, for soil crust communities and characterized using the best available science. If cryptobiotic soil crusts are found in densities deemed sufficient to warrant avoidance, the use of mechanical equipment may be restricted.
- Coarse and fine woody debris retention levels, measured using ocular estimates and Brown's transects (Brown 1974), would be determined in conjunction with fuels/fire resource personnel prior to implementation to maintain or improve long-term levels of soil organic matter.
- Burn severity in relation to soil resources would be monitored according to the most appropriate inventory/monitoring protocols.

- Soil rehabilitation following any of the proposed vegetation treatments would be commensurate with the level of disturbance, as characterized by post-implementation monitoring plans and protocols.

2.3.4.9 Vegetation

- All seed would be "state certified" free of weed seeds.
- All equipment and vehicles used to implement treatments would be cleaned (i.e., power washed off site) to remove any soil and potential weed seeds before entering the project area and checked for weed seeds after leaving the project area.
- Patches of old and/or large trees would be defined as ponderosa pine trees larger than 15 inches DBH or with yellow bark, pinyon pine trees larger than 6 inches DBH, or juniper trees larger than 15 inches DRC, and would be retained.
- Presence of invasive species would be considered in developing treatment plans to ensure treatments minimize the introduction and spread of weeds and maximize the ability for native species to establish.
- Mosaics of tree densities, age classes, and openings would be retained and created.
- Existing snags would be retained to provide habitat for wildlife.

2.3.4.10 Visual Resources

- Treatment boundaries would be irregularly shaped (i.e., not straight lines, unless using roads 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.
- Buffers (e.g., along roadsides and near viewpoints) may be established around treatments in visually sensitive areas.

2.3.4.11 Wildlife (Including BLM Sensitive Species, Species of Greatest Conservation Need, and Migratory Birds)

- Surveys for BLM sensitive species would be necessary prior to treatment, if treatments occur during the nesting season. Identified nest sites would be protected during treatment.
- Treatments proposed in ponderosa pine communities would emphasize maintenance and improvement of habitat for goshawks.

2.3.5 Monitoring

The BLM would monitor the vegetation treatments and erosion-control measures to determine whether they were implemented as designed, their effectiveness in achieving desired outcomes, and the effectiveness of project design features. All monitoring would be in accordance with BLM monitoring protocols. Resources to monitor include, but are not limited to:

2.3.5.1 Prescribed Fire

- Monitoring would be conducted prior to implementation of prescribed fire, during prescribed fire operations, and immediately following (both short-term and long-term) prescribed fire treatments.

Table 2-4. Four-Level Approach to Fire Monitoring and Potential Variables for Each Level

Monitoring Level	Monitoring Variables
Level 1: Environmental	Weather, fire danger rating, fuel conditions, concerns and values to be protected, and other biological, geographical, or sociological data
Level 2: Fire Observation	Reconnaissance - fire location and size, fuel and vegetation description, fire regime and condition class, current and predicted fire behavior, potential for spread, current and forecasted weather, and smoke volume and movement
	Fire Conditions - topographic variables, fire weather, fuel model, fire characteristics, smoke characteristics
Level 3: Short-term Change	Change in fuel load, vegetation structure, and vegetation composition, or other objective-dependent variables, within 2 years post-burn
Level 4: Long-term Change	Trends in Level 3 variables over time (5+ years)

2.3.5.2 Vegetation

- Qualitative and quantitative monitoring would occur to determine changes in plant composition and cover. Approximately 27 existing monitoring key areas are within the project area, with about half of these within proposed treatment areas (see Figure 2-4). Long-term monitoring includes vegetation trend monitoring conducted at 5-year intervals at key areas. Trend study sites include establishment of permanent plots and transects. Photos are taken at each trend location. Trend monitoring data is collected using the Pace-Frequency method, which measures the occurrence frequency of forage and non-forage vegetative species.[1] Cover data, which documents the percent of bare ground, litter, rock, cryptogram, and live basal vegetation, is also collected (see BLM Technical Reference 1734-4 (BLM 1996)). Many of these trends were established 20 to 30 years ago and have typically been read (and photographed) every five years since establishment. This gives a good representation of pre-treatment vegetation composition and cover for these sites.
    - As mentioned previously, there are also established key areas that are within the project area, but are not within treatment polygons. These key areas would serve as control plots for comparison to key areas that are treated.
    - Because key areas have not been established for all treatment units, and there are some data gaps, additional qualitative and quantitative monitoring sites would be established to monitor response to treatments. This includes establishing monitoring sites in the Mount Logan Allotment around Mount Logan and Death Valley area to monitor treatment effects to ponderosa pine and pinyon-juniper communities. Additional monitoring sites would also be established in the Tuweep Allotment around Mount Trumbull to monitor treatment effects to pinyon-juniper and ponderosa pine communities. Additional monitoring sites would be established in the Crosby Allotment in the Craigs Knoll and Death Valley areas primarily to study treatment effects to pinyon-juniper communities. Efforts would be made to establish control, as well as treatment, monitoring plots within these areas.

[1]Forage species of sufficient abundance and palatability for the kind and class of livestock permitted.

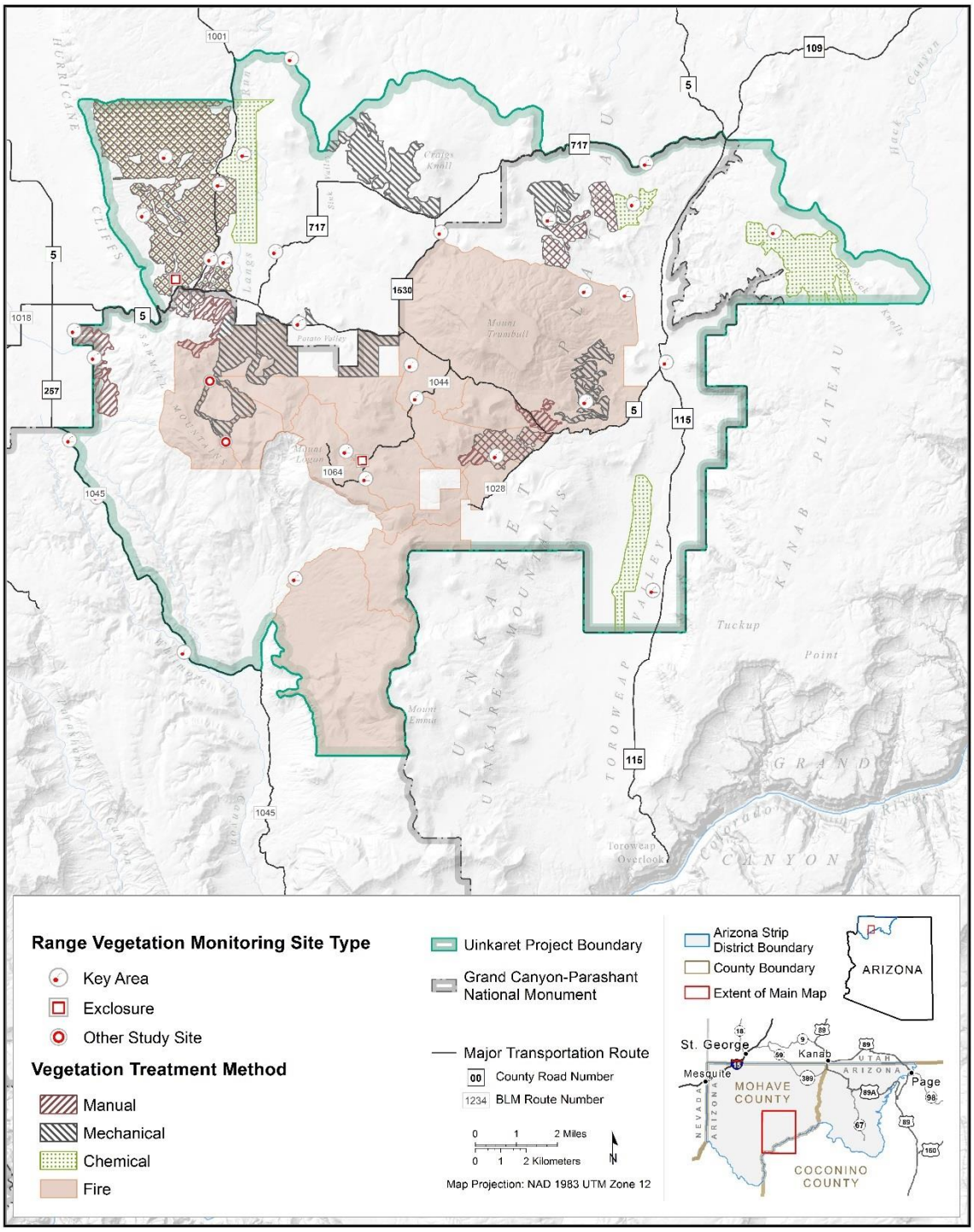


Figure 2-4. Range Vegetation Monitoring Sites and All Proposed Action Vegetation Treatments

2.3.5.4 Soils

- Qualitative comparison of changes in nutrient cycling, productivity and/or fertility.
- Quantitative comparisons of soil health indicators prior to and following project implementation using methodologies similar to those detailed in the *Forest Soil Disturbance Monitoring Protocol* (Dumroese et al. 2009).
- Qualitative (ocular estimates of platy structure) or quantitative (penetrometer measurements of resistance) estimations of soil structure following mechanized vegetation treatments.
- Comparison of pre-treatment depth of soil O and/or A horizon(s) to post-treatment levels of organic matter to quantify topsoil and forest/woodland floor loss.
- Ensure enough coarse and fine woody debris retention to maintain or improve levels of soil organic matter. Use Brown's transects (Brown 1974) or similar method to quantify these levels and to determine adequacy commensurate with site potential and specialist recommendations.
- Visual signs of erosion (rilling/gullying, pedestalled rocks and plants, deposition of soil on uphill side of rocks and plants) or larger mass-wasting features (scarps, slumps, landslides) to assess soil loss and mass wasting.
- Changes to soil chemistry tracked primarily through field pH measurements and more extensive laboratory testing (if necessary) to quantify changes in soil quality.
- Post-burn soil infiltration and soil water repellency using methodology contained in the Field Guide for Mapping Post-Fire Soil Burn Severity (Parsons et al. 2010).

2.3.6 Alternative C – No Action – Continue Current Management

The No Action Alternative represents current management. It is presented to provide a baseline for comparing the effects of the action alternatives.

Under Alternative C, current management, guided by the Grand Canyon-Parashant National Monument RMP (BLM 2008a) and the Arizona Strip Field Office RMP (BLM 2008b), would continue in the project area. However, none of the proposed project activities to improve woodland, range, and forest health; reduce erosion; enhance wildlife habitat; restore fire; and improve plant community resilience would occur.

The project design features listed in Section 2.3.4 do not apply to Alternative C, because no project activities are proposed under this alternative.

2.4 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 RMP); are substantially similar in design to an alternative that is analyzed; or would have substantially similar effects to an alternative that is analyzed.

Public scoping comments received provided suggestions for alternative methods for achieving the purpose and need. The following alternatives were discussed and considered by the

interdisciplinary team during the February 2015 workshop. The public or the interdisciplinary team suggested these alternatives during the scoping period, but the BLM determined they should be eliminated from further detailed analysis when compared to the criteria described above. The following sections describe these alternatives and the rationale for their elimination.

2.4.1 Use of the Four Forest Restoration Initiative in Northern Arizona

Four national forests in Arizona are actively engaged in a collaborative, landscape-scale initiative designed to restore fire-adapted ecosystems in ponderosa pine forests. The suggestion was made that the BLM implement this same initiative in the UMLRP area. While the goals of the Four Forest Restoration Initiative (restore the structure, pattern, composition, and health of fire-adapted ponderosa pine ecosystems; reduce fuels and the risk of unnaturally severe wildland fires; and provide for wildlife and plant diversity) are similar to some of those described for the UMLRP, this initiative does not have direct application to the project area because the UMLRP is composed of a variety of vegetation types (ponderosa pine is just one), specific project objectives are different, and there is no commercial harvest component to this project. Some of the project design features and criteria used for Four Forest Restoration efforts are important reference materials for the interdisciplinary team and have been considered in project design. For these reasons, this alternative has been dismissed from detailed analysis.

2.4.2 Remove Elk and Cattle to Meet the Purpose and Need for Action

The BLM considered this suggestion and has incorporated project design features to ensure that livestock grazing is managed to ensure project treatment success. Grazing after vegetation treatments would be considered carefully and adjustments made to ensure treatments are successful, while also considering livestock permittee needs, as described in Section 2.3.4.8. The eight grazing allotments within the project area are available for livestock grazing (BLM 2008a and 2008b). Rangeland health evaluations have been conducted on these allotments, and all are meeting or making significant progress toward meeting BLM Arizona Rangeland Health Standards for livestock grazing on Public Lands (BLM 1997). Adjustments to authorized numbers and season of permitted livestock are driven by monitoring data and evaluated during livestock grazing permit renewal. Beyond temporarily removing livestock grazing from these allotments to ensure treatment success, making changes to livestock grazing permits is outside the scope of this document. Only a very limited number of elk (if any) are using the UMLRP area and removal is not within the jurisdiction of the BLM. For these reasons, this alternative has been dismissed from detailed analysis.

2.4.3 Retain All Large Trees Greater than 15 inches DBH

The BLM considered this suggestion and has incorporated a similar measure into the project design features section of this document (Section 2.3.4.7) While retention of large ponderosa pine, pinyon pine, and juniper trees is important for ecological health and other reasons, it is not feasible to simply retain all large trees that are greater than 15 inches. The design feature identifies the appropriate size limits for each tree species to direct the retention of old-growth trees. For these reasons, this suggestion has been dismissed from further detailed analysis

2.4.4 Use Only Native Seed in Restoration Activities

Removing the option to use non-native seed in certain treatment areas would conflict with direction contained in the Grand Canyon-Parashant National Monument and Arizona Strip Field Office RMPs. Both RMPs state that “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: (1) are not available; (2) are not economically feasible; (3) cannot achieve desired conditions or other ecological objectives as well as non-native species; and/or (4) cannot compete with already established non-native species. This suggestion was therefore eliminated from consideration.

2.4.5 Use Chaining as a Mechanical Treatment Method

Chaining is an appropriate treatment method for lands within Grand Canyon-Parashant National Monument and the Arizona Strip Field Office. Several areas proposed for treatment under the proposed action (Alternative A) are sites where chaining occurred in the past and they require retreatment. However, the BLM identified other treatment methods that were currently more appropriate for the project area that would better meet project objectives. This means that mechanical treatments other than chaining were determined to more effectively move those treatment units toward desired conditions and meet project objectives. However, chaining would remain a viable treatment method within the project area in the future, with an appropriate level of NEPA review.

2.4.6 Ensure Livestock are Removed for at Least Three to Five Years after Treatment in Sagebrush Communities

The BLM considered this suggestion and has incorporated project design features to ensure that livestock grazing is managed to ensure project treatment success. Grazing after vegetation treatments would be considered carefully and adjustments made to ensure treatments are successful; the length of time during which livestock would be removed from treatment areas would be based upon results of monitoring. For these reasons, this suggestion was eliminated from consideration.

Chapter 3. Affected Environment

The purpose of this chapter is to describe the existing environment potentially affected by one of the alternatives to assist the reader in understanding the existing situation. An interdisciplinary team of resource specialists considered and analyzed the affected environment of this EA. 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. The resources identified and discussed in Section 3.2 include the relevant physical, social, and biological conditions that may be impacted with implementation of one of the alternatives, and provides the baseline for comparing impacts described in Chapter 4.

3.1 General Setting

The project area includes the topography of the Colorado Plateau and the Uinkaret Volcanics, composed of elevation ranging from 4,200 feet in Whitmore Canyon to 8,029 feet on top of Mount Trumbull. This combination of variable topography, along with an intercontinental dry climate, creates rain shadows ideal for optimal clear days per year. Rainfall varies from 8.5 inches in the Eastern Colorado Plateau portion up to 14 inches at the upper elevations of Mount Trumbull. No snow data are currently available for the upper elevations, but these areas have historically been observed with snow cover ranging from 3 inches to over 24 inches.

3.2 Elements or Resources of the Human Environment

The BLM is required to consider many authorities when evaluating a federal action. Those elements of the human environment that are subject to the requirements specified in statute, regulation, or executive order, and must be considered in all EAs (BLM 2008c) have been considered by BLM resource specialists to determine whether they would be potentially affected by the proposed action or alternatives. These elements are identified in table 3-1, along with the rationale for determination on potential effects. If any element was determined to potentially be impacted, it was carried forward for detailed analysis in this EA. If an element is not present or would not be affected, it was not carried forward for analysis. Table 3-1 also contains other resources that have been considered in this EA. As with the elements of the human environment, if these resources were determined to be potentially affected, they were carried forward for detailed analysis.

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	Determination	Rationale for Determination
Air Resources (including air quality, night skies, and greenhouse gas emissions)	PI	Vegetation treatments have the potential to impact air quality and visibility through the: (1) generation of dust due to increased vehicle and equipment use on dirt roads and in areas of treatment; (2) generation of emissions through vehicle and equipment use; and(3) production of smoke through prescribed fire. This issue is therefore analyzed in detail in this EA. Proposed actions also have the potential to result in minor, short-term adverse impacts to night skies (from generation of fugitive dust and/or smoke), but impacts are not anticipated to provide a short or long-term noticeable effect; night skies has therefore been dismissed from further analysis.
American Indian Resources	PI	Vegetation treatments have the potential to impact American Indian resources through the: (1) removal of traditional use plants; (2) disturbance to traditional cultural properties; and (3) removal or disturbance to traditional use areas, including spirit trees (large trees). This issue is therefore analyzed in detail in this EA.
Areas of Critical Environmental Concern	NP	There are no Areas of Critical Environmental Concern within the project area.
Areas Managed to Maintain Wilderness Characteristics	PI	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. This issue is therefore analyzed in detail in this EA.
Cultural Resources	PI	Vegetation treatments have the potential to impact cultural resources through: (1) direct disturbance or damage to archeological and historic resources during treatment activities; and (2) indirect disturbance through increased vandalism or visitation to sites made more obvious due to treatment activities. This issue is therefore analyzed in detail in this EA.
Environmental Justice	NP	The proposed alternatives would not likely create disproportionately high and adverse human health impacts or environmental effects on minority or low-income populations since there are none in the project area based on a review of available census data.
Farmlands (Prime or Unique)	NP	There are no Prime or Unique farmlands within the project area.
Floodplains	NP	There are no floodplains present within the project area.
Fuels / Fire Management	PI	Vegetation treatments have the potential to impact fire and fuels through: (1) reduction in fuel loading and ladder fuels; (2) changes in fire regime condition class; (3) changes in risk of high intensity wildland fire; and (4) protection of structures in the wildland-urban interface. This issue is therefore analyzed in detail in this EA.

Resource	Determination	Rationale for Determination
Geology / Mineral Resources / Energy Production	NI	Geological resources pertain to geological features or mitigating geological hazards. Locatable minerals and mining claims do occur in the Arizona Strip Field Office portion of the project area, but would not be directly or indirectly affected by proposed actions. The potential for any adverse impacts (such as access to mining claims during implementation, etc.) are addressed through project design features, described in detail in Chapter 2. It has been determined that vegetation management activities proposed in this EA would not alter geological features or mineral resources within the project area.
Invasive, Non-native Species	PI	Vegetation treatments have the potential to change the extent and distribution of invasive species and noxious weeds. This issue is therefore analyzed in detail in this EA.
Lands / Access	NI	The alternatives would not affect the use of existing rights-of-way, land use permits, or other activities in the lands/realty program, or the availability of these uses in the future.
Livestock Grazing	PI	Vegetation treatments have the potential for short-term impacts to the livestock grazing permittees through disruption of their operations on the eight allotments with proposed treatments. A potential for long-term benefits also exists due to increases in palatable forage within these allotments. This issue is therefore analyzed in detail in this EA.
Paleontology	NP	No paleontological resources have been identified within the project area based on a review of available GIS data and professional knowledge of the project area.
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. These impacts would include disruption to those recreating in the immediate vicinity of treatment units. However, proposed vegetation management activities in UMLRP area would not 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	Vegetation treatments have the potential to impact soils through: (1) changes in soil erosion potential; (2) ground disturbance and soil compaction; and (3) disturbance or removal of biological soil crusts. This issue is therefore analyzed in detail in this EA.

Resource	Determination	Rationale for Determination
Threatened, Endangered, and Candidate Species	NI	The California condor is the only listed species with the potential to occur in the project area. The condor is listed as endangered. Critical habitat for this species occurs in California only. In 1996, California condors were re-introduced into Arizona in the Vermilion Cliffs under the Endangered Species Act's 10(j) rule (non-essential experimental). Additional releases of 16 condors occurred in 1998 and 1999, from the Hurricane Cliffs, northeast of Diamond Butte. For Endangered Species Act Section 7 purposes, the species is treated as a proposed species on BLM lands on this portion of the Arizona Strip. As of May 2016, there were 78 condors in the wild in northern Arizona (personal communication, C. Parish, The Peregrine Fund 2016). Condors range widely, easily covering over 100 miles in a day, and their current range includes the entire Arizona Strip, throughout the Grand Canyon, into adjacent Utah and Nevada, and south of the Grand Canyon in Arizona. Condors are most commonly observed near the release site on the Vermilion Cliffs, at Navajo Bridge near Marble Canyon, on the Kaibab Plateau, and the South Rim of the Grand Canyon. This species is a carrion feeder, usually on mammalian carcasses. Condors' diet consists of large, terrestrial mammalian carcasses such as deer, goats, sheep, donkeys, horses, pigs, cougars, bears, or cattle (AGFD 2008). They may fly over and feed on carrion in the project area, although it would be a rare event for condors to occur in this portion of the Arizona Strip. Vegetation treatments would not impact this species because of their lack of use of the project area.
Vegetation, Including Noxious Weeds and Invasive, Non-native Species	PI	Vegetation treatments have the potential to impact sagebrush, pinyon-juniper woodland and ponderosa pine communities through: (1) changes in productivity and species diversity; and (2) changes in overall ecological health and resilience to high-intensity fire, drought, or insect outbreaks. This issue is therefore analyzed in detail in this EA.
Visual Resources	PI	Vegetation treatments have the potential to impact visual resources in the project area through visual changes in: (1) the form of the landscape; (2) diagonal, horizontal, and vertical lines created by vegetation patterns and soils; (3) colors of vegetation and soils; and (4) texture of the landscape. This issue is therefore analyzed in detail in this EA.
Wastes (hazardous or solid)	NP	Hazardous Waste: 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 the project. 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 the project. Solid Wastes: Any trash would be confined in a covered container and hauled to an approved landfill. Burning of waste or oil would not be done. Human waste would be contained and disposed of at an approved sewage treatment facility.
Water Quality (drinking / ground)	NI	The proposed action would not affect water quality within the project area as there are no perennial surface or ground water features within the project area boundaries.

Resource	Determination	Rationale for Determination
Wetlands / Riparian Zones	NI	There are no perennial or intermittent streams in the project area. Riparian and wetland habitat is very limited. There are 66 stock ponds (which are not classified as riparian/wetland habitat), 10 springs or seeps, and 3 ephemeral basins in the project area. There are at least 11 semi-wet (frequent surface saturation) meadows that receive run-off water from surrounding uplands and are natural grass sites. All of the springs flow less than a hundred feet from their sources at rates of 0.5 to 3 gallons per minute and most have been developed for livestock, wildlife, recreation, domestic, and/or administrative use. While proposed actions do have the potential to result in minor, short-term adverse impacts to water resources, these impacts would be minimized through project design features, as described in detail in Chapter 2. Thus, water resources would not be affected in the long term by proposed vegetation management activities in the project area.
Wild Horses and Burros	NP	There are no Wild Horse Management Areas within the project area.
Wild and Scenic Rivers	NP	There are no river segments within the project area that are designated, eligible, or suitable as wild, scenic, or recreational under the Wild and Scenic Rivers Act.
Wilderness	PI	Mechanical or chemical treatments are not proposed to take place in designated wilderness areas. Prescribed fire treatments have the potential to impact wilderness character (untrammeled, undeveloped, naturalness, outstanding opportunities for solitude, and opportunities for primitive and unconfined recreation) within designated wilderness areas. This issue is therefore analyzed in detail in this EA.
Wildlife (including BLM Sensitive Species, Species of Greatest Conservation Need, and Migratory Birds)	PI	Vegetation treatments have the potential to impact wildlife populations and habitat in the project area through: (1) direct disturbance to species during treatments (including disruption of foraging, migration, and reproductive behavior as well as injury/mortality to individuals); (2) disturbance to habitat during or as a result of treatments; and (3) short- and long-term changes in habitat quantity and quality as a result of treatments. This issue is therefore analyzed in detail in this EA.

3.3 Resources Brought Forward for Analysis

3.3.1 Air Resources (Including Greenhouse Gas Emissions)

This section describes existing air resources (air quality and climate change) in the project area that will be the basis for evaluating impacts in Chapter 4. The description is based on the review and compilation of available data obtained from the Environmental Protection Agency (EPA), National Park Service (NPS), and the United States Geological Survey (USGS).

3.3.1.1 Air Quality

The two dominant weather patterns affecting the project area are high pressure Mojave Desert/Great Basin climate patterns during fall, winter, and spring, with a large monsoon pattern during the summer. Weather and climate are integral to the air quality because of factors such as humidity, temperature patterns, and wind patterns, all of which can produce water vapor, aerosols, and dust particulates. Air quality for the project area is best compared using the nearest NPS

Interagency Monitoring of Protected Visual Environments program air quality station, GRCA2, located above the rim at Grand Canyon National Park, at Hance Camp, 57 miles to the southeast.

National Ambient Air Quality Standards

The EPA enacted regulations in response to the authority provided under the Clean Air Act requiring monitoring, controlling, and documenting activities that would affect ambient air concentrations of certain pollutants that may endanger public health or welfare. Geographic areas commonly referred to as airsheds, which may not coincide with political boundaries, are designated attainment, non-attainment, or unclassified areas for each of the six criteria pollutants covered by the National Ambient Air Quality Standards (NAAQS). These pollutants are carbon monoxide, lead, nitrogen dioxide (NO_2), particulate matter with a nominal aerodynamic diameter of less than 10 micrometers (PM_{10}) and fine particulates with a nominal aerodynamic diameter of less than 2.5 micrometers ($PM_{2.5}$), ozone, and sulfur dioxide. These standards are defined in terms of threshold concentration (e.g., milligrams per cubic meter, micrograms per cubic meter, or parts per million) measured as an average for specified periods (averaging times).

The NAAQS were set at levels to provide an ample margin of safety to protect both public health and the environment. The primary standards are "health effects" standards and were adopted to protect public health, including "sensitive" populations such as asthmatics, children, and the elderly. The secondary standards are "quality of life standards" and were adopted to protect public welfare against decreased visibility as well as damage to animals, crops, vegetation, and buildings. The secondary standards are the same as, or less stringent than, the primary standards.

Areas in which levels of a criteria pollutant measure below the NAAQS are designated "attainment" areas. However, when a designated air quality area within a state exceeds the NAAQS, that area may be designated a "non-attainment" area. Typically, non-attainment areas are urban regions and/or areas with higher-density industrial development. The given status of an area is designated separately for each criteria pollutant; one area may have all three classifications. The project area is located in Mohave County, Arizona, which is designated as being in attainment for all criteria pollutants as defined under the EPA NAAQS.

CLASS I and CLASS II Areas

Clean air designations were established under the Clean Air Act, Prevention of Significant Deterioration of Air Quality. Designation as a Class I area allows only very small increments of new pollution above already existing air pollution levels. Specific provisions are included in federal, state, and county air quality regulations to preserve the pristine air quality in Class I areas. Class I areas include national parks larger than 6,000 acres and wilderness areas larger than 5,000 acres that existed before August 1977.

Class II designation is applied to all other clean air areas that are in attainment of the NAAQS, where development is permitted under the authority of the state. However, certain areas deserving of preservation, established by the Wilderness Act of 1964, may be designated Class II "Wilderness." State or county requirements or permitting policies may be enacted to protect air quality in these areas. Except for fires and wind erosion, the potential for adverse air quality impacts is from human-caused pollutants transported into these areas by gradient and/or local winds.

The project area is designated as Class II for criteria pollutants. One federally designated Class I area, Grand Canyon National Park, borders the project area on the south and several Class I National Park airsheds lie to the north (Zion and Bryce Canyon).

Existing Air Quality

The existing air quality in the project area is typical of undeveloped regions in the western United States. The entire project area has been designated as either attainment (meets national air quality standards) or unclassified for all pollutants. Air quality in the project area is generally good, although regional haze can impair vistas, and ozone levels are slightly above natural levels in the summer months. Exceptions include short-term pollution resulting from vehicular traffic and wildland fires. Regional haze is most common in the summer, blown in from metropolitan areas south and west of the project area, such as the San Joaquin Valley and Los Angeles, California; Las Vegas, Nevada; and Phoenix, Arizona. In the winter, northerly airflows transport clear, clean air into the project area. Emissions from prescribed burns, wildland fires, and the burning of vegetation on private lands cause localized air pollution due to the release of particles and gases. Fugitive dust is generated by the erosive force of winds blowing across the area, mainly coming from disturbed areas such as roads or recent burns. Fugitive dust is not included in air quality evaluations.

Data collected in and around the project area is limited. Air quality parameters, in terms of NAAQS, are not currently being monitored within the project area, although several special studies have been conducted adjacent to it. Routine monitoring is carried out in Grand Canyon National Park and recently began in Meadview (Lake Mead National Recreation Area) and Zion National Park. Areas with limited ambient air quality data typically indicate that ambient pollutant levels are usually near or below detection limits. Locations vulnerable to decreasing air quality include the areas immediately surrounding surface-disturbing activities, such as energy and mineral development projects, farm tilling, and local population centers affected by residential emissions, none of which occur in or near the project area. Existing practices for managing air quality consist mainly of conducting prescribed burns during favorable wind conditions (e.g., when winds are blowing away from Class I lands).

3.3.1.1.1 Resource Condition Indicators

Measurement indicators used to analyze this issue are:

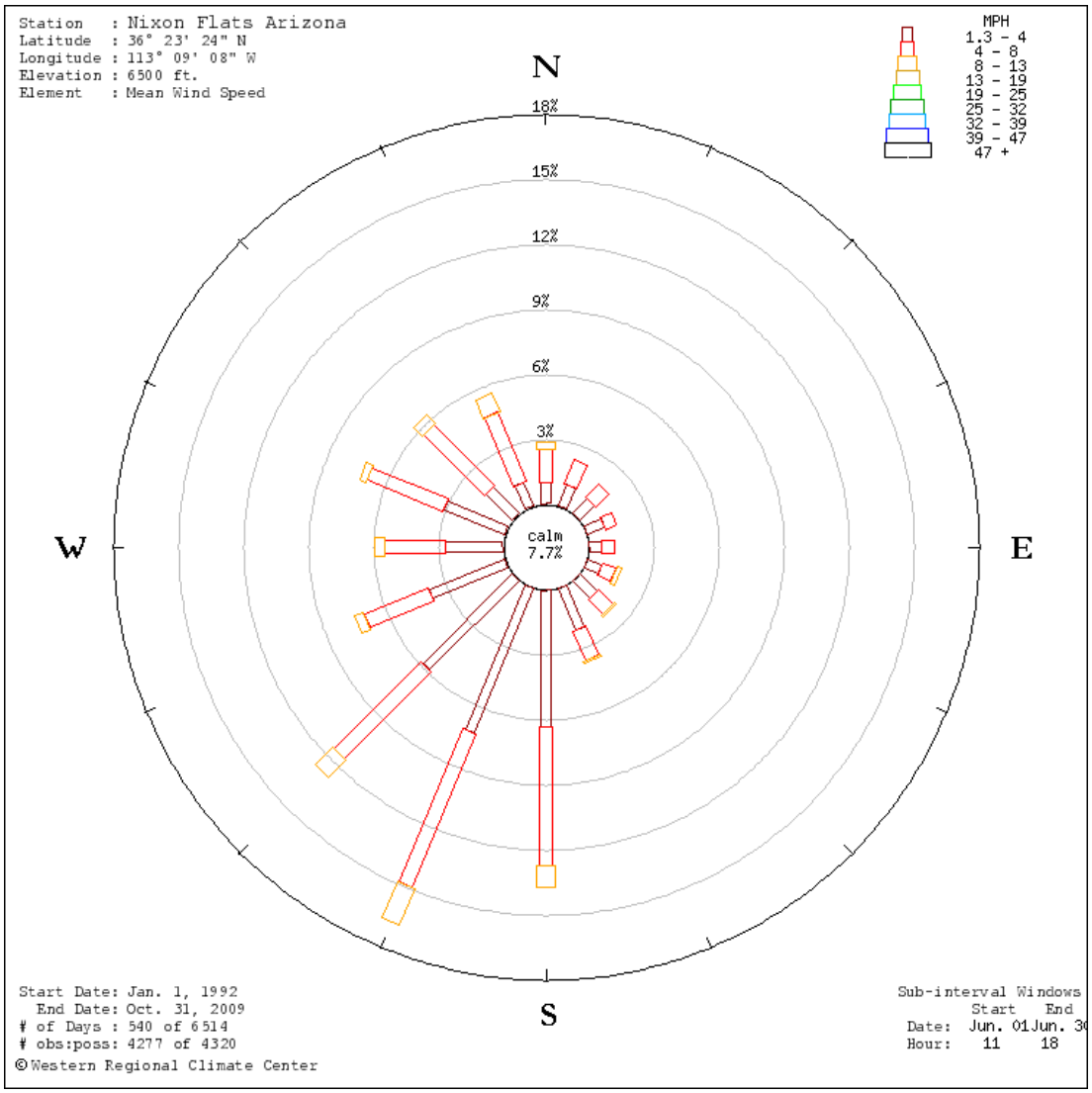
- Quantity of particulates and aerosols in the air.
- Acres of treatments, particularly burning, and proximity to private land.
- Comparison of measured and/or modeled air pollutant concentrations with applicable thresholds (i.e., NAAQS).

3.3.1.2 Climate and Meteorology

The project area is located in northwestern Arizona. Northwestern Arizona has four defined seasons (summer, fall, winter, and spring) and is at much higher elevation than the lower desert regions in southern Arizona, with an appreciably cooler climate that consists of cold winters and relatively mild summers. Air temperatures vary considerably both diurnally and annually throughout the area and can vary greatly depending on elevation. During summer, the average air temperature in degrees Fahrenheit (°F) ranges from the mid-40s to the mid-70s, with highs reaching the low 100s. In comparison, the average minimum temperature in winter generally ranges from the mid to high teens to the high 30s, with the average maximum temperature reaching the high 50s and low 60s. Cold air systems originating in the northern United States and Canada occasionally make their way into Arizona, bringing temperatures below 0 °F to the northern portions of the state. Several climatic elements have an impact on air quality. These elements include winds, temperature, and precipitation.

