

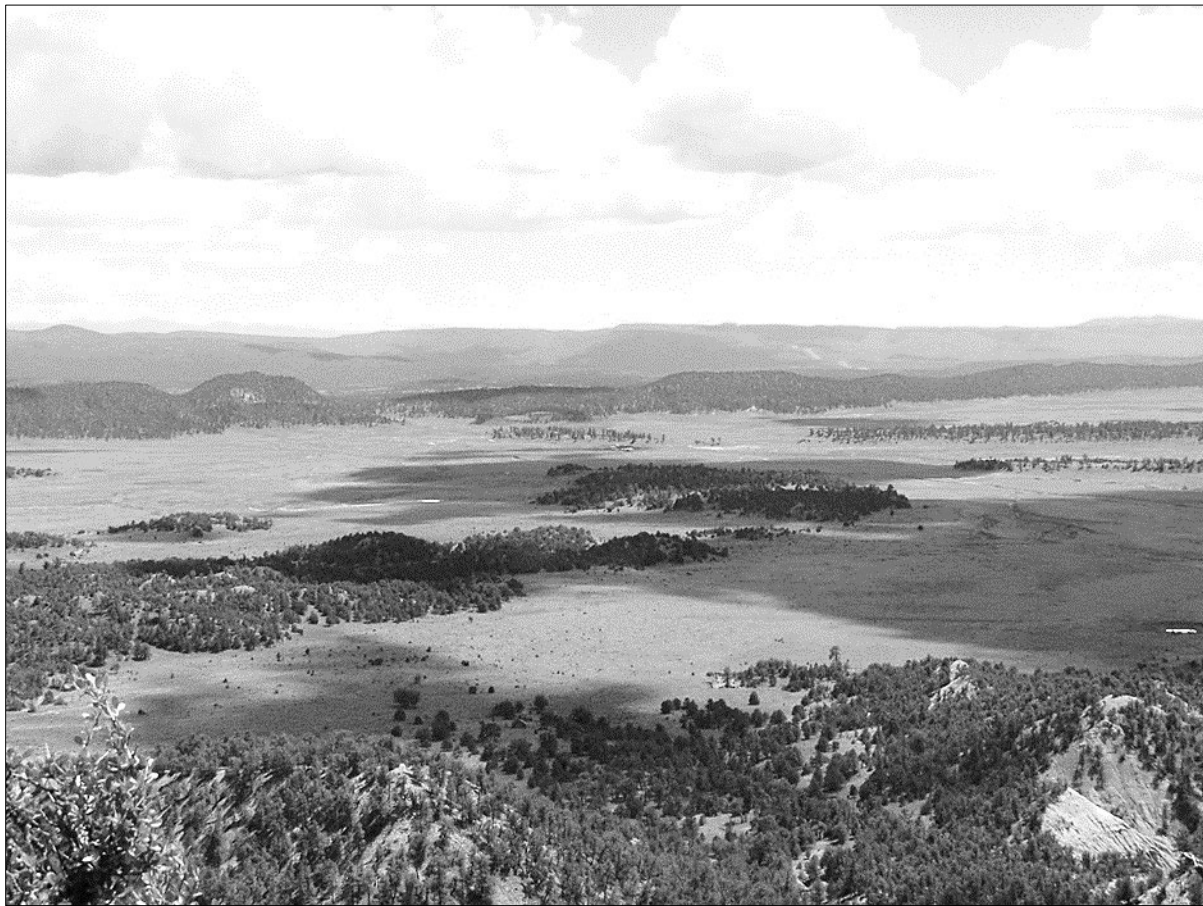


United States Department of Agriculture

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# Luna Restoration Project

## Final Environmental Impact Statement



Forest Service  
Quemado Ranger District

Apache National Forest (Administered by Gila National Forest)  
Publication # MB-R3-06-13

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**Cover photo** is from the northern portion of Luna planning area. View looking east and south of Spur Lake Basin taken from a point near Bill Knight Gap. To the left is Freeman and Dillon Mountains and to the right is Bishop Mountain. The ranch in the middle is part of the Spur Lake Cattle Company called Gribble Head Quarters.

**Luna Restoration Project  
Final Environmental Impact Statement  
Catron County, New Mexico**

**Lead Agency:** USDA Forest Service

**Responsible Official:** Adam Mendonca, Forest Supervisor  
Gila National Forest  
3005 E. Camino del Bosque, Silver City, NM 88061

**For Information Contact:** Emily Irwin, District Ranger  
Quemado Ranger District  
P.O. Box 159, Quemado, NM 87829  
575-773-4678

**Abstract:** The Gila National Forest proposes to conduct restoration activities within the 185,586-acre Luna planning area on the Quemado Ranger District. Four alternatives are being considered. Alternative A proposes no action; there would be no changes in current management. Alternative B, modified proposed action, proposes forest, woodland, fuels, watershed, motorized transportation, and range and wildlife habitat activities, which includes mechanical treatments and prescribed fire. Alternative C includes all of the same proposed in alternative B, but adds the use of herbicides for vegetation treatments of rabbitbrush and alligator juniper. Alternative D includes all of the same activities proposed in alternative B with the exception of not adding closed and user-created routes to the motorized transportation system. This exception does not include the routes required by Tucson Electric Power for utility line maintenance. The Gila National Forest has identified alternative C as the preferred alternative. A description of the preferred alternative may be found in chapter 2 of this document.

This final environmental impact statement and the draft record of decision are subject to objection pursuant to 36 Code of Federal Regulations 218.8, Subparts A and B. Objections will only be accepted from those who have previously submitted specific written comments regarding the proposed project during scoping or other designated opportunity for public comment in accordance with §218.5(a). For more information on how to comment or file objections, see the project website at <https://www.fs.usda.gov/detail/gila/home/?cid=STELPRD3828973> or contact Lisa Mizuno, Environmental Coordinator, at 575-388-8267.

# Summary

## Background

The Gila National Forest proposes to implement a wide range of restoration activities throughout the Luna planning area. Treatments include vegetation and fuels (mechanical and prescribed fire), watershed, motorized transportation, range, and wildlife habitat activities. The area affected by the proposal includes the western portion of the Quemado Ranger District around the area of Luna, New Mexico. Within the planning area, there are electronic and communication sites, the community of Luna and private inholdings, active grazing allotments and associated infrastructure, and natural and cultural resources. Much of the landscape is departed and is at risk to moderate- to high-severity wildfire. Wildfires burning at these intensities and severities could impact watersheds, habitats, infrastructure, the community, and the livelihoods of people living in this landscape. Treatments are designed to restore the structure, function, and resilience in vegetative communities; improve function of riparian areas and streams; improve water quality; and reduce the impacts from roads across the project area.

In response to congressional, agency, and regional emphasis on all-lands restoration level planning, the Gila and Apache-Sitgreaves national forests responded by proposing ecological restoration treatments across a large landscape encompassing both national forests. The Luna Restoration Project area was identified by the Gila National Forest as the highest priority for landscape restoration planning. The purpose of the project is to create and maintain a healthy resilient landscape and watersheds capable of delivering benefits to the public, including clean air and water, habitat for native fish and wildlife, forest products, and outdoor recreation opportunities.

## Public Involvement

This project has been listed on the Gila National Forest's schedule of proposed actions since October 2015 and periodically updated. The Quemado Ranger District staff hosted two open houses and a meeting with members of the Luna Community in Luna, New Mexico, to have discussions with stakeholders on identifying issues, concerns, and restoration and recreation opportunities. Between the open houses, over 200 letters were sent to individuals, tribes, organizations, and agencies introducing the planning area and providing opportunity to provide input. The notice of intent was published in the Federal Register on May 19, 2016. Gila National Forest staff received 27 comments during the scoping period. Twelve tribes were consulted with and provided the opportunity to participate in the planning process. Gila National Forest staff will continue to engage in tribal consultation.

The notice of availability for the draft environmental impact statement was published in the Federal Register on May 11, 2018. The draft environmental impact statement comment period was open for 45 days, which ended on June 25, 2018. The draft environmental impact statement was mailed to 190 individuals, organizations, tribes, and local, state, and federal agencies. The Gila National Forest published a news release announcing the availability of the draft environmental impact statement and posted the release in and around the community of Luna. In response, we received 12 comment letters on the draft environmental impact statement.

## Significant Issues

Significant issues form the basis of alternatives to the proposed action. Three significant issues were identified from the scoping comment letters:

1. Vegetation treatments for rabbitbrush and alligator juniper: Mowing rabbitbrush and cutting alligator juniper may not be effective treatment methods.

2. Fuels treatments: Treatment of mixed conifer stands east of Highway 180 may result in high-severity fires impacting wildlife; and limited burning and thinning may not improve or protect Mexican spotted owl habitat.
3. Motorized transportation system: The 50-inches motorized trail size limits access by utility-task vehicles and side-by-side vehicles; Tucson Electric Power needs motorized access for maintenance; and no additional motorized routes should be added to the National Forest System of roads and trails.

## Alternatives

**Alternative A** is the no-action alternative representing the existing condition.

**Alternative B** is the modified proposed action. This alternative was modified to address all or portions of significant issues related to fuels treatments and motorized transportation system.

**Alternative C** is the preferred alternative. Alternative C is similar to alternative B except it addresses the significant issue of vegetation treatments by utilizing herbicides to treat rabbitbrush and alligator juniper.

**Alternative D** is similar to alternative B except it addresses the part of the motorized transportation system significant issue of not adding more miles to the National Forest System of motorized roads and trails.

## Conclusions Related to Impacts

Over time, the action alternatives move vegetative trends towards desired conditions. Tree and brush encroachment into grasslands and riparian systems decreases. Tree densities decrease with the trend being stands are more resilient to disturbances. Mechanical and prescribed fire treatments would reduce the crown fire potential from approximately 67 percent of the landscape (alternative A) to approximately 16 percent of the project area.

Trends to the soils, riparian, and water quality resources suggest there could be some short-term impacts to these resources including soil compaction and soil exposure. However, the long-term trend is an improvement of impaired soil conditions as well as help in maintaining satisfactory soil conditions in riparian areas, wetlands, upland wet meadows, and degraded uplands.

The action alternatives show a net road mile reduction of 94 miles of road in alternatives B and C, and 126 miles in alternative D.

As described in chapter 3, implementing the action alternatives would improve forest and woodland stand health and improve wildlife habitat, including habitat for threatened, endangered, and sensitive species. There would be reduction in the risk of large uncharacteristic wildfires and their impacts to the landscape, watersheds, species, and human health and quality of life. As described throughout chapter 3, the overall implementation of the action alternatives would improve resources such as range condition, wildlife and aquatic habitat, soil conditions, and others. Erosion control and reducing risk of wildfire would reduce impacts to sensitive resources like water quality, cultural resources, and air quality.

Based upon the effects of the alternatives, the responsible official will decide whether to select the no-action alternative; whether to select the modified proposed action, another action alternative, or an action alternative that is modified as described in the final decision, and which forest plan amendments to include in the final decision.

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**Acronyms**

CFR	Code of Federal Regulations	USDA	United States Department of Agriculture
GIS	geographical information system	USDI	United States Department of the Interior
Infra	infrastructure database	U.S.C.	United States Code
SDI	stand density index	VSS	vegetation structural stage
SNOTEL	snow telemetry		

# Chapter 1. Purpose of and Need for Action

## Structure of this Document

The Forest Service has prepared this final environmental impact statement in compliance with the National Environmental Policy Act and other relevant Federal and State laws and regulations. This document discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. This document consists of the following:

- **Chapter 1. Purpose of and Need for Action:** This chapter briefly describes this project's background, its purpose and need, and our initial proposal for achieving the purpose and need. It then describes how we informed the public of the proposal and how they responded.
- **Chapter 2. Alternatives, Including the Proposed Action:** This chapter describes in detail the proposed action and alternatives—including no action. These alternatives were developed based on significant issues raised by the public and other agencies. The chapter ends with a summary of the environmental consequences for each alternative.
- **Chapter 3. Affected Environment and Environmental Consequences:** This chapter describes in detail the environmental effects of each alternative.
- **Preparers and Contributors:** This section contains a list of preparers and the agencies we consulted with during its development. It also includes a list of agencies, organizations, and persons to whom copies of the final environmental impact statement were sent.
- **Glossary**
- **References**
- **Appendices**
- **Index**

In addition to this document, we produced a separate series of large-size maps to display the proposed activities by alternative, and we refer to these maps in chapters 1 and 2. The maps are included on a compact disc (CD) accompanying the print version of the final environmental statement. The maps also can be viewed online at the project website <https://www.fs.usda.gov/detail/gila/home/?cid=STELPRD3828973>.

Additional documentation, including more detailed analyses of project area resources, may be found in the project planning record located at the Gila National Forest Supervisor's Office, 3005 E. Camino del Bosque, Silver City, New Mexico 88061. Documents are available pursuant to the provisions of the Freedom of Information Act.

## Introduction

In response to congressional, agency, and regional emphasis on all-lands restoration level planning, the Gila and Apache-Sitgreaves national forests have responded by proposing ecological restoration treatments across a large landscape encompassing both national forests.

The Luna Restoration Project is located along the western portion of the Quemado Ranger District around the community of Luna (figure 1). The 185,586-acre Luna planning area is part of the larger Escudilla Landscape, a 279,470-acre landscape planning area that extends across both the Gila and Apache-Sitgreaves national forests (figure 2). The two national forests worked together and identified a number of treatments that cross between the two forest boundaries including vegetation and fuels (mechanical and prescribed fire), watershed, motorized transportation, range, and wildlife habitat activities.

Beginning in 2014, the Quemado Ranger District reached out to the public and county, state, and federal agencies inviting all to assist with the development of proposed activities within the planning area. These stakeholders identified areas of concern related to wildfire potential and community protection; locations for motorized (for example, all-terrain vehicle and utility-task vehicle) trails; maintenance needs for roads and trails; and maintenance needs for sediment control features and structures. Stakeholders also identified locations for vegetation restoration treatments, and locations and type of range and wildlife improvements.

## Location and Description of Planning Area

The Luna Restoration Project is located along the western portion of the Quemado Ranger District around the community of Luna (figure 1). The 186,586-acre planning area is bounded to the north by the Gila National Forest boundary, the west by the Arizona and New Mexico state lines, the south by the Quemado Ranger District boundary, and the east along a series of ridgelines along watershed boundaries. There are 14,226 acres of private inholdings within the planning area. The project lies within the area of townships 2 through 7 south and ranges 19 through 21 west.

The community of Luna is located in the southern portion of the planning area. There is important infrastructure located in the vicinity of Luna. A large electronic and communication site is situated on the San Francisco Divide on the southern boundary of the planning area. This site supports systems for the Forest Service; Catron County Sheriff's Department and Emergency Management Services; New Mexico State Police; and private enterprises. Tucson Electric Power interstate has two transmission lines that extend through the entire length of the project area. The El Paso Electric interstate transmission line runs approximately 3 miles northeast of the planning area. A local service line managed by Navopache Electric Cooperative extends in and around Luna.