Precipitation amounts tend to be highest in the winter months, ranging from approximately 7.25 inches (Potato Valley Watershed, Mohave County, Arizona) to 4.32 inches (Upper Toroweep Valley Watershed, Mohave County, Arizona), and lowest in the spring months, ranging from 4.45 inches (Potato Valley Watershed, Mohave County, Arizona) to 2.20 inches (Upper Toroweep Valley Watershed, Mohave County, Arizona) (source: NOAA Advanced Hydrologic Prediction Service).

Figure 3-1 displays the wind rose[2] from the Nixon Flats remote automatic weather station (RAWS), located within the project area. It shows that the prevailing winds are from the southwest to northwest during June, which is also true for late spring, summer, and into the fall. This is when the proposed project work would most likely be done.



[2] A wind rose is a graphic tool used by meteorologists to give a succinct view of how wind speed and direction are typically distributed at a particular location. The modern *wind rose* shows the frequency of winds blowing from particular directions over a specified period; the length of each "spoke" around the circle is related to the frequency that the *wind* blows from a particular direction per unit time.

Figure 3-1. Nixon Flats RAWS Wind Rose

Global Climate Change

Climate change is a global phenomenon that is thought to result from a combination of several causes including solar activity and global GHG emissions. GHGs include water vapor, carbon dioxide, nitrous oxide, methane, and carbon monoxide. There are more sources and actions emitting GHGs (in terms of both absolute numbers and types) than are typically encountered when evaluating the emissions of other pollutants. These emissions are often categorized as either anthropogenic (human-caused) or non-anthropogenic (naturally occurring). From a quantitative perspective, there is no single dominating anthropogenic source and fewer sources that would even be close to dominating total GHG emissions. The global climate change problem is much more the result of numerous and varied sources, each of which might seem to make a relatively small addition to global atmospheric GHG concentrations. Currently, there are no sites within the project area that are collecting ambient GHG data.

Projected climate change impacts include air temperature increases and decreases; sea level rise; changes in the timing, location, and quantity of precipitation; and increased frequency of extreme weather events such as heat waves, droughts, and floods. These changes would vary regionally and affect renewable resources, aquatic and terrestrial ecosystems, and agriculture. While uncertainties would remain regarding the timing and magnitude of climate change impacts, computer models predict that continued increases in GHG emissions could lead to increased climate change.

The proposed alternatives would be a minute source of carbon dioxide (CO_2) and other GHGs, which would have a negligible effect on local, regional, and global climate change. This analysis is unable to identify the specific impacts of the proposed alternatives' GHGs on global warming and climate change because there is insufficient information, and there are numerous models that produce widely divergent results. Therefore, it is difficult to state with any certainty what impacts may result from GHG emissions, or to what extent the proposed alternatives could contribute to those climate change impacts.

Good sources of local climate data for the project area are the 13 Arizona Strip RAWS that read temperatures and precipitation once per every hour of the day. The data are compiled by the Western Regional Climate Center in Reno, Nevada. Installation of the RAWS began in the late 1980s, with the last ones coming on line in the late 1990s, so they show only recent climate trends. Two of them, Mount Logan (elevation 7,600 feet) and Nixon Flats (elevation 6,500 feet), are within the project area, close to the center. They are about 3.9 linear miles apart. The others are from 8 to 70 linear miles from the project area at elevations ranging from 2,900 feet at Olaf Knolls to 7,235 feet at Paria Point.

3.3.1.2.1 Resource Condition Indicators

Measurement indicators used to analyze this issue are:

- Quantity of GHG emissions emitted under each alternative.
- Potential changes in carbon sequestration based on alternative vegetation treatment type.

3.3.2 American Indian Resources

The Arizona Strip Field Office and Grand Canyon-Parashant National Monument regularly seek input on proposed actions from 36 entities, representing 18 different federally recognized tribes.

The following discussion and analysis is based solely on information supplied by these tribes during the current ongoing consultation and previous consultations.

Historically, the Uinkaret Band of Southern Paiutes resided in the project area until sometime after 1873. It is not known exactly when or why Uinkaret Band members left the area, or which families are associated with this group, but we do know they are presently associated with both the Shivwits and Kaibab Bands.

While there are no official traditional cultural properties located in or near the project area, Lava Trails and Mount Trumbull are traditional tobacco gathering locations. A number of specific resources in the project area are also identified as having value and include pine nuts and sap, cliff rose bark, willows, sage, cacti, yuccas, milkweed, primrose, teas (mullen and mint), rabbit brush, cattail, dogbane, creosote, various wheat, currant, and sumac. In addition, two specific resources were identified as deserving special focus: Indian tobacco and old-growth trees (100 years and older).

Mount Trumbull is an important location to many American Indian tribes, serving as both a physical and cosmological landmark. Located on the north rim of the western end of the Grand Canyon, it towers above one of the few known historic cross-canyon trails on this end of the canyon (Lava Falls/Shivwits Crossing), and figures prominently in the Southern Paiute Salt Song, helping to guide spirits on their final journey.

3.3.2.1 Resource Condition Indicators

- Proximity of traditional use areas, concentrations of traditional use plants, and traditional cultural properties to proposed treatments.
- Likelihood of concurrent or overlapping timing of traditional activity with proposed treatments and the potential for noise or visual disruptions.
- Number of (or acres of) key plants, spirit trees, or other traditional use items with potential to be removed or damaged by proposed treatments.
- Manner and degree to which the resource or asset would be degraded or consumed by proposed treatments.

3.3.3 Areas Managed to Maintain Wilderness Characteristics

There are 9,309 acres of federal land within the UMLRP area that possess wilderness characteristics (naturalness, outstanding opportunities for solitude and primitive recreation) but not designated as wilderness by Congress that are managed to maintain these wilderness characteristics. These acres of areas managed to maintain wilderness characteristics are all within the Death Valley Spring Unit, within Grand Canyon-Parashant National Monument (Figure 3-2). The Grand Canyon-Parashant National Monument RMP (BLM 2008a) provides direction for managing these areas.

3.3.3.1 Resource Condition Indicators

Measurement indicators that will be used to analyze this issue are:

- Acres of treatments in areas managed to maintain wilderness characteristics.
- Qualitative assessment of the potential changes in wilderness characteristics from proposed treatments.

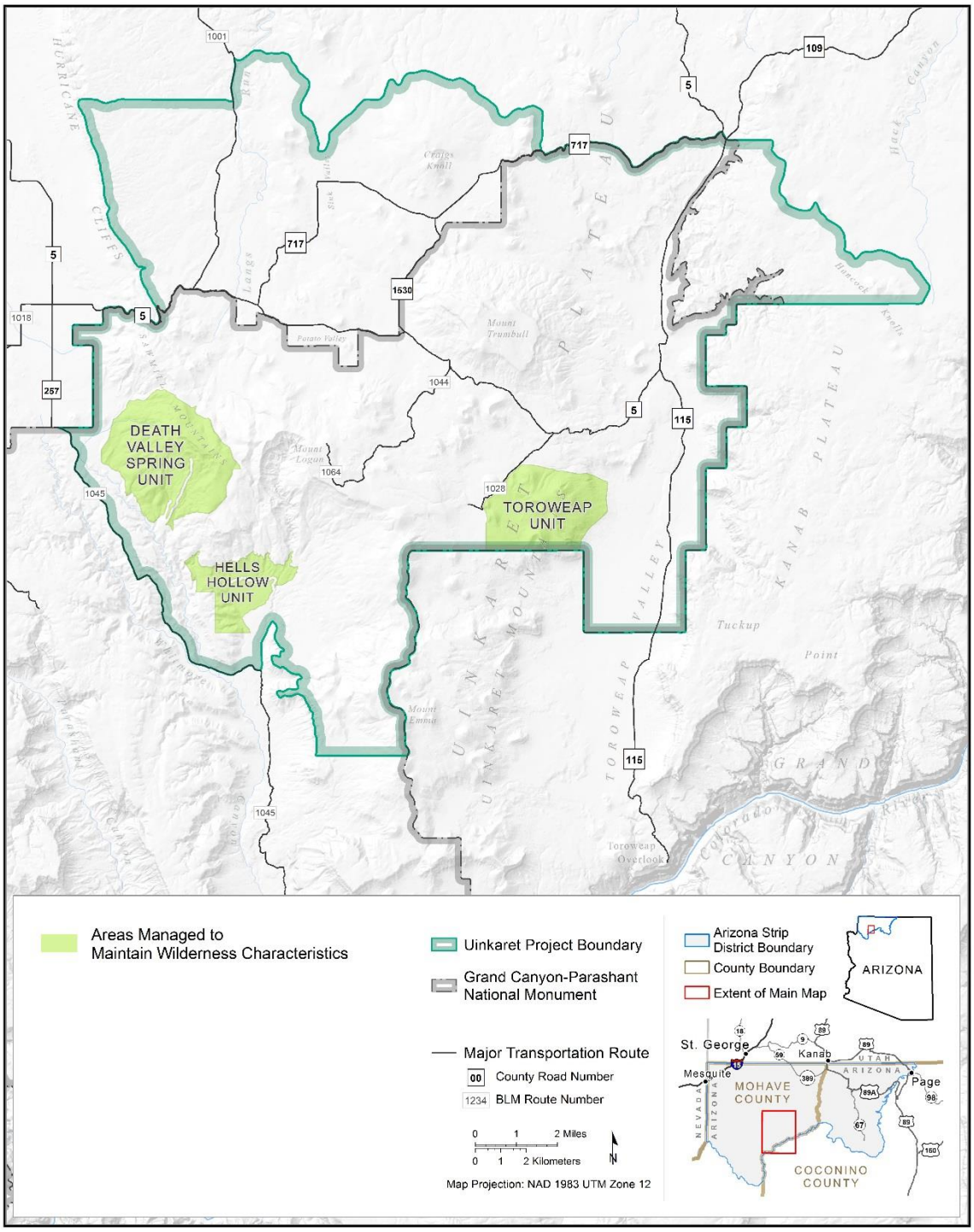


Figure 3-2. Areas Managed to Maintain Wilderness Character in the Project Area

3.3.4 Cultural Resources

Cultural resources include all evidence of past human activity more than 50 years old and any current use and knowledge of a given area by American Indians. It is a very broad category of resources that include everything from prehistoric pottery and arrowheads, to historic corrals, fences, tree stumps, holes dug into the ground, and oral interviews with living people. Any physical remnant of past human behavior is a unique, fragile, and irreplaceable resource, that once destroyed or lost, would become a hole in the jigsaw puzzle of our understanding of the human experience at a given place and time.

The BLM (and the agency's National Conservation Lands System) is guided in their management of cultural resources by a number of federal laws, departmental and bureau policies, and executive orders (see Section 1.6 of this EA).

Cultural Setting

All evidence indicates that the project area has been occupied, though at widely varying population levels, beginning after 7,000 B.C.E[3] and continuing through the modern day. While there is no evidence that people visited the project area during the earliest human exploration of the continent (12,000 to 7,000 B.C.E), the single documented projectile point from this time period on the Arizona Strip was found in a tributary to the Virgin River Gorge, roughly 50 miles to the northwest of the UMLRP area. While yet unproven, it is entirely possible the project area was visited as early as 12,000 B.C.E.

The earliest evidence for human use of the project area dates to roughly 6,000 to 5,000 B.C.E., a time that falls within the Archaic Period. The Archaic Period represents a long time span (approximately 7,000 B.C.E. to 500 C.E.[4]) in which the large animals of the earlier Paleo-Indian period have succumbed to climatic changes, and human populations were beginning to rely on more modern animals and increasingly on plants as the glaciers receded and large lakes and marshes were left in their wake.

Beginning around 100 to 300 C.E., the introduction of corn, beans, and squash, along with ceramic technology, led to populations becoming more settled, larger, and more geographically diverse as social forms were created and abandoned to deal with changing social pressures.

The Protohistoric Period (1300 to 1540 C.E.) is very poorly understood throughout the Southwest, and is represented locally by questions surrounding the Southern Paiute populations. Due to environmental changes occurring at a time of maximum population levels, the Formative archaeological cultures began to break down and either abandoned the settled, agricultural way of life, or physically abandoned large areas of the Southwest to aggregate in a smaller number of locations that essentially became towns and cities by the time of the Spanish Entrada in 1539 C.E.

The Historic Period in the Southwest begins with Spanish Conquistador Coronado's exploration of the American Southwest around 1540 C.E. and continues to this day. Though undoubtedly the local indigenous groups of the project area were impacted by the Europeans long before they ever encountered them, due to the incredible remoteness of the Mount Trumbull region, it was not until well into the 1800s that the first non-indigenous settlers set foot in the project area. The

[3] Before the Common Era, has replaced B.C. (Before Christ)
[4] Common Era, has replaced A.D. (Anno Domini)

primary historic presence in the project area was due to nearby homesteading, and harvesting of the ponderosa pine trees on Mount Trumbull.

Identification of Prehistoric and Historic Resources

A complete records search for the project area (Class I Inventory) was conducted using the site files and maps of the Arizona Strip Field Office and the GIS and relational databases of Grand Canyon-Parashant National Monument. All documented previous inventories and recorded sites were used as the dataset to derive the following information. Table 3-2 lists the total area inventoried and the total number of sites for each vegetation community in the dataset. Figure 3-3 shows the vegetation community and inventoried areas within each vegetation community.

Table 3-2. Total Area, Area Inventoried, and Number of Sites by Vegetation Community

Vegetation Zone	Total Area mile	Inventoried mile	Percent Inventoried	Number of Sites
Ponderosa	65.93	28.11	42.64	245
Pinyon-Juniper	327.78	30.32	9.25	335
Sagebrush	99.56	4.87	4.89	31
Total	**493.27**	**63.3**	**12.83**	**611**

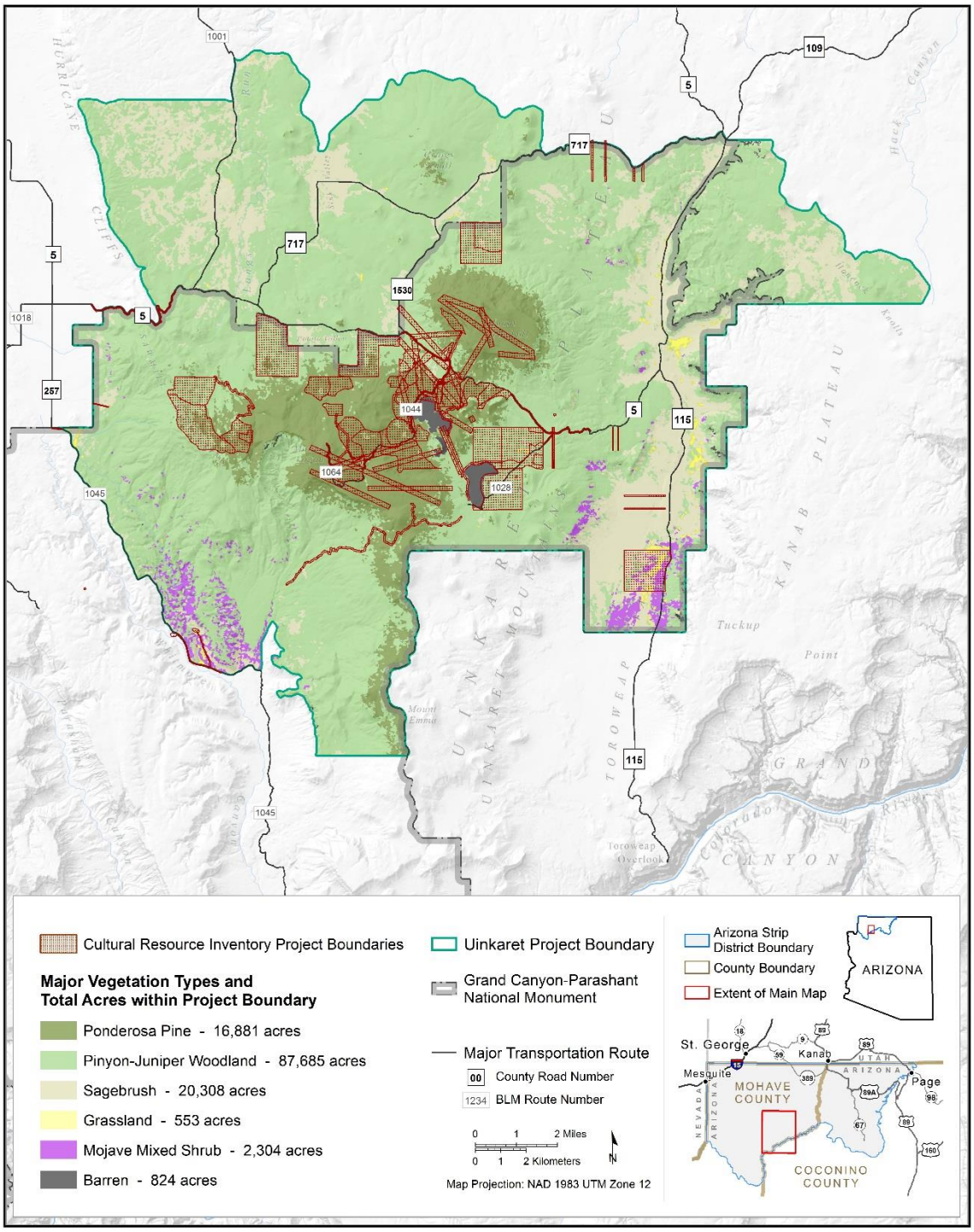


Figure 3-3. Inventoried Areas within Vegetation Communities

The National Register of Historic Places

Not all cultural resources are equal in terms of the amount of information that they are likely to yield, a concept embraced by the term data potential. This concept is the cornerstone of determining whether any particular resource is eligible to be listed on the National Register of Historic Places (NRHP). Other criteria that could make a resource eligible for the NRHP are: association with events important in our history, association with important historical people, or its importance as representative of a certain style, work of a master, or high artistic value. None of the sites within the project area would currently qualify under any of the criteria except the data potential criterion.

Within the project area, there are currently no properties officially listed on the NRHP. Table 3-3 lists the number of sites considered Potentially Eligible, Ineligible, and Unevaluated, divided by vegetation community within the project area.

Table 3-3. Eligibility of Cultural Resources by Vegetation Community

NRHP	Potentially Eligible Sites	Ineligible Sites	Unevaluated Sites	Total All Sites
Ponderosa	88	36	121	**245**
%	35.92	14.69	49.39	
Pinyon-Juniper	185	25	125	**335**
%	55.22	7.46	37.31	
Sagebrush	8	4	20	**32**
%	25.00	12.50	62.50	
Totals	**273**	**61**	**246**	**580**
%	**47.07%**	**10.52%**	**42.41%**	

While it would be impossible to know the current condition of all cultural resources within the project area, site recording forms request that the information be documented. Table 3-4 lists the impact level of sites in the previously inventoried areas (by vegetation community) within the project area. The overwhelming majority of the sites in the project area appear to be in very good condition. The exception to this pattern, however, is in the sagebrush vegetation community where there appear to be a number of moderately impacted sites. While the very small sample size from this vegetation community most likely influences (at least in part) the unexpected numbers, it could also reflect a greater level of focus of past land-management actions, or greater use by the public.

Table 3-4. Site Conditions Among the Three Vegetation Communities

	"Pristine"	<25% Impacted	25%-50% Impacted	>50% Impacted	Unknown
Ponderosa	188	29	13	0	15
%	76.73	11.84	5.31	0.00	6.12
Pinyon-Juniper	191	59	45	18	22
%	57.01	17.61	13.43	5.37	6.57
Sagebrush	10	4	6	1	11
%	31.25	12.50	18.75	3.13	34.38
Total	**389**	**92**	**64**	**19**	**48**
%	**63.56**	**15.03**	**10.46**	**3.10**	**7.84**

3.3.4.1 Resource Condition Indicators

Cultural resource condition indicators include:

- The number of known prehistoric and historic sites to be affected and number of acres to be disturbed by treatments.
- Changes in settings or visual qualities that contribute to the integrity of cultural resource sites (evaluated qualitatively) and the degree to which the settings or visual qualities of these sites may return post-treatment.

3.3.5 Designated Wilderness

Permanent wilderness protection for federal lands comes only through congressional action that creates "statutory" or "designated" wilderness areas. Such lands are managed under the mandates of the Wilderness Act of 1964 [16 U.S.C. 1131–1136] and any special management instructions that Congress may include in the specific legislation that "designates" specific wilderness areas. The Wilderness Act dictates that wilderness areas are managed to protect and preserve their "wilderness character."

Wilderness character is defined (from Section 2(c) of the Wilderness Act) by:

- **Untrammeled:** Wilderness is "an area where the earth and its community of life are untrammeled by man, where man is a visitor who does not remain."
- **Naturalness:** Wilderness is an area that "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable" and "is protected and managed so as to preserve its natural conditions."
- **Undeveloped:** Wilderness is "an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, "where man himself is a visitor who does not remain."
- **Outstanding Opportunities for Solitude:** Wilderness has "outstanding opportunities for solitude" (i.e., conditions favorable for avoiding the sights, sounds, and evidence of other people in the area or for attaining a state of being alone or remote from others)
- **Outstanding Opportunities for a Primitive and Unconfined Type of Recreation:** Wilderness provides situations favorable for non-motorized, non-mechanized, and undeveloped types of recreation activities.

There are two wilderness areas within the project area: Mount Trumbull Wilderness and Mount Logan Wilderness, both designated under the Arizona Wilderness Act of 1984 (see Figure 3-4).

These two wilderness areas provide a standard of solitude and naturalness that ranges from good to outstanding. They contain little evidence of surface disturbance, other than former vehicle ways, past livestock grazing, and timber harvesting activities. Federal lands within wilderness areas are closed to mineral entry, subject to valid existing rights. No valid mineral discoveries have been documented in either of these wilderness areas.

Mount Trumbull Wilderness

The Mount Trumbull Wilderness is managed in accordance with the Mount Trumbull – Mount Logan Wilderness Management Plan (BLM 1990), and covers approximately 7,903 acres. The wilderness lies 40 miles south of Colorado City, Arizona, just north of the Grand Canyon in Mohave County, Arizona. Located at the southern end of the Uinkaret Plateau and part of the Uinkaret Mountains, Mount Trumbull is a large, basalt-capped mesa with slopes dominated by pinyon pine and juniper trees interspersed with groves of aspen and Gambel oak. The summit or the plateau is covered with ponderosa pine. These vegetation communities provide homes for mule deer, wild turkey, and the Kaibab squirrel. Recreation opportunities include day hiking, watching and hunting wildlife, and photography.

Mount Logan Wilderness

The Mount Logan Wilderness is also managed in accordance with the Mount Trumbull – Mount Logan Wilderness Management Plan (BLM 1990), and covers approximately 14,680 acres. The wilderness lies 45 miles south of Colorado City, Arizona, just north of the Grand Canyon in Mohave County, Arizona. Mount Logan is an area of interesting volcanic activity. It includes basalt ledges, cinder cones, ponderosa pine forests, pinyon-juniper woodlands, and a large, colorful, naturally eroded amphitheater known as Hells Hole. The area provides habitat for deer, wild turkey, and the Kaibab squirrel. Hiking, camping, scenic vistas, watching wildlife, and hunting are some of the prime recreational opportunities found in this wilderness.

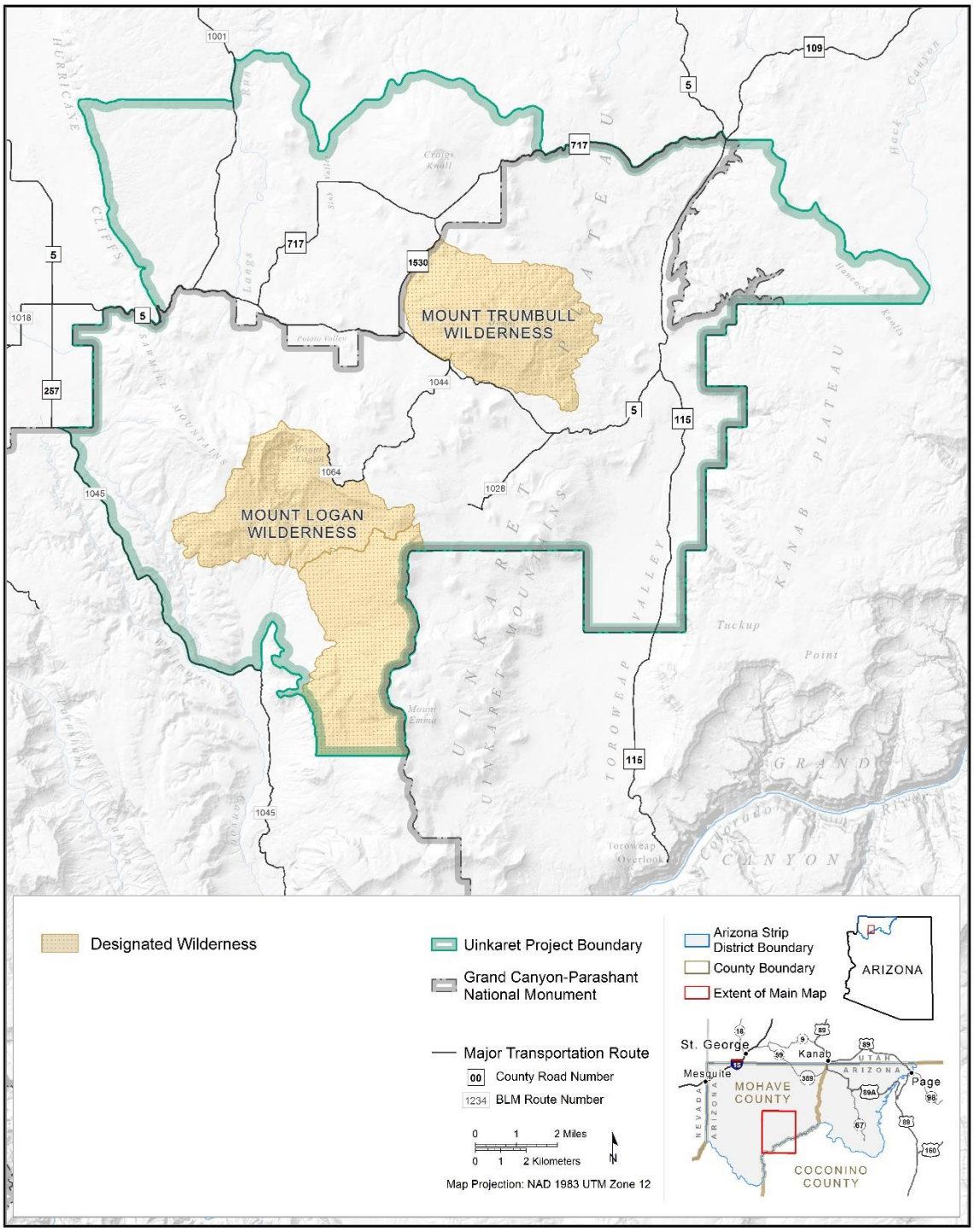


Figure 3-4. Designated Wilderness within the Project Area

3.3.5.1 Resource Condition Indicators

Measurement indicators used to analyze this issue are:

- Acres of treatments in designated wilderness.
- Qualitative assessment of the potential changes in wilderness character due to proposed treatments.

3.3.6 Fire and Fuels

Wildland Fire and Fuels Management

The areas within and surrounding the UMLRP area have a large potential for moderate to high-intensity wildfires in many places, as demonstrated by past fire history and deviation from historic fire regimes. Fire suppression, wildland fire use, and fuels treatments, including prescribed fire, mechanical, manual, chemical, and biological treatments, are based on goals, objectives, and strategies described in the most current FMP.

Fire History in the Project Area

Across the western United States, years of restricting wildfire has created over-dense fuels in ponderosa pine forests, pinyon-juniper woodlands, and sagebrush-grassland communities with closed canopies, high amounts of litter, and continuous fuel beds.

Over-dense vegetation communities exhibit a greatly reduced energy flow and nutrient cycling. Little sunlight reaches the ground, so almost no herbaceous vegetation can survive. This condition often locks up nutrients in the above-ground biomass and makes them unavailable for plant growth.

Under normal conditions, frequent, low-intensity fires fueled primarily by grass and woody plants moved across the ground, but generally did not climb into the canopy. With high quantities of continuous fuels connecting the ground surface to the canopy, today's fire-adapted vegetation communities are susceptible to unnatural high-severity fire effects.

This over-dense condition creates situations where large wildfires can threaten human lives and property and have large impacts on natural resources.

The frequent, low-intensity fire regime that naturally occurred in southwestern ponderosa pine forests (Covington et al. 1999), pinyon-juniper woodlands, and sagebrush-grassland communities was disrupted when European-American settlers arrived in the area and began implementing their land use practices in the late 1800s and early 1900s. Grazing removed fine fuels that carry fire, and logging altered the structure of forests. Fire suppression reduced the number of acres burned and altered the vegetative composition. As a result, many of these plant communities in the Southwest are functioning outside of the range of natural variability and are in poor ecological condition.

Since 1980, approximately 12 wildfires have occurred annually within the project area, burning an average of 267 acres per year. The number of wildfires and acres burned has trended higher since 1998.

Table 3-5 provides the number of fires and acres burned each year from 1980 to 2015. Lightning is the most common cause of fires. Most wildfires burned between May and September, with the

number of starts peaking between July and August, and the greatest number of acres burned in June and July. Acreage numbers provided were generated as actual acres burned.

Table 3-5. Wildfires and Acres Burned in the Project Area from 1980 through 2015

Year	Number of Fires	Acres Burned	Year	Number of Fires	Acres Burned
1980	5	0.5	1998	16	1,211.1
1981	21	13.2	1999	15	201.6
1982	11	9.7	2000	34	1,049.7
1983	6	0.6	2001	14	369.4
1984	11	243.8	2002	20	921.5
1985	6	10.7	2003	19	2.9
1986	14	14.3	2004	22	2.5
1987	8	7.1	2005	5	0.7
1988	11	55	2006	22	276.7
1989	12	123	2007	11	3.7
1990	8	1.7	2008	4	1
1991	8	2.4	2009	5	474.2
1992	5	1.5	2010	9	15.8
1993	2	1.6	2011	5	631.6
1994	16	66.9	2012	4	3,202.1
1995	6	0.4	2013	4	1
1996	26	51.4	2014	6	298.2
1997	13	109	2015	3	5,560.1

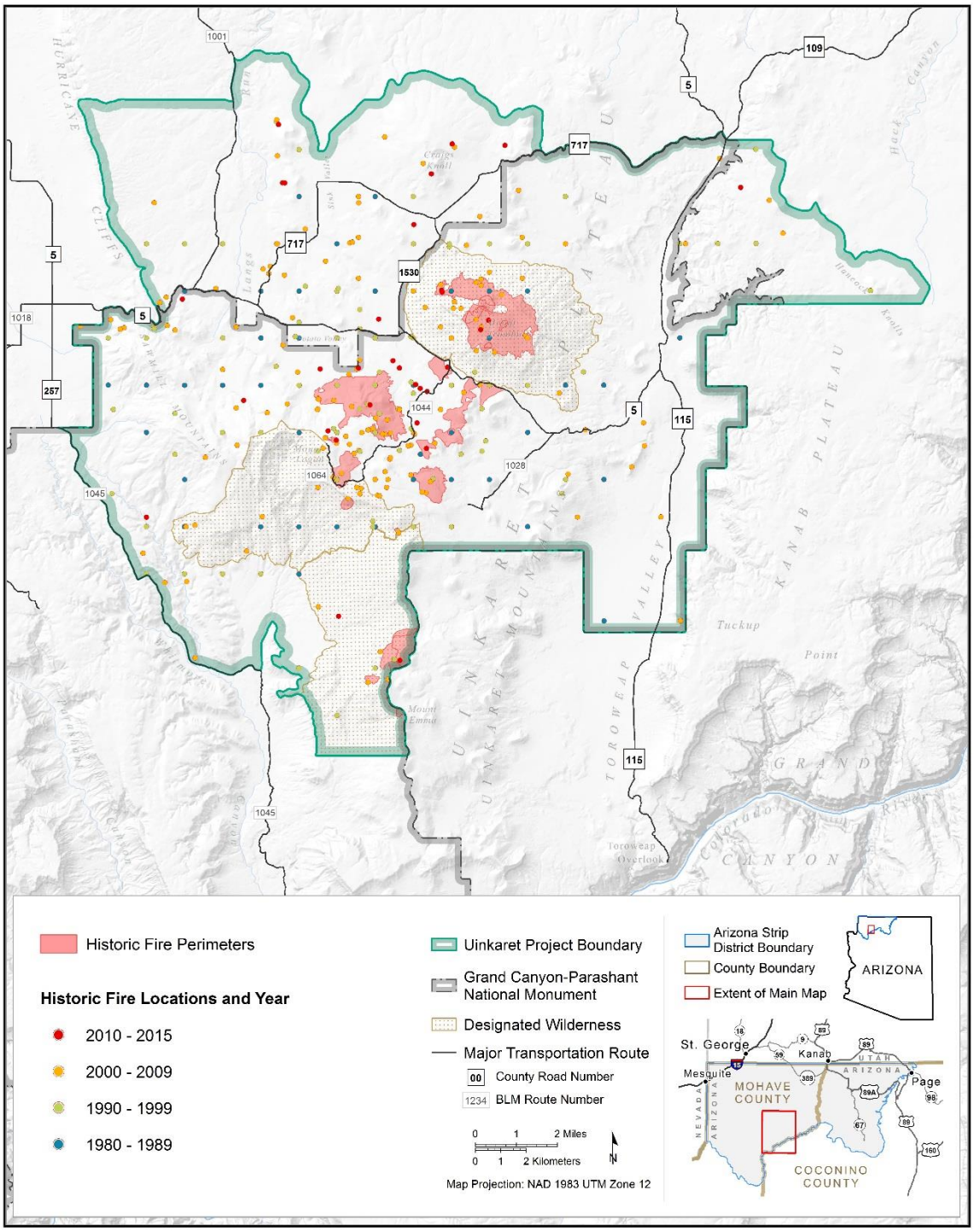


Figure 3-5. Fire History in the Project Area

3.3.6.1 Fire Regimes and Fire Condition Classes in the Project Area

Fire Regime Condition Class (FRCC) is an interagency, standardized tool for determining the degree of ecological departure from historical, or reference condition, vegetation, fuels, and disturbance regimes. Assessing FRCC can help guide management objectives and set priorities for treatments.

Describing ecological status and trends are common components of natural resource evaluation. Within the discipline of fire ecology, relationships between natural disturbances and resulting vegetation patterns are used to inform current conditions and management opportunities. Developed in 2002, FRCC provides an assessment tool for understanding historical reference landscapes, current conditions, and ecological departure.

FRCC leans heavily on the concept of reference conditions to define pre-settlement landscapes. Reference conditions, developed through academic modeling workshops, describe historical seral stages, vegetation patterns, and fire regimes. These in turn become the baseline against which current conditions are compared. Fire regimes are grouped as shown in Table 3-6.

Table 3-6. Fire Regime Groups

Fire Regime Group	Frequency	Severity
I	0 – 35 years	Low to mixed
II	0 – 35 years	Replacement
III	35 – 200 years	Low to mixed
IV	35 – 200 years	Replacement
V	200+ years	Replacement / any severity

Fire regimes have been defined in terms of fire frequency, severity, stand effects, soil effects, landscape spatial patterns, seasons of occurrence, fire causation, and other descriptors. However, fire frequency and severity are the most common traits studied by ecologists and used by land managers. For example, fire regime classifications often include a wide range of types, from frequent, low-severity fires (usually of low fireline intensity, which has little effect on soil heating or overstory vegetation) to infrequent, high-severity fires (a fire that has strong ecosystem effects, such as complete canopy mortality or extensive soil heating).

During the past 100 years or more, some long-established fire regimes, particularly the low- and mixed-severity types, have often shifted toward a pattern of more severe fires as a result of land management practices and possibly climate change (Smith 2000).

Individual fires can vary greatly in severity, and the specific effects and risks caused by a fire would depend on the specifics of its fire regime. As shown in Table 3-7, the BLM identified five fire regimes that occur in the UMLRP area.

Table 3-7. Natural Fire Regime Groups in the Project Area

Fire Regime Group	Severity Description	Number of Acres in Project Area
I	Generally low-severity fires replacing less than 25 percent of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75 percent of the overstory.	16,814
II	High-severity fires replacing greater than 75 percent of the dominant overstory vegetation.	116
III	Generally mixed-severity; can also include low-severity fires.	97,745
IV	High-severity fires.	7,496
V	Generally replacement-severity; can include any severity type in this frequency range.	5,644

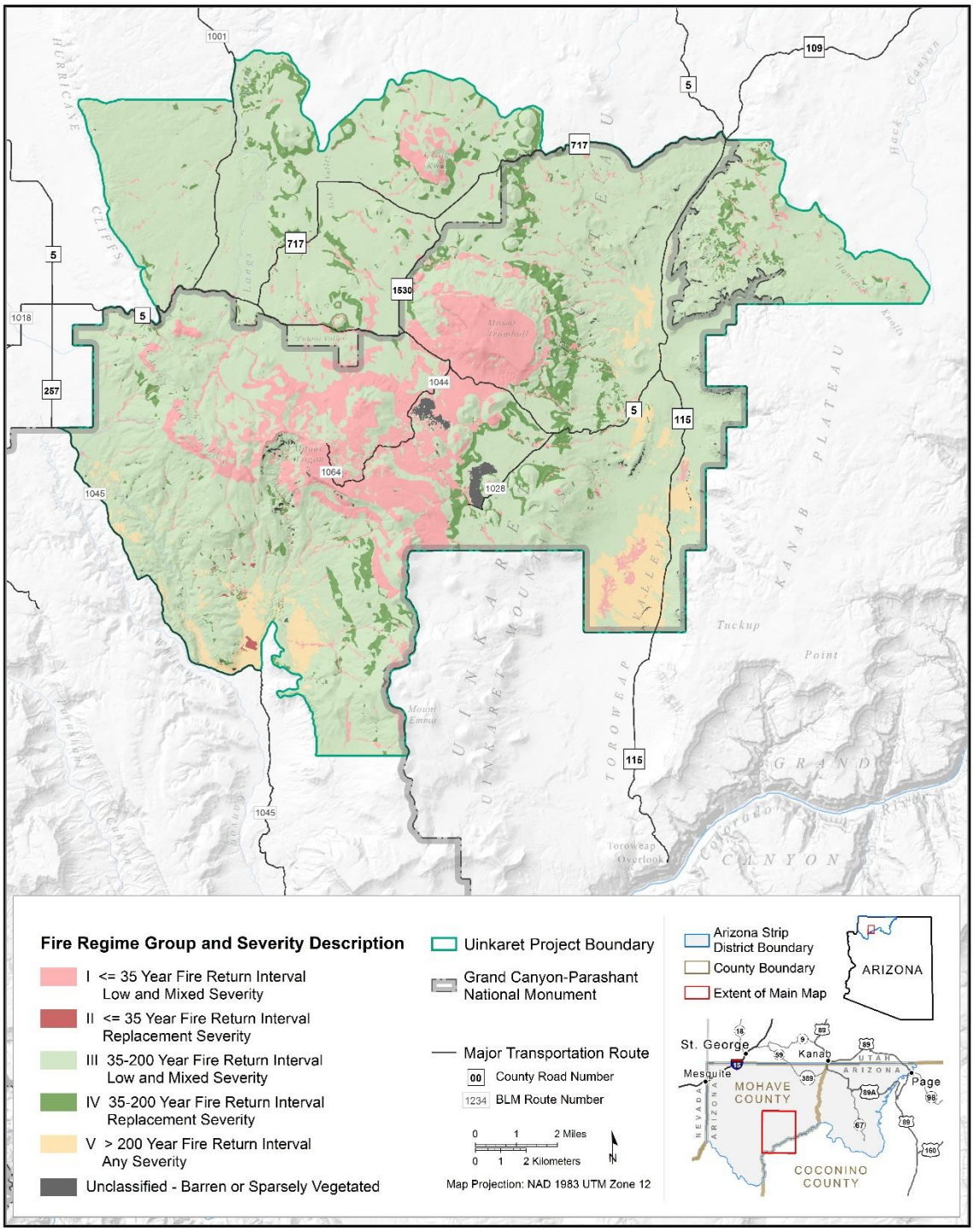


Figure 3-6. Natural Fire Regime Groups in the Project Area

FRCC uses three condition classes to describe low departure (FRCC 1), moderate departure (FRCC 2), and high departure (FRCC 3). This departure results from changes to one or more of the following ecological components: vegetation characteristics, including species composition, structural stage, and canopy cover, and spatial fire regime characteristics, including fire frequency and severity (Hann and Bunnell 2001; Schmidt et al. 2002; Hardy et al. 2001; Hann et al. 2004).

Simply put, FRCC assessments determine how similar a landscape's fire regime is to its natural or historical state. Fire regime condition classes are broken down into three categories. The three fire regime condition classes are defined in the Interagency FRCC Guidebook as follows:

Fire Regime Condition Class 1: Fire regimes are within the natural or historical range and risk of losing key ecosystem components is low. Vegetation attributes (composition and structure) are intact and functioning.

Fire Regime Condition Class 2: Fire regimes have been moderately altered. Risk of losing key ecosystem components is moderate. Fire frequencies may have departed by one or more fire intervals (either increased or decreased). This may result in moderate changes in fire and vegetation attributes.

Fire Regime Condition Class 3: Fire regimes have been substantially altered. Risk of losing key ecosystem components is high. Fire frequencies may have departed by multiple fire intervals. This may result in dramatic changes in fire size, fire intensity and severity, and landscape patterns. Vegetation attributes have been substantially altered.

FRCC designation can assist in determining vegetation treatment methods to move public lands toward their natural fire regime. For the UMLRP, treatments are focused on locations having a FRCC rating of II and III; however, additional site-specific information may determine other areas.

Table 3-8. Fire Regime/Condition Class Definitions

Condition Class	Fire Regime	Risk of Losing Key Ecosystem Components	Number of Acres in Project Area
I	Fire regimes are within historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition, structure, and pattern) are intact and functioning within the historical range.	Risk of losing key ecosystem components is low.	82,227
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 frequencies by one or more fire return intervals (either increased or decreased), resulting in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation and fuel attributes have been moderately altered from their historical range.	There exists a moderate risk of losing key ecosystem components from fire.	24,112
III	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components 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.	22,139

Fuels Treatments

The BLM has implemented a science-based, integrated vegetation management program that is consistent with Department of the Interior and BLM policy and direction, and meets the goals and objectives of the National Fire Plan.

For the past 19 years, the BLM, working with the Ecological Restoration Institute at NAU and AGFD have been implementing a large-scale, ponderosa pine ecosystem restoration project in the Mount Trumbull/Mount Logan area.

The Mount Trumbull Ponderosa Pine Ecosystem Restoration Project involves public lands managed by the BLM within Grand Canyon-Parashant National Monument in northern Arizona. A ‘sky island,’ the approximately 17,000-acre ponderosa pine forest sits atop 7,000- to 8,000-foot mountains amid a pinyon-juniper/sagebrush/grassland community. The forest contains 500+ year-old ponderosa pine along with old-growth pinyon, juniper, and New Mexican locust.

The goals of the Mount Trumbull restoration project were to:

1. Restore pre-settlement ecosystem health and function to a ponderosa pine forest.
2. Reduce fuel loads and disrupt fuel continuity to reduce the risk of catastrophic wildland fire

3. Understand the effects of restoration treatments. By reducing fuel loads and reestablishing and herbaceous understory, we hope to one day restore natural fire processes.
4. Gather information on a wide variety of ecosystem components and processes in order to understand the effects of restoration treatments.

In many cases, the potential for large high-intensity fire has been reduced by decreasing fuel loads through fuel treatment projects, including prescribed fire, mechanical treatments (using equipment to eliminate or control vegetation), and chemical treatments (the use of herbicides). Within the project area, most fuels treatments were conducted in the Ponderosa Pine Forest and Great Basin ecological zones. Ponderosa pine and pinyon-juniper were often treated mechanically before using prescribed fire to reduce hazardous fuel loads. Sagebrush was treated chemically to increase species diversity and increase herbaceous ground cover, improving wildlife habitat and watershed condition. Completion of these treatments on the Uinkaret Mountains Landscape in the past has also allowed for the management of wildfires for multiple objectives moving the landscape toward the desired future conditions (DFCs) identified in the RMPs.

Table 3-9 and Figure 3-7 show historic fuels treatment project types and acreages in the project area. These treatments occurred over a 60-year period.

Table 3-9. Acres of Fuels Treatment Projects in the Project Area

Prescribed Fire	Reseed/Planting	Mechanical	Chemical
6,753	4,720	29,491	12,219

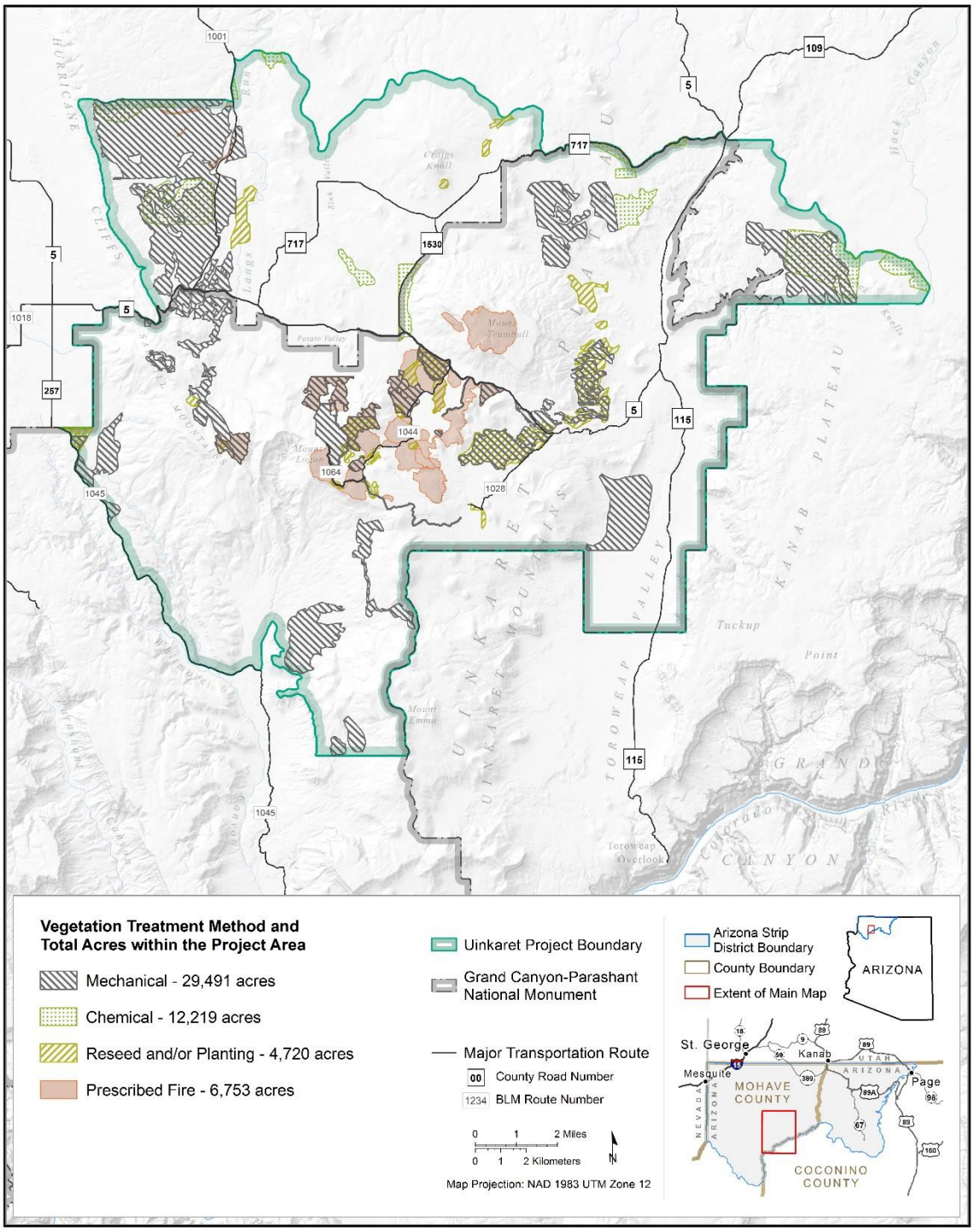


Figure 3-7. Historic Vegetation Treatments in the Project Area

Smoke Management

Airsheds within the project area are managed as Prevention of Significant Deterioration Class II, except for airsheds within Grand Canyon National Park that are managed as Class I (see previous section on Air Quality). There are no air quality non-attainment areas in the project area. Smoke from wildland fires can influence the adjacent Class I airsheds under some weather conditions. The BLM is under the jurisdiction of the Arizona Department of Environmental Quality (ADEQ) in matters relating to air pollution from wildland fires. The BLM works with the ADEQ to ensure compliance with the ADEQ's Smoke Management Plan (see http://www.azdeq.gov/environ/air/smoke/fires.html), which works toward a reduction in smoke impacts due to prescribed burning of nonagricultural fuels.

3.3.6.2 Resource Condition Indicators

Measurement indicators used to analyze this issue are:

- Acres of treatment and overall change in fuel loading.
- Acres of treatment and overall shift in fire regime condition class.
- Acres of treatment and overall reduction in risk of high-intensity wildland fire.
- Acres of treatment in proximity to the wildland-urban interface.

3.3.7 Livestock Grazing

There are eight active grazing allotments that are entirely or partially within the project area (Figure 3-8). Four allotments are entirely within the project area. These allotments operate under allotment management plans (AMPs) which prescribe grazing use by allotment and season of use. Approximately 386 cattle are currently authorized to use 3,919 animal use months (AUMs) of forage annually.[5]

Current livestock operations in the project area are cow/calf operations. Season of use on four allotments is yearlong and four are seasonal (Table 3-10 and Table 3-11). These operations encompass a mixed ownership of private, Arizona State Trust Lands, and BLM land.

Table 3-10 lists the four allotments entirely within the project area by name, season of use, livestock numbers, and AUMs.

Table 3-10. Allotments Entirely in the Project Area

Allotment	Season of Use	Livestock	AUMs
Crosby Tank	6/16-11/15	137 cattle	470
Mount Logan	Yearlong	88 cattle	930
Tuckup	10/15-5/15	161 cattle	1,075
Tuweep*	Yearlong	Set by BLM	1,444

* Tuweep Allotment is managed as a forage reserve allotment with livestock grazing being at BLM's discretion. Livestock grazing would be managed to complement current and future forest restoration research, and to provide rest and deferment on other allotments undergoing vegetation treatments or areas with wildfire damage.

[5] Animal unit month (AUM) means the amount of forage necessary for the sustenance of one cow or its equivalent for a period of 1 month.

The four other allotments only have a percentage of their acres within the project area, but also operate in accordance with specific AMPs. By percentage of each allotment, approximately 249 cattle and 9 horses are authorized to use 1,973 AUMs. Table 3-11 lists these allotments by percentage within the project area, season of use, livestock numbers, and AUMs. The numbers shown only represent that percentage of the allotments' total authorized preference.

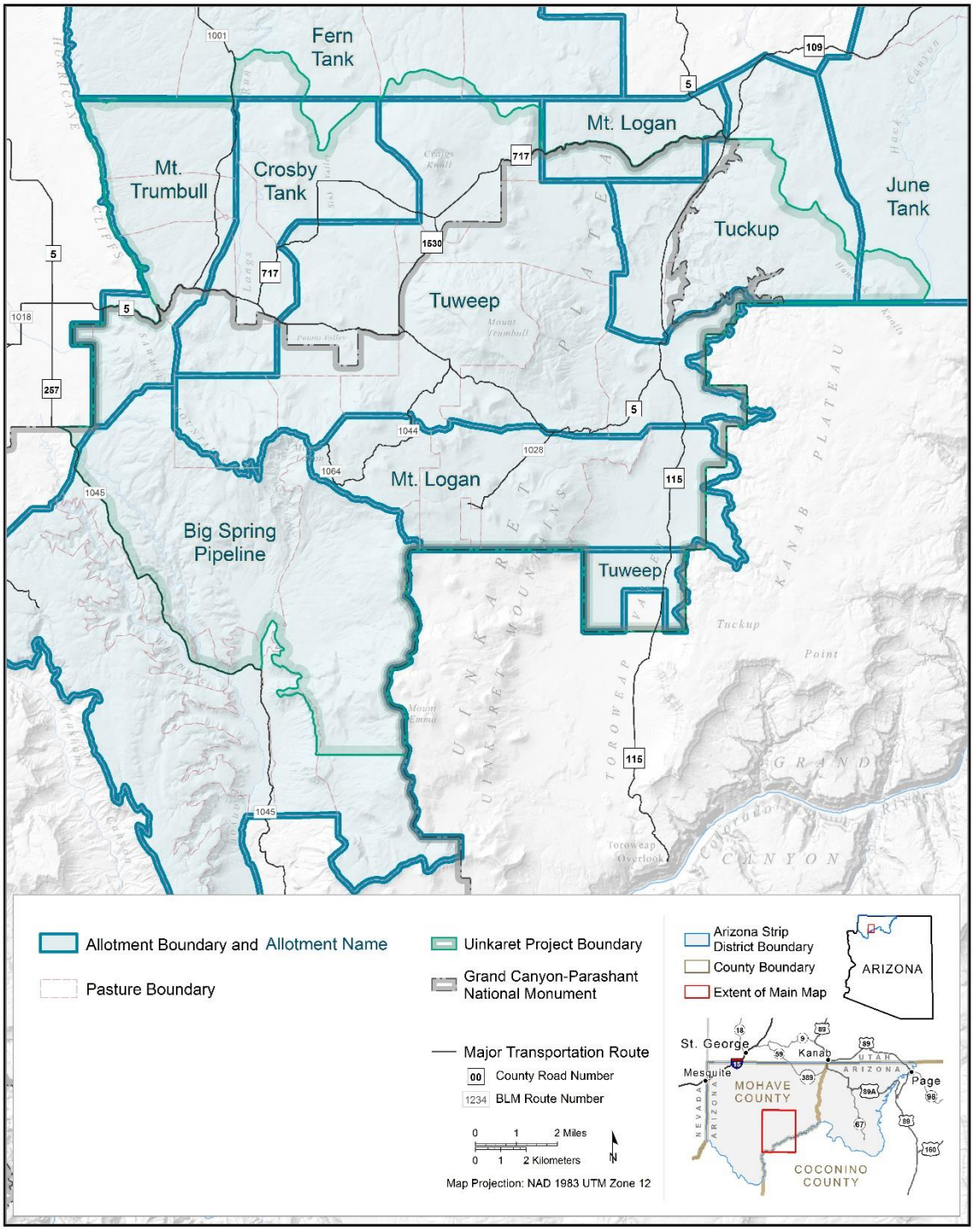


Figure 3-8. Grazing Allotments and Pastures within the Project Area

Table 3-11. Allotments Partially in the Project Area

Allotment (percent in project area)	Season of Use	Livestock	AUMS
Big Spring (20%)	Yearlong	42 Cattle and 4 Horses	374
Fern Tank (5%)	10/16-6/30	30 Cattle	240
June Tank (3%)	10/16-6/15	33 Cattle	246
Mount Trumbull (71%)	Yearlong	144 Cattle and 5 Horses	1,113

The Arizona Strip has two types of AMPs: intensive and less intensive. Intensive AMPs involve grazing systems such as rest-rotation, deferred rotation, best pasture system, and holistic resource management. All eight allotments that occur within the project area are managed under intensive systems (Table 3-12).

Land health evaluations have been completed for each allotment in the project area. These evaluations were conducted in accordance with the Arizona Standards for Rangeland Health and Guidelines for Grazing Administration and under policy established in 43 CFR 4180. Each evaluation indicates whether each allotment was meeting, progressing toward meeting, or not meeting these standards. Table 3-12 shows the grazing system and land health evaluation of each allotment associated with the project area.

Table 3-12. Grazing System and Land Health Evaluation Determination for Allotments in the Project Area

Allotment	Grazing System	Land Health Evaluation
Crosby Tank	Deferred Rotation	Progressing toward meeting
Mount Logan	Deferred Rotation	Meeting
Mount Trumbull	Deferred Rotation	Meeting
Tuckup	Deferred Rotation	Progressing toward meeting
Tuweep	Rest-Rotation	Progressing toward meeting
Big Spring	Deferred Rotation	Progressing toward meeting
Fern Tank	Best Pasture	Meeting
June Tank	Rest-Rotation	Progressing toward meeting

3.3.7.1 Resource Condition Indicators

Measurement indicators used to analyze this issue are:

- Acreage of treatment within an allotment.
- Duration of rest required for successful vegetative response within each allotment.

3.3.8 Soils

This section provides a description of soil resources in the project area based on review and compilation of available data for selected soil properties obtained from the Natural Resources Conservation Service (NRCS) and the BLM.

3.3.8.1 General Description of the Project Area

Soil Groupings

Soil types in the project area are variable, reflecting the differences and interactions between climate, organisms (vegetation and soil micro- and macrofauna), relief (topography, elevation), parent material (geologic material that soil forms from), and time. Topography ranges from nearly level valley bottoms to vertical cliffs, while elevation ranges from 4,200 feet in Whitmore Canyon to 8,029 feet on top of Mount Trumbull. The dominant soil parent materials in the project area are sedimentary (limestone, mudstone, shale, gypsum, and sandstone.) and igneous (basalt, basalt cinders, scoria, and tuffaceous pyroclastics) rocks. The forces of water, wind, and gravity (i.e., erosion) also have left imprints on soil properties.

The NRCS has completed and published two soil surveys that cover the project area. These surveys are referenced by number and are:

- Number 623: everything west of the Hurricane Cliffs (NRCS 1994)
- Number 625: lands east of the Hurricane Cliffs to Kanab Creek (NRCS 1992)

In the past, heavy grazing in the project area adversely affected much of the soils through compaction and decreased ground cover (BLM 1980). Subsequent grazing cuts implemented to counter these impacts led to reduced compaction and increased ground cover, resulting in increased water infiltration, reduced runoff, and decreased erosion over portions of the project area. Poorly designed and/or located roads can also adversely affect soils. However, several roads were moved or closed to prevent erosion on sensitive soils. Some areas of productive soils continue to have accelerated erosion rates and require further restoration and stabilization efforts.

Soils are placed into specific groups based on physical, chemical, and mechanical characteristics important to proper watershed function. These groups are used to assess impacts on soils from various uses, to evaluate the potential for restoration of ecological sites, to set the parameters for watershed management, and to determine the benefits and prioritization of restoration projects. The acres of soils under each rating in the project area are presented in Table 3-13. Because of soil map inclusions such as rock outcrop, the various acreage figures should be considered as rough estimates. Gypsiferous and other saline soils are not discussed because of their small extent and the fact that they are unsuitable for vegetation treatments.

Table 3-13. Acres by Soil Groupings

Acres by Soil Grouping			
Productivity Rating			
Very High	High	Medium	Low
16,679	73,366	23,763	14,666
Compactibility			
Compactable		Slightly Compactable to Not	
82,771		45,782	
Water Erosion Potential			
Severe	Moderate	Slight	Can Gully
75,035	36,667	7,262	9,510
Wind Erosion Potential			
High	Moderate	Slight	
645	19,624	108,205	

Soil Productivity

The productivity grouping rates the soils according to inherent soil values based upon the amount of genetic development, available water capacity, fertility, organic matter, and salt leaching. As the potential for soil productivity increases, so does the potential for ecological diversity.

Figure 3-9 displays soil productivity potential within the project area. Soils with the highest production potential are Mollisols located in higher elevations (over 6,000 feet) of the Mount Trumbull and Mount Logan areas. These soils typically have formed underneath grass or grassy chaparral cover, are normally free of soluble salts for several feet of depth, and have well-developed soil horizons. In addition to having the highest productive potential rating and the greatest potential for ecological biodiversity, these soils also readily respond to restoration and management efforts. These soils are mapped as covering 16,679 acres (13 percent) of the project area. Other Mollisols with thinner topsoil or "A" horizons in the project area are rated as having high productivity. Such soils usually occur in areas that receive 12 to 16 inches of precipitation per year, and are estimated to comprise 73,366 acres (57 percent) of the project area.

The soils rated as having medium productivity have lower amounts of soil carbon/organic matter relative to the aforementioned Mollisols and are slightly to moderately alkaline due to higher soluble salt concentrations. These soils make up about 23,763 acres (19 percent) of the project area.

Soils rated as having low productivity have very thin or no topsoil/A horizons and are light in color due to lower soil organic matter/carbon content. These soils may be moderately to strongly alkaline with only slight leaching of salts and may be very shallow to bedrock. Low-productivity soils are mapped on 14,666 acres (11 percent) of the project area.

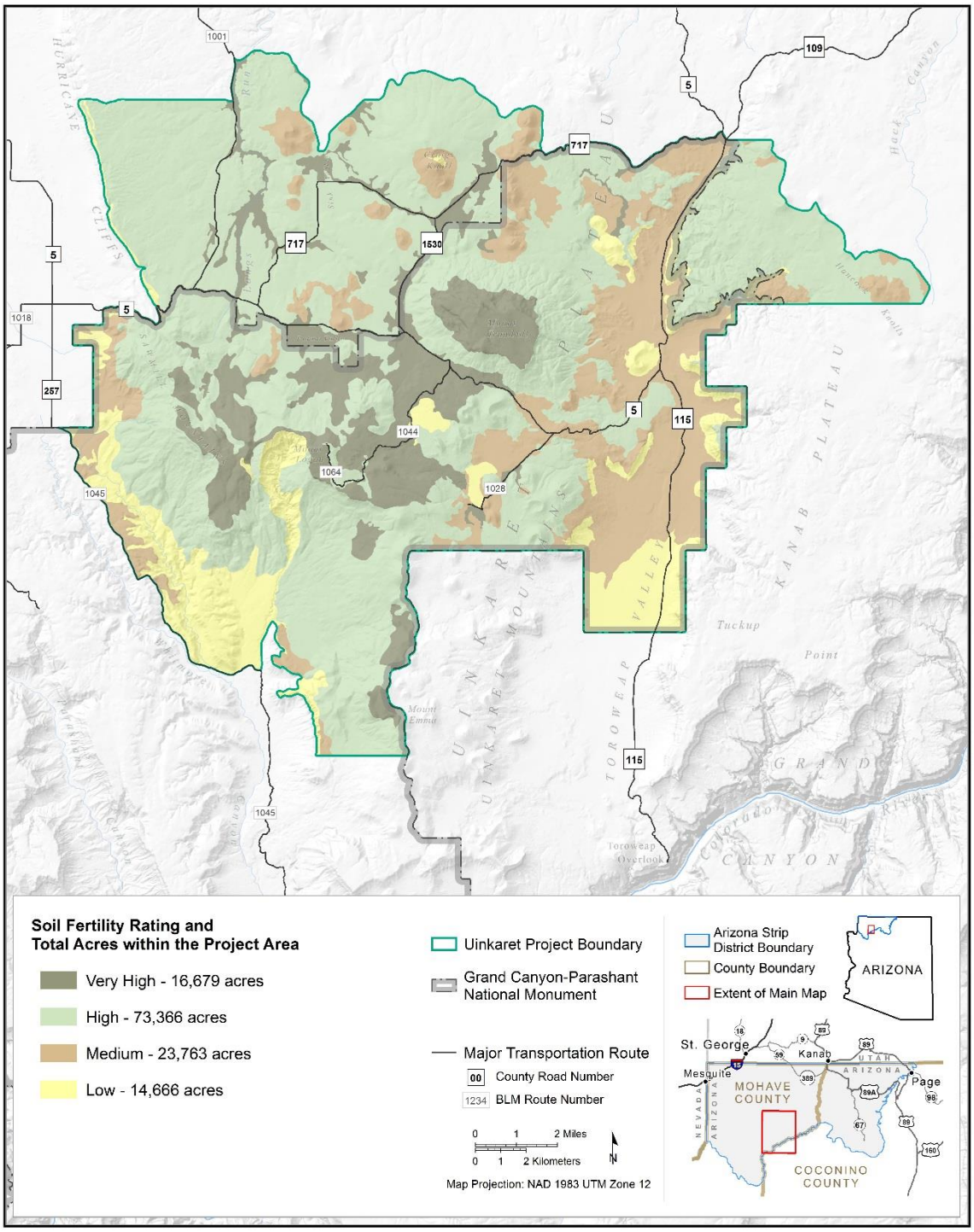


Figure 3-9. Soil Productivity Potential

Soil Compactibility

The compactibility grouping rates soils according to their sensitivity to compaction from surficial compressive forces. Compaction is one of the most detrimental impacts to soil quality, because it can reduce macropore space enough to hinder good root growth, especially for grasses. Reduced pore space also diminishes water-holding capacity and decreases the infiltration rate, thereby accelerating erosion. It also limits the exchange of gases between the soil and the atmosphere, which can limit root growth. Soil compaction can often transform grasslands by allowing invasive species an advantage over grasses, especially invasive species with strong roots or deep root systems, such as trees, brush, mustards, and Russian thistle.

Soils rated as "slight" in terms of compactibility are resistant to compression due to a high percentage of rock fragments and coarse (sandy) soil textures. Figure 3-10 displays compactible soils in the project area. All soils not shown as compactible are considered to have a low risk for compaction. Soils rated as compactible contain enough silts and clays to fill the void spaces when subjected to compactive forces; compactible soils are mapped as covering 82,771 acres (64 percent) of the project area.

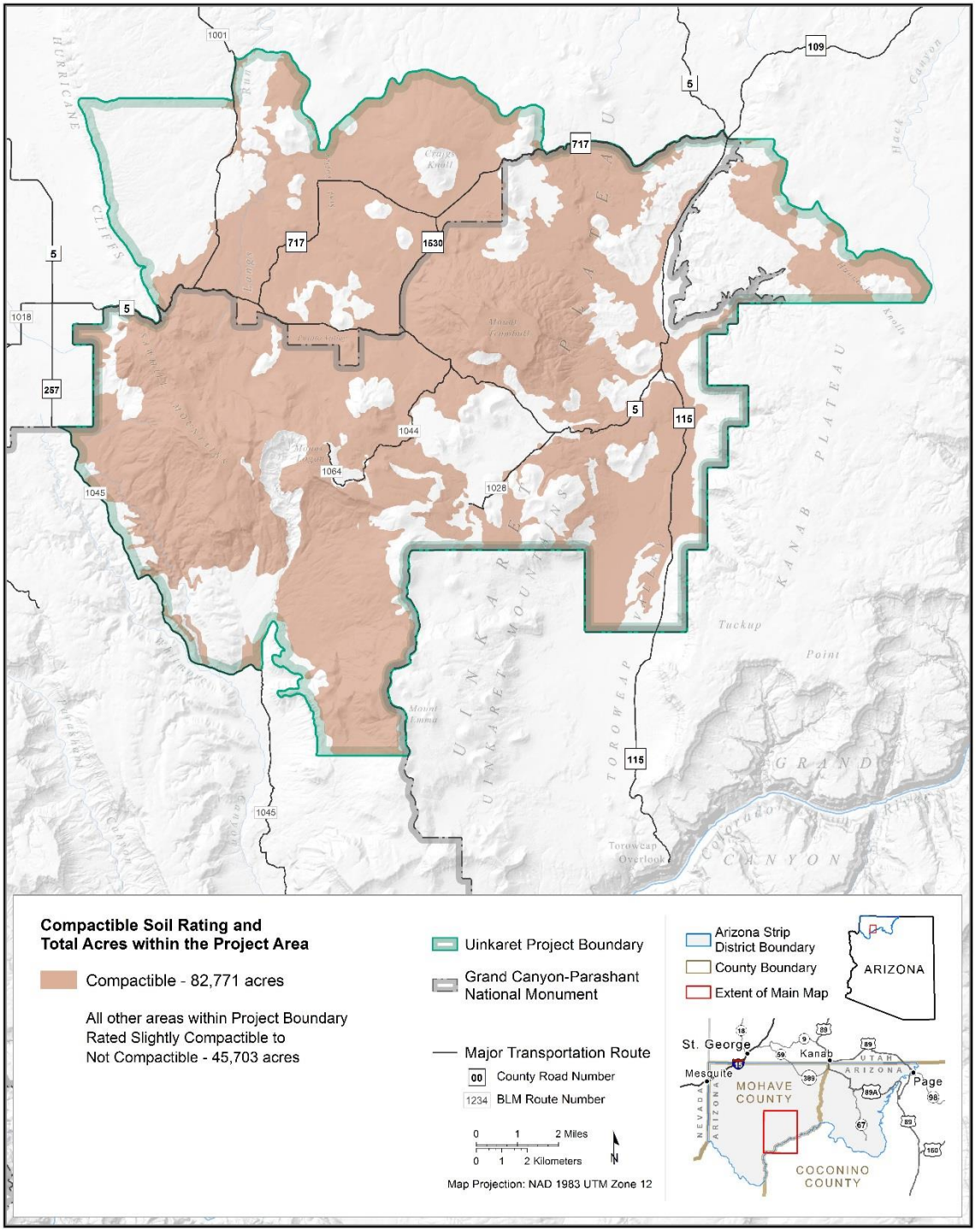


Figure 3-10. Compactible Soils

Water Erodibility

Soils are rated under the water erodibility grouping according to their susceptibility to erosion as if devoid of all organic cover. The rating is based on the assumption that soils are in a natural, undisturbed state and evaluates impacts under worst-case scenarios (when vegetative cover is lacking). The water erodibility rating would likely increase if the soil has been degraded by compaction or surface disturbances. Because wildland soils are non-renewable resources, they have a lower soil loss tolerance than similar cultivated farmland soils. Figure 3-11 displays the water erosion potential ratings for soils within the project area.