The community of Luna and key infrastructure and natural resources are located in a forested, ponderosa pine setting and on mountaintops. Prevailing winds, alignment of topography, and dense forest vegetation place the community and infrastructure at risk of a wildfire starting in the southwest corner of the project area and rapidly burning northeast.

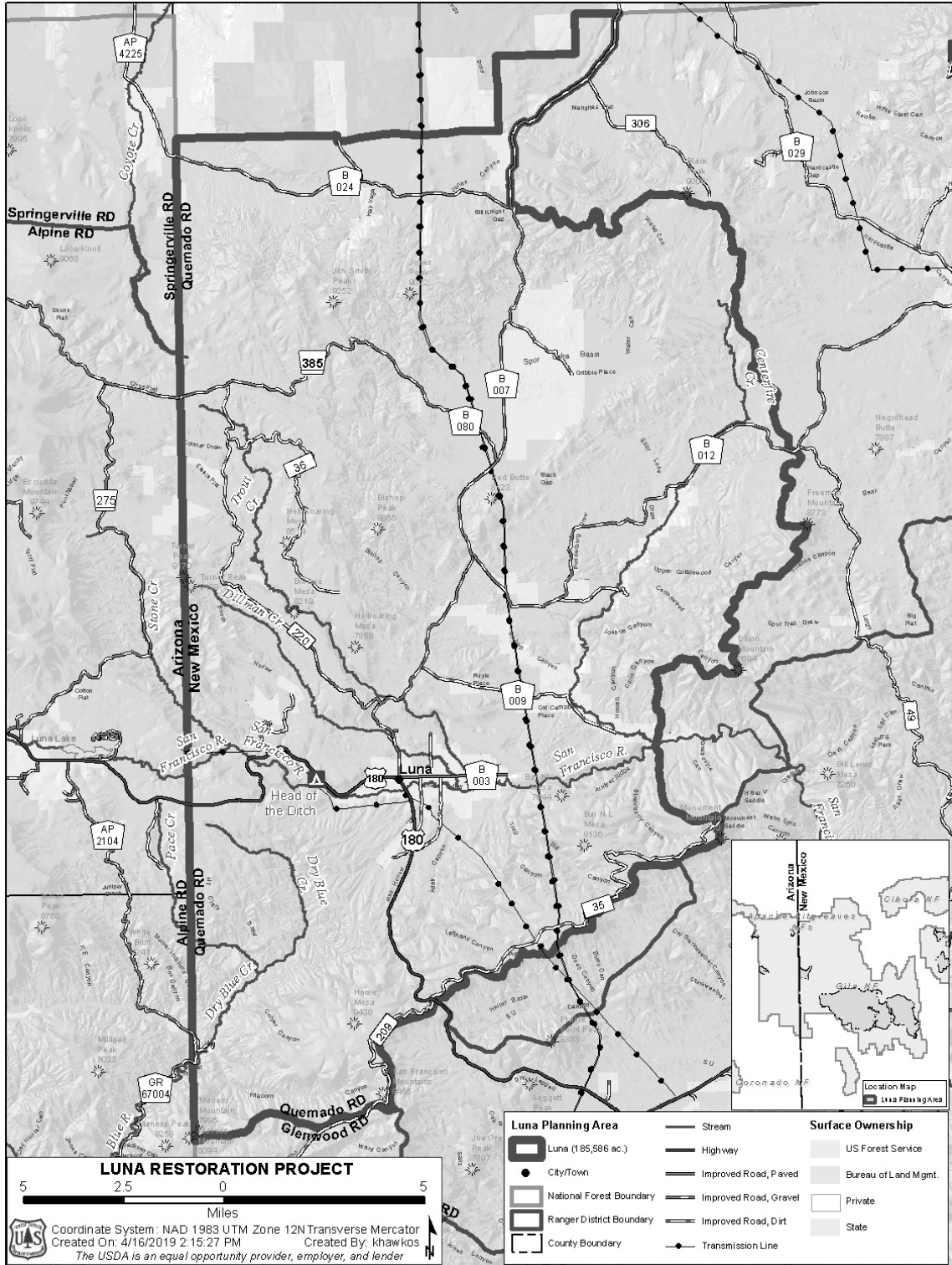


Figure 1. Luna Restoration Project vicinity map and planning boundary

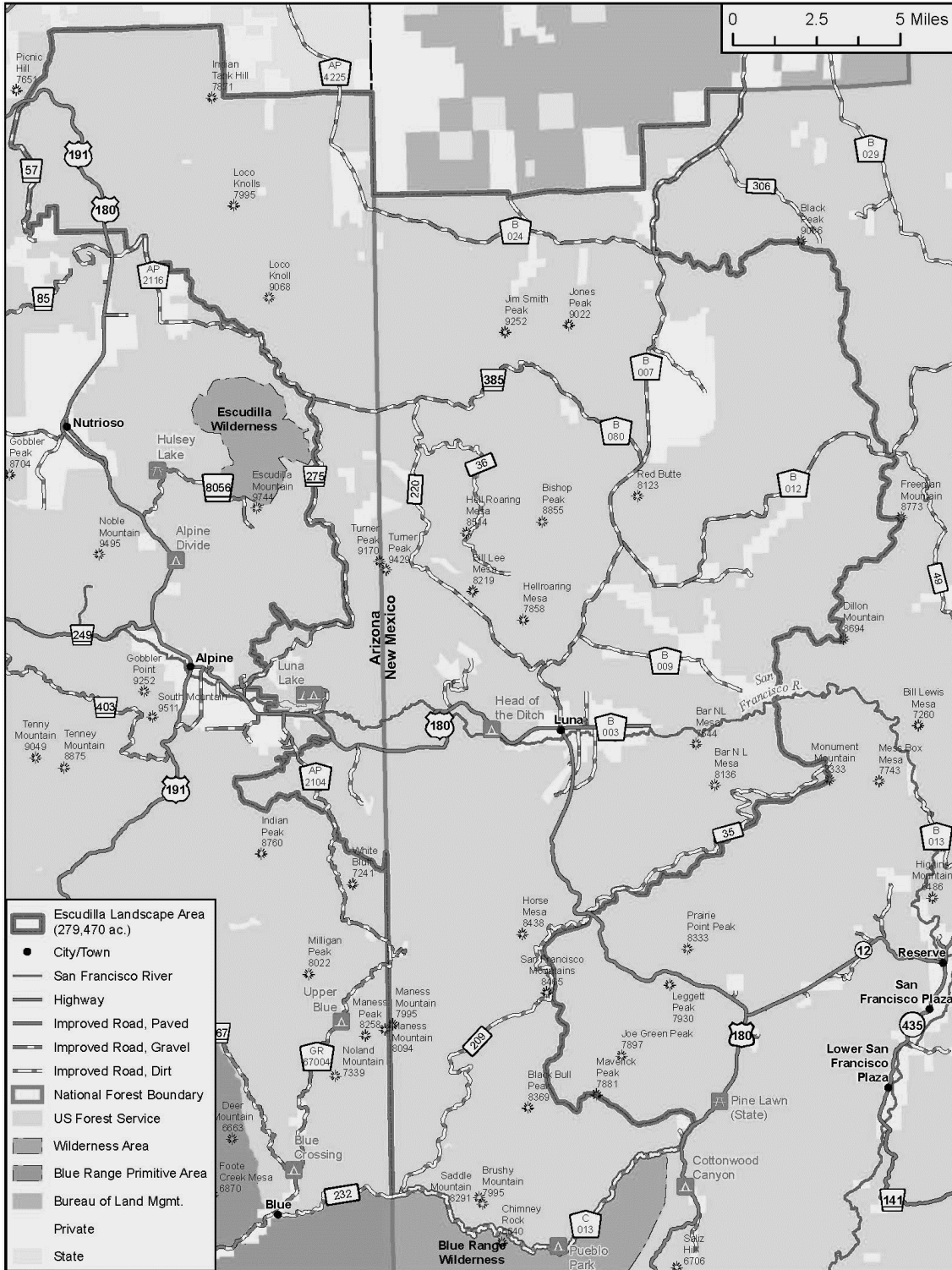


Figure 2. Map displaying the Escudilla Landscape planning boundary, which extends across both the Apache-Sitgreaves and Gila national forests

## Background

Luna and surrounding private inholdings are identified as “high” on the priority list for protection from wildfires in both the 2005 Catron County and 2006 Luna Community Wildfire Protection Plans. In the late 1990s to early 2000s, the Quemado Ranger District personnel implemented some hazardous fuels reduction projects around Luna which included prescribed burning, thinning of ponderosa pine stands, and construction of a 300-foot fuelbreak on the south and west sides of the community. Beginning in 2009 there was concern regarding the risk of wildfire to the community of Luna and surrounding private inholdings, which initiated inventories of the surrounding area to determine the vegetation condition. Inventories indicated the presence of high tree densities in both large continuous areas and smaller patches, which confirmed the concerns regarding the risk of high-intensity wildfire.

In 2011, the Wallow Fire burned onto the Gila National Forest from Arizona, west of the community of Luna, burning approximately 15,400 acres in New Mexico. The fire burned across the landscape with varying levels of severity. High-severity fire impacted numerous natural resources. Flooding occurred immediately after the fire, and numerous sediment trap and tanks across the fire area were silted in.

Within the larger Escudilla Landscape area (Arizona and New Mexico), approximately 39,385 acres were burned during the Wallow Fire. Post-fire satellite imagery indicates 1,757 acres were burned by high-severity fire and 4,039 were burned by moderate-severity fire. Areas that burned with low-severity fire resulted in little or no change to the density of trees or amount of fuels on the ground. The impacts of the Wallow Fire in moderate to high-severity burn areas resulted in degraded watershed conditions on thousands of acres; substantially altering future yields of clean water and future vegetative communities. Land use opportunities, especially on the heavily impacted areas, will continually change as the severely degraded areas move through successional stages of recovery.

The Wallow Fire and post-fire impacts on the landscape, watersheds, habitat, forest facilities, infrastructure, and community of Luna highlights the range of possible future impacts from wildfires on stakeholders and land managers.

## Existing and Desired Conditions

### Vegetation

#### Forest Cover Types

The Luna planning area contains a wide range of vegetation communities. The broad forest cover types are grassland, Douglas fir, oak woodland, piñon pine-juniper woodland, ponderosa pine and white fir (table 1).

The desired condition is to maintain a variety of forest cover types within the project area, while increasing acres of grasslands that have been encroached by woodland species (table 1). It is also desired to favor Gambel oak, aspen, and southwestern white pine within individual stands, increase the herbaceous, forb, and shrub components within individual stands and manage for uneven-aged characteristics (multistoried) across the majority of the landscape with the exception being areas having high levels of insect infestations, disease (white pine blister rust or mistletoe) and areas adjacent to private land.

**Table 1. Existing acres of vegetation types within the Luna planning area. The percentage change from existing conditions are shown for each cover type that would maintain variety and reach desired conditions per cover type in the planning area.**

Forest Cover Type	Existing Acres	Desired Percentage Change from Existing Condition
Grassland/Meadow	21,941	+0-2 %
Douglas fir	6,323	+0-2 %
Engelmann Spruce	109	+0-2 %
Oak Woodland	1,414	± 2 %
Piñon pine-Juniper	41,713	± 5 %
Ponderosa pine	87,195	± 5 %
Riparian	784	Not applicable
Southwestern White Pine	69	+0-2 %
White Fir	6,887	+0-2 %
Reforestation Area	3,954	Not applicable
Rocky Area	942	Not applicable
Total acres	171,331 <sup>1</sup>	Not applicable

<sup>1</sup> Acreage does not include private land.

### Stand Density Index

Stand stocking density is the measurement of tree spacing within a stand and can be thought of in terms of the degree of crowding among trees in a stand. This can be measured in square feet of basal area, or expressed as an index of stocking, such as stand density index. For a given tree species of a given size (average stand diameter) there is a maximum number of trees that can be supported on an acre, or maximum stand density index.

The stratification of stand density index provides a useful means for discussing stand dynamics relative to species composition, and the impacts of different tree densities. Long (1985) divided the stand density index into four zones based on the percent of the overall density of a tree stand relative to the biological maximum density. Regeneration of desired species can be initiated by maintaining stand density in zone 1, based on maximum stand density index. Open canopy stands with grassy understories and large diameter trees with long, heavy-limbed crowns can be developed by targeting densities in zones 1 and 2. Stands of moderate crown closure and intermediate sized trees with thrifty, well-pruned crowns can be developed by targeting densities in the upper half of zone 2 and the lower half of zone 3. Clumpy, irregular stands containing groups of varying ages can be developed through managing for a mix of zones 1, 2, and 3. Avoiding density related mortality and maintaining forest vigor can be achieved by maintaining densities at or less than the lower half of zone 3.

Current and desired relative densities within the various zones across the Luna planning area are provided below in table 2. Currently 48 percent of the area is at full site occupancy. Most of the full site occupancy is concentrated in zones 3 and 4; both zones are within their desired respective ranges. The existing condition for zone 2 is slightly above the desired range, while zone 1 is within the desired range.

A variety of density conditions are desired across the landscape to meet various management objectives. To reduce standing fuel loadings within the project area densities should be distributed among zone 2 and lower end of zone 3 (with an emphasis on lower densities adjacent to private

land holdings and along identified Forest System Roads to increase defensible space for firefighters in the event of a wildfire. There would also be an emphasis on low densities in grassland and savannah areas to increase herbaceous vegetation and reduce conifer tree encroachment. Areas managed for northern goshawk vegetation structural stages 4–6, Mexican spotted owl, protected habitat and protected activity centers, Mexican spotted owl threshold stands, and areas that are designated for old-growth development should be managed to achieve zones 2–4. Maintaining areas in zones 3 and 4 would provide for wildlife requiring higher tree densities and canopy cover, and promote development of old growth characteristics in areas designated as old growth.

**Table 2. Existing and desired stand density index (SDI) percentage of maximum for the Luna project area**

Zone	Maximum SDI (percent)	Existing Percentage of Landscape	Desired Percentage of Landscape	Biological Implications
1	0–25	19	10–20	Less than full site occupancy, maximum forage No competition among trees, little crown differentiation Maximum individual tree diameter and volume growth Minimum whole stand volume growth Shade intolerant seedlings favored
2	25–35	33	20–30	Less than full site occupancy, intermediate forage Onset of competition among trees, onset of crown differentiation Intermediate individual tree diameter and volume growth Intermediate whole stand volume growth Shade-tolerant and intolerant seedlings favored
3	35–55 <sup>1</sup>	38	30–50	Full site occupancy, minimum forage Active competition among trees, active crown differentiation Declining individual tree diameter and volume growth Maximum whole stand volume growth Shade-tolerant seedlings favored Upper range marks the threshold for the onset of density-related mortality
4	55 <sup>1</sup> –100	10	10–20	Full site occupancy, minimum forage Severe competition among trees, active competition induced mortality Minimum individual tree diameter and volume growth, stagnation Declining whole stand volume growth due to mortality Shade-tolerant seedlings favored

<sup>1</sup> Zones 3 and 4 upper/lower ranges vary between 55-60% based on review of the existing research 55% was used as the respective upper and lower thresholds for zones 3 and 4 for the Luna Analysis.