Soils rated as "slight" on the water erodibility scale are limited in the project area. They consist mainly of gravel cobble or stone surfaces and associated rock outcroppings, or other forms of coarse-textured surfaces. These soils tend to have high infiltration rates, slopes of less than 15 percent, and are not likely to erode unless heavily disturbed. These soils are about 7,262 acres (6 percent) of the project area.

Soils rated as "moderate" under the water erodibility grouping include gravel or cobble-like surfaces with some slopes of 15 to 25 percent, moderately coarse-textured surfaces, or surfaces with a restrictive layer. These soils are susceptible to erosion if they are disturbed or if their vegetative cover is greatly reduced, and are mapped as covering 36,667 acres (28 percent) of the project area.

Soils rated as "severe" have slopes of more than 25 percent or have surface textures that are highly erodible. These soils readily erode when disturbed or when their vegetative cover is reduced and are mapped on 75,035 acres (58 percent) of the project area.

A separate group of soils rated as "run-in" is characterized by high susceptibility to rill and gully erosion caused by surface disturbances or excessive runoff from surrounding uplands. These soils mostly occur on floodplains or alluvial fans at slopes of less than 5 percent. See Figure 3-11 for location of large floodplains across the project area. Gully erosion usually results in irreversible soil losses, drier ecological sites, and lateral rill formation. These soils are mapped for 9,510 acres (7 percent) of the project area.

Most of the soils in the project area are mapped as having a moderate or severe water erosion potential rating, adding impetus for the use of revegetation and erosion control techniques to mitigate these risks.

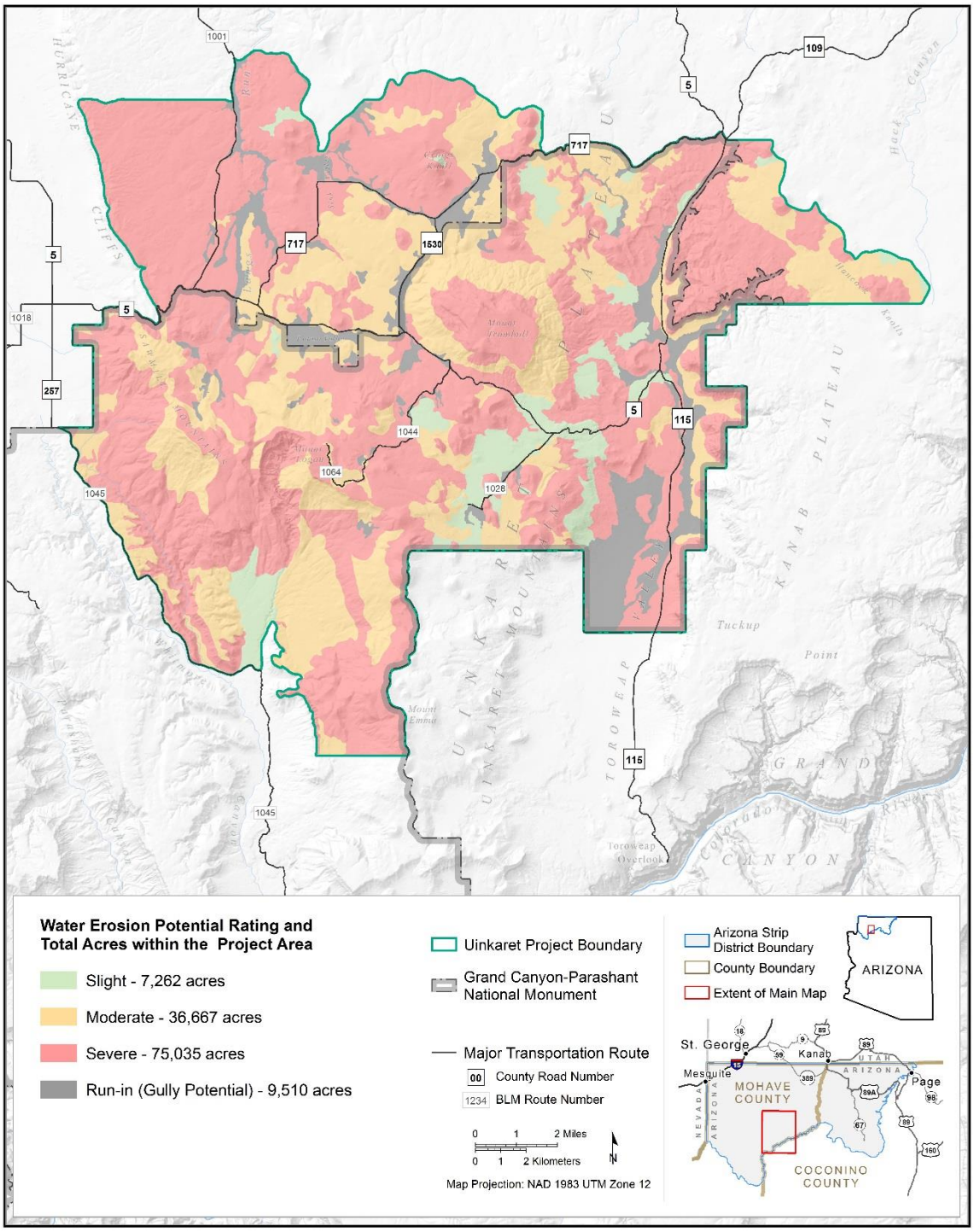


Figure 3-11. Water Erosion Potential

Wind Erodibility

Soils are rated under the wind erosion potential grouping according to their susceptibility to wind erosion in a worst-case (no surface vegetative cover) scenario. Ratings can vary according to the percentage of coarse (rock) fragments at the surface. Figure 3-12 displays the wind erosion potential ratings for soils within the project area.

Soils rated as "slight" for wind erosion potential have more "armored" surfaces that resist wind erosion due to their structural stability, weight, or protective cover of coarse fragments. A majority of the soils in the project area, about 108,205 acres (84 percent) are mapped as having a "slight" wind erosion potential rating. Soils with "moderate" wind erosion potential consist mainly of fine-textured surfaces or calcareous, medium-textured surfaces that are susceptible to wind erosion when disturbed. About 19,624 acres (15 percent) have this rating. Soils with "high" wind erosion potential consist mainly of sand and loamy sand-textured surfaces of medium or smaller-sized sands. Some of these soils make up dunes or stabilized dunes; these are of very small extent, 645 acres (less than 0.5 percent), and would not be treated by this project.

Biological Soil Crusts

Biological, or "cryptogramic" soil crusts are ubiquitous on high deserts of the Colorado Plateau and adjacent physiographic land provinces. They are made up of a complex assemblage of mosses, lichens, cyanobacteria, algae, and other microorganisms that come together to produce a soil crust layer that increases resistance to erosion and enhances moisture and nutrient retention. Additional ecosystem services provided by biological soil crusts include enhancement of below-ground soil structure, carbon and nitrogen fixation, soil temperature moderation, seed germination refuge, preclusion of invasion by annual weeds, increasing fire resiliency, and mitigation of soil compaction effects (Belnap et al. 2001).

Biological soil crusts are mapped as having a high potential for occurrence on 4,623 acres of the project area, although this figure is based only on the presence of high gypsum content (gypsiferous) soils. It is likely that the extent of soil crust coverage is higher than the 4,623-acre figure cited.

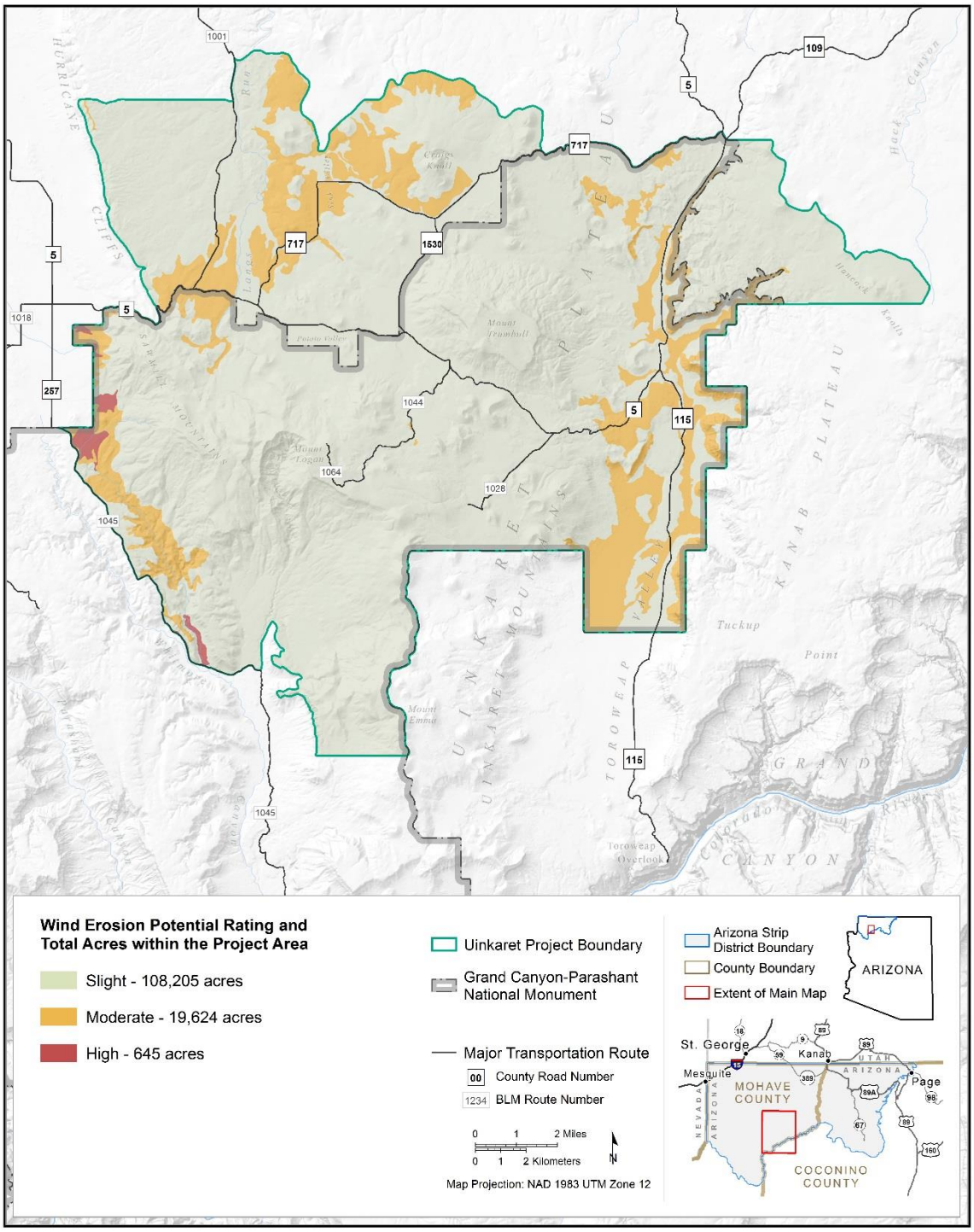


Figure 3-12. Wind Erosion Potential

Condition of the Soils

Many of the soils on alluvial fans and mountain slopes are experiencing pinyon-juniper encroachment that has crowded out desirable grasses and other understory plants. Reduced understory cover has resulted in sheet and rill erosion, causing a loss of much of the favorable (loamy) surface layers in some areas. Through this process, erosion has exposed layers higher in clay at the surface that have lower infiltration rates and available water-holding capacity, making it harder for many plant seedlings to survive.

Other soils are undergoing sagebrush encroachment with an associated loss of grasses; erosion features such as rills and gullies often accompany this phenomenon. This is especially true for the semi-wet meadows and stream terraces where erosion has reduced the areal extent of run-on, increased run-off from the sites, reduced the amounts of water infiltration, and reduced the available water-supplying capacity on portions of them.

Considering the same amounts of precipitation as prior to erosion and tree invasion, many of these soils are much drier now because of their current unstable condition and interception of precipitation by thick tree canopies. On floodplains where gullies have formed, there is now a net loss of soil instead of deposition.

3.3.8.1 Resource Condition Indicators

Measurement indicators used to analyze this issue are:

- Acres of treatment and overall increases or decreases of erosion potential.
- Acres of treatment in areas of sensitive soils, including biological soil crusts.
- Acres of treatment in soils susceptible to compaction, wind erosion, and water erosion.

3.3.9 Vegetation, including Noxious Weeds and Invasive, Non-native Species

3.3.9.1 Vegetation Communities

Public lands in the project area support a wide variety of vegetation types based on soils, climate, landform, and the effects of land use. Healthy, productive vegetation is the key to soil stability, wildlife habitat quality, and the type and amount of potential human uses. Recreation opportunities and the scenic qualities of an area are also based in large part on vegetation.

The vegetation and ecosystem condition in the project area has been looked at through a variety of lenses. The BLM has used Ecological Site Inventory and DPC descriptions, usually from a rangeland or wildlife habitat perspective. The BLM also uses FRCC to classify vegetation condition in relation to fire hazard and the range of natural variability.

Most of the UMLRP area is within the Colorado Plateau geophysical region. The Colorado Plateau contains diverse flora and fauna. The isolation, complex geological features, and substantial climate change from glacial to postglacial times have led to the existence of many relict populations of endemic species that are exclusively native to this region. More than 300 plant species are endemic to the Colorado Plateau (Tuhy et al. 2002).

The UMLRP area contains a variety of vegetation communities such as grasslands similar to those found in the Great Plains, ponderosa pine forests, sagebrush, and pinyon-juniper woodlands. Managing this diversity requires that plants are grouped into areas with common ecologies. Similarities in ecological functions and conditions allow for the classification of large areas into ecological zones. Ecological zones are primarily based on the geology, soils, hydrology, plants, and animals of the area. In many areas, there is a gradual gradient between ecological zones. In other areas, there are inclusions of one zone within another. Ecological processes do not necessarily stop at ecological zone boundaries, and events that affect one ecological zone may affect conditions in another. Several vegetation communities or stages of development may be found in any ecological zone; the grouping system can be used to describe vegetation over vast regions, such as the project area. Figure 3-13 shows the ecological zones within the UMLRP area.

A description of vegetation resources within the project area follows, and the discussion is organized by ecological zone. Table 3-14 lists the dominant plant species for each ecological zone.

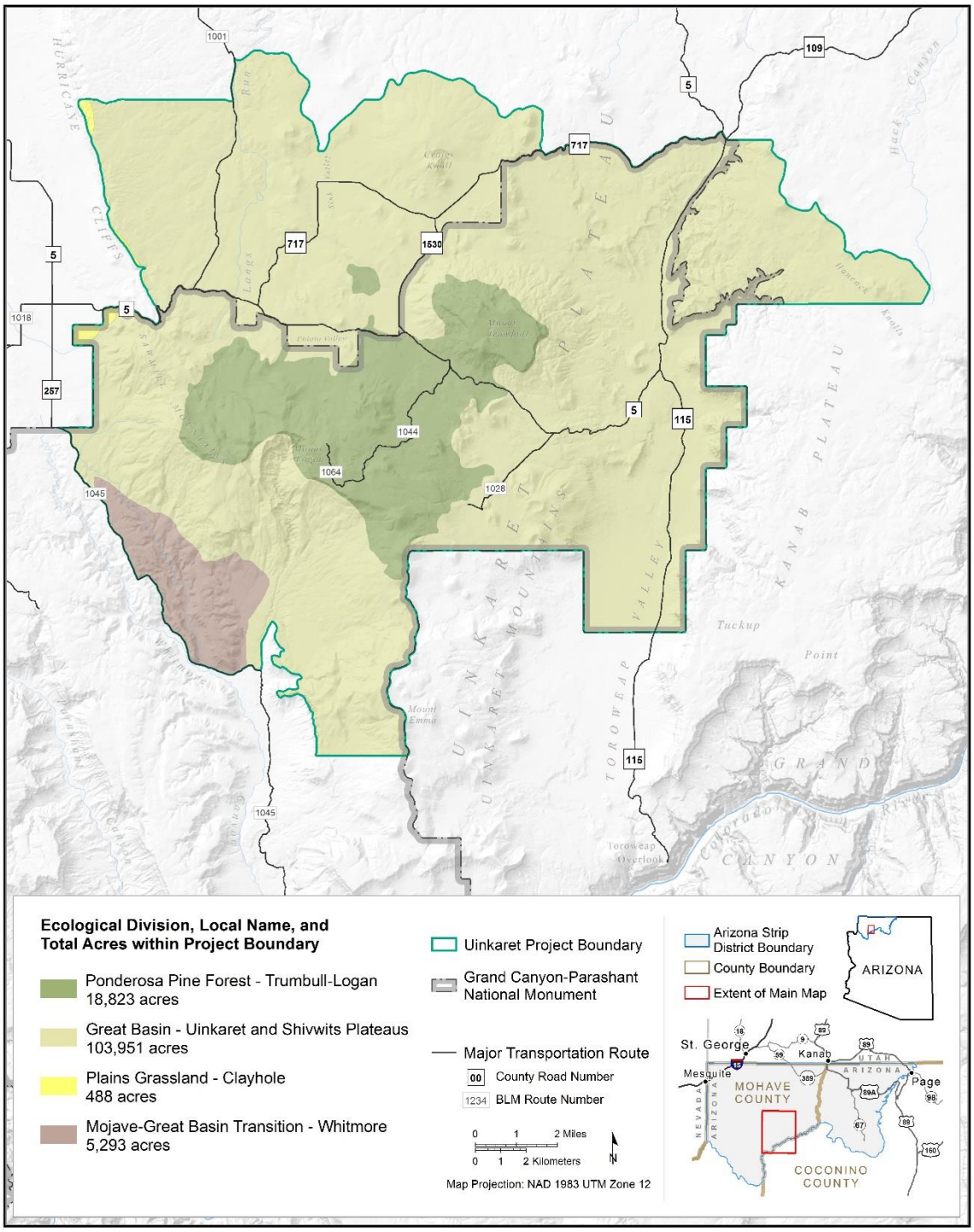


Figure 3-13. Ecological Zones within the Project Area

Table 3-14. Dominant Plant Species by Ecological Zone

Ecological Zone	Dominant Plant Species
Ponderosa Pine Forest	Ponderosa pine (*Pinus ponderosa*), Gambel oak (*Quercus gambelii*), New Mexico locust (*Robinia neomexicana*), serviceberry (*Amelanchier utahensis*)
Great Basin	Sagebrush (*Artemesia* spp.), pinyon pine (*Pinus* spp.), juniper (*Juniperus* spp.)
Mojave-Great Basin Transition	Blackbrush (*Coleogyne ramosissima*), yucca (*Yucca* spp.)
Plains-Grassland	Grasses: grama (*Bouteloua* spp.), muhly (*Muhlenbergia* spp.), needlegrass (*Hesperostipa comata*), wheatgrass (*Pascopyrum smithii*), galleta (*Pleuraphis jamesii*), Squirreltail (*Elymus elymoides*), dropseed (*Sporobolus* spp.)

Ponderosa Pine Forest Ecological Zone

The Ponderosa Pine Forest Ecological Zone occupies approximately 15 percent (about 18,824 acres) of the UMLRP, typically at the highest elevations around Mount Logan and Mount Trumbull.

The species most commonly associated with ponderosa pine is Gambel oak. Small clumps of quaking aspen may also grow in the general area, often near a meadow. Other species include New Mexico locust and serviceberry, both usually as shrubs or small trees. At lower elevations in the project area, an occasional ponderosa pine stringer (3 to 15 trees) may be found mixed with pinyon-juniper woodlands. These ponderosa pine stringers located in the midst of Great Basin woodlands and shrublands are of very high ecological value. The understory of more open stands supports abundant grasses and forbs. Shrubs present include those from adjoining communities along with scattered individuals of mountain snowberry, Oregon grape, common juniper, and Oregon boxwood.

The BLM, NAU, and AGFD are conducting ongoing research projects on ponderosa pine restoration treatments at Mount Trumbull. This research was initiated in 2005. Much of this work involves returning the ponderosa pine forest to a state resembling its pre-European settlement condition. Treatments to accomplish this include raking litter, mechanical removal and thinning of trees, prescribed burning, seeding, and temporarily excluding livestock.

Several species of wildlife are dependent upon ponderosa pine, including the Kaibab squirrel, goshawk, and Merriam's turkey. Certain varieties of neo-tropical migratory songbirds are found only in close association with ponderosa pine. Some wildlife species use ponderosa pine as a resource and may have impacts on pine stands. Porcupines eat the inner bark of young ponderosas, stripping and killing terminal shoots. Kaibab squirrels consume the fresh green needles produced by pines and can weaken trees. Mule deer will feed on new shoots and saplings, but generally prefer other forage.

The natural fire regime of this zone exhibits very frequent surface fires averaging four years apart with generally low, occasionally mixed and very rare stand-replacement fire severity. Prior to European settlement, very frequent, generally low-intensity fires averaging four years apart, killed young trees and shrubs, minimized ladder fuels, and maintained open stands of ponderosa pine with herbaceous understories. More than 100 years of fire suppression have resulted in

dense, closed-canopy forests with abundant litter, continuous fuels, and limited herbaceous vegetation. Trees in these situations must compete for limited moisture and nutrients, and are at risk of stand-replacing fires.

Great Basin Ecological Zone—Sagebrush and Pinyon-Juniper Communities

The Great Basin Ecological Zone covers more area than any other ecological zone in the project area. Large portions of the Uinkaret Plateau are classified as Great Basin. This ecological zone contains a wide range of vegetation communities including grasslands, shrublands, and woodlands. The vegetation composition in this ecological zone changes over time, based on the type and amount of disturbance (or lack thereof). The UMLRP area contains about 102,192 acres of the Great Basin Ecological Zone. A wide variety of vegetation exists within the ecological zone. Extensive pinyon-juniper woodlands dominate the mountains and plateaus, with grasses and shrubs prevalent in the valleys.

Herbaceous, grass-dominated communities have become less prevalent as grazing and fire suppression have allowed woody species to become established, and often to dominate an area. Now, in many areas, a single or a few species dominate. Major shrubs include basin big sagebrush, blackbrush, shadscale, Mormon tea, and greasewood. Invasive, annual grasses have invaded parts of the Great Basin desertscrub life zone, but have not caused the fire problems seen in the Mojave desertscrub.

Sagebrush communities are the most widespread of the "typical" Great Basin plant communities. Basin big sagebrush is the most common species. Sand sage dominates on sandy soils. Shadscale communities are usually found between greasewood-dominated communities and sagebrush communities in harsh, cold deserts on dry plains, foothills, valley bottoms, or dried alkali lakes. Common associates include black greasewood, big sagebrush, winterfat, spiny hopsage, blue grama, needle-and-thread, wild ryes, cheatgrass, Indian ricegrass, and alkali sacaton.

Pinyon and juniper are the dominant tree species of this zone in northern Arizona. The species of pinyon most often present is the common pinyon (two-leaf pinyon or Colorado pinyon), with single-leaf pinyon occasionally being found. Utah juniper is the most common juniper present, with one-seed juniper found occasionally. The understories of pinyon-juniper and dense mature juniper woodlands are very species-poor, containing only widely scattered shrubs, forbs, and small clumps of grass. Grasses are the most common understory component. Predominant (or formerly predominant) grasses include grama, Arizona fescue, prairie junegrass, Indian ricegrass, needlegrass, dropseed, and squirreltail. Shrubs may include sagebrush, cliffrose, serviceberry, rabbitbrush, shadscale, and winterfat. Understory plants are most common along the edges of the zone. Bare ground is very common. Utah juniper is a climax species in a number of pinyon-juniper, sagebrush, grassland, and shrub-steppe communities. The natural fire regime of these pinyon-juniper areas ranges from frequent to infrequent fire return intervals of between 30 to 100 years apart with mixed to local stand-replacement fire severity. Over time, these areas shift between community types based on impacts due to disturbance.

Mojave-Great Basin Transition Ecological Zone

This ecological zone is a transition between the Mojave Desert and the Great Basin and contains vegetation-type representatives from both ecological zones. Soil and vegetation vary widely within the transition area, although it more closely resembles the Mojave Desert. There is a transition area in lower Whitmore Canyon that is within the project area. The UMLRP area contains about 5,293 acres of the Mojave-Great Basin Transition Ecological Zone.

Blackbrush communities occur in the Mojave-Great Basin Transition Ecological Zone. Blackbrush is typically found on gentle slopes above creosote bush communities and below the interior chaparral or big sagebrush/pinyon-juniper communities. Blackbrush is usually killed by fire and may take over 100 years to re-establish itself. It is co-dominant with other native species such as creosote, juniper, desert almond, Anderson wolfberry, and yucca. Dominant invasive species include cheatgrass and filaree. These communities change little over several decades, exhibiting very low reproductive rates and very slow growth.

Historically, wildfires were a function of woody plant condition and density. More precipitation supports a greater annual grass fuel load than the Mojave Desert, resulting in a grass/fire regeneration cycle and susceptibility to type conversion. Fire years are typically correlated with high spring moisture, which follow several years of lower than average precipitation. The fire regime of this zone is an infrequent fire return interval with fires occurring an estimated average of about 40 years apart. Mixed fire severity creates a mosaic of plant ages and species across the landscape.

Plains-Grassland Ecological Zone

There is only a very small portion of Plains-Grassland Ecological Zone in the project area, located just south of the private lands (Bundyville), to the west of the Hurricane Cliffs. The UMLRP area contains about 488 acres of the Plains-Grassland Ecological Zone.

The Plains-Grassland Ecological Zone consists mostly of vast areas of relatively flat terrain compared to the surrounding canyons and plateaus of the project area. There are few trees in the ecological zone, consisting mostly of scattered pinyon and juniper. Grasslands are important habitat for pronghorn.

Historically, perennial and annual grasses covered much of the ecological zone in a clumpy, relatively continuous carpet interspersed with shrubs and forbs. The natural fire regime for this zone involves frequent fires, which occur an average of 10 years apart, nearly all of which have stand-replacement fire severity. Frequent fires are limited to woody species with a varied vegetation pattern across the landscape. Changes in fuel continuity from past management practices and fire suppression activities essentially eliminated fire from this ecological zone, resulting in increased shrub densities, loss of perennial grasses, and spread of non-native, invasive species. Typical grass genera include grama, muhly, needlegrass, wheatgrass, brome, galleta, fescue, and dropseed. An occasional cactus, shrub, or juniper may also be present, usually along the edge of the grassland or in microhabitats.

3.3.9.1.1 Resource Condition Indicators

Measurement indicators used to analyze this issue are:

- Acres and type of sagebrush treatment and the post-treatment change in productivity, diversity, and invasive species introduction or spread.
- Acres and type of pinyon-juniper woodland treatment and the post-treatment change in productivity, diversity, and invasive species introduction or spread.
- Acres and type of ponderosa pine treatment and the post-treatment change in productivity, diversity and invasive species introduction or spread.
- Overall shift in progress toward desired condition, by vegetation type.
- Potential for loss or removal of large and/or old-growth trees.

3.3.9.2 Noxious Weeds and Invasive, Non-native Species

There are occurrences of invasive species within the UMLRP area. Some of these have been designated as "noxious" weeds in the state of Arizona, meaning they have been determined to be detrimental to public health, agriculture, recreation, wildlife, or property (BLM 2009). There are also additional invasive species within the project area that have not been designated as noxious, but are non-native in this region and can rapidly invade an area. Information about the presence and distribution of noxious weeds and other invasive non-native vegetation is obtained from inventory, treatment, and monitoring data, background documents, aerial photographs, and rangeland health studies.

Historical human uses and management practices have not always been consistent with stable ecological principles. Surface-disturbing activities such as logging, grazing, fire suppression, mining, and OHV activity have affected the vegetation, altering species composition and density, and allowing the invasion by noxious weeds. In some areas, there is a need for proactive restoration of ecological functions and conditions.

Noxious Weeds

Noxious weed infestations in the UMLRP area occur on approximately 2,668 acres. Noxious weeds occur sporadically, particularly infesting wildfire burn locations and other disturbance areas. Noxious weeds are concentrated around areas of high soil disturbance, including roadsides, and areas of soil or water disturbance. The following areas are associated with noxious weeds on public lands in the UMLRP area.

- Rights-of-way and improved dirt roads - Hoary cress, Scotch thistle, and Russian knapweed.
- Disturbance associated with range improvements including waterholes, corrals, catchments, and pipelines - Hoary cress, Scotch thistle and Russian knapweed.
- Wildland fire burn locations - Scotch thistle.
- Open range - Scotch thistle and Russian knapweed.
- Recreation/industrial - Scotch thistle and Russian knapweed.

Table 3-15 provides a summary of the noxious weeds known to occur within the UMLRP area, and Figure 3-14 displays their location. Most of these species have been treated using manual or chemical control methods. The BLM is engaged with multiple other parties as part of a Memorandum of Understanding to manage noxious weeds as the Washington County Cooperative Weed Management Area. This memorandum outlines a formal agreement to promote an integrated weeds management program throughout the Cooperative Weed Management Area, including coordination of weed control efforts and methods. The recommended control methods for each noxious weed species are also included in Table 3-15.

Table 3-15. Noxious Weeds in the Project Area

Project Area Species	Typical Habitat	Control method
Hoary cress	Disturbed alkaline soils. Pastures, fields, roadsides, rangelands, waste areas, and along waterways.	Manual removal; chemical control by using 2,4-D, chlorsulfuron, or metsulfuron methyl. Not effective: Mechanical control.
Russian knapweed	Broad range of sites. Rangeland, waste areas, roadsides, and along waterways.	Chemical control by using chlorsulfuron, clopyralid, or glyphosate. Not effective: Mechanical methods.
Scotch thistle	Pastures, rangelands, roadsides, and waste areas.	Mechanical or manual methods

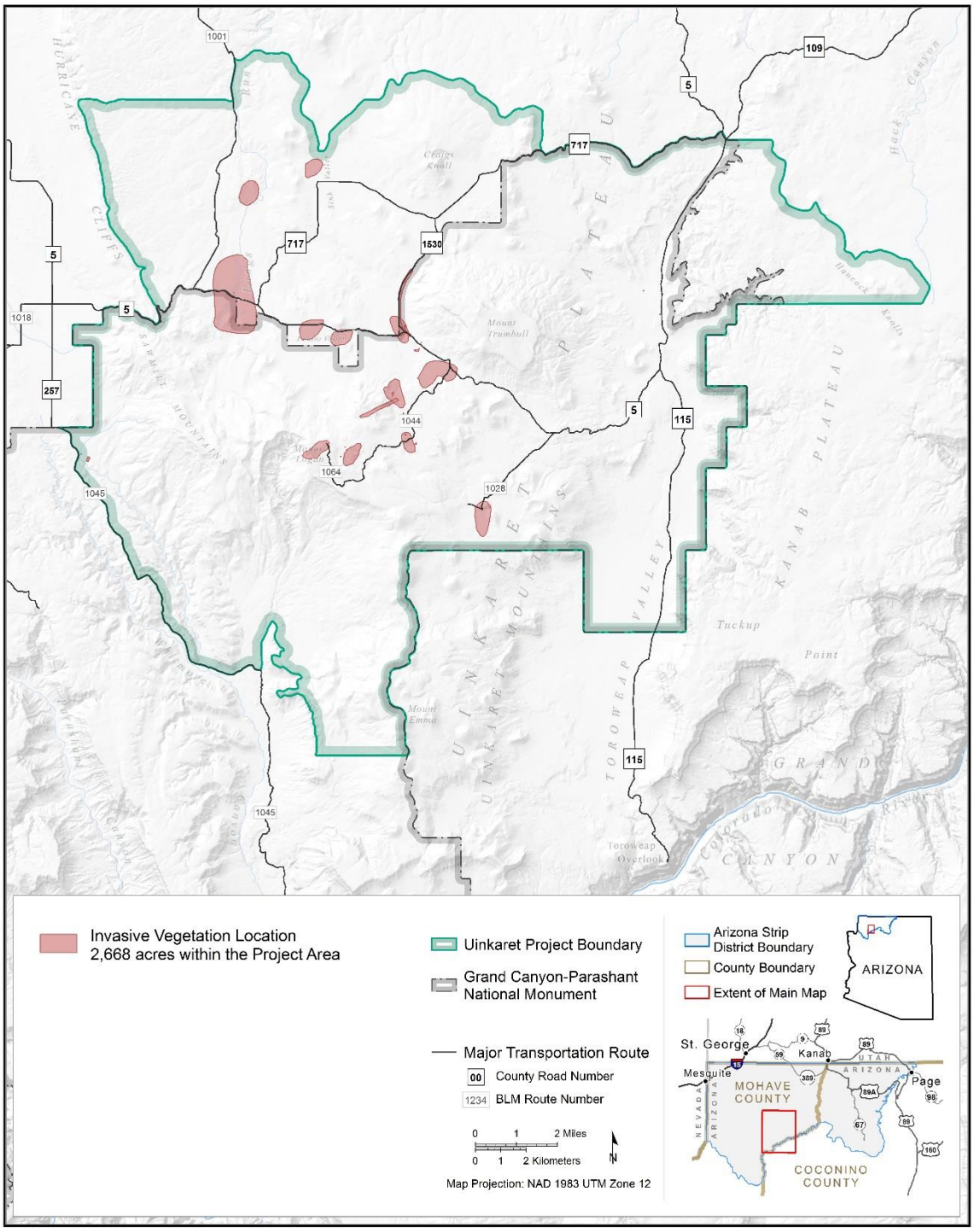


Figure 3-14. Location of Noxious Weed Populations in the Project Area

Cheatgrass

Cheatgrass (*Bromus tectorum L.)* is an abundant, invasive annual grass species that commonly establishes in disturbed sagebrush-grassland communities, and other western rangelands, including the Arizona Strip. Cheatgrass is not on the Arizona Noxious Weed list. However, it can be a very invasive non-native grass species. Inventories have indicated that cheatgrass is dominant on more than 6.8 million hectares of the sagebrush ecosystem (Pellant and Hall 1994) and more than 40 million hectares throughout the Intermountain West (Whisenant 1990).

Cheatgrass can reduce the productivity and diversity of native grass communities. It is a prolific seed producer, which gives it a competitive advantage over native vegetation (Hulbert 1955). Cheatgrass is able to germinate in the fall and spring (Martens et al. 1994) before native grasses, which also makes it very competitive with native plant species. It is tolerant of grazing and increases with fire (Klemmedson and Smith 1964).

Cheatgrass is very flammable and when abundant can increase the fire frequency of ecosystems. Historically, the return interval for wildfires in western shrublands was long-term and generally ranged from 50 to 150 years or more. The wildfire return intervals in rangelands infested with cheatgrass have been greatly increased.

Because cheatgrass is so widespread and established on the range within the Arizona Strip District, surveys for this species are not normally conducted. However, areas of observed cheatgrass, with the potential for cheatgrass monocultures within the project area are monitored by specialists. Large burn areas are considered areas of cheatgrass monoculture potential. However, the BLM has seeded many of these burn areas with non-native perennial grasses and forage kochia under the BLM Emergency Stabilization and Rehabilitation Program to combat cheatgrass expansion. During the rangeland health studies, cheatgrass was observed in sampling areas throughout the project area.

3.3.9.2.1 Resource Condition Indicators

Measurement indicators used to analyze this issue are:

- Population size and spread of known noxious weed occurrences within project area.
- Overall shift in progress toward desired condition, by vegetation type.
- Proximity of treatment areas to known occurrences of noxious weeds.

3.3.10 Visual Resources

The UMLRP area contains many outstanding scenic landscapes including areas of forested land, grassland, shrub land, canyon land, 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.

The UMLRP area is in the southwestern portion of the Colorado Plateau. 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, broad plains, dark gray cinder cones, fields of rugged volcanic rock, and major fault scarps. 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 as viewed along County Road 5, County Road 717, and Toroweap Road, consists primarily of rolling terrain within a series of broadly enclosed landscapes. Foreground views are primarily composed of broad valleys covered with desert shrubs and grasses, and thick 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 in northern Arizona that creates a feeling of vastness and open space similar to many areas within the Colorado Plateau region. Areas near the Mount Trumbull Wilderness and Mount Logan Wilderness 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.

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). 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 establishes Key Observation Points (KOPs) to rate the possible visual changes (see Appendix A). These KOPs are areas where visual changes are of highest concern. Visual Contrast Rating Worksheets and possibly visual simulations are 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 3-16.

Table 3-16. 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.
IV	The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements of the landscape.

Within the project area, there are approximately 22,583 acres in VRM Class I (areas within designated wilderness), approximately 64,901 acres in VRM Class II, approximately 41,024 acres in VRM Class III, and approximately 5 acres in VRM Class IV (see Figure 3-15).

3.3.10.1 Resource Condition Indicators

Measurement indicators used to analyze this issue are:

- Consistency with and conformity to designated BLM Visual Resource Management class objectives.
- Consistency with and conformance to the Field Office and Monument visual objectives from key viewpoints within the project area.

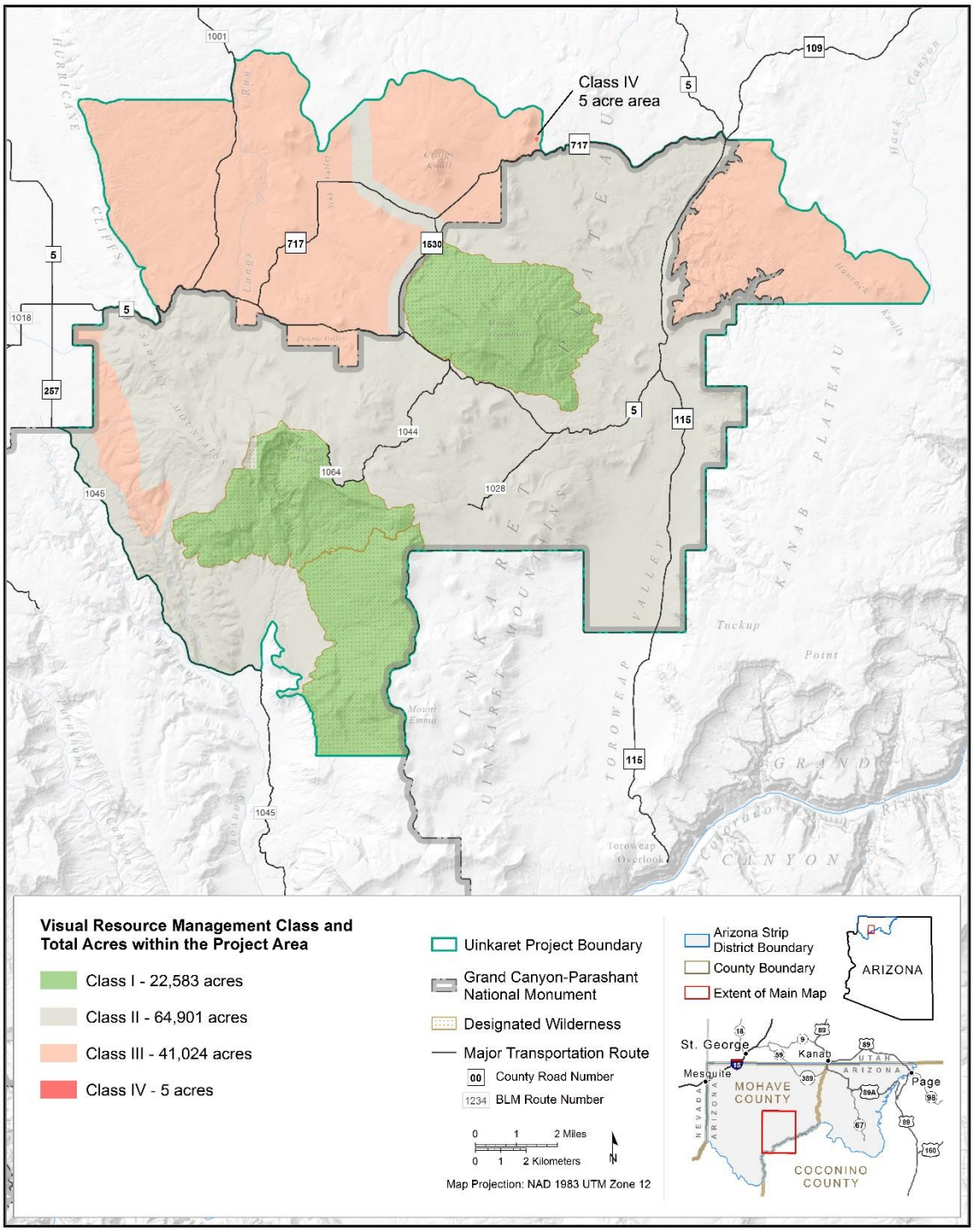


Figure 3-15. Location of the Visual Resource Management Classes in the Project Area

3.3.11 Wildlife (Including BLM Sensitive Species, Species of Greatest Conservation Need, and Migratory Birds)

The project area is located within the greater Arizona/New Mexico Plateau ecoregion, which supports a wide variety of wildlife species. The project area contains no perennial aquatic systems and associated riparian habitats; therefore, no fish and riparian-dependent wildlife species occur within it. Resource condition indicators for wildlife include changes in habitat, specifically patch size, contiguity, structure, and quality that affect overall species health and abundance.

General wildlife species, BLM sensitive species, species of greatest conservation need, and migratory birds associated with the project area are discussed in Table 3-17 and within the following various subsections. The term 'possible' is defined as being when a species has a high probability of occurring because documented habitat components are present, the species may exist near the project area, or the species may be affected by actions proposed in one or more of the alternatives.

3.3.11.1 General Wildlife Species

Species representative of grassland, Mojave mixed shrub, sagebrush, pinyon-juniper woodland, and ponderosa pine forest are listed in Table 3-17. Descriptions and species listed are from Brown and Lowe (1980). Some game species (including mule deer, pronghorn, and turkey) that are likely to occur within the project area are also discussed below.

Table 3-17. Representative wildlife by vegetation community

Vegetative Community	Representative Wildlife Species
Grassland	The most well-known grassland mammal representative is the pronghorn (*Antilocapra americana*). Associated smaller mammals found in this community include pocket gopher (*Geomys* spp.), harvest mouse (*Reithrodontomys* spp.), and chisel-toothed kangaroo rat (*Dipodomys microps*). Grassland birds may include Brewer's sparrow (*Spizella breweri*), western meadowlark (*Sturnella neglecta*), prairie falcon (*Falco mexicanus*), and western burrowing owl (*Athene cunicularia hypugaea*).
Mojave Mixed Shrub and Sagebrush	A distinctive fauna is centered in the sagebrush and Mojave mixed shrub vegetation communities in northern Arizona. Mammals such as Townsend's ground squirrel (*Spermophilus townsendi*), long-tailed pocket mouse (*Perognathus formosus*), and northern grasshopper mouse (*Onychomys leucogaster*) are closely associated with sagebrush. Large ungulates are poorly represented here, but mule deer are known to use theses vegetation communities. Birds characteristic of these communities include sage thrasher (*Oreoscoptes montanus*), sage sparrow (*Amphispiza belli*), and Vesper sparrow (*Pooecetes gramineus*). Characteristic reptile and amphibian species include sagebrush lizard (*Sceloporus graciosus*) and Great Basin spadefoot toad (Spea intermontanus), respectively. A number of reptile subspecies such as desert horned lizard (*Phrynosomo platyrhihnos platyrhinos*) and Great Basin and Plateau tiger whiptails (*Aspidoscelis tigris tigris* and *A. tigris septentrionalis*, respectively) are indicative of sagebrush.

Vegetative Community	Representative Wildlife Species
Pinyon-Juniper Woodland	Vertebrate species closely tied to or centered within this vegetation community in northern Arizona include pinyon mouse (*Peromyscus truei*), pinyon jay (*Gymnorhinus cyanocephalus*), gray flycatcher (*Empidonax wrightii*), bushy-tailed woodrat (*Neotoma cinerea*), gray vireo (*Vireo vicinior*), juniper titmouse (*Baeolophus ridgwayi*), black-throated gray warbler (*Dendroica nigrescens*), Scott's oriole (*Icterus parisorum*), and Plateau striped whiptail (*A. velox*) (Brown 1994). Pinyon-juniper woodlands are also seasonal habitats for a number of montane animals; as such, they are often of great importance as winter range for species such as mule deer.
Ponderosa Pine Forest	Several species of wildlife are dependent on ponderosa pine, including Kaibab squirrel (*Sciurus aberti kaibabensis*), northern goshawk, and Merriam's turkey. The list of characteristic nesting avifauna includes flammulated owl (*Otus flammeolus*), white-breasted nuthatch (*Sitta carolinensis*), pygmy nuthatch (S. pygmaea), brown creeper (*Certhis familiaris*), western bluebird (*Sialia mexicana*), yellow-rumped warbler (*Dendroica coronata*), western tanager (*Piranga ludoviciana*), pine siskin (*Carduelis pinus*), and chipping sparrow (*Spizella passerine*). Ponderosa pine forests support a wide variety of neotropical migratory songbirds.

Mule Deer (Odocoileus hemionus)

Mule deer are generalists that use ponderosa pine, mixed-conifer, woodland, and chaparral habitats. Forage items mostly consist of a variety of woody browse, but they feed more on grasses and forbs during the spring and summer months. Important forage plants include mountain-mahogany (*Cercocarpus ledifolius*), buckbrush (*Ceanothus cuneatus*), cliffrose, sagebrush, buckthorn (*Rhamnus* spp.), juniper, and oak.

Mule deer apparently were not common on BLM Arizona Strip lands before the arrival of early settlers (BLM 2008b). Populations began increasing during the early 1900s, and peaked during the 1960s following decades of intensive predator control measures. The AGFD considers the current mule deer population on the Arizona Strip to be low but stable (BLM 2008b). Numerous water sources have been developed to make more habitats accessible to deer.

Mule deer habitat is categorized to describe its importance. The entire project area is considered some category of mule deer habitat. AGFD has categorized habitat characteristics for big game species within the state. Habitat categories are based on several factors such as topography, forage and cover, availability of water, and limiting factors such as prohibitive fencing. The project area contains winter crucial (9 percent), summer crucial (29 percent), yearlong (37 percent), and summer (25 percent) habitats.

Pronghorn (Antilocapra americana)

Pronghorn are associated with grasslands and savannahs with scattered shrubs and rolling hills. It prefers forbs and grasses as forage, but will browse on woody shrubs when forbs and grasses are not available. Rangeland with a low vegetative structure, averaging 15 to 24 inches in height, is considered prime pronghorn habitat. Pronghorn movements vary seasonally.

Pronghorn are native to the project area. However, they apparently were eliminated from the Arizona Strip in the early 1900s, and reintroduced beginning in the 1960s (BLM 2008b). Much of the pronghorn habitat in the project area is found in the Tuweep Valley area. Most of the habitat in the area, approximately 22,802 acres (84 percent), is considered poor quality habitat for pronghorn with small areas of low and moderate quality habitat.

The development of private lands, fence lines, railroads, roads, and highways has resulted in the fragmentation of pronghorn habitat. Since the 1980s, pronghorn populations on the Arizona Strip have been low but stable (BLM 2008b). Management actions to help restore pronghorn to their former ranges within the Arizona Strip include modifying fences to allow pronghorn movement, improving forage species composition and diversity, and developing or making other water sources available for pronghorn (BLM 2008b).

Merriam's turkey (Meleagris gallopavo merriami)

Merriam's turkeys are found primarily in ponderosa pine forests with a mix of meadows, oak, and juniper. Roosting and nesting habitat consists of large, open-crowned trees, often on steep slopes. Good brood-rearing habitats include natural or created openings, riparian areas, abundant herbaceous vegetation adjacent to forest cover, and mid-day loafing and roosting areas. Turkeys are migratory in parts of their range, moving to lower elevations during winter. Timing of movements can differ annually, depending on snowfall. Merriam's turkeys occur in the ponderosa pine habitat of the Mount Trumbull area (within the project area). This population is the direct result of transplants that have occurred since the 1970s. Several wildlife catchments have been constructed to assure reliable water in turkey habitat. In addition, small-scale thinning and prescribed burning create open areas for foraging while preserving denser areas for nesting.

Mountain lion (Puma concolor)

Mountain lions in Arizona use desert mountains with broken terrain and steep slopes, along with dense vegetation, caves, and rocky crevices that provide shelter. Stream courses and ridgetops are frequently used as travel corridors and hunting routes. Mountain lions are active throughout the year, any time, day or night, but most hunting occurs at dawn or dusk. They are essentially solitary animals, with the exception for a few days during mating and periods of juvenile dependence. In northern Arizona, mule deer are the principal prey species (AGFD 2007).

Population densities vary, depending on habitat components and density of prey items. Home range size for adult males is approximately 20 to 150 square miles, while for females it is approximately 10 to 50 square miles, both of which probably vary seasonally (AGFD 2007). Territories of males and females may overlap, but males tend to avoid other males. Loss of habitat is probably the greatest threat to mountain lion populations throughout its range. Large tracts of roadless habitat are necessary to maintain individual populations, and the corridors that connect these tracts are required for dispersal of lions between populations. In addition, any loss of habitat of their prey species (deer) may cause a reduction in the mountain lion population.

3.3.11.2 BLM Sensitive Species

BLM 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 significantly 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 significant 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 5 years following their delisting shall be conserved as BLM sensitive species (BLM 2010). Information on species trends is included with the individual species accounts when available.

American peregrine falcon (Falco peregrinus anatum) (Delisted)

American peregrine falcon is likely to occur in or near the project area. Currently, there are more than 50 nesting pairs in Grand Canyon National Park, from Lees Ferry to Lake Mead, and a monitoring program is in place (Payne et al. 2010). Optimum peregrine habitat is generally considered to be steep, sheer cliffs overlooking woodlands, riparian areas, or other habitats supporting abundant avian prey species (AGFD 2002a). Within the project area this species may occur in all habitats, however, it is more likely to occur in the northwestern part near the Hurricane Cliffs.

Northern goshawk (Accipiter gentilis atricapillus)

Northern goshawk is known to occur within the project area. In Arizona, the species nests most commonly in ponderosa pine forests along the Mogollon Rim and on the Kaibab Plateau, and in ponderosa pine forests in the southeastern mountains (AGFD 2003a). Beier (1997) found that adult goshawks in Arizona wintered in ponderosa pine forest and pinyon-juniper woodlands during some winters. In general, females remained in ponderosa pine in the general vicinity of their nest, while most male goshawks moved 5 to 10 miles from the nesting area and generally into the closest pinyon-juniper woodlands.

Human disturbance is not considered a potential limiting factor (Reynolds et al. 2006). A number of the known goshawk nest sites on the Tusayan and Williams ranger districts of the Kaibab National Forest are located close to Level 2 forest roads, which are characterized by relatively low traffic volumes and speeds. Logging trucks passing within approximately 1,600 feet of two active nests on the Kaibab Plateau did not cause discernible behavioral responses from the individuals at the nests (USFS 2009).

Little historical information on goshawk densities exists, but populations appear to have undergone dramatic declines over the past 50 years (AGFD 2003a). Causes being investigated for the decline include a change in forest composition and structure resulting from intensive forest management between the 1960s and early 1990s, combined with high-severity fire and wind throw and natural environmental variation in prey abundance (Bratland et al. 2008). Within the project area this species is more likely to occur in the ponderosa pine habitat around Mount Trumbull and Mount Logan.

Western burrowing owl (Athene cunicularia hypugea)

There are no known or historic records from the project area, however, habitat for western burrowing owl is found there. It occurs locally in open areas, generally year-round, with only a few winter records on the Colorado Plateau in the northeastern part of the state (AGFD 2001a).

Habitat includes open, well-drained grasslands, steppes, deserts, prairies, and agricultural lands, often associated with burrowing mammals. Burrowing owls feed on a wide variety of prey, changing food habits as location and time of year determine availability. Large arthropods, mainly beetles and grasshoppers, form a large portion of their diet. Small mammals, especially mice, rats, gophers, and ground squirrels, are also important food items. Other prey animals include reptiles and amphibians, scorpions, young cottontail rabbits, bats, and birds, such as sparrows and horned larks (AGFD 2001a).

Ferruginous hawk (Buteo regalis)

Ferruginous hawk is considered likely to occur within the project area. In Arizona, this species prefers open scrublands and woodlands, grasslands, and semidesert grassland (AGFD 2001b). In general, the ferruginous hawk breeds in open areas with little topographic relief and avoids high elevation, forest interior and narrow canyons. Hunting areas are typically open grasslands, preferably those dotted with suitable low hills or short trees that serve as perches (AGFD 2001b).

This species is primarily found in the western states of North America, southern Canada and into central Mexico. It breeds from western Canada south to northern Arizona and New Mexico. The winter range is primarily from central Mexico north through the southwestern and mid-western United States. As discussed by AGFD (2001b), within Arizona, this species breeds in northern Arizona on the Colorado Plateau and can be seen in virtually any part of Arizona with open environs, particularly in agricultural fields and native grasslands. Within the project area this species is more likely to occur in the eastern part where there are more open sagebrush and grasslands.

Golden eagle (Aquila chrysaetos)

Golden eagle is known to occur within the project area. This species is usually found in open country, in prairies, arctic and alpine tundra, open wooded country and barren areas, especially in hilly or mountainous regions. They nest on rock ledges, cliffs or in large trees. In Arizona, they are found in mountainous areas that are virtually vacant after breeding in some desert areas (AGFD 2002b). The golden eagle's territory size in several areas of the western United States averaged 22 to 55 square miles (57 to 142 square kilometers). The golden eagle is a carnivore that feeds mainly on small mammals like rabbits, marmots, and ground squirrels. They may also eat insects, snakes, birds, juvenile ungulates, and carrion (AGFD 2002b). Within the project area this species may occur in all vegetation communities; however, it is more likely to occur in the northwestern part near the Hurricane Cliffs.

Pinyon jay (Gymnorhinus cyanocephalus)

The pinyon jay occurs throughout much of the western United States, including in the project area. The pinyon jay can be found from central Oregon and Montana south to central Arizona, New Mexico, and northwestern Oklahoma (UDWR 2014a). Pinyon jays do not migrate and are typically found on dry mountain slopes and foothills near pinyon-juniper forests. This species can also be found in sagebrush, scrub oak, and chaparral communities and in pine forests. Pinyon jays live in large flocks of as many as 500 birds. A pinyon jay may spend its entire life in the flock it was born into. The pinyon jay population varies depending on the availability of pinyon pine seeds. In years when the seeds are scarce, the jay population drops. Each flock has an established home range, but may become somewhat nomadic and move long distances when food is scarce. The diet of the pinyon jay consists primarily of pinyon and other pine seeds, but also includes berries, small seeds, grains, and insects. At times, pinyon jays may also eat bird eggs and hatchlings (UDWR 2014a). Within the project area this species may occur in the pinyon-juniper and sagebrush vegetation communities.

Greater western mastiff bat (Eumops perotis californicus)

This insectivorous bat species is likely to occur within the project area and on adjacent lands (AGFD 2014). In Arizona, where it is considered a year-round resident, the species been found in all Arizona counties except Yavapai, Navajo, Apache, and Santa Cruz (AGFD 2002c). Habitat includes lower and upper Sonoran Desertscrub vegetation zones near cliffs, where it prefers rugged, rocky canyons with abundant crevices (AGFD 2002c). Population trends are poorly

known (AGFD 2002c). Within the project area this species may occur in all vegetation communities, however, it is less likely to occur in the shrublands in the eastern part of the project area.

Spotted bat (Euderma maculatum)

This insectivorous bat species is known to occur within the project area (AGFD 2014). In Arizona, it is mostly collected in dry, rough desert scrub, with a few captured or heard in ponderosa pine forest (AGFD 2003b). Population abundance and densities are very poorly known, but spotted bat is now known to occupy a wider total range and to be more common than initially thought (AGFD 2003b). Within the project area this species may occur in all vegetation communities.

Allen's lappet-browed bat (Idionycteris phyllotis)

This insectivorous bat species has been recorded within the project area. In Arizona, it has been taken most often in ponderosa pine, pinyon-juniper woodland, and riparian areas with sycamores, cottonwoods, and willows (AGFD 2001c). Population trends are very poorly known (AGFD 2001c). Within the project area this species may occur in all vegetation communities; however, it is less likely to occur in the shrublands in the eastern part of the project area.

Pale Townsend's big-eared bat (Corynorhinus townsendii pallescens)

This insectivorous bat species is known to occur within the project area (AGFD 2014; USFS 1999, 2009). It is considered widespread with habitat in desert scrub, oak woodlands, pinyon-juniper, and conifer forest types throughout the state in summer (AGFD 2003c). Within the project area this species may occur in all vegetation communities.

Arizona myotis (Myotis occultus)

This insectivorous bat species is known to occur in northern Arizona. Arizona distribution records do not contain information regarding whether this species is known to occur within the project area (AGFD 2011a). The total range for this species includes southern California, Arizona, New Mexico, and Colorado, south to Mexico and possibly into west Texas (AGFD 2011a). This species has been observed at higher elevations in Apache, Coconino, Cochise, Gila, Greenlee, Mohave, Navajo, and Yavapai Counties. Its elevation ranges from 3,200 to 8,620 feet; there are also records from much lower elevations between 150 and 1,000 feet along the Lower Colorado River (AGFD 2011a).The AGFD suggests this species may use manmade structures for roosting, but based on radio tracking studies performed in northern Arizona, maternity colonies were frequently observed in large ponderosa pine snags. It may use tree cavities, mines, or possibly caves for winter hibernation (AGFD 2011a). Within the project area this species may occur in all vegetation communities.

3.3.11.3 Species of Greatest Conservation Need

The AGFD has statutory authority and obligation under the Arizona Revised Statutes for fish and wildlife management in the state, including the project area. This statutory obligation includes management of both game and non-game wildlife. In cooperation with the AGFD, BLM develops management plans for wildlife species and habitats (BLM 2007b). Many of the management directions for wildlife included in these management plans are based on statewide goals of the AGFD in managing particular species. The Grand Canyon-Parashant National Monument and Arizona Strip Field Office Resource Management Plans (BLM 2008a and 2008b) include objectives for the construction and maintenance of habitat improvement projects, primarily water

developments for big- and small-game species, but many non-game species benefit from these projects as well. Other habitat enhancement projects implemented include prescribed burns, seeding, and chemical or mechanical treatments of poor-quality habitat areas. Wildlife habitat monitoring studies are being conducted to assess the results of management toward meeting wildlife objectives. In cooperation with the USFWS and AGFD, several species have been reintroduced to former ranges, and existing populations have been augmented. These include pronghorn, desert bighorn sheep, mule deer, and Merriam's turkey.

The AGFD Wildlife Action Plan provides a strategic framework and information resource designed to help conserve terrestrial and aquatic wildlife and their habitats in Arizona (AGFD 2010b). The action plan focuses on habitat types, provides recommended conservation actions for each habitat type on a regional basis, and develops conservation priorities for the 183 Species of Greatest Conservation Need in Arizona. Included among these Species of Greatest Conservation Need are 28 crustaceans and mollusks, 33 fish, 12 amphibians, 26 reptiles, 49 birds, and 35 mammals. Special attention is given to federally listed species, federal candidate species, species currently petitioned for listing, recently delisted species, and species for which conservation agreements already exist.

Common nighthawk (Chordeiles minor)

This species is likely to occur in the project area. Its habitat includes mountains and plains in open and semi-open areas: open coniferous forests, savanna, grasslands, fields, vicinity of cities and towns. Nesting occurs on the ground on a bare site in an open area. In some areas, this species also nests on flat gravel roofs of buildings, perhaps related to prey availability at artificial lights. It prefers areas with sandy soil in the southern United States. Common nighthawks feed on flying insects (e.g., mosquitoes, moths, beetles, flies, caddis flies). They forage at night or during the day, catching insects high in the air or close to the ground. Foraging may occur around artificial lights. Within the project area this species may occur in all vegetation communities.

Lincoln's sparrow (Melospiza lincolnii)

It is unknown whether the Lincoln's sparrow is located within the project area, but it is a species that is possible in the region. Lincoln's sparrow occurs from northern Canada south through the Rocky Mountains and the Pacific coastal ranges to southern California, Arizona, and New Mexico (UDWR 2014b). During winter, it is found in the south-central and southwestern United States, south to Honduras. Habitats used by Lincoln's sparrow during the breeding season include wet meadows, bogs, and riparian thickets, especially where these habitats include willows and where shrub cover is dense; during migration and in winter, this species uses a much broader array of habitats, ranging from weedy pastures to tropical forests. This species feeds mainly on terrestrial invertebrates (arthropods) and small seeds. Within the project area this species may occur in all vegetation communities, however, it is more likely to occur in the northwestern part near Langs Run.

Macgillivray's warbler (Oporornis tolmiei)

It is unknown if the MacGillivray's warbler is located within the project area, but it is a species that is possible in the region. MacGillivray's warblers are migratory birds that spend their summers in temperate forests in the western United States and in boreal forests of western Canada (Cornell Laboratory of Ornithology 2014). In autumn, these birds migrate back to Central America, where they remain in temperate shrublands for the winter. This species primarily feeds on insects, but will also take spiders and occasionally worms. Within the project area this species is more likely to occur in the ponderosa pine habitat around Mount Trumbull and Mount Logan.

Kaibab squirrel (Sciurus aberti kaibabensis)

This squirrel's habitat is confined entirely to the ponderosa pine forests of a few areas of northern Arizona, including the project area. In 1965, 200,000 acres (800 square kilometers) of Kaibab squirrel habitat within Grand Canyon National Park and Kaibab National Forest were declared the Kaibab Squirrel National Natural Landmark. The Kaibab squirrel lives in the ponderosa pine forests, where it builds its nest out of twigs and pine needles. Kaibab squirrels, ponderosa pines, and the fungi which grow in the vicinity of the ponderosas exist in a symbiotic relationship. The squirrel eats acorns, fruit, and fungi (especially an underground truffle), as well as the seeds, bark, and twigs of the trees where it makes its home. The Kaibab squirrel's largest source of food is the seeds found within ponderosa pine cones (Wikipedia 2014). Within the project area this species is more likely to occur in the ponderosa pine habitat around Mount Trumbull and Mount Logan.

Kit fox (Vulpes macrotis)

The kit fox may occur in the project area. Its habitat includes open desert, shrubby or shrub-grass habitat. In the Great Basin it is found in shadscale, greasewood, and sagebrush. The primary food item is usually the most abundant nocturnal rodent or lagomorph in the area. It may also feed opportunistically on birds, reptiles, and insects. Within the project area this species is more likely to occur in the eastern part where there are more open sagebrush and grasslands.

Mexican free-tailed bat (Tadarida brasiliensis)

This bat has been found roosting in caves, mine tunnels, and crevices in bridges, parking garages and building, and in attics. Some of these roosts are used only in the spring and fall by bats as transition or resting roosts, on their annual migrations north and south. They are known to roost in tightly packed groups. They feed primarily on moths (90 percent) and numerous other insects in small amounts. They are precise hunters that can bite off the soft abdomen of a moth in flight and let the wings, legs, and thorax fall to the ground. They probably hunt in groups. In the spring, these migratory bats move northward from southern Arizona and Mexico, to the Lower Sonoran and Upper Sonoran life zones. Considered primarily a lowland species, they do sometimes range into the highlands. Habitats include desert scrub, coniferous forests, and coniferous woodlands (AGFD 2004). Within the project area this species may occur in all vegetation communities.

Red fox (Vulpes vulpes)

The red fox occurs in various open and semi-open habitats. It usually avoids dense forest, although open woodlands frequently are used. It is an opportunistic omnivore eating whatever is available. It feeds on small mammals, carrion, birds, insects, fruit, and human refuse. Rabbits and mice are common prey (NatureServe 2014). Within the project area this species is more likely to occur in the eastern part where there are more open sagebrush and grasslands.

Stephen's woodrat (Neotoma stephensi)

This burrowing rodent is usually found in rocky areas (usually not cliffs) in pinyon-juniper woodlands. Much of its diet is composed of foliage and seeds of juniper. It is also known to feed on ephedra, which may be stored within the burrow (Hoffmeister 1986). Within the project area this species may occur in all vegetation communities; however, it is more likely to occur in the pinyon-juniper community.

Yuma myotis (Myotis yumanensis)

This bat is found in a wide variety of upland and lowland habitats, including riparian, desertscrub, moist woodlands, and forests. It prefers cliffs and rocky walls near water. It is a colonial species,

hanging in closely grouped clumps, using caves, mines, cliff crevices, attics, buildings, underneath bridges, and similar structures. Nursery colonies (sometimes in the thousands) are usually in buildings, caves, and mines, or under bridges. It is more closely associated with water than any other North American species of bat (Barbour and Davis 1969). This nocturnal species probably makes local or short migrations to suitable hibernacula for the winter. For example, individuals that spend the summer at high elevations probably move downslope. It forages over water surfaces, feeding extensively on small moths (78.6 percent by frequency) and other small insects including dipterans and even some ground beetles (AGFD 2011b). Within the project area this species may occur in all vegetation communities.

3.3.11.4 Migratory Birds

The Migratory Bird Treaty Act of 1918 gives federal protection to all migratory birds, including nests and eggs. Under the act [16 U.S.C. 703–711], it is unlawful to take, kill, or possess migratory birds except as permitted by regulations [50 CFR Subpart B]. Executive Order 13186 of January 10, 2001 (Federal Register 66[11]:3853–3856) directs federal agencies to support migratory bird conservation and to "ensure that environmental analyses . . . evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern" [50 CFR Section 3d(6)]. Species of concern are defined as "those species listed in the periodic report 'Migratory Nongame Birds of Management Concern in the United States,' priority migratory bird species as documented by established plans (such as Bird Conservation Regions in the North American Bird Conservation Initiative or Partners in Flight physiographic areas), and those species listed in 50 C.F.R. 17.1" [50 CFR Section 2i].

Golden eagles are considered migratory birds, and are protected under the Bald and Golden Eagle Protection Act [16 U.S.C. 668–668c], enacted in 1940, and amended several times since then. This Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles (*Haliaeetus leucocephalus*), including their parts, nests, or eggs. This act provides for the protection of the bald eagle and the golden eagle (*Aquila chrysaetos*) by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. Amendments were made in 1972 and 1978, and a 1994 Memorandum (Federal Register 59:22953, April 29, 1994) from President William J. Clinton to the heads of Executive Agencies and Departments sets out the policy concerning collection and distribution of eagle feathers for Native American religious purposes.

The USFWS has the legal mandate and the trust responsibility to maintain healthy migratory bird populations for the benefit of the American public. Management recommendations for migratory birds can be found in the USFWS Migratory Bird Program Strategic Plan 2004–2014 (USFWS 2010a). A list of species protected as migratory birds can be found in USFWS (2010b) and Appendix 2.G of the Arizona Strip Proposed RMP/Final EIS (BLM 2007a). Latta et al. (1999) describe priority bird species of concern by vegetation type in Arizona. These vegetation types are in turn grouped into the pertinent physiographic areas at the Partners in Flight (2014) website. The following vegetation (habitat) types are found in the project area: pinyon-juniper woodland, sagebrush, ponderosa pine forest, Mojave mixed shrub, and grassland.

Numerous migratory bird species occur within the boundary of the project area. Many of the species classified as BLM sensitive species (e.g., northern goshawk and burrowing owl) also are classified as migratory. These species are addressed in Section 3.3.11.2. Migratory bird species that may potentially occur in or adjacent to the project area are listed in Table 3-18, and described based on information in Latta et al. (1999).