### Vegetation Structural Stage

Vegetation structural stage pertains to how treatments meet or improve wildlife habitat for northern goshawk. Vegetation structural stage is the metric used to show how the treatments move ponderosa pine stands toward the desired conditions (table 3).

Existing conditions shows a surplus of acres in vegetation structural stages 1, 3 and 4 for the ponderosa pine cover type in comparison to the desired condition. All other structural stages are deficit to varying degrees (table 3).

**Table 3. Vegetation structural stage existing and desired conditions in percentage of acres of ponderosa pine cover type in the Luna planning area**

Vegetation Structural Stage (VSS) (diameter class in inches)	Existing Condition (percent acres)	Desired Condition (percent acres)
VSS 1 (0.0–0.9)	22	10
VSS 2 (1.0–4.9)	Less than 1	10
VSS 3 (5.0–11.9)	30	20
VSS 4 (12.0–17.9)	25	20
VSS 5 (18.0–23.9)	16	20
VSS 6 (24 +)	8	20

For canopy density classes in the ponderosa pine cover type, class B is in surplus in comparison to the desired condition. Classes A and C are deficit and are not meeting desired conditions (table 4). For the woodland canopy density class A, B, and C do not meet desired condition (table 5).

Both ponderosa pine and woodland cover types are deficit in uneven-aged structure, 46 percent and 40 percent respectively, compared to desired conditions (90 percent and 100 percent). With both being deficit in uneven-aged structure, means both are exceeding their even-aged structures compared to desired conditions. Ponderosa pine has 54 percent and woodlands 60 percent even-aged structure. The desired is to move toward 10 percent and 0 percent, respectively, even-aged structure.

**Table 4. Ponderosa pine cover type existing and desired conditions for canopy density classes by percent**

Canopy Density Class	Class Description	Existing Condition (percent)	Desired Condition (percent)
A	Open (0–39%)	36	40
B	Moderately closed (40–59%)	51	40
C	Closed (60% +)	12	20

**Table 5. Woodland cover type existing and desired conditions for canopy density classes by percent**

Canopy Density Class	Class Description	Existing Condition (percent)	Desired Condition (percent)
A	Open (0–39%)	13	55
B	Moderately closed (40–59%)	63	30
C	Closed (60% +)	24	15

## Old Growth Stand Structural Attributes

Old growth stand structure attributes include number of live trees of a given size, snags, basal area, and canopy cover by vegetation type. These minimum criteria for the structural attributes vary between vegetation types for mixed species, ponderosa pine, and woodland species.

The Gila forest plan identifies a minimum of 20 percent of the forest cover types within the planning area must be managed for meeting old growth features. The area of forest cover types identified to be managed are: approximately 7,965 acres of the mixed-species group which includes Douglas fir, white fir, Engelmann spruce, limber/southwestern white pine); approximately 14,952 acres of the woodland group including juniper species; and approximately 20,177 acres of the ponderosa pine group.

Desired future condition in areas identified as potential old growth management areas include reduction of risk of high-intensity wildfire while maintaining and increasing key old growth attributes. Existing and desired condition of structural attributes and respective minimum criteria to determine old growth for each cover type for the Luna planning area is displayed in table 6. Presently, approximately 12 percent of the ponderosa pine group; 19 percent of the mixed-species group; and 87 percent of the woodland group designated as old growth simultaneously meet all minimum criteria of the structural attributes (table 6). For the remaining areas, the structural attributes are met to varying degrees.

In addition to the old growth direction found in the Gila forest plan, for this project it is desired that treatments would be designed to retain old and young large trees whenever possible unless they must be cut for threats to human health, safety, and property, and where the removal of an old tree is necessary for forest health concerns (high populations of insect or severe disease), or where removal is needed to reduce tree density to achieve project desired conditions. Information on old and large tree descriptions and instances in which old and/or large trees may need to be removed is located in the appendix 3 Luna Restoration Project Old and Large Tree Implementation Strategy of the vegetation report.

**Table 6. Existing and desired old growth structural attributes by cover type group expressed in percentage of area within the Luna planning area**

Old Growth Group	Minimum Criteria of Structural Attributes <sup>1</sup>	Percentage Existing Condition of Designated 20% Old Growth Area	Percentage Desired Condition of Designated 20% Old Growth Area
Ponderosa pine	20 live trees in main canopy at least 14 inches in diameter at breast height (DBH)	68	100
Ponderosa pine	1 standing dead tree per acre at least 14 inches DBH and at least 15 feet	46	100
Ponderosa pine	70 to 90 square feet per acre total basal area	98	100
Ponderosa pine	40 to 50% total canopy cover	34	100
Ponderosa pine	Percent area simultaneously meeting all attributes <sup>2</sup>	12	100
Mixed-species	12-16 live trees in main canopy at least 18 inches DBH	45	100
Mixed-species	2.5 standing dead tree per acre at least 14 inches DBH and at least 20 feet	85	100
Mixed-species	80 to 100 square feet per acre total basal area	100	100
Mixed-species	50 to 60% total canopy cover	43	100
Mixed-species	Percent area simultaneously meeting all attributes <sup>2</sup>	19	100
Woodland	12 to 30 live trees in main canopy at least 9 inches in diameter at root collar (DRC)	99	100
Woodland	1 standing dead tree per acre at least 9 inches DRC and at least 8 feet	88	100
Woodland	6 to 24 square feet per acre total basal area	100	100
Woodland	20 to 35% total canopy cover	97	100
Woodland	Percent area simultaneously meeting all attributes <sup>2</sup>	87	100

<sup>1</sup> Low site productivity values were used as threshold for each old-growth group for the Luna planning area.

<sup>2</sup> Age and down dead trees are unknown for the group.

## Fuels and Fire

Fire behavior modeling results suggest current vegetative conditions in the planning area could result in torching and passive and active crown fires that are uncharacteristically intense and severe (table 7, MAP 1<sup>1</sup>). Vegetation and fuel conditions across the planning area include dense stands, closed canopies, ladder fuels (canopy base height), and high surface fuel loadings (table 8).

<sup>1</sup> To view MAP 1 through MAP 10, see “Structure of this Document” on page 1.

**Table 7. Acres by fire type within the Luna planning area**

Fire Type	Description	Acres at Risk
Surface Fire	Fire that burns predominately across the surface litter and undergrowth	44,183
Torching/Passive Crown Fire	Type of crown fire in which the crowns of individual trees or small groups of trees burn, but solid flaming in the canopy cannot be maintained except for short periods	86,842
Active Crown Fire	Also referred to as running crown fire or continuous crown fire. An active crown fire presents a solid wall of flame from the surface through the canopy fuel layers	36,566

**Table 8. Existing fuel conditions by vegetation type within Luna planning area**

Vegetation Type	Surface Fuel Loading <sup>1</sup> (tons per acre)	Coarse Woody Debris <sup>2</sup> (tons per acre)	Canopy Base Height <sup>3</sup> (feet)	Canopy Bulk Density <sup>4</sup> (kg/m <sup>3</sup> )
Piñon-juniper	5	4	5	0.08
Ponderosa pine	5	3	11	0.07
Mixed conifer	11–18	7–13	4–7	0.11–0.14

<sup>1</sup>Surface fuels include the total amount of fuels on the forest floor. Surface fuels include duff, grass, needles, sticks, and small branch wood. Surface fuel loads are measured in tons per acre.

<sup>2</sup>Coarse woody debris consists of fallen dead trees and the remains of large branches on the ground in forests and woodlands. Coarse woody debris is measured in tons per acre.

<sup>3</sup>Canopy base height is the average height from the ground surface to a forest stand's canopy bottom.

<sup>4</sup>Canopy bulk density is the mass of the available canopy fuel. Canopy bulk density is used to predict crown fire.

The desired conditions for fuels and fire are to:

- reduce the number of acres at risk to crown fires (table 7);
- use wildland fire as a disturbance agent;
- have the mean fire return intervals ranging from 2 to 24 years in ponderosa pine and dry mixed conifer stands; and
- move the planning area fuel conditions towards values or ranges described in table 9.

**Table 9. Desired fuel conditions by vegetation type within Luna planning area**

Vegetation Type	Surface Fuel Loading <sup>1</sup> (tons per acre)	Coarse Woody Debris <sup>2</sup> (tons per acre)	Canopy Base Height <sup>3</sup> (feet)	Canopy Bulk Density <sup>4</sup> (kg/m <sup>3</sup> )
Piñon-juniper	5	5–10	4–6	Less than 0.05
Ponderosa pine	7–14	5–7	Greater than 18	Less than 0.05
Mixed conifer	2–4	10–15	Greater than 5–10	Less than 0.08

<sup>1</sup>Surface fuels include the total amount of fuels on the forest floor. Surface fuels include duff, grass, needles, sticks, and small branch wood. Surface fuel loads are measured in tons per acre.

<sup>2</sup>Coarse woody debris consists of fallen dead trees and the remains of large branches on the ground in forests and woodlands. Coarse woody debris is measured in tons per acre.

<sup>3</sup>Canopy base height is the average height from the ground surface to a forest stand's canopy bottom.

<sup>4</sup>Canopy bulk density is the mass of the available canopy fuel. Canopy bulk density is used to predict crown fire.

## Watershed and Aquatics

All or portions of nine 6<sup>th</sup>-code watersheds are in the Luna planning area (table 10). In 2015, watershed condition ratings were determined by a qualitative assessment of twelve indicators. These indicators include water quality, water quantity, aquatic habitat, aquatic biota, riparian and wetland vegetation, roads and trails, soils, fire regime and wildfire, forest cover, rangeland vegetation, terrestrial invasive species, and forest health. The indicators were given a rating of functioning properly, functioning at risk or impaired. A composite score was derived from these ratings to give an overall watershed condition rating. Watersheds that are rated in Class 2 or Class 3 condition have several indicators that are not functioning properly. Examples of this include poor road drainage, high erosion rates, degraded riparian conditions, fragmented aquatic habitat, recent high-severity wildfire, noxious weed infestation, decline in perennial water, and road and stream conflicts.

Aquatic and riparian obligate species are being impacted by impaired watersheds. High sediment loads and temperatures, lack of woody debris in the channel, lack of mature, multistory riparian vegetation, and exotic species are some of the conditions present.

The desired conditions for watershed and aquatics are:

- all 6<sup>th</sup>-code watersheds are rated as class 1, functioning properly;
- all streams meet New Mexico State water quality standards; and
- have a healthy, diverse riparian corridor that supports aquatic species and riparian obligates.

**Table 10. Sixth-code watersheds in the Luna planning area. Summary of the 2015 watershed condition rating and number of streams in nonattainment of New Mexico State water quality standards.**

6 <sup>th</sup> -Code Watershed <sup>1</sup>	2015 Watershed Condition Rating(*)	Number of Streams / Stream Name in Nonattainment of State Water Quality Standards (**)
Trout Creek	Class 2	0
Stone Creek-San Francisco River	Class 2	1 / San Francisco River
SA Creek	Class 2	0
Outlet Centerfire Creek	Class 3	1 / Centerfire Creek
Big Canyon-San Francisco River	Class 2	1 / San Francisco River
Headwaters Centerfire Creek	Class 2	1 / Centerfire Creek
Spur Draw	Class 2	0
Dry Blue Creek	Class 2	0
Canovas Creek-Coyote Creek	Class 2	0

<sup>1</sup> The nine watersheds listed make up the majority of the project area. Several other watersheds are impacted by the project, however less than 5 percent of the project area is within each of these watersheds.

(\*)Class 1 = Functioning Properly; Class 2 = Functioning at Risk; Class 3 = Impaired Function.

(\*\*)2016–2018 State of New Mexico Clean Water Act section 303(d)/305(b) Integrated List and Report: San Francisco River listed for exceedances of benthic-macroinvertebrate bioassessments, water temperature, *Escherichia coli* and turbidity; Centerfire Creek listed for exceedances of *Escherichia coli*, nutrient/eutrophication biological indicators, sedimentation and siltation, specific conductance, water temperature, and turbidity.

## Wildlife

The Luna planning area is located in the Upper Gila Mountain recovery unit for the Mexican spotted owl. On the Gila National Forest, the Mexican spotted owl occupies mixed conifer and ponderosa pine-Gambel oak vegetation types, usually characterized by high canopy closure, high stem density, multilayered canopies within the stand, numerous snags, and downed woody material.

One of the primary concerns for the Mexican spotted owl is the potential loss of habitat from uncharacteristic wildfire (U.S. Fish and Wildlife Service 2012). Crown fire potential was analyzed, approximately 68 percent of the planning area is at risk to torching and passive and active crown fire (table 6).

The habitat outside Mexican spotted owl protected activity centers is managed for Mexican spotted owl recovery habitat (restricted or protected) in mixed conifer, ponderosa pine Gambel oak, and riparian vegetation, and for northern goshawk habitat in other ponderosa pine forest types and woodlands. Home range for the northern goshawk is called post-fledgling family area and includes the nest sites and habitat most likely to be used by fledglings during their early development. Portions of the northern goshawk post-fledgling family areas is characterized as having dense, small-diameter, young ponderosa pine trees. Many of these stands are also at risk to torching, passive, and active crown fire.

Browse for big game species across the planning area is decadent with little regeneration to provide forage for wildlife.

The desired conditions for wildlife are:

- having a range of diverse habitats for fish and wildlife populations;
- improving habitat for threatened or endangered species
- reducing the risk of high-severity fire within Mexican spotted owl and northern goshawk acres identified for treatment;
- increasing diversity in age, size, and structure of stands within northern goshawk habitat; and
- increasing diversity, productivity, and abundance of browse species (for example, mountain mahogany, Gambel oak, and gray oak) for wildlife game species.

## Purpose and Need for Action

The purpose of the Luna Restoration Project is to create and maintain a healthy resilient landscape and watersheds capable of delivering benefits to the public including reduced threat of high-intensity fire, clean air and water, habitat for native fish and wildlife, forest products, and outdoor recreation opportunities. There is a need to:

- reduce the impacts of high-severity fire on natural and cultural resources, private inholdings, communities, infrastructure, and livelihoods within the planning area;
- implement vegetative treatments to restore departed landscapes that are, overstocked, encroached, and at risk to fire, disease, insects, and climate stressors;
- implement treatments in watersheds that are not properly functioning;

- improve water quality by hardening stream crossings and performing road maintenance;
- continue to provide the wide range of forest products that are important to the culture, tradition and livelihoods of local communities;
- protect and restore threatened and endangered species and habitats;
- provide opportunities for off-highway vehicle use, enjoyment, and access from the community of Luna;
- provide permanent water supplies to support wildlife and livestock; and
- improve rangeland, wildlife, aquatic and riparian habitat.

The Gila forest plan as amended (USDA Forest Service 1986) will need “project-level” amendments specifically applicable to the Luna Restoration Project.

## Previous Decisions

This project is proposing restoration to grasslands and watersheds; however, this analysis will not change the range management decisions for allotments within the planning area.

The Gila National Forest travel management record of decision was signed in 2013 and the decision was implemented with publication of motor vehicle use maps forestwide. The Travel Management Rule (USDA Forest Service. 2005) provides for flexibility and revision of designations to the motorized system (36 CFR 212.54), which states:

Designations...pursuant to section 212.51 may be revised as needed to meet changing conditions. Revisions of designations shall be made in accordance with the requirements for public involvement in section 212.52, the requirements for coordination with governmental entities in section 212.53, and the criteria in section 212.55, and shall be reflected on a motor vehicles use map pursuant to section 212.56.

## Modified Proposed Action

The proposed action for the Luna Restoration Project was published on May 19, 2016. The proposed action has been modified and fully described under alternative B in chapter 2.

Changes between the proposed action and the modified proposed action include acres of prescribed fire only; removal of site preparation activities in the Wallow Fire; clarification of stream, riparian, and wet meadow activities; additional water systems and wells; a change in route designations for all-terrain vehicle and utility-task vehicle use; no heavy maintenance on level 2 roads; and reopening roads, decommissioning roads, or both.

The modified proposed action is designed to achieve the purpose and need with proposed treatments to move toward the improvement and restoration of the structure and function of vegetation and watersheds in the project area. Treatments are briefly described below. Restoration treatments and the general locations are described in chapter 2. Initial and maintenance treatments will take place over the next 8 to 10 years, extending up to 20 years or until objectives are met.

## **Restore the Structure, Function, and Resilience of Forests**

- Mechanically treat (cut and/or remove) trees to reduce tree density, treat insect and disease, and provide species, age, structure, and size class diversity within the stands.
- Use prescribed fire to create and maintain open conditions, restore natural fire, and reduce natural and activity fuels.
- Enhance and promote browse species including Gambel oak, gray oak, and mountain mahogany for wildlife through cutting, burning, or both.

## **Improve the Function of Riparian Areas and Streams, Vegetative Diversity, and Water Quality**

- Plant trees, shrubs, and native grasses to enhance native riparian vegetation.
- Place structures, plant vegetation, or both in or near stream channels to stabilize streambanks.
- Improve or harden road and motorized trail crossings at streams to reduce sedimentation.
- Maintain erosion control or stabilization structures located across the planning area.
- Develop waters to improve livestock and wildlife distribution.
- Remove encroaching pine and juniper species from meadow margins to restore and increase meadow habitat.
- Reduce density of rabbitbrush to improve grassland habitat.

## **Reduce Impacts from Roads and Project-Related Access**

- Decommission roads.
- Maintenance of existing National Forest System roads used for project-related access.
- Construct temporary roads and decommission them after use.
- Reopen existing closed roads and close or decommission them after use.

## **Forest Plan Amendments**

Chapter 2 has a detailed discussion of the forest plan amendments needed for implementation.

## **Decision Framework**

The forest supervisor is the responsible official for this decision. Based on the environmental analysis and supporting documents in the project record, the forest supervisor will decide:

- whether to select the no-action alternative;
- whether to select the modified proposed action, another action alternative, or an action alternative that is modified as described in the final decision; and
- which forest plan amendments to include in the final decision.



## Public Involvement

This project has been listed on the Gila National Forest's schedule of proposed actions since October 2015 and periodically updated. It was originally listed as Luna Planning Area and was changed to its current name of Luna Restoration Project in the July 2016 schedule of proposed actions.

Prior to scoping the proposed action, the Quemado Ranger District staff hosted two open houses in the community of Luna, New Mexico on December 10, 2014 and May 7, 2015 to have discussions with stakeholders on identifying issues, concerns, and restoration opportunities within the planning area. In between those open houses, over 200 letters, dated February 2, 2015, were sent to individuals, tribes, organizations, and agencies introducing the planning area and requesting help in identifying and shaping the activities needed within the area. Also, on July 21, 2015, Gila National Forest staff met with members of the Luna Community who had great interest in all-terrain vehicle and utility-task vehicle recreational-related access opportunities. The comments received during these events assisted in the development of the proposed action.

The notice of intent was published in the Federal Register on May 19, 2016. The notice of intent asked for public comment on the proposal for 45 days ending on July 5, 2016. We mailed the proposed action to approximately 270 people and held an open house on June 8, 2016 at the Luna Community Center, in Luna, New Mexico. The open house provided an opportunity for interested parties to review project maps, ask questions, and provide input to the proposed project. In response, we received 27 letters and emails. The content of the letters and emails formed the basis of the alternatives (see "Issues" section) and environmental analysis.

The notice of availability for the draft environmental impact statement was published in the Federal Register on May 11, 2018. The draft environmental impact statement comment period was open for 45 days; which ended on June 25, 2018. The draft environmental impact statement was mailed out to 190 individuals, organizations, tribes, and local, state, and federal agencies. The Forest published a news release announcing the availability of the draft environmental impact statement and posted the release in and around the community of Luna. In response, we received 12 comment letters on the draft environmental impact statement.

## Tribal Consultation

Tribal consultation for the Forest Service is guided by a variety of laws, executive orders and memoranda, as well as case law. Laws include the National Historic Preservation Act of 1966 and subsequent amendments (Public Law 89-665, 15 October 1966), Archaeological Resources Protection Act of 1979 (Public Law 96-95, 16 U.S.C. 470aa-mm, 31 October 1979), American Indian Religious Freedom Act of 1978 (Public Law 95-341, U.S.C. 1996 and 1996a, 11 August 1978), National Environmental Policy Act of 1969 (Public Law 91-190, 42 U.S.C. 4321-4347, 1 January 1970), Native American Graves Protection and Repatriation Act of 1990 (Public Law 101-601, 16 November 1990), and National Forest Management Act of 1976 (Public Law 94-588, 22 October 1976, codified in 36 CFR 219). Executive orders and memoranda include a 1994 memorandum on government-to-government relations with Native American Tribal Governments (59 Federal Register 85, 4 May 1994), Executive Order 13007 on accommodation of sacred sites (61 Federal Register 104, 29 May 1996), and Executive Order 12898 on environmental justice (59 Federal Register 32, 16 February 1994).

The Gila National Forest staff is committed to, and has conducted, tribal consultation and provided documents associated with the National Environmental Policy Act during the scoping period. These consultations were carried out at the government-to-government level, ensuring that interested tribes were given the opportunity to participate in the planning process as required in the National Environmental Policy Act and elsewhere. The Gila National Forest staff will continue to engage in ongoing tribal consultation through all of the National Environmental Policy Act phases for this project. The following 12 tribes or chapters were consulted with:

- Alamo Navajo Chapter
- Fort Sill Apache Tribe
- Mescalero Apache Tribe
- Pueblo of Acoma
- Pueblo of Laguna
- Pueblo of Zuni
- Ramah Navajo Chapter
- The Hopi Tribe
- The Navajo Nation
- San Carlos Apache Tribe
- White Mountain Apache Tribe
- Ysleta Del Sur Pueblo

## Issues

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, forest plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality National Environmental Policy Act regulations explain this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Section 1506.3)..." A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record.

As for significant issues, the Forest Service identified the following issues during scoping.

## Vegetation Treatments

- Just cutting juniper is not an effective means of treatment. (Comment 7.3)
- Mowing does not reduce rabbitbrush. (Comment 11.11; 27.11)

**Result:** Develop an alternative to include use of herbicides as part of proposed activities within juniper and rabbitbrush treatment areas.

## Fuels Treatments

- Burning mixed conifer canyons east of U.S. 180 could result in high-severity fire, impacting wildlife travel routes. (Comment 27.16)
- Proposed activities are not improving or protecting Mexican spotted owl habitat. (Comment 26.18; Comment 27.12) (less than 9 inches thinning, limited burning)

**Result:** Modify the proposed action to add acres south of Luna along Frisco Divide for prescribed fire only. Burning prescriptions will include high-moisture and low-intensity parameters.

### **Routes 1**

- 50 inches limits access by utility-task and side-by-side vehicles. (Comment 10.1; Comment 25.1)

**Result:** Modify the proposed action to change proposed motorized routes less than 50 inches to routes allowing for the use of utility-task and side-by-side vehicles.

### **Routes 2**

- Provide motorized access for Tucson Electric Power maintenance. (Comments 20.4, 20.5, 20.7)

**Result:** Modify the proposed action to provide access for Tucson Electric Power to perform powerline maintenance activities.

### **Routes 3**

- User routes should not be added to the National Forest System of roads and trails. (Comment 26.12; 26.14)
- The proposed loop route roads (4134, 4019 H, etc.) should not be opened to motorized use due to going through wet meadows and Dillman Creek. (Comment 27.29)
- Opening user all-terrain vehicle route down Adair Canyon will increase wildlife disturbance and multiple drainage crossings. (Comment 27.30)

**Result:** Develop an alternative that does not add user routes or closed roads to the open motorized National Forest System roads except for those providing access to Tucson Electric Power powerline.

# Chapter 2. Alternatives, Including the Proposed Action

## Introduction

This chapter describes the alternatives considered for the Luna Restoration Project. The interdisciplinary team used the significant issues identified under the “Issues” section of chapter 1 to modify the proposed action or develop alternatives to the modified proposed action.

There are many similarities in proposed activities between all action alternatives. Because of this, the alternatives will be described in the following manner:

- Alternative A, no action, is a stand-alone description.
- Alternatives B, C, and D are displayed and described by each proposed activity type (vegetation, fire, range management, stream and riparian, etc.).

This chapter is outlined this way to minimize describing similarities between alternatives and to maximize attention to the differences of proposed activities within their specific alternative.

## Alternatives Considered in Detail

### Alternative A – No Action

The no-action alternative is required by 40 Code of Federal Regulations 1502.14(d). There would be no changes in current management and the forest plan would continue to be implemented. There are currently no ongoing vegetation or other restoration type projects within the planning area. Activities such as road maintenance, recreation, prescribed fires, and fuelwood gathering would continue. Activities that have been authorized in separate decisions such as special use permits (for example, powerline corridors, and communication towers), travel management implementation, and authorized livestock grazing would continue. Alternative A is the baseline for assessing and comparing effects of the action alternatives B, C, and D.

### Alternatives B, C, and D by Proposed Activity Types

#### Activities Common to all Action Alternatives

All proposed activities may require the use of varying types and sizes of motorized vehicles off roads or trails designated open to the public or for administrative use only; that is, travel cross-country or on closed roads during implementation. Cross-country travel will be authorized by the line officer on a case-by-case basis.

#### Vegetation Treatments

The following vegetation treatments are the same for alternatives B, C, and D (table 11, MAP 2 and MAP 3). There are no differences in the location, acres, or proposed treatments between alternatives.

**Table 11. Acres of vegetation treatments by action alternative and map reference number**

<b>Vegetation Treatments</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>MAP Number</b>
Woodland (juniper and piñon pine) mechanical and/or hand treatments [acres]	20,328	20,328	20,328	MAP 2
Forested (ponderosa pine and mixed conifer) mechanical and/or hand treatments [acres]	53,529	53,529	53,529	MAP 2
<b>Total acres mechanical and/or hand treatments</b>	<b>73,856</b>	<b>73,856</b>	<b>73,856</b>	Not applicable
Grassland tree removal (ponderosa pine, juniper spp.) [acres]	20,283	20,283	20,283	MAP 3
Grassland wet/upland meadow and valley bottoms tree removal (ponderosa pine, juniper spp.) [acres]	2,842	2,842	2,842	MAP 3
<b>Total acres grassland treatments</b>	<b>23,125</b>	<b>23,125</b>	<b>23,125</b>	Not applicable
Mexican spotted owl protected activity centers – thin trees less than 9 inches, pile or broadcast burn [acres]	1,319	1,319	1,319	MAP 2
Treat Gambel, gray oak and mountain mahogany stands by cutting and/or prescribed burning	Yes	Yes	Yes	Not applicable

**Woodland and Forest – Maintenance and Restoration:** Woodland (for example, juniper, and piñon pine) and forest (ponderosa pine and mixed conifer) maintenance and restoration treatments are proposed on approximately 73,856 acres. Cutting of vegetation will be accomplished by hand or mechanized equipment. Implementation prescriptions will vary based on wildlife habitat (Mexican spotted owl restricted or northern goshawk) due to differing habitat requirements. More detailed information is located in appendix 1 Luna Restoration Project Treatment Details for Vegetation Treatments of the vegetation report.

Group Selection with Thinning is one uneven-aged forest management system. The objective is to achieve multiple age (canopy stories) classes of trees within each stand of trees. Dominant tree species to treat are ponderosa pine, Douglas fir, piñon pine, Gambel oak, gray oak, and all species of juniper. Minor species include white fir, aspen, and southwestern white pine. In the ponderosa pine and mixed conifer forests, a mix of species would be maintained. Healthy aspen clones, individual and healthy Gambel oak motts, and southwestern white pine would be favored as leave species where they occur. Otherwise, the most dominant tree species suited to the site would be favored. Group selection of excess size classes and diseased patches would be used to regenerate 20 percent of the area. Additional seed trees of desirable species and characteristics would be retained when openings are greater than one acre. Newly created openings will be irregular shaped and generally range from one-tenth to three-quarter acre in size, but groups may be less than one-tenth acre and occasionally greater than one acre in size. Smaller openings are preferable. When openings exceed one acre in size, 5 to 10 desirable seed trees per acre will be retained. The remaining 80 percent of the area would be thinned to increase the resiliency, health and vigor of the remaining trees. Sprouting tree species may be pruned in conjunction with thinning to raise crown height of ladder fuels in lieu of cutting when appropriate in wildland-urban interface areas.

Improvement Thinning/Woodland Transition is a treatment designed to restore and maintain mixed conifer and ponderosa pine forests and woodlands having a ponderosa pine component by cutting trees to move the area toward the desired condition for Mexican spotted owl restricted recovery habitat and restricted threshold recovery nest/roost habitat, or northern goshawk habitat. No regeneration openings would be created. In forested areas, species as discussed under Group Selection with Thinning would be favored. In the woodland, piñon pine and juniper would be favored as leave tree species to encourage and maintain dominance in the woodland vegetation transition. With the exception of juniper, this treatment would focus on thinning trees up to 12 inches diameter at breast height or diameter at root collar. Sprouting tree species may be pruned in conjunction with thinning to raise crown height of ladder fuels in lieu of cutting when appropriate in wildland-urban interface areas.

Woodland/Ponderosa Pine Transition treatment is an improvement thinning designed to restore and maintain areas currently dominated by piñon pine and juniper species by cutting trees. No regeneration openings would be created, similar to the Improvement Thinning/Woodland Transition treatment. Dominant tree species to treat are ponderosa pine, piñon pine, Gambel oak, gray oak and all species of juniper. In the ponderosa pine forests, where vegetation is or has transitioned from ponderosa pine dominance to piñon pine and juniper dominance, if ponderosa pine is present it would be favored as a leave tree species to encourage increasing this species component and shifting the composition back to forest based on soil type. In the piñon pine and juniper woodland, piñon pine and juniper would be favored as leave tree species. Sprouting tree species may be pruned in conjunction with thinning to raise crown height of ladder fuels in lieu of cutting when appropriate in wildland-urban interface areas.