Table 3-18. Migratory Birds Associated with the Project Area

Species Name	Bird of Conservation Concern (BCC)	Seasonal Occurrence in Project Area
Bell's Vireo (*Vireo bellii*)	Yes	Breeding
Bendire's Thrasher (*Toxostoma bendirei*)	Yes	Breeding
Black-chinned Sparrow (*Spizella atrogularis*)	Yes	Wintering, Breeding
Black-throated Gray Warbler (*Dendroica nigrescens*)	Yes	Breeding
Brewer's Sparrow (*Spizella breweri*)	Yes	Breeding, Wintering, Migrating
Burrowing Owl (*Athene cunicularia*) [6]	Yes	Breeding, Year-round
Cassin's Finch (*Carpodacus cassinii*)	Yes	Year-round
Costa's Hummingbird (*Calypte costae*)	Yes	Breeding
Golden Eagle (*Aquila chrysaetos*)	Yes	Year-round
Grace's Warbler (*Dendroica graciae*)	Yes	Breeding
Gray Vireo (*Vireo vicinior*)	Yes	Breeding
Juniper Titmouse (*Baeolophus ridgwayi*)	Yes	Year-round
Lucy's Warbler (*Vermivora luciae*)	Yes	Breeding
Olive-Sided Flycatcher (*Contopus cooperi*)	Yes	Breeding
Pinyon Jay (*Gymnorhinus cyanocephalus*) [7]	Yes	Year-round
Prairie Falcon (*Falco mexicanus*)	Yes	Year-round
Williamson's Sapsucker (*Sphyrapicus thyroideus*)	Yes	Wintering

3.3.11.4.1 Resource Condition Indicators

Measurement indicators used to analyze this issue are:

- Acres of treatment within each category of wildlife habitat.
- Acres and type of habitat lost and duration of loss.
- Timing of treatments (that could result in changes in migratory, foraging, or reproductive behavior)
- Qualitative assessment of changes in overall habitat quality for both game and non-game species as a result of treatments.

[6] Discussed in Section 3.3.11.2, BLM Sensitive Species.

Chapter 4. Environmental Consequences

4.1 Introduction

This chapter describes the environmental consequences of implementing any of the alternatives described in Chapter 2, including the no action alternative and the proposed action. It examines the potential impacts of the alternatives and design features on each of the issues described in Chapter 3. Impacts were analyzed with the design features outlined in Chapter 2 in place.

Impact Assessment Methodology

- **Direct Impacts:** Direct impacts are caused by an action and occur at the same time and same place as the action.
- **Indirect Impacts:** Indirect impacts are caused by an action and occur later or not in the same location as the action, but are reasonably foreseeable.
- **Short-term Impacts:** Less than 5 years (for this project)
- **Long-term Impacts:** Five years or longer (for this project)
    - No Impact: Impacts are not discernible, or cannot be quantified (measured).
    - Minor Impact: Impacts would occur, but resources would retain existing character and overall baseline conditions.
    - Moderate Impact: Impacts would occur, but resources would partially retain existing character. Some baseline conditions would remain unchanged.
    - Major Impact: Impacts would occur that would create a high degree of change within the existing resource character and overall condition of resources.

4.2 Air Resources (Including Greenhouse Gas Emissions)

4.2.1 Air Quality

This section provides an assessment of existing potential for air quality impacts. The description is based on review and compilation of available data obtained from the U.S. Department of Transportation (2006) Multi-Pollutant Emissions Benefits of Transportation Strategies, and EPA (2009) AP 42: Compilation of Air Pollutant Emission Factors, Chapter 13. The impact analyses in the following sections are based on knowledge of the resources and the site, information provided by experts and other agencies, and professional judgment. This analysis is qualitative in nature due to the dearth of local/pertinent air monitoring data, coupled with the relatively insignificant amount of expected emissions from the proposed activities.

4.2.1.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Based upon the application of the assumptions provided above for each treatment, short-term, direct impacts are anticipated to be minor. Under this alternative, air quality and visibility would be reduced in the immediate area of the treatments for a short period of time. Project design features would attempt to minimize smoke emissions to the Class I airshed to the south (Grand Canyon National Park). A review of the Grand Canyon air monitoring data prior to and following vegetation treatments would provide the best data for the six criteria pollutants covered by the NAAQS. Concentrations of carbon monoxide, lead, NO_2, PM_{10} and $PM_{2.5}$, ozone, and sulfur dioxide are not expected to increase to a level that would push either the local Class II or neighboring Class I airshed into non-attainment status. Prescribed fire treatments would

substantially obscure visibility and deteriorate air quality in the immediate area. These burned areas would contribute elevated dust levels until soil surfaces have stabilized and revegetated, which should be within the short term. Short-term direct and indirect impacts are therefore anticipated to be minor.

Long-term, direct and indirect impacts are likewise anticipated to be minor. Selectively removing biomass would alter the landscape's ability to propagate wildland fires, allowing for less severe fire emissions, thereby improving air quality. Proposed erosion control treatments are designed to reduce wind-blown (eolian) and water-derived soil losses, leading to coincident reductions in fugitive dust that diminishes air quality.

4.2.1.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Short-term, direct impacts are anticipated to be minor. Prescribed fire treatments would substantially obscure visibility and deteriorate air quality in the immediate area. These burned areas would contribute elevated dust levels until soil surfaces have stabilized and revegetated, which should be within the short term.

Long-term, direct and indirect impacts are anticipated to be minor. Prescribed fire treatments would improve air quality, as the removal of available fuel would minimize the magnitude of wildfires and thereby result in fewer fire emissions. Dust levels would reduce minimally as soil surfaces mature and a more varied vegetation scheme takes place across the project area. Erosion control structures are intended to provide decades of soil retention and vegetative cover improvements, leading to associated improvements in long-term air quality.

4.2.1.3 Direct and Indirect Impacts of Alternative C – No Action

No direct or indirect impacts to air quality would be anticipated in the short term under this alternative. No emissions of particulates, carbon monoxide, volatile organics, or nitrogen oxides would be released in the immediate area since no vegetation treatments would be implemented. Likewise, no direct or indirect impacts would be anticipated in the long term. However, accumulated fuels would not be reduced, resulting in the possibility of increased frequency and size of wildland fires. Thus, impacts under this alternative are anticipated to be moderate due to the increased potential for emissions.

4.2.2 Climate Change

This section provides an assessment of existing potential for climate change impacts. The description is based on review and compilation of available data obtained from EPA 2011 (Inventory of U.S. Greenhouse Gas Emissions and Sinks). The impact analyses in the following sections are based on knowledge of the resources and the site, information provided by experts and other agencies, and professional judgment.

Guidance to land management agencies on how to consider climate change in the NEPA process is evolving. Guidance from the Council on Environmental Quality recommends that agencies quantify project contributions to GHG emissions, but also allows for a more general qualitative analysis. Estimates of the combined CO_2 emissions for a suite of treatments (manual, mechanical, chemical, erosion control, and fire) were under 35 metric tons over a 2-day period.

4.2.2.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Based upon the application of the assumptions provided above for each treatment, short-term, direct impacts are anticipated to be minor. Use of mechanized tools, aircraft, and vehicles would

briefly elevate levels of GHGs, but not at a substantial amount. Long-term direct and indirect impacts are anticipated to be minor, as well. Removing biomass would reduce the landscape's ability for carbon sequestration in the short term, but lead to higher amounts of vegetative cover and biomass-derived carbon in the long term. Anticipated reductions in soil loss through the implementation of erosion control projects would also lead to increased vegetative cover and reductions in soil carbon loss, benefiting soil and atmospheric chemistry on the project-level scale.

4.2.2.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Based upon the application of the assumptions provided above for each treatment, short-term, direct impacts are anticipated to be minor. Prescribed fires would elevate GHGs to the greatest extent of all proposed treatments. Unknown are the post-fire effects regarding enhanced CO_2 uptake, soil respiration, and bio-mass regrowth. Short-term levels of GHGs would still be minimal, compared to global emissions. Long-term direct and indirect impacts would be minor. Regeneration of biomass from fire operations would be variable, along with carbon sequestration abilities. Overall impact would be anticipated to be minimal, due to minute GHG quantities in comparison to global levels.

4.2.2.3 Direct and Indirect Impacts of Alternative C – No Action

The no action alternative would result in no direct emissions from BLM activities tied to the proposed actions of vegetation and fuels treatments and erosion control implementation. However, taking no action would lead to increased risk of wildland fire and accelerated erosion rates. This would then increase the likelihood of indirect impacts through higher GHG emissions by causing higher rates of fuel combustion (high-severity wildfire scenario) or the need for heavy equipment to mitigate more severe, accelerated soil erosion.

4.3 American Indian Resources

The American Indian Religious Freedom Act applies to sites of religious concern or sites used for religious ceremonies. While no specific criteria are given for assessing project-derived impacts within the law, generally, an effect is considered substantial if the action would impede or reduce access to such locations, change some aspect of the location that no longer makes it suitable for ceremonies, or affects the actual physical location itself.

4.3.1. Direct and Indirect Impacts of Alternative A – Proposed Action

Implementation of Alternative A could result in impacts to the traditionally used plants listed in Chapter 3. For example, prescribed fire could burn plants used for medicine, eating, or basket-weaving. On the other hand, Indian tobacco tends to thrive in the disturbed conditions following a fire.

All of the proposed treatments under Alternative A could directly impact at least some of the traditionally used plants listed in Chapter 3. However, since no specific location were identified for any of the plants of concern, the importance may lie in the fact that they are collected from the general Mount Trumbull area.

Access within the project area depends upon a number of County and BLM roads. During normal project work, roads are generally only closed briefly for safety reasons, and, where one is available, an alternate route is marked.

The Mount Trumbull landscape is topographically complex, encompassing at least two large eroded volcanic mountains and numerous smaller and larger spatter cones and hills. When the thick and varied vegetation from the sagebrush flats to the ponderosa pine forests are added to this landscape, it is difficult for any unwanted intrusion, be it visual, audible, or other to intrude upon any given point. The one exception is smoke. However, given the variability in amount, density, and direction of smoke at any given time, the intrusion/impact would be temporary.

Most of the plants of concern are prolific throughout the project area, some to the point of being problematic and the focus of some of the proposed treatments. Even under the most unlikely of circumstances that all of the proposed treatments under Alternative A were funded and completed in a year's time, there would be no reduction of access, change of setting, or effect to the physical location of the plants of concern that are present within the remaining 71,139 acres (55 percent) of the project area.

4.3.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

The direct and indirect impacts under Alternative B (prescribed fire only) would be the same as the impacts from the fire treatments described in Alternative A. The same number of acres and same areas are proposed for fire treatment as in Alternative A. However, no mechanical or chemical treatments are proposed in Alternative A. Thus, the overall potential for direct or indirect impacts to American Indian resources from Alternative B should be less, although no specific locations were identified for any plants of concern so impacts to these plants from prescribed fire treatments only are uncertain.

4.3.3 Direct and Indirect Impacts of Alternative C – No Action

Under this alternative, the vegetation and erosion issues within the project area would be expected to continue along their current trajectories of increasingly dense overstories and species-poor understories in the vegetation communities, as well as head- and down-cutting of drainages.

In terms of the plants of concern identified through consultation, there may be some minor benefit in terms of an abundance of native tobacco coming in after large wildfires, but this minor benefit would be offset by what could be the major loss of old-growth trees (various pine species) and pinyon-juniper woodlands, which are utilized for collection of pine nuts and sap. High-severity wildfire would also invariably affect the setting and character of places of traditional activities by leaving potentially large areas of burned trunks and other vegetation that can take decades to return to their original character.

4.4 Areas Managed to Maintain Wilderness Characteristics

4.4.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Prescribed fire would occur within lands managed to maintain wilderness characteristics. In the very short term, vegetative treatments would temporarily adversely affect opportunities for solitude and primitive, unconfined recreation during the actual treatment operations. Fire effects would be similar to wildfire operations. This would be due to the presence of and noise from equipment and laborers conducting these operations, as well as smoke from prescribed burning.

There would also be approximately 117 acres treated by mechanical methods (i.e., mastication). As described above for prescribed fire, mechanical treatment activities would temporarily adversely affect opportunities for solitude and primitive, unconfined recreation during the actual

treatment operations. This would be due to the presence of and noise from equipment and laborers.

Post-treatment, there would be short-term impacts to naturalness from either prescribed fire or mechanical treatments, as long as the evidence of human manipulation of the vegetation remained visible. As new vegetation gradually replaces the treated vegetation, the appearance of naturalness would be restored over time.

Table 4-1. Acres of Treatment Proposed in Alternative A within Areas Managed to Maintain Wilderness Characteristics

Treatment Type	Acres
Prescribed Fire	1,214
Mechanical Treatment	117

4.4.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Impacts under this alternative would be similar to those described for Alternative A, except that only prescribed fire would be used as a treatment method. The impacts to wilderness character would be the same as those described from prescribed fire for Alternative A. However, there would be no mechanical treatments, so no impacts to the 117 acres managed to maintain wilderness characteristics that would occur under Alternative A.

Table 4-2. Acres of Treatment Proposed in Alternative B within Areas Managed to Maintain Wilderness Characteristics

Treatment Type	Acres
Prescribed Fire	1,214

4.4.3 Direct and Indirect Impacts of Alternative C – No Action

Under Alternative C, current management of areas managed to maintain wilderness characteristics in the project area (as guided by the Grand Canyon-Parashant National Monument RMP (BLM 2008a)). There would be no proposed vegetation treatments, so no impacts to wilderness characteristics as a direct result of treatment activities would occur. However, fuel loads would continue accumulating due to fire suppression activities, which would increase the likelihood of a large-scale wildfire. This could impact the wilderness characteristics of the areas managed to maintain those characteristics and could affect opportunities for visitors to engage in primitive and unconfined recreation during fire suppression activities. Fire crews, aircraft, and other equipment needed to fight wildfires have short-term impacts on recreation activities. Large and/or high-severity wildfires could remove vast amounts of vegetation, reducing the opportunities for visitors to escape the sight and sound of each other, which is an important attribute of solitude.

4.5 Cultural Resources

4.5.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Alternative A contains nearly the complete suite of tools available to land managers: manual, mechanical, fire, and chemical treatments, seeding, and erosion control construction. However,

due to the project design feature of avoiding all identified cultural resources, fire is the only proposed treatment that could have an adverse effect.

The adverse effects to cultural resources from fire derive primarily from the related issues of fuel-loading and intensity and duration of the fire. While the direct impacts of fire to historic wooden objects can be mitigated by fire wrap and sprinklers, and rock art can have a vegetation buffer zone cut around it (or also draped with fire wrap), the natural build-up of forest litter, broken limbs and fallen trees can only be dealt with by removing whatever excess fuel can be carried away from the site and let fire do its natural job. It is important, however, to avoid the adverse effects fire can have on cultural resources; any addition of surface fuel-loading needs to be avoided. This can only be accomplished through site identification, avoidance of mulching on sites, and excess fuel removal prior to project initiation.

Surface artifacts can suffer from adverse fire effects with metates breaking, pottery sooted and "re-fired," and, under extreme heat, even glass and obsidian partially re-melting. Buried features and artifacts generally fare much better, though those within a few inches of the surface can still be affected by exposure to long-duration, hot fires. Roots and stumps can also cause more localized subsurface problems similar to those of surface artifacts when they burn, and can also add "modern" carbon contamination for radiocarbon dating.

One of the beneficial effects of prescribed fire in the project area is the removal of the thick layers of forest litter. Without being able to see the ground and find artifacts, many of the structural sites in this area remain undated, not understood, and unevaluated in terms of NRHP eligibility and significance.

Other direct and indirect impacts of fire derive from fire management activities, primarily the creation of fire-breaks and retardant use, and post-fire erosion and illegal surface collecting of the now-visible artifacts. Fire-break impacts depend entirely on how the break is created. Hand-cutting along existing roads and fence-lines would generally have no adverse effect. Retardant use can have substantial adverse impacts to rock art and historic resources, particularly wooden structures.

4.5.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Under this alternative, prescribed fire would be the only treatment method used within the project area. Since the proposed fire treatment acreage is the same as Alternative A, the fire impacts would be the same as discussed above (4.1.5.1)

4.5.3 Direct and Indirect Impacts of Alternative C – No Action

Under this alternative, the UMLRP would not occur and only pre-existing impacts (sheet erosion and the head- and down-cutting of drainages) would continue to affect the cultural resources.

The lack of ground visibility, and artifact visibility, due to accumulated forest litter would only get worse, leaving identified cultural resources unevaluated in terms of National Register Eligibility and unidentified non-structural sites at increasing risk of inadvertent discovery and damage.

The threat of impacts from wildfire would also continue to increase with the accumulation of additional surface fuel-loading and growth of ladder fuels that could lead to greater impacts to surface and sub-surface artifacts either through longer, hotter fires, or more aggressive methods required to control the fire.

4.6 Designated Wilderness

4.6.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Under this alternative, treatments are proposed within both the Mount Trumbull and Mount Logan wilderness areas. Natural fires in the area generally occur during peak fire season when they are likely to expand out of the wilderness and threaten resources and users outside the wilderness. As a result, most fires in the project area have been actively suppressed, resulting in changed ecosystems and adversely impacting the untrammeled and natural character of wilderness. The management actions proposed in Alternative A would result in a short-term adverse impact to the untrammeled and natural character of the wilderness areas. This would be due to the presence and noise of equipment and laborers around each wilderness area during treatment operations. No mechanical treatments are proposed within wilderness. Prescribed fire would be less impacting to wilderness character than wildfires can be if fuels accumulate to the point that the wildfire is high severity and active suppression is deemed necessary. Prescribed fire would likely improve the untrammeled and natural character of wilderness in the long term. Alternative A would also have beneficial effects on opportunities for solitude as a result of decreasing the amount of fire suppression. Within these areas, MIST tactics would be used to ensure that any treatment method used is appropriate and minimizes the impact to wilderness character. Arizona Strip fire resource advisors and wilderness specialists would be consulted during vegetation treatments to ensure that management actions are the minimum necessary for wilderness administration.

Table 4-3. Acres of Treatment within Designated Wilderness – Alternative A

Treatment Type	Acres
Prescribed Fire	16,854

4.6.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Impacts to designated wilderness would be the same as those described for Alternative A.

4.6.3 Direct and Indirect Impacts of Alternative C – No Action

Under Alternative C, current management of designated wilderness guided by the Grand Canyon-Parashant National Monument RMP (BLM 2008a) would continue in the project area. However, no vegetation treatment activities would occur. Therefore, there would be no long-term improvements to naturalness, solitude, and primitive and unconfined recreation. This alternative would continue to limit opportunities for fire to play its natural role in designated wilderness. This would allow fuel loads to continue accumulating due to suppression activities and increase the likelihood of a large scale wildfire. This could further impact the natural characteristics of the area and could affect opportunities for visitors to engage in primitive and unconfined recreation activities. Fire crews, aircraft, and other equipment needed to suppress wildfires have short term impacts on recreation activities. Large wildfires could also impact the opportunities for visitors to escape the sight and sound of each other which is an important attribute of solitude.

4.7 Fire and Fuels

Actions proposed in the alternatives can affect: hazardous fuel loads and the BLM's ability to manage them; tools for implementing fuels treatments; the potential for human-caused ignitions; fire suppression activities; fire use; threats to people, property, and sensitive resources from wildfire; FRCC; and the risk of undesirable wildfire, as defined within the FMP.

4.7.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Fuels and vegetation treatments would be implemented with acreage limits and treatment priorities by vegetation community. Fire treatments following MIST tactics would be authorized for both designated wilderness areas. Treatments would directly affect fuel loads and could indirectly affect fire suppression operations, as treated areas may burn less intensely than untreated areas in wildfires. Impacts would be moderate and both short- and long-term.

Treatments identified under Alternative A would help reduce hazardous fuel loads, create fuel breaks and reduce the overall threat of an undesirable wildfire event impacting private property, firefighter and public safety, simply by reducing the overall fuel loads. Additionally, these fuel breaks would provide opportunities to be used as fire breaks in the future.

Treatments in and around the sagebrush areas would break up continuous fuels. Treatments designed for creating a variety of age classes of sagebrush would reduce the potential for high-intensity wildfire, should a fire enter these areas, allowing fire to play a more natural role.

Removing and/or thinning pinyon/juniper in a mosaic pattern would also break up continuous fuels and reduce the risk of a high-intensity wildfire entering these areas. Because there is a greater risk of conversion of shrublands to annual grasslands under a high-intensity fire, managed treatments under Alternative A would reduce the likelihood of cheatgrass invasion and help native grasses and forbs persist long term.

All treatment types proposed would help to effectively return these areas to a fire regime closer to the historical range (FRCC1 and FRCC2). All treatment types are effective in breaking up the continuity of fuels, increasing the potential for firefighters and resource managers to suppress the fire and/or manage a fire for resource benefits. Mechanical treatments and prescribed fire would be most effective at mimicking natural events (such as low-intensity wildfire) and in moving the area toward the desired future conditions. Hand thinning and manual treatments are effective, but take longer to accomplish and may increase ladder fuels (and subsequent fire risk) for a short period of time (1 to 2 years as the needles fall and fuels break down).

4.7.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Vegetation treatments would be implemented with the same treatment preferences as under Alternative A. Only prescribed fire treatments would be authorized. Fire treatments following MIST tactics would be authorized for both designated wilderness areas based on vegetation community. Treatments would directly affect fuel loads and could indirectly affect fire suppression, as treated areas may burn less intensely than untreated areas in wildfires. Prescribed fire could indirectly affect appropriate management response during future ignitions. Impacts would be moderate and both short- and long-term.

4.7.3 Direct and Indirect Impacts of Alternative C – No Action

Under this alternative, no vegetation treatments would occur. The current condition of woodlands, ponderosa pine forests, benefits of restoring of fire on the landscape, and plant community resilience would not be affected by any treatments. Untreated areas would likely burn more intensely during a wildfire, while the final fire size and severity would likely increase as a result of continued fuels accumulation.

Over 100 years of fire suppression has created conditions that require a more intensive suppression effort to prevent wildfires from damaging or destroying known values. The impacts associated with fire suppression, even when using MIST, adversely affect the landscape by

interfering with the natural fire process. This results in a cycle of suppression, which in turn results in increased fuel loads requiring more intensive suppression efforts.

Impacts to fire and fuels would be moderate to major and long-term under this alternative.

4.8 Livestock Grazing

4.8.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Under Alternative A, ecological conditions would be expected to improve following implementation of the proposed vegetation treatments. Removing the dense overstory of sagebrush and pinyon-juniper trees would promote the health, vigor, recruitment, and production of perennial grasses, forbs and shrubs by opening the canopy. There would also be less competition with the trees and shrubs 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 area. Implementation of this alternative should assist those portions of allotments within the project area that are progressing toward meeting Rangeland Health Standards 3[7] of the Arizona Standards for Rangeland Health and the Fundamentals of Rangeland Health (Title 43 CFR 4180) by increasing the quantity and quality of herbaceous vegetation.

Implementation of this alternative would improve quantity and quality of forage for both livestock and wildlife, and would increase the production and vigor of herbaceous plant communities. The forage base would more adequately sustain the existing grazing preference of the allotments within the project area, and would improve overall livestock performance (e.g., increased cow weight, increased calf crops, increased weaning weights). Several of the permittees are dependent on their allotment to help generate a large portion of their annual income, while other permittees have alternate sources of income and depend on the allotment for supplemental income.

Implementation of the proposed action may have a short-term economic effect on the permittees due to a mandatory rest period of the treatment areas. This may disrupt a permittees' typical rotation and require further trailing or trucking to available pastures or forage reserves. 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. All treatments would require a minimum two growing season rest period. The rest period may be extended, pending the rate of progress toward vegetative establishment. Seed germination, drought-related influences, wildland fire, or other natural unforeseen events could affect the rate of vegetative establishment.

The type of treatment implemented may also affect the rate of recovery (e.g., mechanical, chemical, fire). A fast moving underburn, with an adequate understory that does not require seeding, may recover quicker than a mechanical treatment that has little or no understory and requires seeding for adequate understory recovery. Chemical treatment of overstory plants, including sagebrush, juniper, and pinyon, may have none or only short term effect to understory

[7] Standard No. 3: Productive and diverse … exist and are maintained, as indicated by (a) composition; (b) structure; and (c) distribution.

perennial grasses. This is because the herbicide that would be used targets shrubs and trees, with little to no effect on perennial grasses.

The BLM would work with grazing permittees to develop project implementation schedules that would be documented by a Cooperative Agreement (CA) or Memorandum of Understanding (MOU) prior to project implementation. The terms and conditions of each CA or MOU would remain in effect following the completion of each treatment. The BLM and the grazing permittees would work together to find alternative grazing lands for the period of the non-use to accommodate their livestock operations. Because pastures on an allotment would not be treated during the same year through project design, an entire allotment would likely not be placed in non-use, reducing the impact to livestock operations.

Two forage reserves are located within the project area would be available to accommodate affected permittees within treatment units. In the long term, the proposed action would benefit grazing operations by improving the quality and quantity of forage (see Vegetation discussion, Section 4.10.1.1).

4.8.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Effects to livestock grazing under this alternative would be similar to those described under Alternative A. However, no manual, mechanical, or chemical treatments would be authorized or conducted, and approximately one-third less acreage would be treated. Displacement and disruption to livestock operations would have less short-term impact, as not only would there be less acreage treated, but fewer allotments would be treated, and hence fewer permittees would be displaced.

Prescribed fire would be focused on ponderosa pine communities. These communities do not typically provide much forage for livestock in the understory, even with the re-introduction of fire. The communities with the greatest potential for response to treatments, including sagebrush and pinyon-juniper dominated communities, would be largely excluded from treatment under this alternative. Little to no long-term increase in forage or diversity would be expected. Long-term benefits of increased forage production and the increase in desired vegetation would likely be reduced by an estimated two-thirds or more when compared to Alternative A.

Since little to no prescribed fire would take place in sagebrush communities or pinyon juniper communities in this alternative, overstory canopies in these communities would continue to preclude or reduce understory species (i.e., grasses and forbs). Continued loss of understory vegetation may prevent portions of the allotments within the project area from meeting Standard No. 3 of the Arizona Standards for Rangeland Health and the Fundamentals of Rangeland Health (Title 43 CFR 4180), including DPC objectives, due to continued declines of native, herbaceous vegetation.

In pinyon pine/Utah juniper woodlands, the ability of understory plants to recover after disturbance rapidly declines after pre-fire tree cover reaches about 40 to 50 percent. The ability for a community to recover after a wildfire directly corresponds to the amount of native perennial grass and forb cover prior to fire. A community with reduced understory is also prone to sheet erosion when heavy rains occur (Firescience 2008).

4.8.3 Direct and Indirect Impacts of Alternative C – No Action

Under Alternative C, rangeland conditions are expected to remain the same for the short term and decline in condition over the long term. The health, vigor, recruitment, and production of native

and non-native perennial grasses and native shrubs would decline in the long term, due to a combination of factors including competition for nutrients, sunlight and precipitation with older, decadent shrubs and invasive pinyon/juniper woodlands. The invasion of pinyon/juniper woodlands onto sagebrush/steppe vegetation communities would continue and the older, decadent even-aged shrub communities would further decline in health and vigor, affecting the recruitment and establishment of new grasses, forbs and shrubs.

This alternative would be expected to eventually affect overall livestock performance and livestock management of the grazing permittees, due to a reduction in the quantity and quality of grasses and other herbaceous forage, which are important to livestock and other grazing animals. With a reduction in the production and vigor of herbaceous plant communities, the forage base would probably not adequately support the existing herd sizes and would adversely affect livestock performance (e.g., reduced cow weights, reduced calf crops, reduced weaning weights, etc.). Possible future reduction in stocking rates may adversely affect the permittees' long-term operations.

This alternative may also prevent portions of the allotments within the project area from meeting Standard No. 3 of the Arizona Standards for Rangeland Health and the Fundamentals of Rangeland Health (Title 43 CFR 4180), including DPC objectives, due to continued declines of native, herbaceous vegetation.

4.9 Soils

4.9.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Mechanical Treatments

Mechanical treatments are proposed for 6,170 acres of the project area, with approximately 1,610 of these acres proposed for either mechanical or lop and scatter treatment. This section assumes that potentially all 6,170 acres may be mechanically treated (Table 2-1 and Figure 2-2).

Chainsaws are the simplest and least impactive machines that would be used for the mechanized options of Alternative A. No direct effects to soils from these hand-held devices are anticipated other than slight increases in soil bulk density (compaction) from chainsaw operator foot traffic if treatments are done when soils are wet. Chainsaws are likely to be used in areas of steeper slopes and/or where motorized vehicle access is precluded. In this light, chainsaw work would protect soil resources by eliminating the need for wheeled or tracked vehicle access on the most vulnerable soils. Wheeled and tracked vehicles with hydraulic attachments or other implements that cut, shred, and incorporate vegetation can be much more time- and cost-effective than chainsaws in removing vegetation (Zachman 2003). Shrub and pinyon-juniper stands can be felled and masticated using either a roller chopper or hydro-axe equipped machinery. Roller choppers are large steel drums with blades attached across the width of the cylinder; water can be added to the drum to increase weight and aid in crushing woody material before it is chopped by the blades. Using this technology on frozen ground is beneficial from both a soil protection standpoint as well as from a treatment efficacy perspective. When air temperatures are below freezing, soil compaction is reduced and vegetation is easier to break up and mulch. The surface mulch left behind from roller chopping helps reduce erosion and enhance water infiltration; seeding coincident with roller-chopper treatment further enhances soil resource protection. A hydro-axe is a front-mounted device that uses a mower-mulcher attachment to grind vegetation in place. The flotation tires used to advance the attachment reduce soil compaction and the fine

mulch litter left behind provides surface protection and a source of organic matter for the native soil. Effects to soil from the attachment itself are minimal. Implementing the project design features presented in Section 2.3.4 regarding the use of heavy equipment would minimize soil compaction and displacement from these treatment options.

Successful mechanical treatments under Alternative A would likely improve soil productivity and stability. Mechanical treatments would increase mulch/organic matter in the project area and would thereby (likely) improve soil moisture-holding capacity and infiltration rates. Mechanical treatments using skid-steers and similar wheeled or tracked vehicles would disturb soil surfaces, especially where sharp turns are made by the vehicles and when soils are saturated.

While mechanical treatments have the potential to disturb biological soil crusts, the benefits gained from mechanical treatments and associated revegetation would benefit soils in the long term. Short-term impacts would cause some loss of some soil crusts, though minimal in severity if travel routes and access corridors are spaced sufficiently to minimize the aerial extent of soil disturbance. With establishment of a more robust and diverse vegetative cover in treatment areas (i.e., more native grasses and forbs), long-term benefits to soil health would offset any short-term losses of biological soil crusts.

Project design features and proposed erosion control measures would mitigate most impacts to soils and biological soil crusts. No mechanical treatments would take place when soil moisture is excessive (enough to cause major rutting and displacement). Alternative A states that mechanical work would not take place when ruts greater than 4 inches form on roadways adjacent to work areas. Soil stabilization through erosion control structures, increased vegetation cover and diversity, and improved conditions for biological soil crust establishment should lead to a net improvement for soil resources as a whole from this alternative.

Seeding and Harrow

Under Alternative A, seeding, followed by a harrow is proposed for 561 acres in the White Spring Unit (Table 2-2). Short-term impacts to soils would be greater from this treatment, when compared to impacts from mechanical treatments. Seed would be broadcast by hand or attached to the rear of a tractor in front of the harrow implement. A harrow disturbs the soil with a series of long metal spikes intended to assist in covering the seeding and open the soil to allow room for seedling establishment. This method is typically used in areas where existing seed banks are determined to be inadequate. Short-term impacts would be some rutting and localized soil erosion associated with the harrow implement. However, successful seeding in the treatment area in the long term would increase soil stability by establishing more desirable grasses and forbs, when compared to species such as cheatgrass.

Biological soil crusts would be disturbed by the harrow implement. Mechanical treatment leading to greater site stability would benefit both soils and biological crusts in the long term. Short-term impacts would cause some loss of biological soil crust, though it would be minimal in severity. Consequently, long-term benefits would offset any short-term losses of biological soil crust. Design features of Alternative A would mitigate the impacts to soils and biological soil crusts. The same design features for mechanical work would apply to this method; specifically, no mechanical treatments would take place when soils are saturated and no harrow treatments would take place when ruts greater than 4 inches form on roadways adjacent to work areas.

Erosion Control

Under Alternative A, erosion control features are proposed in areas experiencing sheet flow, channel incision, and rill/gully erosion, including (but not limited to) the Crosby Unit, where the Lang's Run drainage is located. Head cutting and downward cutting along the main drainage of Lang's Run and tributary drainages have been previously identified for erosion control work. When initially implementing erosion-control features, there would be a slight increase in erosion as control structures are installed. As the control structures become stabilized and part of the channel framework, erosion should be substantially reduced in the drainage in the long term. Structures should reduce overall sediment movement within the Lang's Run drainage and the greater Fort Pearce Wash watershed. Further benefits to watershed resources would be realized through salinity reductions by precluding sediment transport to the Colorado River and its tributaries.

Chemical Treatment

The Crosby, Lower Kent, and Mount Trumbull Rim units would be subject to chemical treatments of manual backpack and aerial spraying of tebuthiuron. These actions would minimally affect soil resources directly, although the indirect effect of vegetation removal or reduction in canopy cover would temporarily affect soils by altering how vegetation intercepts rainfall, slows overland flow, and helps stabilize soils. These impacts would be realized until re-growth or re-vegetation takes place, usually in two to three growing seasons. The benefits over 3 to 10 years of reducing overstory vegetation cover and stimulating growth of understory vegetation (i.e., grasses and forbs) would increase soil stability in the treatment area, improving soil nutrient cycling and soil fertility.

Biological soil crusts could be affected by tebuthiuron treatments. One study conducted on mountain sage communities in south-central Utah (USDA 2001) indicated that no adverse effects could be detected on soil microflora when treated with low amounts of tebuthiuron. The same study indicated that little is known about the impacts of tebuthiruon on soil crusts.

A review of the BLM Vegetation Treatments Using Herbicides Final Programmatic EIS (BLM 2007b) indicates that tebuthiuron application could benefit soils by removing invasive species and favoring re-vegetation efforts. In addition, it is thought that chemical treatments of tebuthiuron in the project area would not produce undue degradation of biological soil crusts.

4.9.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Alternative B would use prescribed fire as a vegetation treatment to meet the project objectives. A detailed overview of the direct and indirect impacts of prescribed fire on soils is contained in the project record (McMullen 2011). This is a highly nuanced and complex topic that is beyond the scope of full analysis in this EA, but the proposed implementation of relatively low-intensity/severity prescribed fire would have much less deleterious impacts to soil resources than a high intensity/severity wildland fire. Consequently, low-intensity burns reduce the risk of soil loss and erosion (Wright and Bailey 1982). Low-intensity burns would not be hot enough to permanently damage biological soil crusts, leaving the structural matrix of soil crusts intact (Johansen et al. 1984).

4.9.3 Direct and Indirect Impacts of Alternative C – No Action

Alternative C would allow existing practices and conditions to continue within the project area. In approximately 5 to 10 years, water and wind erosion rates, soil compaction, and soil productivity would remain relatively unchanged. In the long term (approximately 10 to 20 years), soil

conditions may degrade in areas where soils are prone to erosion and where juniper encroachment would increasingly dominate a site, resulting in reduced site productivity. The conversion of grass/shrubland to woodland canopy cover would lower soil productivity as less soil organic matter accumulates under tree canopy than under grass/shrubland.