Treatments could be accomplished through commercial, noncommercial, and fuelwood gathering activities.

**Grassland – Maintenance and Restoration:** Grassland maintenance and restoration treatments are proposed on approximately 23,125 acres. Ponderosa pine and piñon-juniper have encroached, become established, and continue to spread into the grasslands. Proposed activities consist of cutting ponderosa pine and piñon-juniper by hand or mechanized equipment, to reduce tree canopy cover to less than 10 percent in grasslands. Treatments located in upland wet meadows and valley bottoms primarily associated with Jenkins Creek, Badger Creek, Romero Creek, Stone Creek, Dry Blue, San Francisco River, Dillman Creek, and Trout Creek areas.

Material may be lopped and scattered or chipped and scattered in upland wet meadows and valley bottoms.

**Mexican Spotted Owl Protected Activity Centers:** Thin small-diameter trees less than 9 inches on approximately 1,319 acres within protected activity centers. No activities would take place from March 1 to August 31 to avoid disturbance to owls during the breeding season.

**Wildlife Habitat:** Cut and/or prescribe burn a portion of the Gambel oak, gray oak, aspen, and mountain mahogany components within the woodland and forest to promote new growth and sprouting in various locations across the planning area. This would occur in conjunction with other vegetation and fuel treatments.

#### *Design Features Common to Vegetation Treatments*

- Follow appropriate best management practices for vegetation management activities (for example, forestry, logging, and roads).

- Minimize damage to hardwood trees that are designated for retention during operations.
- All proposed activities may require the use of motorized vehicles off designated or administrative roads or trails; that is, cross-country during implementation.
- To avoid impacts on southwestern willow flycatcher critical habitat, critical habitat would be buffered and no vegetation treatments would be implemented within critical habitat.
- To avoid impacts on narrow-headed gartersnake proposed critical habitat, critical habitat would be buffered and no vegetation treatments would be implemented within critical habitat.
- Monitoring will occur before and after implementation of projects for federally listed and sensitive species. Mitigations such as breeding season restrictions would be used to lessen effects to wildlife.
- Notify and coordinate with Tucson Electric Power and Navopache Electric Cooperative during design and layout of vegetation treatments areas near or within their powerline rights-of-ways.

### Vegetation Treatments – Herbicide Treatments

The following treatments are for rabbitbrush and treatment of rabbitbrush and alligator juniper using herbicide (table 12, MAP 3 and MAP 4). There are differences in proposed treatments in alternative C. Treatments in alternative B and D are the same.

**Table 12. Acres of rabbitbrush, alligator juniper, and herbicide use by alternative and map reference number**

Vegetation Treatments	Alternative B	Alternative C	Alternative D	MAP Number
Rabbitbrush treatment with mowing only [acres]	20,283	0	20,283	MAP 3 <sup>1</sup>
Rabbitbrush herbicide application with or without mechanical assistance (for example, mowing) [acres]	0	Up to 20,283	0	MAP 4
Alligator juniper herbicide application in grassland meadows [acres] <sup>2</sup>	0	30	0	MAP 4
Alligator juniper herbicide application in forests and woodlands [acres] <sup>2</sup>	0	Up to 8,000	0	MAP 4

<sup>1</sup> Grassland polygons on MAP 3 correspond to same treatment areas for rabbitbrush.

<sup>2</sup> Acres for alligator juniper are a subset of the acres in table 11 describing acres of vegetation treatments.

**Rabbitbrush Overview:** There are approximately 23,125 acres of grassland vegetation community within the planning area. Of that, approximately 20,283 has been proposed for the treatment of rabbitbrush under all of the action alternatives. Green and rubber rabbitbrush are native shrubs that grow widely across Western United States rangelands. Though they can appear as a weedy monoculture (especially following disturbance), they are early colonizers, and their presence can be reduced under improved management regimes (USDA Forest Service 2015). The objectives of the proposed treatments are to manage rabbitbrush and reduce the occurrence of dense stands or monocultures of rabbitbrush, not to eliminate rabbitbrush across the planning area. The objectives can be met by treating existing stands to allow for the replacement of rabbitbrush by desired herbaceous vegetation and shrubs, and through management of grasslands

to prevent the establishment of dense stands of rabbitbrush. The majority of the 20,283 acres of grassland identified, the proposed herbicide use would be to maintain the grassland characteristics if needed. Individual rabbitbrush treatment projects within the proposed 20,283 acres of grassland are not likely to exceed 1,000 acres.

### *Alternatives B and D*

Alternatives B and D would only include mowing for rabbitbrush treatment. Under these alternatives, dense stands of rabbitbrush would be identified for mowing and reseeding to break up these communities and allow for replacement by vegetation that is more desirable. Mowing alone could require multiple entries into the site to deplete the plants energy stores enough to achieve limited mortality in rabbitbrush. Single entry mowing would only suppress top growth in rabbitbrush and would not result in long-term alteration of the plant community. Mowing would be limited to those areas that are accessible to mowing equipment and where mowing would not result in resource concerns.

### *Alternative C*

Alternative C would incorporate the application of herbicide on rabbitbrush in grasslands and alligator juniper in forest and woodland areas. Pretreatment of vegetation may be needed before application of herbicide using such things as chainsaws, mowing, or other type of mechanical equipment to assist in exposing the part of the plant recommended for effective treatment. For alligator juniper, herbicide could be applied on identified acres in conjunction with mechanical and/or hand treatments. Herbicide applications in forest and woodland would be used to treat alligator juniper in areas where current treatments are not meeting objectives due to re-sprouting. For rabbitbrush, herbicide could be used in conjunction with mowing or on its own in locations where mowing is not feasible. The herbicide selected, timing of application, species and subspecies treated, and soil type are important factors for success.

The application of herbicide would follow all Federal, State, and local laws and all herbicide label requirements. Herbicides selected for use for the management of rabbitbrush and alligator juniper would be those approved through the environmental assessment for noxious weed management on the Gila National Forest (USDA Forest Service 2000a).

No aerial application of herbicides will occur. All applications will be by hand spraying (liquid), hand spreading (granular or powder), or broadcast using a small tractor or all-terrain or utility-task vehicle towing a spreader. Rubber-tired mechanical equipment will be used.

### *Design Features Specific to Herbicide Treatments*

The following design features and best management practices would be considered in the use of herbicide:

- Prior to implementation, an interdisciplinary team will develop a forestwide Vegetation Management Plan for herbicide treatments on rabbitbrush and alligator juniper. The plan would include such things as objectives, techniques, and monitoring elements as well as the design features identified in the environmental impact statement and appropriate best management practices, permitting, and handling of materials.
- Avoid or minimize the risk of soil sand surface water or groundwater contamination by complying with all label instructions and restrictions required for legal use.



- Herbicide application would occur under the supervision of a licensed applicator and in accordance with Federal, State, and local laws, regulations, and policies.
- When applying near private lands, maintain a buffer between treatments and private land to avoid impacting vegetation on private lands. This buffer can be removed or reduced upon request by the private landowner.
- When applying near private lands, provide adequate notification and post appropriate signing.
- Evaluate surface drainage patterns in treatment area and establish 300-foot buffer zones from surface water, wet meadows, and riparian areas. Avoid treatment in channel or ditch connections that lead to surface water, wet meadows, and riparian areas.
- Do not direct spray toward any open water.
- Mixing and loading would not occur near streams or other standing water.
- To avoid impacts on southwestern willow flycatcher critical habitat, critical habitat would be buffered and no herbicide treatments would be implemented within critical habitat.
- To avoid impacts on narrow-headed gartersnake proposed critical habitat, critical habitat would be buffered and no herbicide treatments would be implemented within critical habitat.
- Apply chemicals under favorable weather conditions as identified in the label instructions and in accordance with equipment manufactures specifications. To reduce the risk of non-target species being impacted, all spraying should occur with winds less than 10 miles per hour and greater than 1 mile per hour unless otherwise indicated in the label instructions.
- Avoid applying chemicals before forecasted severe storm events to limit runoff and ensure the chemical reaches intended targets. Suspend operations if project prescription or weather limitations have been exceeded.
- Select herbicides that are appropriate for treating the target species and prioritize chemicals for use that have the following features limited half-life, limited soil mobility and limited residual activity.
- Identify public water supplies, private domestic water supplies, and threatened, endangered, and sensitive aquatic dependent species and fish populations near or downstream of chemical treatment areas.
- Consider soil type, chemical mobility, distance to surface water, and depth to groundwater to avoid or minimize surface water and groundwater contamination.
- Manage, store and transport chemicals in accordance with all applicable Federal, State, or local regulations, including label directions.
- Prior to herbicide application, identify resource concerns and mitigations specific to the individual treatment area.
- Herbicide application including the use of mechanical equipment for application will avoid all known archaeological sites.

## Prescribed Fire Treatments

Alternatives B, C, and D propose the same treatment (table 13, MAP 5 and MAP 6). There are no differences in the location, amount or types of treatments between alternatives.

**Table 13. Acres of prescribed fire only and activity fuels treatments by alternative and map reference number**

Prescribed Fire Treatments	Alternative B	Alternative C	Alternative D	MAP Number
Prescribed fire only – mixed severity [acres]	11,996	11,996	11,996	MAP 5
Prescribed fire only – low severity [acres]	24,026	24,026	24,026	MAP 5
<b>Prescribed fire only (total)</b>	<b>36,022</b>	<b>36,022</b>	<b>36,022</b>	Not applicable
Mexican spotted owl protected activity centers – broadcast burn (subset of prescribed fire only total)	8,399	8,399	8,399	Not applicable
Prescribed fire and mechanical treatments – low and mixed severity [acres]	70,000 – 100,000	70,000 – 100,000	70,000 - 100,000	MAP 6

**Prescribed Fire – Mixed Severity:** Mixed-severity prescribed fire is proposed to treat natural fuels and activity fuels. Mixed severity prescribed fires typically burn in a mosaic, resulting in a highly variable pattern of mortality on the landscape that fosters development of diverse communities. Pockets of tree mortality and reduction of surface and ladder fuels is desired.

Prescribed fire would be initiated using hand-ignition devices (drip torches, fusees, pen flare or very pistol, terra torch, matches), aerial-ignition devices (helicopter – ping-pong balls), or both.

**Prescribed Fire – Low Severity:** Low-severity prescribed fire is proposed on approximately 24,026 acres on the north aspect of the San Francisco Divide, and southwest of Luna in the Dry Blue and Frieborn Canyon areas extending south to the planning area boundary. This area has limited access, steep topography, sensitive soils, high fuel loads, and potential for high-severity wildfire. The community of Luna and key infrastructure are located to the northeast. The objective of implementing prescribed fire is to create a mosaic of burned and unburned patches of vegetation, of varying acreages, on the landscape to protect values at risk.

Low-severity prescribed fire would be introduced when fuel conditions, weather conditions, or both minimize fire spread across the landscape. These conditions could include rain and monsoon season; fall and early spring when low temperatures, high humidity, and residual snow patches limit fire growth. Ignitions would be patterned after a lightning storm; a number of ignitions (dots) scattered across an area. Desired results would be reduction of surface and canopy fuels. The end state would be areas treated with prescribed would eventually merge and breakup the fuel continuity across a larger area. Multiple entries and time would be needed to meet these objectives.

Prescribed fire would be initiated using aerial-ignition devices (helicopter – ping-pong balls), hand-ignition devices (drip torches, fusees, pen flare or very pistol, terra torch, matches), or both.

*Design Features Specific to Low-severity Prescribed Burning Activities*

- Coordinate with Natural Resource Conservation Service to manage vegetation and fuels around the snow telemetry (SNOTEL) site.
- There would be no tree removal or burning within 400 feet around the SNOTEL site except to cut hazard trees that have the potential to fall on the facility.
- Notify and coordinate with infrastructure permit holders on the San Francisco Divide.

*Design Features Common to All Prescribed Burning Activities*

- Prescribed fire would be implemented in any season of the year provided the burn is conducted within the weather and fuel conditions prescribed in the burn plan.
- Consider using ignition patterns that allow fire to back through ponderosa pine and mixed conifer stands, especially on slopes greater than 40 percent, in efforts to reduce burn severity within the watershed.
- All slash piles (hand and machine) will be constructed to minimize disturbance to existing ground cover, surface soil and rock material and any existing surface organic matter material (surface litter, duff, old branches, and logs). Piles will be constructed to minimize residual heat, to minimize the effects on soils.
- Firelines would be used to facilitate broadcast burns or pile burning operations as needed.
- Notify and coordinate with Tucson Electric Power and Navopache Electric Cooperative at least 2 weeks in advance, when burning near or within their powerline rights-of-way.
- For public and firefighter safety, federal and state highways, county and national forest roads, and national forest trails within or adjacent to the project area would be signed when prescribed fire activities are taking place.
- Landowners would be notified at least one week prior to implementation.
- Public notices will be posted within the local communities and local agencies contacted (for example, sheriff's department and local volunteer fire departments) at least one week prior to ignition.
- Contact Catron County Clinic two weeks prior to planned ignition.
- During development of burn plans, consult soil scientist and soils map for locations of soils of concern to determine appropriate prescriptions to minimize impacts to sensitive soils.
- Notify and coordinate with allotment permittees when scheduling and implementing treatments.
- All burning would be coordinated and conducted in accordance with New Mexico Environmental Department, Air Quality Bureau smoke management rule. Emission reduction techniques would be utilized when possible to minimize impacts to sensitive receptors.
- Use low-intensity prescribed fire along trails corridors to minimize the creation of snags.
- Prescribed fire can occur within Mexican spotted owl core areas however, prescribed fire ignitions cannot be initiated within Mexican spotted owl core areas. Initiate firing patterns within and adjacent to protected activity centers which result in low-severity prescribed

fire. No activities would take place from March 1 to August 31 to avoid disturbance to owls during the breeding season.

- To minimize smoke impacts to nesting northern goshawk, no prescribed fire would take place from March 1 to September 30 within post-fledging family areas.
- To avoid impacts on southwestern willow flycatcher critical habitat, critical habitat would be buffered and no prescribed fire treatments would be implemented within critical habitat.
- To avoid impacts on narrow-headed gartersnake proposed critical habitat, critical habitat would be buffered and no prescribed fire treatments would be implemented within critical habitat.

## Range Management

Alternatives B, C, and D propose the same range improvements (table 14, MAP 7). There are no differences in the location, amount or types of improvements between alternatives. The types and quantity of improvements are summarized by allotment in table 15.

Alternatives propose adding new or upgrading existing water systems on the Centerfire, Dillman/Trout Creek, Luna, Mangitas, and Spur Lake allotments to increase livestock and wildlife distribution to benefit rangeland conditions, including watershed, soils, and stream resources. A pasture division fence is proposed on the Spur Lake allotment. The proposed improvements would improve livestock distribution, forage utilization and management flexibility. This proposal would not alter the management (livestock kind, class, number or season of use) or desired conditions outlined in each allotment's corresponding grazing analysis.

**Table 14. Rangeland improvements proposed under alternative B, C, and D by allotment and pasture; map symbols correspond to labels found on MAP 7**

Allotment	Pasture	Map Symbols on MAP 7	Rangeland improvement description
Centerfire	SA Pasture	CF1	Bury .75 miles of existing pipeline.
Centerfire	Centerfire	CF2	Install 1 new well and 1 storage tank and 1 drinker*.
Centerfire	Freeman Mountain	CF5	Install 2 new trick tanks.
Centerfire	Freeman	CF3	Install 1 new well and 1 storage tank and 1 drinker*.
Dillman/Trout Creek	Mesa	DTC1	Install 1 new well and 1 storage tank, 2 drinkers*, and 1 mile of pipeline
Luna	Hy Clark	LUNA1	Install 1 storage tank, 2 drinkers* and 1.25 miles of pipeline. Install 1 new well in section 12.
Luna	Sawmill, Kiehne, Adair	LUNA2	Install 1 new well and 2 storage tanks, 4 drinkers*, and 2.75 miles of pipeline.
Luna	Stone Creek	LUNA3	Install 1 new well and 1 storage tank, 2 drinkers*, and .75 miles of pipe.
Luna	Dry Blue	LUNA4	Install 1 new well and 1 storage tank, 4 drinkers*, and 2.5 miles of pipeline.
Mangitas	Jones	MANGITAS1	Install 1 new well and 1 storage tank, 2 drinkers*, and .5 miles of pipeline.
Spur Lake	Canovas	SL5	Install 2.25 miles of pasture division fence.
Spur Lake	Black Peak	SL4	Install 1 new well and 1 storage tank, 2 drinkers*, and 2 miles of pipeline.
Spur Lake	SA	SL1	Install 1 new well and 1 storage tank, 3 drinkers*, and 2 miles of pipeline.
Spur Lake	Jenkins Creek	SL2	Install 1 new well and 1 storage tank, 3 drinkers*, and 2.5 miles of pipeline.

\* Additional storage tanks may be placed with drinkers if needed to improve functionality of water systems.

**Table 15. Summary of range improvements by type per allotment**

Allotment	Wells (number)	Storage Tanks (number)*	Drinkers (number)	Trick Tanks (number)	Pipeline (miles)	Fence (miles)
Centerfire Allotment	2	4	2	2	0.75	0
Dillman/Trout Allotment	1	1	2	0	1	0
Luna Allotment	4	4	10	0	7.25	0
Mangitas Allotment	1	1	2	0	0.5	0
Spur Lake Allotment	3	3	8	0	6.5	2.25
Total	11	13	24	2	16	2.25

\* Additional storage tanks may be placed with drinkers if needed to improve functionality of water systems.

Eleven of the proposed water systems include the installation of new wells (table 15). Installation of these improvements is contingent on the Gila National Forest’s ability to meet the requirements of the New Mexico Office of the State Engineer. The improvements would require the appropriate licenses or water use agreements prior to implementation. In the event the Gila National Forest is unable to obtain a license, an alternative water source could be considered

provided the effects of using that water source do not differ from the effects disclosed in this analysis.

Storage tanks are available in a variety of sizes and construction materials. For the purposes of this project, one storage tank refers to approximately 10,000 gallons of storage capacity. This can be achieved through a single tank or multiple smaller tanks. Additional storage capacity may be necessary for the water system to function properly. Design will be reviewed prior to implementation. Drinkers or troughs located away from the water source and primary storage could have an associated 3,000 to 5,000 gallon storage to improve functionality of the water system.

All pipelines proposed within this analysis would be buried unless resource concerns or terrain would not allow for the ability to bury the lines below the frost level. Pipelines are buried to improve the functionality of the system and reduce maintenance needs. To reduce impacts to wildlife during trenching operations, where possible, the following guidelines would be implemented construction:

- Attempt to keep trenching and back-filling activities as close together to minimize the amount of area and time the trench is open.
- Avoid leaving trenches overnight. If left open, place escape ramps no more than 300 feet apart. Ramps should be sloped less than 45 degrees. Trenches should be inspected and any wildlife removed prior to resuming work.
- Attempt to conduct trenching operations during cooler months.

Drinkers would have wildlife escape ramps securely installed and would be maintained to provide a year-round water source to wildlife except:

- where the possibility of freezing could compromise the integrity of the water system;
- where the water source is limited and not adequate to support year-round use;
- for resource management purposes; limit water or availability so livestock, wildlife, or both have to disperse; or
- for general maintenance needs.

Implementation of proposed improvements will require using motorized equipment. Motorized equipment will vary depending on improvement type, ranging from all-terrain vehicles and utility-task vehicles, full-size vehicles, large trucks, up to small dozers. A helicopter may be used to deliver materials into some locations.

Fence construction or reconstruction will be wildlife-compatible; that is, constructed in a manner to facilitate wildlife access over, under, or through the fence while minimizing chances of becoming entangled. The following specifications (or the most current Forest Service specifications) would be used during construction, where needed:

- a top wire or rail preferably no more than 38 inches above the ground, and absolutely no more than 42 inches
- at least 12 inches between the top two wires
- at least 16 inches between the bottom wire or rail and the ground
- smooth wire on the bottom

- posts 16 to 20 feet intervals
- utilize gates, drop-downs, or other passages where wildlife concentrate and cross

## Motorized Transportation System

### *Alternatives B, C, and D*

The following transportation activities are the same for alternatives B, C, and D (table 16, MAP 8 and MAP 9). There are no differences in the location, miles, or proposed treatments between alternatives.

**Table 16. Miles and types of treatments to the motorized transportation system common to alternatives B, C, and D, and map reference number for each alternative**

Transportation Treatments	Alternative B	Alternative C	Alternative D
MAP Number	MAP 8	MAP 8	MAP 9
Road decommissioning	116	116	116
Change Admin/Written Authorization road segments from open to decommissioned (Tucson Electric Power) (miles subset of decommissioning)	1.7	1.7	1.7
Leave horse, hiking and foot trail tread during decommissioning of roads	4.23	4.23	4.23
Reopen maintenance level 1 closed roads for administrative or permitted use for proposed treatment activities and close or decommission after activities are completed	34.5	34.5	34.5
Maintenance level 1 administrative or permitted use roads to be closed after activities completed	22.6	22.6	22.6
Maintenance level 1 administrative or permitted use roads to be decommissioned after activities completed (miles are subset of total road decommissioning)	12	12	12
Add user-created route and designate as administrative use or written authorization only (Tucson Electric Power)	0.5	0.5	0.5
Construct temporary roads - obliterate after vegetation treatments are completed	3–5	3–5	3–5
Reopen closed roads for periodic administrative use or written authorization only (Tucson Electric Power)	3.5	3.5	3.5

Road decommissioning are activities that result in the stabilization and restoration of unneeded roads to more natural states (36 CFR section 212.1). Decommissioning includes utilization of heavy equipment to install signs, gates, rock barriers, or ripping and recontouring of slopes and installing drainage features such as water bars. Routes that have established vegetation may need minimal treatment while others may need to be entirely ripped, seeded, and slopes recontoured.

A trail tread for horse and hiking or foot access would be maintained on National Forest System roads 4023 V, 4029 E, and 4030 W during design and implementation of decommissioning.

Heavy equipment would be used to reopen closed roads for project activities or administrative uses. These roads would be returned to closed status once activities are completed expect for those needed by Tucson Electric Power Company to access powerlines. To restrict motorized access such things as berms, gates, or other barriers would be installed.

Add user routes as part of the national forest road system to facilitate Tucson Electric Power Company to access lines. These roads would be designated administrative use only.

Construct temporary roads to access treatment activity areas and obliterate after treatments are completed. Obliteration is a full restoration of entire temporary roadbed, utilizing the same equipment and methods described in decommissioning.

**Alternative D**

Alternatives B and C provide the same motorized transportation opportunities to address recreation and public motorized uses (table 16, MAP 8). Alternative D was developed in response to a scoping comment to not increase miles of National Forest System roads (table 17, MAP 9). The decision for reopening of 0.2 mile of National Forest System road 3050 was made in the 2013 travel management record of decision, so it remains in alternative D unlike the other routes (table 17). The type of work and equipment to reopen 3050 is the same as described in alternatives B and C.

Under alternative D, the 13.6 miles of maintenance level 1 road will be added to the decommissioning miles, bringing the total miles of roads to be decommissioned to 130 miles for alternative D.

**Table 17. Changes to road system in miles by alternative**

Transportation Treatments	Alternative B	Alternative C	Alternative D
Reopen national forest system maintenance level 1 closed roads to open to all motor vehicle types	13.8	13.8	0.2
Add user-created routes and designated as National Forest System roads open to all motor vehicle types	4.2	4.2	0
Construct motorized 4x4 trail (Dillman Creek reroute)	0.3	0.3	0

The Dillman Creek reroute is a 4x4 motorized trail, to be constructed to a maximum trail tread width of 60 inches, with an obstacle clearing limit width of 72 inches, utilizing mechanized equipment. Barriers would be installed at each end of the 4x4 trail segment to limit vehicle size access.

**Design Features Common to All Road Activities**

- All roads, temporary or permanent, will be located sufficiently far from streams or other water bodies (except for portions of such roads which must cross water bodies) to minimize discharges of dredged or fill material into waters.
- All temporary roads would be designed to minimize impacts to natural resources.
- Follow appropriate best management practices for roads management.



## Stream and Riparian Treatments

Alternatives B, C, and D propose the same stream and riparian treatments (table 18, MAP 10). There are no differences in the type, number or location of treatments between alternatives. Although route LATV-9 would not be implemented under alternative D, work is still proposed on the crossing in alternative D to address sedimentation concerns.

**Table 18. Summary of the type, number and location, including MAP 10 reference symbols, in [ ], of stream and riparian treatments for all action alternatives**

Type of Work	Number	Location
Crossing	10	National Forest System road 882 Head of Ditch CG; [Map Symbol X2] Dry Blue Trail #61 (6 crossings); [Map Symbol DB1-DB6] County Road B-012; [Map Symbol X1] National Forest System road 4127U; [Map Symbol X3] LATV-9; [Map Symbol X4]
Diversion	1	Luna Ditch Diversion point in Head of Ditch Campground; [Map Symbol X2]
Exclosure	4	Stone Creek Centerfire Creek Spur Lake Draw Adair Spring
Barriers	2	Construct motor vehicle barriers Frieborn Trail [Map Symbol DB7] Construct motor vehicle barriers Blue Spring Trail; [Map Symbol DB8]
Riparian	2	Centerfire Creek, Spur Lake Draw
Erosion Control Maintenance	157	Existing erosion control features located across the planning area [Map symbol yellow triangles]
Seeding	multiple	Spur Lake Draw
Stream and bank structures	10 streams, multiple	Instream structures, bank stabilization, or both: Bishop Canyon, Romero Creek, Dry Blue, Pace Creek, Centerfire Creek, San Francisco River, Stone Creek, Spur Lake Draw, Jenkins Creek, Canovas Creek
Surface erosion reduction	2	Head of the Ditch Campground roads; [Map Symbol X2] Trout Creek dispersed camping area; [Map Symbol Trout Creek]

**Crossings:** Within the Dry Blue, harden six motorized trail crossings to reduce impacts to aquatic habitat and improve water quality. Hardening of crossing may consist of such things as interlocking concrete blocks, concrete planks, prefabricated bridges, rock riprap, or other engineered design. Equipment such as a Kabota or small backhoe may be used to dig footings for bridge type structures or carrying in construction materials. A helicopter may be used to transport pre-fabricated structures.

Road crossings at County Road B-012, National Forest System road 4027 U, LATV-9 will be designed to facilitate adequate water passage and reduce erosion. Work may include such things as replacement or upgrade of existing structures or material or placement of structures or material (for example, culverts, rock, riprap, and fill). All work will utilize some type of heavy equipment such as dozers, backhoe, and trucks.

National Forest System road 882 (Head of Ditch campground road) will be relocated due to being located within the proposed Luna Irrigation Ditch diversion facility project area. The new crossing will be located downstream of its current location and hardened to provide safe ingress and egress for the public and landowners, and improve aquatic habitat and water quality. All work will utilize some type of heavy equipment such as dozers, backhoe, and trucks.

**Diversion:** The Luna Irrigation Ditch Association owns water rights on the San Francisco River, which allows them to store water in Luna Lake, upstream in Arizona, and release this water downstream into New Mexico during irrigation season. The diversion is located in the Head of Ditch Campground downstream of National Forest System road 882.

The current diversion is a “push-up” style native soil dam located on the Gila National Forest that requires frequent maintenance by heavy equipment, particularly following flood events. The diversion takes all of the stream flow (except for floods) from May 1 to September 30 of each year, leaving no water in the main channel until the stream reaches the first tributary downstream.

The proposal is to construct a permanent diversion facility in the same location, replacing the existing diversion, out of durable material, such as concrete, steel, etc. The base would extend the width of the stream channel and be tied into the stream banks and protected with concrete wings, riprap, or both. The facility would be a dual channel system with easy to move and install panels for easy channel switching between irrigation and non-irrigation periods. The proposal includes construction of a sediment retention pool upstream of the facility. Construction of the diversion facility, sediment retention pool and any other associated activities would require use of heavy equipment (for example, backhoe and dozer). There would be activities within and adjacent to the stream channel to implement this project. Best management practices and design features will be implemented to reduce impacts to stream resources and appropriate permitting obtained to conduct instream work.

**Exclosures:** Exclosure fences are proposed to be constructed along segments of Stone Creek, Centerfire Creek, Spur Lake Draw, and Adair Spring. Exclosures would exclude both wildlife and livestock providing time for proposed riparian, stream and bank restoration projects to establish. Exclosures would be from 0.5 acres up to 200 acres. Once the area stabilizes or vegetation becomes established, the exclosure could be relocated or expanded to continue restoration work.

Where access to water is needed for livestock management, Gila National Forest personnel and permittees will coordinate to identify appropriate location(s) for water access points or off-water sites.

Fencing would be 8 feet or taller to exclude both wildlife and livestock. Motor vehicles may be needed to haul fencing materials. A small drill rig or hand drill rig may be used for digging postholes.

**Barriers:** The Frieborn and Blue Spring Trails are designated and constructed for use by hikers and horses. These trails intersect the Dry Blue Trail, which is designated for all-terrain vehicle use. Motorized vehicles off the Dry Blue Trail have been accessing the nonmotorized Frieborn and Blue Spring Trails causing resource concerns and conflict of recreational uses.

Barriers are proposed to block access by motorized vehicle to these trails. Access for hikers and horses would be maintained.

Motor vehicles may be needed to haul barrier construction materials. A hand drill rig (auger) may be used for digging postholes.

**Riparian:** Proposed riparian restoration includes planting riparian species in Spur Lake Draw in areas above Centerfire Bog and in Centerfire Creek near the vicinity known as Pinpoint 40 and within perennial headwater reaches. Planting would provide bank stabilization, improve water temperature, and enhance overall water quality. Other stream and bank treatments that will be implemented will also serve to enhance riparian resources.

Motor vehicles may be needed to haul equipment and plants. Most planting activities would utilize handtools, but there may be a need for a small backhoe to dig trenches.