Under Alternative C, short-term impacts to biological soil crusts would be minor as existing conditions would be perpetuated in the project area. Long-term impacts could result in a loss of biological crusts based on a lack of vegetation treatments that would improve soil stability and related productivity. Erosion-prone areas would continue to degrade and compromise the integrity of the sparsely located biological crusts in the project area.

4.10 Vegetation, Including Noxious Weeds and Invasive, Non-native Species

The direct and indirect impacts of management actions or uses of vegetation resources may vary, depending on factors such as the type of soils, soil moisture, topography, and plant reproductive characteristics. Direct impacts are generally caused by vegetation treatment activities (manual, chemical, mechanical and prescribed fire vegetation treatments) as well as by seeding; and the introduction, spread, and treatment of noxious weeds and invasive non-native species. Indirect impacts are generally caused by dust accumulation immediately adjacent to roads and would include lowered vigor or death of plants; changes in plant abundance and/or species composition resulting from modified nutrient cycling due to soil compaction; and nutrient modification and soil loss or deposition associated with fire.

4.10.1 Vegetation

4.10.1.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Under this alternative, a variety of vegetation treatments including manual, mechanical, chemical, and prescribed fire would occur over the project area. All of the proposed treatment methods would be effective at removing encroaching juniper and decadent sagebrush. Some treatments are more effective on a broad scale, but may have risk of weed introduction, soil compaction or other adverse effects.

Communities which have overly dense overstories either pinyon-juniper or sagebrush do not provide a diverse perennial understory, which in turn may limit wildlife diversity and numbers. These communities are also at a higher risk of invasion by noxious weeds and invasive species, increased soil erosion, and are at higher risk of high severity/high intensity wildfire. The risk of wildfire is then compounded because once this occurs, a community that lacks adequate perennial grass and forb understory is much more likely to be converted to a monoculture of non-native invasive species, such as cheatgrass, after a wildfire (Chambers et al. 2014). This alternative offers the greatest benefit from treatment of the various vegetation communities within the project area.

Compared to other methods, manual treatments would minimize effects to specific vegetation species and plant communities by retaining more vegetation of non-target species. Manual treatments would result in a lower likelihood of soil erosion, soil instability, soil compaction, sedimentation, and increased surface temperatures, all of which would cause minimal impacts on vegetation. Impacts from this treatment method would therefore be direct and minor.

Use of mechanical tools and equipment would reduce overstory canopy cover, increase plant diversity, and increase soil moisture due to the reduced evapotranspiration. These impacts would be direct, both short and long term. Mechanical treatment methods could also result in localized, short-term impacts to air quality from fugitive dust, equipment emission/exhaust, and chemical fumes, which in turn could lead to reduced plant vigor and fitness. Long-term impacts would result from changes in plant community composition and structure due to changes in overstory density and canopy cover. Understory plants, including perennial grasses and forbs, would have less competition for resources such as light, water, and soil nutrients. This would allow an increase in diverse composition and vigor of understory plants that in many of these stands is lacking or greatly reduced. Mechanical treatments would also be effective at providing a diverse age class in both the pinyon-juniper and sagebrush communities.

Chemical treatments would cause target and some non-target species to experience direct, short-term impacts, depending on the chemical used and the application rate. Short-term indirect effects could include reduced soil infiltration, increased erosion and sedimentation, and increased soil surface temperatures until understory species (grasses and forbs) re-establish. Once they do, plant diversity and community structure (frequency and composition) would increase, resulting in long-term benefits to soils (see Section 4.9.1) and associated vegetation. Chemical treatments would also be effective at providing a diverse age class in sagebrush communities.

The intensity of impacts from prescribed fire depends on the size and intensity of the fire, as well as fuel type and quantity. Impacts from fires could change species composition, plant density, and vegetative structure, and could also increase the abundance of non-native invasive plant species. There would be direct, minor effects to fire-adapted plant species, with effects lasting both short and long term. Short-term reductions in ground cover and litter could result in accelerated erosion until understory species (grasses and forbs) become re-established. However, once these understory species do re-establish, plant diversity and community structure (frequency and composition) would increase, resulting in long-term benefits to soils (see Section 4.9.1) and associated vegetation.

Prescribed fire is effective in ponderosa pine communities where the invasion of weeds such as cheatgrass is of less risk. The impacts of these treatments in the ponderosa pine community would be direct, moderate, and both short and long-term. Ponderosa pine communities would benefit from reduced competition from pinyon pine and juniper trees, as well as opening the canopies, which would result in more sunlight reaching the forest floor and an increase in soil moisture, allowing understory vegetation (perennial grasses and forbs) to re-establish in these areas. The risk of stand replacing wildfires would be reduced as tree spacing would be greater, and remaining trees would likely be more vigorous. Indirect impacts would be increased vegetative vigor and understory species diversity, and maintenance of this plant community.

4.10.1.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Under this alternative, treatments would be targeted at prescribed fire treatments in ponderosa pine dominated communities. Impacts to these communities would, therefore, be the same as described for Alternative A.

Pinyon-juniper and sagebrush communities that have become overstocked and decadent would continue to have sparse understories. The risk of devastating wildfires to these communities would increase, as well as the likelihood of cheatgrass or other invasives forming monocultures in these burned areas following a wildfire. Resilience and resistance to both large-scale wildfire and

invasives such as cheatgrass are directly correlated to the amount of perennial grass and forbs in the understory pre-fire (Chambers et al. 2014).

4.10.1.3 Direct and Indirect Impacts of Alternative C – No Action

Where fuel loads are excessive, failure to conduct vegetation treatments would increase the risk of high-severity wildfire, which would put tens of thousands of acres at risk of a type conversion to annual invasive grasses. Effective ground cover would be greatly reduced, and erosion would be accelerated. High severity wildfire would also cause major, long-term indirect impacts in terms of wildlife habitat loss and reduction in biomass productivity from erosion. Vegetation conversions of this nature would risk attainment of Rangeland Health Standards in the project area for potentially a long period of time.

4.10.2 Noxious Weeds and Invasive, Non-native Species

Vegetation communities that have diverse, vigorous understories of perennial grasses and forbs tend to be more resistant to not only invasive weeds, but are more likely to recover to a desired condition (i.e., density and species diversity) following a wildfire. Under all alternatives, integrated weed management would continue in the project area. Weed management activities include weed inventories and continued manual, biological, and herbicide treatments. Preventive measures would be taken, which include cleaning of equipment prior to moving to a new site and monitoring of disturbed areas to catch any new sites early.

4.10.2.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Diverse, vigorous, understory conditions would result in the decreased likelihood of weed establishment and an increased resiliency to widespread weed invasion. Conversely, any resource activity or management which results in ground disturbance could increase the risk of weed invasion and establishment. Therefore, mechanical treatments pose a greater risk than manual treatments. Chemical and prescribed fire treatments could also pose a risk to weed invasion or spread. All equipment used for mechanical treatments would be pressure washed prior to entering the project area to reduce spread of noxious weeds or invasive non-native species.

4.10.2.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Short term effects from this alternative would be less than Alternative A, as the acreage treated would be less, and there would be no mechanical treatments or machinery to disturb soil or spread existing weed populations. However, all equipment and vehicles used to implement prescribed fire treatments would also be power washed if entering from areas with known weed populations. As these treatments would primarily target ponderosa pine communities, neighboring pinyon-juniper and sagebrush dominated communities would not be specifically treated. These communities in the long term would be prone to weed invasion and wildfire risk (see Section 4.7.3). As communities with a diverse, vigorous understory are more resilient to weed invasion, they are also more resistant to wildfires, and able to recover more rapidly if there is a wildfire.

4.10.2.3 Direct and Indirect Impacts of Alternative C – No Action

Short-term effects would be minimal in relation to spreading noxious weeds or invasive non-native species. No additional machinery would be present to cause soil disturbance, so there would be no immediate risk of weed invasion. Long-term effects could be moderate to major. As stated above, communities with canopy closure from overstory trees and shrubs including pinyon-juniper and sagebrush are vulnerable to weed invasion. This is due primarily to lack of perennial

understories. Any disturbance, whether man caused or natural (including wildfire) could cause weed monocultures in these communities. There is a correlation between tree density (i.e., closed canopy pinyon-juniper stands and/or sagebrush decadence, with little understory vegetation) and resilience to wildfires or wildfire intensities (Firescience 2008). Cheatgrass, typically present in small amounts in many vegetation communities pre-fire, may dominate a community post-fire. Once this dominates a community, the fire return cycle increases to favor continued cheatgrass dominance. Understories with little or no perennial vegetation are prone to soil erosion both pre and post wildfire. Reclamation of large burned areas is costly, and often does not occur, which exacerbates the spread of invasive species.

4.11 Visual Resources

4.11.1 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 harrowing 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. Chemical treatments would result in stands of dead sagebrush. 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 interesting visual landscape. VRM objectives would be met for the long term in all VRM class areas. Table 4-4 lists the acres of treatment type by VRM class for Alternative A.

Table 4-4. Acres of Visual Resource Management Class by Treatment Type

Treatment Type	VRM Class (Acres)			
	I	II	III	IV
Mechanical - Mastication	0	5,206	7,270	0
Mechanical - Harrow	0	561	0	0
Manual	0	2,363	6,803	0
Chemical	0	1,307	9,350	0
Prescribed Fire	16,854	21,859	0	0

4.11.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Effects to visual resources under Alternative B would be similar to those described for prescribed fire under Alternative A. However, no mechanical (mastication), manual or chemical treatments would occur. Prescribed fire would have different impacts to the form, line, color, and texture of the area, compared to mechanical (mastication and harrowing), manual and chemical treatments, as described for Alternative A. VRM objectives would be met for the long term in all VRM class areas under this alternative. Table 4-4 lists the acres of treatment type by VRM class for Alternative B.

Table 4-5. Acres of Visual Resource Management Class Treated Under Alternative B

Treatment Type	VRM Class (Acres)			
	I	II	III	IV
Prescribed Fire	16,854	21,859	0	0

4.11.3 Direct and Indirect Impacts of Alternative C – No Action

There would be no human-caused alterations to the existing landscape, so VRM objectives in the project area would continue to be met. However, failure to conduct vegetation treatments could result in large, uncontrolled wildfires, which could alter the landscape and create dramatic visual contrasts. These may include changes in vegetation patterns, which would alter the forms, colors, lines, and contrasts 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.

4.12 Wildlife (Including BLM Sensitive Species, Species of Greatest Conservation Need, and Migratory Birds)

4.12.1 General Wildlife Species

4.12.1. Direct and Indirect Impacts of Alternative A – Proposed Action

Adverse effects to wildlife common to all treatment methods include injury and loss of life, noise and other disruptions associated with treatment applications, and temporary and long-term habitat effects.

The use of vehicles and treatment equipment for restoration poses a risk of injury or death by crushing animals or their nests or roosts. Vehicle weight may also collapse burrows or compact soils. Soil compaction may also make burrow or den excavation difficult.

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 wildlife in the treatment area.

Over the short term, treatments could make habitats less suitable for some wildlife species, requiring displaced wildlife to find suitable habitat elsewhere. If these habitats were already near or at capacity in the number of wildlife they could support, displaced animals might perish or suffer lower productivity. In many cases, the treatments would return all or a portion of the treated area to an early successional stage, favoring early successional wildlife species. In areas where fire suppression has historically occurred, vegetation treatments could benefit native plant communities by mimicking a natural disturbance component that has been missing from these communities.

Species that are more mobile or not dependent on a specific habitat type can relocate during treatment activities and adapt to a new environment. Species that require very specific habitat conditions or cannot relocate easily may be more vulnerable to impacts. Treatments covering a large area have more potential to affect species because there may be less opportunity for an

animal in the interior of a treatment area to vacate, and because the number of individual animals affected is likely to be greater for a large area.

Proposed treatments would occur across the landscape, would target areas with declining habitat quantity and quality, and would facilitate wildlife movement across the landscape. There has been a loss of habitat diversity and complexity from pinyon-juniper encroachment into woodlands and sagebrush habitats, and a decrease in the abundance and diversity of animals that can be supported in areas with pinyon-juniper encroachment. Loss of habitat at the landscape level would be addressed by reducing levels of pinyon-juniper encroachment into other habitats. Wildlife movement would be aided by thinning dense stands of pinyon-juniper and sagebrush, allowing freer passage.

Treatments that reduce hazardous fuel loads, slow the spread of pinyon-juniper, and reduce woodland densities would reduce the risk of high severity wildfire harming wildlife or their habitat. Treatments aimed at restoring natural fire cycles would improve vegetation resilience and increase plant diversity across the landscape to benefit wildlife.

Improvements in habitat quality would increase the carrying capacity of the landscape and allow it to support larger and healthier wildlife populations. In particular, treatments would benefit mule deer and pronghorn by removing pinyon-juniper that reduces habitat quality or thinning vegetation (pinyon-juniper and sagebrush) to allow more desirable vegetation, such as forbs and grasses, to better compete and thrive. Thinning and removing vegetation would also benefit local and seasonal movements of wildlife, including mule deer. In addition, slash piles left from thinning pinyon-juniper or selective thinning in sagebrush would provide microhabitat and cover for reptiles, rabbits and other small mammals, and songbirds.

Manual Treatment

Under Alternative A, 9,166acres of vegetation could be treated using manual methods in ponderosa pine, pinyon-juniper, and sagebrush habitats. Manual treatments would result in disturbance to wildlife and temporary loss of wildlife habitat. Wildlife would be temporarily displaced by human activity and noise. Wildlife habitat, until it begins to recover from the disturbance, would be less usable to some species.

Overall, wildlife would benefit from manual treatments in the form of improved habitat quality and decreased risk of high-severity wildfire in the future (see Vegetation discussion in Section 4.10.1.1).

Mechanical Treatment

Under Alternative A, 13,037 acres of vegetation could be treated using mechanical methods in ponderosa pine, pinyon-juniper, and sagebrush habitats. Mechanical treatment would result in the injury or death of some wildlife that are unable to get out of the way of equipment. Mechanical treatments would result in disturbance to wildlife and temporary loss of wildlife habitat. Wildlife would be temporarily displaced by human activity and noise. Wildlife habitat, until it begins to recover from the disturbance, would be less usable to some species.

Overall, wildlife would benefit from mechanical treatments in the form of improved habitat quality and decreased risk of high-severity wildland fire in the future (see Vegetation discussion in Section 4.10.1.1).

Seeding and Harrowing

Under Alternative A, 561 acres would be seeded and harrowed in pinyon-juniper and sagebrush habitats. Seeding and harrowing would result in the injury or death of some wildlife that are unable to get out of the way of equipment. Seeding and harrowing would result in disturbance to wildlife and temporary loss of wildlife habitat. Wildlife would be temporarily displaced by human activity and noise. Wildlife habitat, until it begins to recover from the disturbance, would be less usable to some species.

Overall, wildlife would benefit from seeding and harrowing in the form of improved habitat quality (see Vegetation discussion in Section 4.10.1.1).

Erosion Control

Under Alternative A, erosion-control measures would occur in sagebrush habitat. Erosion-control measures would result in the injury or death of some wildlife that are unable to get out of the way of equipment. Erosion-control measures would result in disturbance to wildlife. Wildlife would be temporarily displaced by human activity and noise.

Overall, wildlife would benefit from erosion-control measures in the form of improved habitat quality.

Chemical Treatment

Under Alternative A, 10,657 acres of vegetation would be treated using chemical methods in sagebrush habitat. Chemical treatments would result in disturbance to wildlife and temporary loss of wildlife habitat. Wildlife would be temporarily displaced by human activity and noise. Wildlife habitat, until it begins to recover from the disturbance, would be less usable to some species.

Overall, wildlife would benefit from chemical treatments in the form of improved habitat quality and decreased risk of high-severity wildland fire in the future (see Vegetation discussion in Section 4.10.1.1).

Prescribed Fire

Under Alternative A, 38,713 acres of vegetation would be treated using prescribed fire in ponderosa pine habitats, although some pinyon-juniper and sagebrush habitats may be affected. Fire treatment would result in the injury or death of some wildlife that are unable to get out of the way of the fire. Fire treatments would result in disturbance to wildlife and temporary loss of wildlife habitat. Wildlife would be temporarily displaced by human activity and noise. Wildlife habitat, until it begins to recover from the disturbance, would be less usable to some species.

Overall, wildlife would benefit from fire treatments in the form of improved habitat quality and decreased risk of high-severity wildland fire in the future (see Vegetation discussion in Section 4.10.1.1).

4.12.1.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Under Alternative B, 38,713 acres of vegetation would be treated using prescribed fire in ponderosa pine habitats, although some pinyon-juniper and sagebrush habitats may be affected. The impacts to wildlife from the fire treatments would be the same as those described under Alternative A for prescribed fire. Impacts from erosion control and seeding would also be the same as those described for Alternative A. Impacts from manual and mechanical treatments would not occur under Alternative B. The total amount of wildlife habitat impacted would be

smaller under Alternative B. Temporary adverse impacts would be reduced. Beneficial impacts (i.e., facilitating movement, improving habitat diversity, increasing carrying capacity, and decreasing the risk of high-severity wildland fire) would also occur in a smaller area.

4.12.1.3 Direct and Indirect Impacts of Alternative C – No Action

There would be no direct effects to wildlife resources from treatments, as no treatments would be authorized under this alternative. The BLM would not thin and remove pinyon-juniper to promote healthy, diverse stands; thin and remove pinyon-juniper and sagebrush to encourage understory development; restore fire as an integral part of the ecosystem; implement erosion control or seeding; or reduce the risk of a large-scale wildland fire to the benefit of wildlife and their habitats.

Alternative C also poses the greatest threat to wildlife, through long-term habitat loss and degradation, because no habitat would be restored. Species at greatest risk from habitat degradation are northern goshawk and cavity-nesting birds through densification of pinyon-juniper and sagebrush, and pinyon-juniper encroachment.

4.12.2 BLM Sensitive Species

4.12.2.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Under Alternative A, 57,361 acres of vegetation would be treated in ponderosa pine, pinyon-juniper, and sagebrush habitats. Northern goshawk, western burrowing owl, ferruginous hawk, and pinyon jay may be impacted directly during treatment activities. Direct impacts would be in the form of disturbance to adult individuals. Temporary habitat disturbance would result in indirect impacts to these species. Golden eagle and American peregrine falcon would be impacted indirectly in the form of temporary disturbance to foraging habitat. Habitat for these raptors is primarily in cliffs that occur adjacent to the project area, so direct impacts are therefore unlikely.

Bat species would not be impacted directly since the treatments would occur during the day when bats are inactive and treatments would not impact bat roosts. Bat foraging habitat may be impacted indirectly by the temporary removal of vegetation.

Overall, BLM sensitive species would benefit from vegetation treatments in the form of improved habitat quality and decreased risk of high severity wildfire in the future. Treatments that reduce hazardous fuel loads, slow the spread of pinyon-juniper, and reduce woodland densities would reduce the risk of high severity wildland fire harming wildlife or their habitat. Treatments aimed at restoring natural fire cycles would improve vegetation resilience and increase plant diversity across the landscape to benefit wildlife.

Improvements in habitat quality would increase the carrying capacity of the landscape and allow it to support larger and healthier wildlife populations. Treatments would benefit sensitive wildlife species by removing pinyon-juniper that reduces habitat quality or thinning vegetation (pinyon-juniper and sagebrush) to allow more desirable vegetation, such as forbs and grasses, to better compete and thrive. Thinning and removing vegetation would also benefit local and seasonal movements of wildlife. In addition, slash piles left from thinning pinyon-juniper or selective thinning in sagebrush would provide microhabitat and cover for sensitive species.

4.12.2.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Under Alternative B, 38,713 acres of vegetation would be treated (prescribed fire) in ponderosa pine habitats, although some pinyon-juniper and sagebrush habitats may be affected. Fire treatment could result in the injury or death of some BLM sensitive species that are unable to get out of the way of the fire. Fire treatments could also result in disturbance to BLM sensitive species and temporary loss of habitat. BLM sensitive species could be temporarily displaced by human activity and noise. BLM sensitive species habitat, until it begins to recover from the disturbance, would be less usable to some species. Beneficial impacts (i.e., facilitating movement, improving habitat diversity, increasing carrying capacity, and decreasing the risk of high severity wildfire) would also occur in a smaller area.

4.12.2.3 Direct and Indirect Impacts of Alternative C – No Action

There would be no direct effects to BLM sensitive species from treatments, as no treatments would be authorized under this alternative. The BLM would not thin and remove pinyon-juniper to promote healthy, diverse stands; thin and/or remove pinyon-juniper and sagebrush to encourage understory development; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire to the benefit of wildlife and their habitats. Because no habitat would be restored, Alternative C also poses the greatest threat to BLM sensitive species through long-term habitat loss and degradation. Species at greatest risk from habitat degradation are northern goshawk and cavity-nesting birds through densification of pinyon-juniper and sagebrush, and pinyon-juniper encroachment.

4.12.3 Species of Greatest Conservation Need

4.12.3.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Under Alternative A, 57,361 acres of vegetation would be treated in ponderosa pine, pinyon-juniper, and sagebrush habitats. Bird species may be impacted directly during treatment activities. Direct impacts would be in the form of disturbance to adult individuals. Temporary habitat disturbance would result in indirect impacts to these species.

Bat species would not be impacted directly because the treatments would occur during the day when bats are inactive and would not impact bat roosts. Bat foraging habitat may be impacted indirectly by the temporary removal of vegetation.

Direct impacts to the Kaibab squirrel and Stephen's woodrat could include mortality and temporary disturbance. Since these species are capable of reproducing quickly, the populations should recover within a few years. Habitat for these species would be temporarily disturbed.

Fox species would be directly impacted by treatment activities. Direct impacts would be in the form of disturbance to adult individuals and possible mortality of young unable to escape treatment activities. Foxes would be indirectly impacted by temporary habitat disturbance.

Overall, Species of Greatest Conservation Need would benefit from vegetation treatments in the form of improved habitat quality and decreased risk of high-severity wildfire in the future. Treatments that reduce hazardous fuel loads, slow the spread of pinyon-juniper, and reduce woodland densities would reduce the risk of high-severity wildfire harming wildlife or their habitat. Treatments aimed at restoring natural fire cycles would improve vegetation resilience and increase plant diversity across the landscape to benefit wildlife.

Improvements in habitat quality would increase the carrying capacity of the landscape and allow it to support larger and healthier wildlife populations. In particular, treatments would benefit wildlife by removing pinyon-juniper that reduces habitat quality or thinning vegetation (pinyon-juniper and sagebrush) to allow more desirable vegetation, such as forbs and grasses, to better compete and thrive. Thinning and removing vegetation would also benefit local and seasonal movements of wildlife. In addition, slash piles left from thinning pinyon-juniper or selective thinning in sagebrush would provide microhabitat and cover for reptiles, rabbits and other small mammals, and songbirds.

4.12.3.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Impacts to AGFD Species of Greatest Conservation Need would be the same as those described for BLM sensitive species in Section 4.12.2.2.

4.12.3.3 Direct and Indirect Impacts of Alternative C – No Action

Impacts to AGFD Species of Greatest Conservation Need would be the same as those described for BLM sensitive species in Section 4.12.2.3.

4.12.4 Migratory Birds

4.12.4.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Adverse effects to migratory birds common to all treatment methods include injury and loss of life, noise and other disruptions associated with treatment applications, and temporary and long-term habitat effects.

The use of vehicles and treatment equipment for restoration poses a risk of injury or death by crushing animals or their nests or roosts. Vehicle weight may also collapse burrows or compact soils. Soil compaction may also make burrow or den excavation difficult.

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 wildlife in the treatment area.

Over the short term, treatments could make habitats less suitable for some migratory bird species, requiring displaced birds to find suitable habitat elsewhere. If these habitats were already near or at capacity in the number of migratory birds they could support, displaced animals might perish or suffer lower productivity. In many cases, the treatments would return all or a portion of the treated area to an early successional stage, favoring early successional migratory bird species. In areas where fire suppression has historically occurred, vegetation treatments could benefit plant communities by mimicking a natural disturbance component that has been missing from these communities.

Species that are more mobile or not dependent on a specific habitat type can relocate during treatment activities and adapt to a new environment. Species that require very specific habitat conditions or cannot relocate easily may be more vulnerable to impacts. Treatments covering a large area have more potential to affect species because there may be less opportunity for an animal in the interior of a treatment area to vacate, and because the number of individual animals affected is likely to be greater for a large area.

Proposed treatments would occur across the landscape, would target areas with declining habitat quantity and quality, and would facilitate migratory bird movement across the landscape. There has been a loss of habitat diversity and complexity from pinyon-juniper encroachment into woodlands and sagebrush habitats, and a decrease in the abundance and diversity of animals that can be supported in areas with pinyon-juniper encroachment. Loss of habitat at the landscape level would be addressed by reducing levels of pinyon-juniper encroachment into other habitats.

Treatments that reduce hazardous fuel loads, slow the spread of pinyon-juniper, and reduce woodland densities would reduce the risk of high-severity wildfire harming migratory birds or their habitat. Treatments aimed at restoring natural fire cycles would improve vegetation resilience and increase plant diversity across the landscape to benefit migratory birds.

Improvements in habitat quality would increase the carrying capacity of the landscape and allow it to support larger and healthier migratory bird populations. Treatments would benefit migratory birds by removing pinyon-juniper that reduces habitat quality or thinning vegetation (pinyon-juniper and sagebrush) to allow more desirable vegetation, such as forbs and grasses, to better compete and thrive. Thinning and removing vegetation would also benefit local and seasonal movements of migratory birds. In addition, slash piles left from thinning pinyon-juniper or selective thinning in sagebrush would provide microhabitat and cover for migratory birds.

4.12.4.2 Direct and Indirect Impacts of Alternative B –Prescribed Fire

Impacts to migratory birds would be the same as those described for BLM sensitive species in Section 4.12.2.2.

4.12.4.3 Direct and Indirect Impacts of Alternative C – No Action

Impacts to migratory birds would be the same as those described for BLM sensitive species in Section 4.12.2.3.

4.13 Cumulative Impacts

"Cumulative impacts" are those impacts resulting from the incremental impact of an action when added to other past, present, or reasonably foreseeable actions regardless of what agency or person undertakes such other actions. This EA is intended to qualify and quantify the impacts to the environment that result from the incremental impact of the alternatives when added to other past, present, and reasonably foreseeable future actions. These impacts can result from individually minor but collectively important actions taking place over a period of time.

There are other uses and activities occurring on the lands within and adjacent to the project area, including livestock grazing, recreation, and mining. Specific actions that have occurred, are occurring, or are likely to occur in the reasonably foreseeable future include:

- ***Livestock grazing*** – 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. Livestock grazing continues to occur on lands both within and around the project area. Cumulative impacts from livestock grazing are discussed in more detail in Section 4.13.7.
- ***Recreation*** – Recreation activities occurring throughout the project area involve a broad spectrum of pursuits ranging from dispersed and casual recreation to organized, BLM-permitted group uses. Typical recreation in the region includes OHV driving, scenic driving, hunting, hiking, wildlife viewing, horseback riding, camping, backpacking, mountain biking, geocaching, picnicking, night-sky viewing, and photography. The Arizona Strip is known for its large-scale undeveloped areas and remoteness, which provide an array of recreational

opportunities for users who wish to experience primitive and undeveloped recreation, as well as those seeking more organized or packaged recreation experiences.

- ***Northern Arizona Withdrawal*** – On July 21, 2009, the Department of the Interior published notice of the Secretary of the Interior's proposal to withdraw approximately 1 million acres of land in northern Arizona from locatable mineral entry under the Mining Law of 1872 [30 United States Code (U.S.C.) 22–54], subject to valid existing rights. On January 9, 2012, the Secretary signed the Record of Decision to implement the withdrawal. The withdrawal was in response to increased mining interest in the region's uranium deposits, as reflected in the number of new mining claim locations that were filed in the mid-2000s, and concern over potential impacts of uranium mining to the Grand Canyon watershed, adjacent to Grand Canyon National Park.
- ***Mining and Mineral Resources*** – Public lands on the Arizona Strip are generally open to mineral development (see above for a discussion on the Northern Arizona Withdrawal). However, upon designation in 2000, the federal land within Grand Canyon-Parashant National Monument was withdrawn from all forms of entry, location, selection, sale, or leasing or other disposition under the public land laws, other than by exchange that furthers the protective purposes of the monument.
    - The primary economic mineral resource in the area consists of locatable mineral deposits, including breccia pipe deposits (i.e., vertical collapse features formed from the collapse of karst solution caverns in the underlying Redwall limestone). A variety of precious metals (including copper and silver) are found within breccia pipes. However, it is the presence of uranium minerals within breccia pipes that has been of the most interest during the past half century. There are currently two uranium mines in various stages of operation on the Arizona Strip, the Arizona One Mine (presently in standby status) and Pinenut Mine (in the beginning stages of reclamation), both located northeast of the Uinkaret Mountains project area.
    - Other potential mineral resources in or near the project areas are leasable minerals (including oil and gas, and geothermal resources) and salable minerals (consisting primarily of sand and gravel, and stone). In the area, the potential for geothermal resources is low and the potential for oil and gas is low to moderate; the potential for sand, gravel, and stone is high.
- ***Vegetation Treatments***
    - ***Past Treatments:*** Mechanical vegetation treatments in the project area targeting sagebrush and juniper reduction date back to the 1950s (see Table 4-6). Reseeding efforts, presumably perennial grass, are known to have accompanied these treatment efforts in the 1950s, but are documented as more common practice beginning in the 1970s. Herbicide treatment for vegetation control is known since the 1960s. Prescribed fire as a vegetation treatment in the project area is documented from the 1980s, but was likely used prior to any of the previous mentioned methods, but not documented. There are over 100 documented individual historic vegetation treatments that have occurred in the project area in the past 60 years. These individual treatments range in size from less than 10 acres to over 1,700 acres. Table 4-6 summarizes the historic vegetation treatments (type and acres) that are known within the project area. The primary objective of the historic treatments was to decrease the density of sagebrush and juniper, and allow for the increase in density, diversity and vigor of the native and desirable understory plant species (i.e., grasses and forbs).

- ***Proposed Treatments:*** Comparison is found in Table 4-6 between historic vegetation treatments and treatments proposed in this EA by grazing allotment (which is how these historic treatments are documented). For details of proposed vegetation treatments, see Table 2-1 and Table 2-2.

Table 4-6. Historic and Proposed Vegetation Treatments

Allotment Name	Mechanical Treatment Acres	Chemical Treatment Acres	Prescribed Fire Acres	Reseed and/or Planted Acres
Approximate Historic Acres Treated				
Big Spring Pipeline	2,131	0	0	7
Crosby Tank	691	0	10	284
Fern Tank	0	113	0	0
June Tank	0	304	0	0
Mount Logan	2,812	200	2,871	1,227
Mount Trumbull	6,504	1,391	86	5
Tuckup	1,710	1,651	0	0
Tuweep	5,118	495	3,782	1,586
Total By Historic Treatment	18,966	4,154	6,749	3,109
Total of All Documented Historic Treatments	32,978			
Approximate Proposed Treatment Acres				
Big Spring Pipeline	0	0	9,824	0
Crosby Tank	2,683	1,358	1,629	0
Fern Tank	0	0	0	0
June Tank	0	0	0	0
Mount Logan	747	500	6,518	0
Mount Trumbull	753	6,286	26	0
Tuckup	4	2,072	398	0
Tuweep	3,806	440	20,286	0
Uinkaret Proposed Vegetation Treatments	7,993	10,656	38,713	0
Total of All Proposed Treatments	57,389			

4.13.1 Air Resources (Including Greenhouse Gas Emissions)

The geographic area of analysis for cumulative impacts to air quality is the Arizona Strip District of the BLM, including Grand Canyon-Parashant and Vermilion Cliffs national monuments. Air quality is affected by past, current, and reasonably foreseeable future use and management activities on these public lands including recreation, grazing, natural resource extraction, vegetation management, and transportation associated with the aforementioned items. Cumulative impacts to air quality for the Uinkaret project also are influenced by regional (parts of southern Utah, Nevada, and California) populations centers, such as St. George, Las Vegas, and Los Angeles; regional haze from development and transportation to and from these metropolitan areas

influences the air quality of the Arizona Strip. Regional and global climate phenomena that are beyond the scope of this analysis (i.e., warming trends, increased drought frequency/severity, elevated GHG levels) would also impact the precipitation and vegetation of the project area and cause incremental impacts to local air quality.

The proposed actions of mechanized vegetation treatments, prescribed fire, and erosion control implementation would have a wide-ranging set of impacts to air quality. Despite the diversity of likely impacts, a common characteristic would be the short-term nature (measured in days and weeks rather than decades to millennia) of these impacts. Mechanized vegetation treatment would lead to temporary increases in fugitive dust and petroleum-derived emissions from the transport and operation of vehicles and equipment required to reduce cover of target vegetation. These increases would be confined in time and space, largely to the period and immediate vicinity of operations. Smoke from prescribed fire would have a similar temporal scale (emissions and impacts occurring mostly during the period of the activity) but a broader spatial scale, due to the nature of dispersal of smoke. Levels of smoke and associated chemical (i.e., carbon dioxide) and physical (particulate matter) emissions to the atmosphere would be much lower under a prescribed fire scenario contained in Alternatives A and B than a high-severity wildfire scenario, which the Uinkaret project aims to prevent.

Effectively implemented erosion control activities associated with the restoration components of Alternatives A and B would serve to reduce, in part, fugitive dust emissions. Increasing the amount of vegetative cover and reducing the amount of soil loss from project area watersheds would, over the long term, mitigate some of the previously described impacts to air quality. By decreasing the amount of bare ground and increasing soil moisture content, a reduction in wind-borne soil losses could be reasonably expected with implementation of this facet of the Uinkaret project.

4.13.2 American Indian Resources

When assessing the cumulative impacts to the items of American Indian concern, an important distinction must be made between impacts to the plants themselves versus impacts to the traditional American Indian access and use of these plants. For example, some pine trees, identified as important resources by the tribes, would be directly impacted and removed as part of the action alternatives, but this would not have an adverse impact on traditional pine-nut and sap gathering from the larger Mount Trumbull landscape.

Access throughout the Mount Trumbull region and project area has changed very slowly since the first roads were developed to access the timber resources, and later, for the Forest Service to manage the acreage. It is not clear when the road network attained its current configuration, but it is unlikely that additional rights-of-way for access roads would be granted within the project area. Travel management plans, completed for the monument and currently in progress for the field office, identified routes that would either be closed or have access restricted. Given the fact that none of the proposed alternatives would more than briefly affect access along any given route, and there are no anticipated substantial changes to the existing network of roads, the proposed project would have no cumulative impact on American Indian access to culturally important resources within the project area.