**Erosion Control Features:** Numerous erosion control or stabilization structures exist within the planning area. It is proposed to conduct maintenance on existing structures. Maintenance of structures will vary depending on condition of the structure. Work may include such things as removing accumulated sediment, repairing or replacing breached sections where new headcuts and gullies are developing.

**Seeding:** Improve water quality and quantity by seeding the uplands in multiple locations in Spur Lake Draw. The objective is to increase herbaceous ground cover to slow down overland flow and reduce erosive processes. Sourcing of seed material will follow Region 3 (Southwestern Region) guidance on weed free materials. Seeding activities would be by hand or trailer type seeders pulled behind motorized vehicles appropriately sized for the trailer type.

**Stream and Bank Stabilization Structures:** Structures in the uplands may be constructed out of on-site native material, rock riprap, rock and wire riprap, or other proven methods. In-channel structures may be constructed utilizing on-site native material, rock riprap, rock weirs, bendway weirs, wooded material or other proven methods.

**Surface Erosion Reduction:** To reduce surface erosion, gravel would be placed on roads within Head of Ditch Campground and on the access route to the dispersed camping area along Trout Creek. Heavy equipment would be used to transport and spread gravel over the proposed locations.

#### *Design Features Common to Stream and Riparian Treatments*

- Surveys for loach minnow and narrow-headed and northern Mexican gartersnakes will occur prior to implementation of stream and riparian treatments within Dry Blue Creek and its tributaries, where applicable. Appropriate methods to reduce impacts to the species would be applied prior to implementation if detected.
- Surveys for narrow-headed and northern Mexican gartersnakes will occur prior to implementation of stream and riparian treatments within the San Francisco River and its tributaries, where applicable. Appropriate methods to reduce impacts to the species would be applied prior to implementation if detected.

#### **Forest Plan Amendments**

Alternatives B, C, and D propose the same forest plan amendments. There are no differences in amendments between alternatives.

Project-specific amendments to the Gila forest plan will be prepared under the 2012 Planning Rule. These project-specific amendments are a one-time amendment to the Gila forest plan for related activities proposed and to be implemented under the Luna Restoration Project only. These project-specific amendments include:

- Allow a one-time, project-specific amendment to the forest plan to allow the Gila National Forest to deviate from forest plan standard and guidelines for management areas 3B (pages 105–106), 3C (page 112), and 3D (page 118) to exceed the acres per decade for the amount of activity fuels treated (10,000, 4,000, and 12,000 respectively) and fuels treated with prescribed fire (10,000, 3,000, and 10,000 respectively).
  - ◆ Replace with: “No more than 25 percent of a 6<sup>th</sup>-code watershed within a 3-year period would be treated. Percentage may be adjusted up or down based on monitoring and assessment of watershed conditions, after treatments.”
- Allow a one-time, project-specific amendment to the forest plan to allow the Gila National Forest to deviate from forest plan standard and guidelines in Management Area 3D (page 115) to exceed the amount of wildlife habitat development numbers (water developments – 1 structure; wetland developments – 8 structures; brush pile development – 10 structures; prescribed burns – 1,000 acres; planting browse/riparian – 10 acres; control of habitat access – 10 miles).
  - ◆ The standard and guidelines will be removed and will not be replaced with another.
- Allow a one-time, project-specific amendment for Mexican spotted owl protected activity center fuel accumulation treatments to abate fire risk (page 29a 1995 Mexican spotted owl recovery plan elements).
  - ◆ Select for treatment 10 percent of the protected activity centers where nest sites are known in each recovery unit having high fire risk conditions. Also select another 10 percent of the protected activity centers where nest sites are known as a paired sample to serve as control areas.
  - ◆ Select and treat additional protected activity centers in 10 percent increments if monitoring of the initial sample shows there were no negative impacts or there were negative impacts that can be mitigated by modifying treatment methods.
    - Replace with 2012 Mexican spotted owl recovery plan (page 74, U.S. Fish and Wildlife Service 2012): Conduct restoration and fuels treatments in up to 20 percent of the protected activity center’s within each ecological management unit that exhibits high fire risk conditions.
  - ◆ Designate a 100-acre “no-treatment” area around the known nest site of each selected protected activity center. Habitat in the no-treatment area should be as similar as possible in structure and composition as that found in the activity center.
  - ◆ Use light prescribed burns in nonselected protected activity centers on a case-by-case basis. Burning should avoid a 100-acre “no-treatment” area around the activity center.
    - Replace with 2012 Mexican spotted owl recovery plan (page 263, U.S. Fish and Wildlife Service 2012): Planned ignitions (prescribed fire) and unplanned ignitions (wildland fire) should be allowed to enter core areas only if they are expected to burn with low fire severity and intensity. Fire lines, check-lines, backfiring, and similar fire management tactics can be used to reduce fire effects

and to maintain key habitat elements (for example, hardwoods, large downed logs, snags, and large trees).

### Design Features Common to All Action Alternatives

The Forest Service also developed the following design features to be used as part of all of the action alternatives. The following were developed to protect and enhance various resources during and after proposed activities.

#### *Forest Stakeholders*

- Project activities will be coordinated with all affected stakeholders including grazing permit holders, private landowners, federal, state, and local governments.
- Advanced notification of projects, especially prescribed fire, will be completed through methods such as letters, emails, flyers, newspaper or worldwide web publications.

#### *Watershed, Water Quality, Riparian, and Soils*

- Appropriate best management practices would be properly implemented for all project activities to prevent or minimize impacts to soil and water resources and to maintain or improve water quality on National Forest System lands.
- Limit ground disturbance by all heavy equipment work when soils are wet or are saturated to reduce compaction and soil displacement (rutting).

#### *Invasive and Noxious Weeds*

- Prevent the spread of potential and existing noxious or invasive weeds by vehicles used in management activities by incorporating weed prevention and control into project contracts, layout, design, and implementation.
- Avoid existing noxious or invasive weeds during soil disturbing activities to reduce the risk of spread.

#### *Wildlife*

- Strive to retain snags of various size and condition for various wildlife species.
- Mitigate loss of individuals and groups of sensitive plants during management activities by avoiding or buffering known locations. If found during implementation, plants will be avoided or buffered.
- Mexican gray wolf
  - ◆ The U.S. Forest Service will coordinate with the Mexican gray wolf field team on wolf activity, especially denning detection during implementation of projects.
  - ◆ If denning activities are detected within vicinity of projects, appropriate actions would be implemented in coordination with Mexican gray wolf field team to minimize or avoid impacts. Actions may include such things as temporarily suspending work or moving activities to another part of the treatment area.
- Mexican spotted owl protected activity centers – Avoid noise disturbing or other activities within protected activity centers during the breeding season (March 1–August 31).
- Northern goshawk post-fledging family areas – Avoid noise disturbing or other activities within post-fledging family areas during the breeding season (March 1–September 30).

- Helicopter operations will be coordinated with wildlife biologist.

#### *Cultural Resources*

- Archaeological surveys will be conducted on projects and areas in accordance with the Luna Planning Area Survey Sampling Plan (USDA Forest Service 2017a, HR 2017-06-029/NMCRIS No. 137925).
- All archaeological sites will be avoided and protected to avoid potential impacts.
- Avoid piling slash or activity fuels on sites. For prescribed burning, no ignition points will be within archaeological sites.
- If cultural or historic sites are discovered during implementation, work will cease until appropriate treatment is identified and consultation with the State Historic Preservation Office is completed.
- Use of mechanical treatments for all project types will avoid all known cultural and historic sites.

#### *Recreation and Scenery Management*

- Closure and information signs will be placed on all trail access points and along the trail where activities are occurring.
- Shape of individual units, edges of individual units, and patterns created by multiple units will appear natural when viewed by forest visitors.
- Character trees and trees that define the trail corridor would be retained wherever feasible.
- Minimize both short and long-term impacts to recreation infrastructure and use. Keep temporary roads, skid trails, and landing construction to a minimum. Minimize the long-term visual impact of access roads, skid trails, and landings along trail corridors.
- Where feasible activity slash will be piled 150 feet from system trails.
- Minimize “leave tree” marking along Highway 180 corridor, County roads, National Forest System roads and trails, and Head of the Ditch Campground.
- When trails are temporarily closed due to harvesting, trail tread will be cleared of all slash. Changes to trail alignment and surfacing will be minimized; the trail will not be straightened nor its surface be changed with an alternate material unless such actions are needed to enhance the trail and protect resources.
- When skid trails intersect national forest system trails, after implementation skid trails will be obscured with slash. If skid trails do not revegetate naturally, then ripping and seeding would be considered.
- Stump heights within 150 feet of trails will be cut to 6 inches or less. Ideally, stumps immediately adjacent to trail would be flush cut.
- Where the trail tread crosses the transmission line corridor, a distinguishable trail tread across the corridor would be maintained to ensure users stay on the trail system. If activities involving mechanized equipment or ground disturbance obscures or alters the trail tread, the trail tread will be restored to maintain its trail class design parameters. Additionally, any access used to cross a system trail will be maintained at right angles to the trail.

## Implementation

Implementation is estimated to begin in late 2018 with initial treatments over the next 8 to 10 years and extending 20 years or until objectives are met, including maintenance. Amount, frequency and duration of work would occur as funding, favorable conditions, or both allow.

## Monitoring

- Conduct implementation and effectiveness monitoring for best management practices. Review of a selection of effectiveness monitoring sites will be accomplished as a part of either the annual project review or Gila National Forest activity review by Gila National Forest watershed personnel.
- Conduct implementation and effectiveness monitoring for proposed vegetation and prescribed fire activities, including ensuring compliance of contract specifications.
- Monitoring projects, including effectiveness monitoring for best management practices, 5-year review of forestwide watershed condition classification documentation, or both, would be reviewed to determine if the limitation of landscape treatment acres to no more than 25 percent of a 6<sup>th</sup>-code watershed within a 3-year period could be adjusted. Documentation and consensus by review team and approval by the district ranger is required for percentage adjustment.
- Mexican spotted owl habitat implementation and effectiveness monitoring – In coordination with U.S. Fish and Wildlife Service personnel, monitoring of treatments will be accomplished to determine the effects of treatments on constituent elements of Mexican spotted owl habitat.
- Surveys to detect presence of loachminnow and narrow-headed gartersnake, and New Mexico meadow jumping mouse will occur prior to implementation of stream and riparian treatments. Appropriate methods to minimize impacts to species will be applied during implementation.
- Conduct surveys or monitoring of threatened and endangered species outlined in biological opinion issued by U.S. Fish and Wildlife Service for this project.
- Monitor riparian exclosures for response and modification. Modifications include such things as expanding, moving, reducing, or removal.
- Additional riparian and aquatic monitoring for 6<sup>th</sup>-code watersheds within the planning area is found in the Escudilla Landscape Watershed Restoration Action Plan (USDA Forest Service 2018).
- After treatments are completed, areas will be periodically monitored for detection of invasive and noxious weed infestations and the effectiveness of implementing weed prevention and control measures during activities.
- Conduct implementation and effectiveness monitoring of avoidance and protection design features for heritage resources. If sites are found to be impacted, appropriate mitigation measures will be developed in coordination with the appropriate agencies and applied to relative remaining project implementations.

## Alternatives Considered but Eliminated from Detailed Study

This section describes the alternatives considered but eliminated from detailed study and the reasons why. These are presented in no particular order. Some suggestions from the public were not fully developed alternatives.

### **Use of Mechanical Treatments only within Defined Wildland-Urban Interfaces in the Planning Area**

Limiting mechanical treatments to just wildland-urban interfaces would benefit the community of Luna and some smaller identified areas around private land inholdings (statewide wildland-urban interface layer). Luna is one of the communities considered under the project's need for reducing impacts of high-severity fires. Limiting the use of mechanical treatments to just urban-interface areas, would limit possible implementation methods, reduce the ability to treat a larger number of acres in a timely manner, add to the timelines for implementation over the entire project area, potentially limit treatments due to contract economics, and reduce efficiency of moving toward meeting desired conditions. Therefore, use of mechanical treatments only within defined wildland-urban interfaces does not meet the purpose and need.



## Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in table 19 through table 29 is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

**Table 19. Comparison of the vegetation resources by alternative**

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Forest Composition – Forest Cover Type	No vegetation management activities would occur under this Alternative. Tree densities would continue to increase and there would be an associated decline in understory species diversity and herbaceous growth, which may lead to increased conifer encroachment in grassland/meadow areas. Without disturbance, active-competition induced mortality could occur in high-density areas and predispose areas to bark beetle outbreaks. Fuels would continue to build and could increase the fire hazard within the project area.	Group Selection, thinning and prescribed burning treatments would reduce density, and create more open forest conditions, with increased herbaceous, forb, and woody vegetation production. These treatments would favor seral species retention and would create conditions conducive for seral species regeneration establishment in openings. Grassland and meadow treatments would also see increased grass and forb production. Change in vegetation composition will increase diversity at both the stand- and landscape-scale.	In addition to activities listed in alternative B, herbicide use is proposed to treat rabbitbrush in grassland/meadow restoration treatments, and sprouting juniper in forested and woodland areas. Herbicide use will increase treatment effectiveness by creating growing space for desirable species to regenerate such as grasses and forbs in grassland/meadow treatments, and conifer seedlings in forested areas. Herbicide application would also be targeted within the wildland urban interface where sprouting of juniper post-thinning could create ladder fuels. In this case, herbicide treatment will help increase the effectiveness of fuel reduction treatments with treatments lasting longer than with tree cutting alone.	Effects same as alternative B

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Forest Diversity and Structure – Relative Stand Density	No vegetation management activities would occur under alternative A. in the absence of disturbance stand density levels would continue to increase over time. A large portion of the project area will be at or above 55% of stand density index max in the long term and there will be active competition induced mortality. Stand growth and individual tree vigor will decline as density increases as there is increased competition for site resources. Risk of loss from bark beetles could also increase at high densities.	Vegetation management activities under alternative B will move the landscape towards the desired condition more than the no-action alternative over time. Stand density will be reduced, individual tree vigor and stand growth would be enhanced in forested areas. Stand structural complexity and heterogeneity would be increased at both the stand-and landscape-scale under alternative B. This will help create more resilient ecosystems that are better suited to future disturbances.	Effects are mostly the same as alternative B except for treatment of rabbitbrush and alligator juniper. Under alternative C, herbicide use will increase the length of time targeted species are controlled reducing competition related tree mortality more effectively than alternative B.	Same effects as alternative B.