4.13.3 Areas Managed to Maintain Wilderness Characteristics

The cumulative impact analysis area for areas managed to maintain wilderness characteristics is the project area. Past, present, and reasonably foreseeable impacts to areas managed to maintain

wilderness characteristics include livestock grazing, fire and fuels management activities, and recreation. The impacts of these associated activities have affected naturalness, solitude, and primitive 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. Livestock grazing is expected to continue in the UMLRP area, and recreation (particularly OHV use) is expected to not only continue, but to increase as local and regional communities grow.

Under the no action alternative, a high-severity wildfire 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 in Section 4.4, 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.

4.13.4 Cultural Resources

A cumulative effects analysis is designed to examine the effects of the current proposed actions in the context of past and foreseeable future actions. For this analysis, the entire project area was used as a geographic boundary, without a buffer (128,535 acres), since it is highly unlikely that the entire project area would ever be treated.

Within this project area, roughly 10,893 acres have been inventoried at a Class II or III level (11.8 percent) with 584 sites identified. Of these 584 sites, 294 are considered eligible and 226 are unevaluated. If these figures are applied over the entire project area, an estimated 6,891 (5,245 eligible/unevaluated) sites within the project area may be (or have been) impacted by the cumulative effects of past, present, and foreseeable future actions.

Undeniably, this site estimate is high because of problems with two underlying assumptions: that the existing site density estimate is representative of the entire project area, and that all areas would have an equal chance of containing sites. We know that the Mount Trumbull area is unique in some ways, including having a relatively high site density. That is the reason there has been so much non-project-related inventory done in this area. However, we also know that the site density varies considerably across the entire area with some areas completely devoid of sites. While the problem with the assumptions leads to high estimates of sites, the high number does convey an appropriate sense of importance of the resources in this area.

Cultural resource records indicate that a total of 88 projects, ranging from small cinder pits and study plot exclosure fences to larger forest treatment units and mastication projects, have occurred within the current project area. This number is likely low because many early land treatments have no record of a cultural inventory, and hence, no record in our database. The impacts of these projects vary, though most have had minimal to no direct impact due to cultural resource avoidance. However, a few previous projects in the current project area had adverse effects on the cultural resources, such as the chaining near Nampaweap, North of Lava Flow, in which sites were not avoided and essentially destroyed.

Future foreseeable projects within the project area include maintenance of previous and current sagebrush and pinyon-juniper treatments, including the specific Phase II projects laid out in

Alternative A. These maintenance projects could include such activities as lop-and-scatter, mulching, or chemical treatments. Additionally, fire will always be a part of the Mount Trumbull region, so both prescribed fire and wildfires managed for resource benefit could be expected.

This project, when added to other past, present, and reasonably foreseeable actions, is unlikely to result in cumulative impacts to cultural resources due to the avoidance of sites with implementation of the proposed treatments.

4.13.5 Designated Wilderness

The cumulative impact analysis area is the Mount Trumbull Wilderness and Mount Logan Wilderness, which cover 16,854 acres. Past management activities have disrupted the natural fire regime in the area. For over 100 years, fire suppression has degraded the natural landscape and led to fuel accumulation in ponderosa pine stands. Past, present, and future conditions in the identified wilderness areas will continue to impact wilderness characteristics. The effects to solitude and primitive unconfined recreation have been generally short-term during wildfires, while naturalness has been impacted for a greater length of time, due to the longer lasting effects of wildfire.

The direct and indirect impacts of each alternative on wilderness characteristics have been analyzed in Section 4.6 of this EA. There are no other reasonably foreseeable future projects that would affect the Mount Trumbull and Mount Logan wilderness areas. The alternatives would, therefore, not result in cumulative impacts when added to past, present, and reasonably foreseeable future actions.

4.13.6 Fire and Fuels

The geographic area of analysis for cumulative impacts to fire and fuels is the project area and adjacent NPS-administered lands within the Uinkaret Mountains from Slide Mountain to Mount Emma. Actions affecting fire and fuels primarily include factors that affect fuel loads (e.g., spread of invasive species, vegetation treatments on lands adjacent to the project area, surface-disturbing activities, drought conditions, climate change) and factors that provide potential ignition sources (e.g., recreation, OHV use). The continued spread of exotic annual grasses could increase the size and number of fires. Surface-disturbing activities could alter plant species composition and density, and promote the spread of invasive plants. Vegetation treatments adjacent to the project area would reduce the chance of wildfires spreading to the project area. Drought would impact fuel loads, fire intensities, and the size of wildfires. Population growth and resulting increases in visitor use may increase ignitions through human-caused ignition sources (i.e., OHV use, fireworks, escaped campfires, etc.).

Fire management and fire history within the project area have been affected by past actions that altered vegetation, including logging, grazing, fire suppression efforts, and the spread of invasive vegetation. Euro-Americans began logging ponderosa pine during the 1870s at Mount Trumbull. Past fire-suppression activities have resulted in dense or over-mature stands of pinyon-juniper, interior chaparral, sagebrush, and ponderosa pine across the Arizona Strip. Dense, closed stands of ponderosa pine are at high risk of stand-replacing wildfire. Fire suppression and past livestock grazing practices have altered grasslands through increased shrub densities and loss of perennial grasses. Exotic annual grasses have increased the number and size of fires, killing native vegetation and increasing the proliferation of exotic annual grasses.

Altogether, this project, when added to the past treatments, other actions, past, present, and foreseeable future actions in the cumulative impacts area, would provide a beneficial impact by introducing natural planned fire cycles. Departure from the normal fire regime has had an impact on resources. Bringing it back to its natural condition would provide a beneficial natural fire regime into the ponderosa pine, pinyon, juniper and sagebrush communities.

4.13.7 Livestock Grazing

Livestock grazing has occurred in the region for approximately 150 years, and is one factor that has created the current environment. At the beginning of the twentieth 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. Some speculate that the changes were permanent and irreversible, turning plant communities from grass and herbaceous species to brush and trees. Protective vegetative cover was reduced, and more runoff resulted in more erosion as evidenced by rills and gullies in the UMLRP area.

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 6-year drought in the region occurred between 1998 and 2004, which dramatically affected livestock grazing operations on the Arizona Strip, resulting in virtually all cattle being pulled from the public lands in 2004. Similar fluctuations in livestock numbers would likely occur in the future. None of the alternatives proposes to increase the level of grazing or otherwise alter established grazing systems in any of the allotments addressed in this EA. It is not anticipated that any of the alternatives would result in cumulative long-term impacts to livestock grazing when added to other past, present, and reasonably foreseeable activities in the area. There would, however, be varying degrees of short-term disruption to livestock operations depending upon the alternative implemented (see Section 4.8).

4.13.8 Soils

Past, present, and reasonably foreseeable future actions within the project area boundary have affected (and are likely to continue to affect) the myriad environmental conditions that determine overall soil quality on a given landscape. The existence of a wide-reaching network of transportation corridors, grazing by domestic and wild animals, natural and anthropogenic fires, removal of forest products including timber and geologic materials, and disparate forms of developed recreation has resulted in wide-reaching impacts to soils. The additive impacts of the

action alternatives to the cumulative effects of past, present, and reasonably foreseeable activities are not anticipated to cause major soil resource degradation. This prediction is made based on the required adherence to best management practices, design criteria, and associated policy directives that provide for the protection of these resources.

The cumulative impact area of analysis for soils is composed of five Hydrologic Unit Code 10 watersheds, namely: Fort Pearce, Hack Canyon, Lang's Run, Mohawk Canyon, and Whitmore Wash watersheds. Each of these watersheds is part of the lower Colorado River watershed. This cumulative impact area of analysis is approximately 894,535 acres, and the proposed treatments across the project area would affect approximately 7.5 percent of the area. Considering that the direct and indirect impacts to soils and biological soil crusts from the action alternatives are negligible, few cumulative impacts are anticipated.

Soil is a very slowly renewable resource, as estimates for rates of soil formation range from 0.0056 to 0.00078 centimeter per year (Alexander 1998). Globally, rates of soil formation are not keeping pace with erosion, leading to widespread soil loss that is due in part to fires and heavy equipment use on public lands. In this sense, erosion that is likely to occur from the use of prescribed fire and mechanized vegetation treatments is an irreversible and irretrievable commitment of resources. The loss of soil organic and mineral matter through prescribed fire and mechanical vegetation treatments would likely be offset by soil organic matter accumulation that accompanies regenerative growth of the trees, shrubs, grasses, and forbs from the action alternatives. Long-term resource protection for other uses (i.e., recreation and grazing) would be needed to offset the impacts to soils and biological soil crusts in the absence of any vegetation treatments and erosion-control measures proposed in the alternatives. However, adherence to design criteria and best management practices should keep soil losses to minimal levels well within tolerances for acceptable loss (as defined by T-factors for soil erosion).

4.13.9 Vegetation

The cumulative impact analysis area for vegetation is the project area and adjacent lands. Vegetation on the Arizona Strip has gone through dramatic changes since the 1870s due to historic land use practices and the introduction of non-native species. Livestock grazing would continue across the area. The land health evaluation process would help ensure grazing practices are conducted in a manner to maintain or improve the ecological health of the area. This would also ensure diverse and natural plant communities are maintained, wildlife habitat is maintained or improved, erosion is reduced, and water quality is maintained. The objectives developed to manage for healthy rangelands have a goal of keeping the entire ecosystem healthy and productive to ensure that it yields both usable products and intrinsic values. In addition, practices currently being implemented (such as weed control efforts) would act to prevent and control the spread of invasive plant species.

Continuing gypsum and uranium mining in the region, as well as use of mineral material sites in the area, would cumulatively affect vegetation through the loss of vegetation, higher rates of erosion and sedimentation in drainages/waterways, increased deposition of dust on vegetation adjacent to roadways (i.e., haul routes), and introduction and spread of invasive plants. Reclamation activities would counter some of the reduction in vegetative cover, and preventative measures to inhibit the spread of invasive species could curtail infestation by species such as Scotch thistle.

The effects of the proposed treatments have been analyzed under the "Direct and Indirect Impacts" section of this chapter. Since livestock grazing occurs throughout the area, and

vegetation treatments are periodically implemented to improve the health of vegetative communities, it is reasonable to assume that impacts similar to those identified earlier in this chapter would occur elsewhere in the area. However, given the fact that neither of the action alternatives proposes increasing the level of grazing or otherwise alter established grazing systems in any of the allotments addressed in this EA (other than some temporary removal of livestock from pastures after treatments), it is anticipated that none of the alternatives would result in cumulative impacts to vegetation resources when added to other past, present, and reasonably foreseeable activities in the area.

4.13.10 Visual Resources

The cumulative impact area of analysis for visual resources is the project area. The cumulative impacts to visual resources from past, present, and reasonably foreseeable actions would include vegetation treatments, livestock grazing management facilities, road construction, and maintenance activities. The impacts of these associated activities would most likely be seen when in close proximity, and would be small in scale within the greater landscape.

Effects of past vegetation treatments, including mechanical, chemical, and prescribed fire can be seen in the project area. In addition to the visual effects from vegetation management, range improvements and road construction have created changes in the form and lines across the landscape. Should future actions be proposed in the area, they would be assessed to ensure visual resource objectives continue to be met.

The proposed vegetation treatments would have varying degrees of effects on visual resources. Similar impacts from past vegetation treatments, including changes to vegetation patterns influencing line, form, color, and contrast of the project area would be likely to occur in future actions. However, none of the alternatives propose actions that could cause drastic changes to alter the visual resource management objectives of the project area, and there are no reasonably foreseeable future actions that would affect visual resources in the area. The cumulative impacts to visual resources when added to other past, present, and reasonably foreseeable activities in the area would be likely to produce short-term impacts. The action alternatives would be mitigated to reduce long-term visual impacts to the extent possible.

4.13.11 Wildlife (Including BLM Sensitive Species, Species of Greatest Conservation Need, and Migratory Birds)

The cumulative impact analysis area for wildlife is the project area and adjacent lands. Past vegetation treatments have had similar impacts on wildlife and wildlife habitat as the proposed treatments. Past and future livestock grazing and operations can cause disturbance to wildlife and their habitat. Recreation activities have disturbed wildlife, and are likely to increase in the future. Wildlife water catchment construction, maintenance, and redevelopment have improved the quality of wildlife habitat. Redevelopment and new construction of wildlife waters would continue in the future.

Wildlife may be affected by other activities occurring within and adjacent to the project area, including mineral development and various dispersed recreational activities. Mineral development has led to reduction of habitat quality and physical disturbance in a variety of habitats. Mining-related activities in the area include operations at the Arizona One and Pinenut uranium mines, both of which are located on the Kanab Plateau several miles outside of the project area, and the potential for several additional future mines. Impacts to wildlife species from uranium mining activities were fully analyzed in the Northern Arizona Proposed Withdrawal EIS.

This analysis stated that "Given the relatively small area of surface impact, it is anticipated that none of the alternatives [including the proposed withdrawal] would result in significant cumulative impacts to migratory birds [and wildlife resources] when added to other past, present, and reasonably foreseeable activities in the proposed withdrawal area" (BLM 2011).

Recreational pursuits, particularly OHV use, could cause disturbance to wildlife species and their habitats. Humans could disturb wildlife in a variety of ways. Disturbance could come from vehicle noise, wildlife being chased, or the mere presence of humans. Different species, and individuals within species, react differently to disturbances. The type of reaction also differs with 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 project area. Impacts vary by species and by the location, level of use, and speed of travel over the road.

The effects of vegetation treatments on wildlife resources in the project area have been analyzed under the "Direct and Indirect Impacts" section of this chapter. The additive impact of other activities occurring in the project area may affect wildlife habitat or corridors by altering vegetation associations at specific locales. The vegetation communities in the area, and the health of the region as a whole, are important for the survival of many native species. However, given the relatively limited surface impacts from these activities, it is anticipated that cumulative impacts from past, present, and reasonably foreseeable future actions would not result in cumulatively significant impacts. It is therefore anticipated that none of the alternatives would result in cumulative impacts to wildlife when added to other past, present, and reasonably foreseeable activities in the area.

Chapter 5. Consultation and Coordination

5.1 Public Involvement

This EA is being provided to the public on the web, on the BLM's ePlanning website, and by mail upon request. A Notice of Public Comment Period (NPCP) letter has been emailed or sent to those who submitted scoping comments as well as those on the ASDO NEPA mailing list. The NPCP letter announces availability of this EA, how to access it on the web, and how to submit comments. It notes that comments may be submitted via email to: blm_az_uinkaret_ea@blm.gov, or by mail to: Arizona Strip District Office, Attn: Uinkaret EA comments, U.S. Bureau of Land Management, 345 East Riverside Drive, St. George, Utah 84790. It also notes that questions may be directed to Richard Spotts, Environmental Coordinator, at (435) 688-3207.

5.1.1 Public Scoping

The BLM held public scoping from October 21 through December 18, 2014, to allow the opportunity for public comment on the proposed UMLRP. Comments could be submitted in writing, by electronic mail, hand-delivered, or by facsimile to the BLM NEPA Coordinator. In addition, the BLM held two public scoping meetings, one in St. George, Utah (November 12) and one in Flagstaff, Arizona (December 3). Written comments were also accepted at these meetings.

The scoping process was initiated by the publication of a NOI to Prepare an EIS in the Federal Register. Letters and email notifications were also sent to the project mailing list and news releases were published in local newspapers announcing the scoping period and the public meetings. Since the initiation of public scoping, the BLM decided to terminate the EIS in favor of preparation of an EA. The Notice of Termination (NOT) of Uinkaret Mountains Landscape Restoration Project EIS was published in the Federal Register on August 2, 2016, concluding the EIS process (for more information see Section 5.1.4 below). The BLM determined that the scoping conducted for the EIS was sufficient for the preparation of this EA.

5.1.2 Public Notices and News Releases

On October 21, 2014, an NOI was published in the Federal Register (Volume 79, Number 203, pages 62954 - 62955) to announce the preparation of an EIS and requesting comments to be submitted within 30 days of the date of the notice (or by November 20, 2014) or 15 days after the last public meeting. Because the Flagstaff meeting was held on December 3, the scoping period was extended to December 18. A news release was published on October 21, announcing the scoping period and the public meeting scheduled to be held in St. George, Utah, on November 12. A second news release was issued on November 6, announcing the cancelation of a public meeting in Mesquite, Nevada, and a third news release was published announcing the December 3 public meeting in Flagstaff, Arizona.

The Grand Canyon-Parashant National Monument and the Arizona Strip Field Office websites were updated with this information, and letters and email notifications were sent to the people, organizations, and other agencies on the project mailing list, as well.

5.1.3 Public Meetings

The first public meeting was held in St. George, Utah, at the Lexington Hotel and Conference Center on November 12, 2014, from 4 to 6 pm. The second meeting was held in Flagstaff, Arizona, at the Embassy Suites Hotel on December 3, 2014 from 4 to 6 pm. Both meetings were

conducted in an open-house style. Informational displays were provided and BLM staff was available at each information table to answer questions and provide project information.

A welcome table was set up where participants were greeted, asked to sign in, and provided copies of the NOI, copies of the first news release issued with information on how to comment, and a detailed project description with a map. Comment forms were also available. A project PowerPoint presentation was set up to run on a continuous loop on a laptop computer at a table as well. No formal presentations were made. The BLM received a total of 43 comment submittals (letters, comment forms, emails, and faxes) on the proposed UMLRP (see Section 1.9). That input was then used to prepare the scoping report.

5.1.4 Conversion from EIS to EA

On July 10, 2015, cooperators met with the BLM and recommended the EIS be terminated and that the BLM move forward with an EA, based upon the pared-down scope of the developed alternatives. After careful consideration of preliminary issues, public scoping comments, and field-verification of existing resource conditions by the BLM interdisciplinary team, specific treatment units were developed totaling 18,675 acres of vegetation treatments (including the use of manual, mechanical, seeding, erosion control, and chemical treatments) and 38,713 acres of fire treatments.

Design features, applicable to both action alternatives, were added to include special resource protections, such as avoiding all known cultural resources following intensive surveys, treating areas when soils are not saturated, ensuring mechanical treatment equipment is cleaned prior to use to prevent the spread of noxious weeds, avoiding old-growth ponderosa stands, and designing treatments in irregular shapes to reduce visual contrast.

Following development of the proposed treatment units and design features, the interdisciplinary team evaluated the alternatives and related preliminary analysis against the Council on Environmental Quality significance criteria (40 CFR §1508.27) and determined that the anticipated effects from the treatment methods are consistent with the preparation of an EA rather than an EIS.

5.2 Cooperating Agencies

The BLM has worked extensively with three identified cooperating agencies: Washington County, Utah; Mohave County, Arizona; and the AGFD. These agencies responded to a May 30, 2013 request to participate as cooperating agencies and the relationship for the project were established formally through memoranda of understanding. Coordination with these cooperating agencies has assisted the BLM with review and comment on early drafts of the proposed action and alternatives, issue identification, and screening the project for NEPA analysis level, and review and comment on preliminary drafts of the EA.

5.3 Consultation with Tribal Governments

The BLM consults with federally recognized tribes before making decisions or undertaking activities that may have an effect on federally recognized tribes, their assets, rights, services, or programs. The BLM initiated consultation with the following 18 tribes at the beginning of the NEPA process, and invited each tribe to participate as a cooperating agency, if desired. While no

tribes elected to become cooperating agencies, the BLM continues to consult and coordinate with each of these tribes as the project progresses.

- Chemehuevi Indian Tribe
- Colorado River Indian Tribe
- Havasupai Indian Tribe
- The Hopi Tribe
- Hualapai Indian Tribe
- Kaibab Band of Paiute Indians
- Las Vegas Paiute Tribe
- Moapa Band of Paiute Indians
- Navajo Nation
- Pahrump Band of Paiutes
- Paiute Indian Tribe of Utah
- Indian Peak Band of Paiutes
- Cedar Band of Paiutes
- Shivwits Band of Paiutes
- Koosharem Band of Paiutes
- Kanosh Band of Paiutes
- San Juan Southern Paiute Tribe
- Pueblo of Zuni

5.5 List of Preparers

5.5.1 BLM

Name	Title	Resource Areas of Specialty
Brian Bock	Fire Ecologist	Fire Ecology
Patrick W. Fleming	Fuels Program Manager	Fire Management, Fuels Management, Fire Ecology
David Van Alfen	Archaeologist	American Indian Resources Cultural Resources
Michael L. Cutler	Rangeland Management Specialist	Livestock Grazing, Vegetation
Richard Spotts	Planning and Environmental Coordinator	NEPA
Brian McMullen	Soil, Water, and Air Specialist	Soil, Water, Air, Climate Change
Braden Yardley	Outdoor Recreation Planner	Visual Resources, Designated Wilderness, Areas Managed to Maintain Wilderness Characteristics
Jeff Young	Lead Wildlife Biologist	Special Status Wildlife Species, Wildlife
Bryan Hansen	GIS Specialist	GIS
Mark Wimmer	Grand Canyon-Parashant NM Monument Manager	Management Oversight
Lorraine Christian	Arizona Strip Field Office Manager	Management Oversight
Tim Burke	Arizona Strip District Manager	Management Oversight

5.5.2 Other Preparers

Name	Title	Resource Areas of Specialty	Affiliation
Joe David	Environmental Coordinator	NEPA/Project Management	USFS TEAMS Enterprise Unit
Patricia Goude	Writer-Editor	NEPA	USFS TEAMS Enterprise Unit
Bruce Greco	Director of Outreach		Ecological Restoration Institute Northern Arizona University

5.5.3 Cooperating Agencies

Name	Title	Affiliation
Luke Thompson	Field Supervisor	Arizona Game and Fish Department
Cornell Christiansen	Outreach Coordinator	Washington County
Nick Hont	Development Services Director	Mohave County
Christine Ballard	Planning and Zoning Director	Mohave County

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Chapter 7. Glossary of Terms

AUM – Animal unit month (AUM) means the amount of forage necessary for the sustenance of one cow or its equivalent for a period of 1 month.

Climate – Climate in a narrow sense is usually defined as the "average weather," or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands of years. The classical period is three decades, as defined by the World Meteorological Organization. These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system.

Manual Vegetation Treatments – In manual treatments, plants are cut at or above ground level; plant root systems are pulled or dug out to prevent subsequent sprouting and regrowth; or mulch is placed around desired vegetation to limit the growth of competing vegetation. Hand tools and hand-operated power tools are used in manual vegetation treatments to cut, clear, or prune herbaceous and woody species. Hand tools such as the handsaw, axe, shovel, rake, machete, grubbing hoe, mattock (combination of axe and grubbing hoe), brush hook, and hand clippers, etc. are used in manual treatments. Axes, shovels, grubbing hoes, and mattocks can dig up and cut below the surface to remove the main root of plants such as prickly pear and mesquite with roots that can quickly resprout in response to surface cutting or clearing. Power tools, such as chain saws and power brush saws, are used to sever the main stem of woody vegetation at or near ground level.

Mechanical Vegetation Treatments – Mechanical treatments are used to kill or reduce the cover of undesirable vegetation and thus encourage the growth of desirable vegetation. Several different types of mechanical equipment are effective in suppressing, inhibiting, or controlling herbaceous and woody vegetation. Equipment could include wheeled or track type tractors, mowers, shredders, ATVs or specially designed vehicles with attached implements for mechanical vegetation treatments.

Chemical Vegetation Treatments – Herbicide applications are designed to minimize potential impacts on non-target plants and animals, while achieving the objective of the vegetation treatment project. The rates of application depend on the target species, presence and condition of non-target vegetation, soil type, depth to the water table, presence of other water sources, and the requirements of the label. In many circumstances the herbicide chosen, time of treatment, and rate of application of the herbicide is different than the most ideal herbicide application for maximum control of the target plant species in order to minimize damage to the non-target plant species, and to ensure minimum risk to human health and safety.

Lop and Scatter – Felling, cutting branches, tops, and unwanted boles into lengths and spreading debris more or less evenly over the ground.

Mastication – A mechanical type treatment. Chopping, grinding, and/or mowing treatments, usually by mechanical means, to reduce fuel bed depth or crowning potential.

Appendix A – Visual Contrast Rating Forms and KOPs

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date: 6/29/2016
District: Arizona Strip District
Resource Area: Grand Canyon-Parashant National Monument
Activity (program): Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name: Uinkaret Mountains Landscape Restoration Project
2. Key Observation Point: Key Observation Point 1
3. VRM Class: Class III
4. Location: Township _____ Range _____ Section _____
5. Location Sketch: 36°25.053' N, 113°16.103' W

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. Stippled medium height cliff rose plants in foreground.	1001 Road vegetation removed to create vertical band.
LINE	Horizontal and soft rounded lines	Soft lines from changes in vegetation patterns, mostly brush and grasses. Indistinct to stippled patches of pinyon and juniper trees.	Weak line created from road in the distant northeast.
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 mountains 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 lop and scatter treatements creating continuous 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 CONSTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				X		X						X
Line				X		X						X
Color				X	X							X
Texture				X	X							X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended? ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Braden Yardley, Mark Wimmer	6/24/2016

SECTION D. (Continued)

Comments from item 2.

Additional Mitigating Measures (See item 3)

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

Key Observation Point #1

Form 8400–4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 6/29/2016
District Arizona Strip District
Resource Area Grand Canyon-Parashant National Monument
Activity (program) Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name
Uinkaret Mountains Landscape Restoration Project

2. Key Observation Point
Key Observation Point 2

3. VRM Class
Class II

4. Location
Township _____
Range _____
Section _____

5. Location Sketch
36°21.758' N, 113°12.310' W

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Long wide valley with rounded knolls to the south west containing a moderate slope into the valley floor.	Rectangular patches of grass and sagebrush with heavy stand of trees on the west side. Some broken up patterns of timber in the valley floor.	Two bold square structures in the valley and one indistinct structure.
LINE	Bold lines from ridge edges to the west. Angular lines from knobs that run into the valley floor.	Soft lines in dense timber stands with bold lines in the valley from changes in vegetative patterns.	Soft regular square lines on all buildings.
COLOR	Grayish forms with brown hues.	Dark green hues are dominant in tree stands. Gray hues from sagebrush. Distinct yellows from grasses and variations from seasonal change.	Glaring reflective silver and white on two buildings. One building with soft yellow hues.
TEXTURE	Smooth landscape with some contrast to the west.	Smooth landscape to the west with stipulation and patches in the valley.	Contrasting.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Treatments from bullhog mastication creating more continuous low lying grass and sagebrush in valley with stippled trees.	Same
LINE	Same	A mix of soft and hard lines from vegetation pattern changes.	Same
COLOR	Same	Green hues with more dominant gray hues with gold and yellowgrasses depending on seasonal changes.	Same
TEXTURE	Same	Smooth with contrasting patches of grasses, brush, and trees.	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONSTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				X			X					X
Line				X	X							X
Color				X		X						X
Texture				X		X						X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended? ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
Braden Yardley, Mark Wimmer	6/24/2016

SECTION D. (Continued)

Comments from item 2.

Additional Mitigating Measures (See item 3)

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

Key Observation Point #2

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	6/29/2016
District	Arizona Strip District
Resource Area	Grand Canyon-Parashant National Monument
Activity (program)	Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name Uinkaret Mountains Landscape Restoration Project	**4. Location** Township _____ Range _____ Section _____	**5. Location Sketch** 36°21.987' N, 113°6.373' W
2. Key Observation Point Key Observation Point 3		
3. VRM Class Class II		

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 1028.
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 line created from road.
COLOR	Light brown and red hues where visible.	Dark green hues, with some grays where sagebrush is 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 middle and 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	Light brown and red hues showing through dispersed patches of vegetation.	Dark green hues, with yellow and brown colors from scattered material, gray sagebrush.	Same
TEXTURE	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 CONSTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				X		X						X
Line			X			X						X
Color				X		X						X
Texture				X		X						X

2. Does project design meet visual resource management objectives? ☒ **Yes** ☐ **No** **(Explain on reverse side)**

3. Additional mitigating measures recommended? ☒ **Yes** ☐ **No** **(Explain on reverse side)**

Evaluator's Names	**Date**
Braden Yardley	6/28/2016

SECTION D. (Continued)

Comments from item 2.

Additional Mitigating Measures (See item 3)

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

Key Observation Point #3

Form 8400–4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date: 6/29/2016
District: Arizona Strip District
Resource Area: Grand Canyon-Parashant National Monument
Activity (program): Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name	4. Location	5. Location Sketch
Uinkaret Mountains Landscape Restoration Project	Township _____	36°24.675' N, 113°7.805' W
2. Key Observation Point: Key Observation Point 4	Range _____	
3. VRM Class: Class III	Section _____	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Wide valley with some gently rolling hills.	Medium height, continuous pinyon and juniper cover, smooth, regular pattern.	Slightly curved and straight sections of road 717.
LINE	Mostly soft horizontal lines from undulating landscape.	Strong horizontal lines from changes in vegetation patterns from pinyon and juniper trees to grass and sage.	Hard line created from road.
COLOR	Light brown hues where visible	Green and gray hues across the landscape. Some dispersed small patches of yellow grass depending on seasonal change.	Light brown and yellow hues.
TEXTURE	Smooth and continuous.	Uniform.	Contrasting.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Pinyon and juniper trees lopped and scattered, chemical treatments, and re-seeding, low brush and grass.	Same
LINE	Same	More distinct lines where vegetation is removed and a more continuous patch of sage and grasses where re-seeding occurs.	Same
COLOR	Light brown and red hues showing through dispersed patches of vegetation.	Dark green hues, with yellow and brown colors from scattered material, gray sagebrush.	Same
TEXTURE	Same	Stippled patterns of juniper and a more continuous contrast of grasses.	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONSTRAST

		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form				X			X					X
	Line				X		X						X
	Color			X			X						X
	Texture				X		X						X

2. **Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)**

3. **Additional mitigating measures recommended? ☒ Yes ☐ No (Explain on reverse side)**

Evaluator's Names	Date
Braden Yardley	6/28/2016

SECTION D. (Continued)

Comments from item 2.

Additional Mitigating Measures (See item 3)

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

Key Observation Point #4

Form 8400–4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	6/29/2016
District	Arizona Strip District
Resource Area	Grand Canyon-Parashant National Monument
Activity (program)	Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name Uinkaret Mountains Landscape Restoration Project	**4. Location** Township _____ Range _____ Section _____	**5. Location Sketch** 36°24.675' N, 113°7.805' W
2. Key Observation Point Key Observation Point 5		
3. VRM Class Class II		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Gently rolling terrain in a low valley.	Patchy stand of pinyon and juniper trees.	Slight curves and straight sections of road 717..
LINE	Mostly soft horizontal lines from gentle slopes.	Strong lines created from changes in vegetation patterns.	Weak line created from road.
COLOR	Light brown and red hues where visible.	Green hues with some gray colors.	Brown and red hues.
TEXTURE	Smooth and continuous.	Stippled stand of pinyon and juniper trees.	Slightly contrasting.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Pinyon and juniper trees treated with bullhog mastication. Low brush and grass. .	Same
LINE	Same	More distinct vertical lines from trees, with horizontal changes created by removed vegetation.	Same
COLOR	Light brown and red hues showing through dispersed patches of vegetation.	Dark green hues, with yellow and brown colors from scattered material, gray sagebrush.	Same
TEXTURE	Same	Dotted.	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONSTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				X		X						X
Line			X			X						X
Color				X		X						X
Texture				X		X						X

2. Does project design meet visual resource management objectives? ☒ **Yes** ☐ **No** **(Explain on reverse side)**

3. Additional mitigating measures recommended? ☒ **Yes** ☐ **No** **(Explain on reverse side)**

Evaluator's Names	**Date**
Braden Yardley	6/28/2016

SECTION D. (Continued)

Comments from item 2.

Additional Mitigating Measures (See item 3)

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

Key Observation Point #5

Form 8400–4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date: 6/29/2016
District: Arizona Strip District
Resource Area: Grand Canyon-Parashant National Monument
Activity (program): Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name	4. Location	5. Location Sketch
Uinkaret Mountains Landscape Restoration Project	Township _____	36°28.323' N, 113°1.695' W
2. Key Observation Point: Key Observation Point 6	Range _____	
3. VRM Class: Class III	Section _____	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Gently sloping hills and terrain.	Regular sage brush pattern through valley with patches of pinyon and juniper trees.	None.
LINE	Mostly horizontal undulating lines over a horizontal landscape.	Regular sloping lines created by juniper stands.	None.
COLOR	Light brown where visible.	Greens, grays, and yellow hues from seasonal grasses.	None.
TEXTURE	Smooth and continuous.	Some patchy patterns from sage and mixed pinyon and juniper tree stands.	None.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Same	Same
LINE	Same	Same	Same
COLOR	Same	Same	Same
TEXTURE	Same	Uniform transition from juniper to sage.	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONSTRAST

	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				X			X					X
Line			X				X					X
Color				X			X					X
Texture			X			X						X

2. **Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)**

3. **Additional mitigating measures recommended? ☒ Yes ☐ No (Explain on reverse side)**

Evaluator's Names	Date
Braden Yardley	6/28/2016

SECTION D. (Continued)

Comments from item 2.

Additional Mitigating Measures (See item 3)

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

Key Observation Point #6

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date	6/29/2016
District	Arizona Strip District
Resource Area	Grand Canyon-Parashant National Monument
Activity (program)	Vegetation Management

SECTION A. PROJECT INFORMATION

1. Project Name Uinkaret Mountains Landscape Restoration Project	**4. Location** Township _____ Range _____ Section _____	**5. Location Sketch** 36°18.922' N, 113°3.470' W
2. Key Observation Point Key Observation Point 7		
3. VRM Class Class II		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Gently sloping hills and terrain.	Regular sage brush pattern through valley with patches of pinyon and juniper trees.	None.
LINE	Mostly horizontal undulating lines over a horizontal landscape.	Regular sloping lines created by juniper stands.	None.
COLOR	Light brown and yellow hues where visible.	Greens, grays, and yellow hues from seasonal grasses.	None.
TEXTURE	Smooth and continuous.	Some patchy patterns from sage and mixed pinyon and juniper tree stands.	None.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Same	Same	Same
LINE	Same	Same	Same
COLOR	Same	Same	Same
TEXTURE	Same	Uniform transition from juniper to sage.	Same

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONSTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				X			X					X
Line			X				X					X
Color				X			X					X
Texture			X			X						X

2. Does project design meet visual resource management objectives? ☒ **Yes** ☐ **No** **(Explain on reverse side)**

3. Additional mitigating measures recommended? ☒ **Yes** ☐ **No** **(Explain on reverse side)**

Evaluator's Names	**Date**
Braden Yardley	6/28/2016

SECTION D. (Continued)

Comments from item 2.

Additional Mitigating Measures (See item 3)

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

Key Observation Point #7