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
<p>Forest Diversity and Structure for Wildlife Habitat Improvement (northern goshawk) – Vegetation Structural Stage</p>	<p>No vegetation management activities would occur under alternative A. The existing distribution of vegetation structural stages for ponderosa pine and woodland cover types would change slowly through time without disturbance and would trend towards denser stages and canopy density classes. The risk of loss of trees and possibly entire stands from insect epidemic or wildfire could increase as stand densities within the project area continue to increase. Over time, tree mortality from disturbance or competition-induced mortality would create large enough openings for regeneration establishment and representation of the vegetation structural stages1 and A canopy density class.</p>	<p>There are approximately 76,218 acres of proposed treatments within forested and woodland areas managed for northern goshawk under alternative B. A variety of treatments are proposed including thinning, group selection-thin and/or prescribed burning. These treatments will help promote uneven-aged structure and increase heterogeneity at the stand- and landscape-scale. This will help move the project area towards desired conditions, which is to create diverse stand structures at both the stand- and landscape-scale for northern goshawk management.</p>	<p>Effects are the mostly the same as alternative B except for treatment of rabbitbrush and alligator juniper. Under alternative C, herbicide use will increase the length of time targeted species are controlled reducing competition related tree mortality more effectively than alternative B.</p>	<p>Same effects as alternative B.</p>

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Old Growth – Stand Density, Canopy Cover, and Snag Density	There would be no vegetation management activities under alternative A. As a result as stand densities continue to increase over time there would be a high risk of loss of dead and down material, dead standing material, and live vegetation from disturbance(s) for example, wildfire occurrence due to the high average tree densities. Individual tree growth and vigor would also decline and could predispose areas with high densities to competition-induced mortality and other biotic agents such as bark beetle outbreaks.	Alternative B proposes to treat approximately 24,780 acres of areas designated to be managed to develop old growth characteristics with a variety of treatments including thinning, regeneration treatments and/or prescribed burning. Density reduction would increase residual tree vigor and increase old-growth characteristics at a faster rate than untreated areas. Density reduction would lower the average basal area and provide a reduction of fuels, which may reduce potential damage to old growth components in the event of a wildfire. Treatments would increase structural heterogeneity with project design features emphasizing clumps, gaps and openings.	Alternative C proposes to treat a maximum of 333 acres of stands designated to be managed toward an old growth condition with herbicide in ponderosa pine and woodland areas. Herbicide use when needed to control juniper sprouting in openings will increase the length of time sprouting is controlled more effectively than alternative B. Effects of this alternative in the remaining 24,447 acres designated for management toward an old growth condition would be the same as alternative B.	Same effects as alternative B.

**Table 20. Comparison of the fire and fuels resources by alternative**

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Reduce Impact of High-Severity Fire – Percentage of modeled crown fire (passive and active)	67%	16%	16%	16%
Reduce Impact of High-Severity Fire – Percentage of modeled surface fire	24%	84%	84%	84%

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Restore Departed Landscapes that are at Risk of Fire – Total acres treated in fire regime group I	0	116,000	116,000	116,000
Fire and Fuels Management	<p>Fuel conditions and crown fire potential in the project area would continue to be of concern and may be exacerbated by on-going insect and disease activity, natural disturbances, and the progression of forest growth and change. Canopy and ladder fuels and surface fuel loading levels would continue to increase throughout the project area. There would be no reduction in potential fire behavior and it would be expected crown fire potential would increase. No progress would be made toward reducing the impact of high-severity fire. This alternative would not assist in returning fire as a natural process in fire-dependent ecosystems. It would not allow land managers to help to restore or maintain desired conditions. Ecosystems, that are not adapted to high-intensity/high-severity wildfires, would remain at risk.</p>	<p>Treatments would decrease potential crown fire activity, reduce fuel-loading levels and understory ladder fuels thereby reducing the impacts of high-severity wildfire on resources. Approximately 36,022 acres would be prescribed burned. Additionally, 95,997 acres would receive mechanical treatments, of which may also include a subsequent prescribed burning treatment (pile, under burning). Potential crown fire behavior and the threat of high-severity fire would be reduced. Modeling results show approximately 16% of the project area would exhibit crown fire and 84% would exhibit surface fire, as compared to 67% and 24% respectively with the existing condition. Approximately 115,926 acres would be treated in fire regime group I. Initiating prescribed burning on the landscape will help initiate the restoration of ecological processes in fire-dependent ecosystems.</p>	Same effects as alternative B	Same effects as alternative B

**Table 21. Comparison of the wildlife resources by alternative**

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Mexican gray wolf	No project activities would be implemented and therefore there would be no effect to the Mexican gray wolf.	Under all action alternatives, disturbance to potential denning sites are minimized through avoidance or other features developed in coordination with the field team in relation to the activity being implemented. There are beneficial effects to the species and its habitat through reduction of habitat fragmentation through road decommissioning and improvement of native ungulate (prey species) habitat. A determination of “not likely to jeopardize” is made for all action alternatives.	Same effect as alternative B	Same effect as alternative B

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Mexican spotted owl	No project activities would be implemented and therefore there would be no effect to the Mexican spotted owl. However the habitat would continue to be at risk of being impacted by wildfires.	<p>Thinning and burning activities will reduce basal area in protected activity centers during the short term (but not drop below threshold values) and will adjust the structure and thermal characteristics. Reducing fuel loading in designated critical habitat could impact prey species in the short term. Reducing juniper could reduce food sources for prey species. Performing actions outside of the breeding season, or after confirming non-breeding status, will prevent disturbing nesting owls.</p> <p>The Luna Restoration Project would reduce habitat needs in protected activity centers in the short term, but improve conditions in the long term; therefore, the Luna Restoration Project may affect, likely to adversely affect the Mexican spotted owl.</p> <p>Treatments in designated critical habitat would align with the forest plan, which complements the 1995 Mexican spotted owl recovery plan, therefore the Luna Restoration Project may affect, not likely to adversely affect the designated critical habitat for the Mexican spotted owl.</p>	Same effect as alternative B	Same effect as alternative B

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Southwestern willow flycatcher	There will be no effect to the species due to southwestern willow flycatchers not being observed within the project area for the last 10 years and the designated critical habitat within the planning area does not contain the primary constituent elements to support the birds. No activities are being implemented; therefore, there will be no effect to designated critical habitat.	There will be no effect to the species due to southwestern willow flycatchers not being observed within the project area for the last 10 years and the designated critical habitat within the planning area does not contain the primary constituent elements to support the birds. The removal of riparian vegetation and short-term disturbances from other stream restoration activities and decommissioning within designated critical habitat would be insignificant and discountable. These sites are small and localized, but have the potential to provide long-term benefits, although would not greatly improve or change the primary constituent elements of the critical habitat. Project activities may affect, not likely adversely affect the designated critical habitat.	Same effect as alternative B. Application of design feature for buffering the critical habitat from herbicide treatments would not change the habitat constituents or alter the vegetation.	Same effect as alternative B



Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Narrow-headed gartersnake	No activities are being implemented; therefore, there will be no effect to the narrow-headed gartersnake or its proposed critical habitat.	The removal of riparian vegetation and short-term disturbances from other stream restoration activities and decommissioning within proposed critical habitat would be insignificant and discountable. These sites are small and localized, but have the potential to provide long-term benefits. Surveying for the gartersnake prior to implementation and moving individuals upstream from project sites will reduce the risk of disturbance and harm. Project activities may affect, not likely adversely affect the narrow-headed gartersnake, and may affect, likely to adversely affect its proposed critical habitat.	Same effect as alternative B. Application of applicable design features for water related resources and the buffer for proposed critical habitat from herbicide treatments would minimize risk of impacts to the narrow-headed gartersnake and its proposed critical habitat.	Same effect as alternative B.
New Mexico meadow jumping mouse	No activities are being implemented; therefore, there will be no effect to the New Mexico meadow jumping mouse.	The removal of riparian vegetation and short-term disturbances from other stream restoration activities and decommissioning are small and localized, but have the potential to provide long-term benefits. Surveying for the jumping mouse prior to implementation and reconsulting with U.S. Fish and Wildlife Service if found around projects in habitat will reduce the risk of disturbance and harm. Project activities may affect, not likely adversely affect the New Mexico meadow jumping mouse.	Same effect as alternative B. Application of applicable design features for water related minimizes the risk of impacts to the New Mexico meadow jumping mouse.	Same effect as alternative B.

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Loach minnow	No activities are being implemented, therefore there will be no effect to loach minnow or its designated critical habitat, but the risk of being impacted by wildfires would continue.	Project activities will cause short-term negative impacts to loach minnow and its critical habitat. Stream, riparian, and hardening crossings activities, and reducing the risk sedimentation, ash, and debris from uncharacteristic wildfires through vegetation and prescribed fire, will provide long-term benefit to the specie and habitat. The project will result in a may affect, likely to adversely affect to the loach minnow and its designated critical habitat.	Same effect as alternative B.	Same effect as alternative B.

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Spikedace	<p>There will be no effect to spikedace. Spikedace have not been found occupying streams within the planning area.</p> <p>No activities are being implemented, therefore there will be no effect to designated critical habitat, but the risk of being impacted by wildfires would continue.</p>	<p>Spikedace have not been found occupying streams within the planning area. Spikedace does occur downstream of the planning area. Implementation of conservation measures will reduce the potential for adverse effects to spikedace.</p> <p>The project will result in a may affect, not likely to adversely affect the spikedace.</p> <p>Project activities will cause short-term negative impacts to spikedace critical habitat.</p> <p>Stream, riparian, and hardening crossings activities, and reducing the risk sedimentation, ash, and debris from uncharacteristic wildfires through vegetation and prescribed fire, will provide long-term benefit to the habitat.</p> <p>The project will result in a may affect, likely to adversely affect to the designated critical habitat.</p>	Same effect as alternative B.	Same effect as alternative B.
Region 3 Sensitive Species	<p>No activities are being implemented, therefore there will be no impact to Region 3 sensitive species that occur or may occur within the planning area, in addition to previously permitted actions.</p>	<p>Implementation of activities result in a determination of may impact individuals or habitat, but will not likely contribute to trend in federal listing for Region 3 sensitive species that occur or may occur within the planning area.</p>	Same effect as alternative B.	Same effect as alternative B.

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Migratory Bird Species	For migratory bird species that occur or potential to occur in the planning area, there would be no change to the habitat or disturbance to the species, but there still exists the risk of wildfire impacts to forested and woodland cover types. A determination of “no impact” for migratory bird species.	Individuals may be disturbed by project equipment noise and human presence in the short term. Proposed treatments would improve habitat and reduce wildfire threat in long term. There may be short-term impacts to individual migratory birds, but alteration to their habitats or being disturbed during treatments, will not negatively affect population levels.	Same effect as alternative B. Herbicide application may disturb individuals by noise and human presence in the short term. Rabbitbrush and alligator juniper would be reduced, providing opportunity for growth and increase of herbaceous plants in treatment areas. There may be short-term impacts to individual migratory birds, but alteration to their habitats or being disturbed during treatments, will not negatively affect population levels.	Same effect as alternative B. Not adding user-proposed routes would not impact habitat nor disturb the species. There would be beneficial effects by not having routes crossing through habitats causing fragmentation. Although routes are not added under this alternative, other activities are still being implemented, therefore there may be short-term impacts to individual migratory birds, but alteration to their habitats or being disturbed during treatments, will not negatively affect population levels.

**Table 22. Comparison of management indicator species resources by alternative**

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Mule deer	No activities are being implemented within associated vegetation types; therefore, there would be no impact to mule deer, in addition to previously permitted actions.	Foraging would be disrupted in the short term, but there would be long-term improvement of habitat conditions for this species. Individuals may be affected, but at the forest level, these affects would not adversely affect population trends on the Gila National Forest.	Same effect as alternative B. Applying design features and best management practices pertaining to herbicide treatments will reduce or prevent impacts to the species.	Same effect as alternative B. Also, not adding routes would result in less habitat fragmentation.

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Mearn's quail	No activities are being implemented within associated vegetation types; therefore, there would be no impact to Mearn's quail, in addition to previously permitted actions.	Forage, nesting, and hiding cover would be reduced in the short term, but would increase in the long term. Individuals may be affected, but at the forest level, these affects would not adversely affect population trends on the Gila National Forest.	Same effect as alternative B. Additional forage may be established in treated areas for Mearn's quail. Applying design features and best management practices pertaining to herbicide treatments will reduce or prevent impacts to the species.	Same effect as alternative B. Not adding routes would result in less habitat fragmentation.
Long-tailed vole	No activities are being implemented within associated vegetation types; therefore, there would be no impact to the long-tail vole, in addition to previously permitted actions.	Some long-tail voles may be inadvertently crushed during implementation, but proposed activities will improve conditions in and surrounding habitat in the long term for this species. Individuals may be affected, but at the forest level, these affects would not adversely affect population trends on the Gila National Forest.	Same effect as alternative B. Applying design features and best management practices pertaining to herbicide treatments will reduce or prevent impacts to the species. Wet meadows will be buffered 300 feet, and no herbicide would be used in the buffer zone, reducing risk to the species.	Same effect as alternative B. Not adding routes would not impact the species.
Beaver	No activities are being implemented within associated vegetation types; therefore, there would be no impact to beaver, in addition to previously permitted actions.	Some disturbance and loss of riparian vegetation in the short term, but will have improved habitat conditions in the long term for this species. Individuals may be affected, but at the forest level, these affects would not adversely affect population trends on the Gila National Forest.	Same effect as alternative B. Applying design features and best management practices pertaining to herbicide treatments and water and aquatic resources will minimize effects to beaver.	Same effect as alternative B. Not adding routes would not impact the species.

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Plain titmouse	No activities are being implemented within associated vegetation types; therefore, there would be no impact to plain titmouse, in addition to previously permitted actions.	Since fire has the potential to increase the number of snags, there would be long-term improvement of habitat conditions for this species. Individuals may be affected, but at the forest level, these affects would not adversely affect population trends on the Gila National Forest.	Same effect as alternative B. Herbicide utilization may affect some food sources in the short term. Applying design features and best management practices pertaining to herbicide treatments will reduce or prevent impacts to the species.	Same effect as alternative B. Not adding routes would not impact the species.
Hairy woodpecker	No activities are being implemented within associated vegetation types; therefore, there would be no impact to hairy woodpecker, in addition to previously permitted actions.	Since snags will primarily be retained and fire has the potential to increase the number of snags, there would be long-term improvement of habitat conditions for this species. Individuals may be affected, but at the forest level, these affects would not adversely affect population trends on the Gila National Forest.	Same effect as alternative B. Herbicide utilization may affect some food sources in the short term. Applying design features and best management practices pertaining to herbicide treatments will reduce or prevent impacts to the species.	Same effect as alternative B. Not adding routes would not impact the species.

**Table 23. Comparison of the air quality resources by alternative**

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Air Quality – Clean Air Act Compliance	Compliance with Clean Air Act. No activities are being implemented, so no air quality impacts from fugitive dust. But still higher risk of air quality impacts from uncharacteristic high-intensity wildfire.	Overall, compliance with Clean Air Act is maintained. For vegetation and prescribed fire activities, short-term additional particulate matter, but long-term benefit from reduced wildfire risk. Short-term fugitive dust from road-related treatments.	Same effect as alternative B. No additional impacts from herbicide use.	Same effect as alternative B.

**Table 24. Comparison of the watershed and soils resources by alternative**

<b>Resource Element</b>	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>
Soil Resources	No short-term disturbance and no long-term benefit to soil condition or trend.	For treatments excluding decommissioning, there would be short-term impacts to soils resources, but long-term benefit to soil condition and trend. Short-term impacts to soils resources from decommissioning; long-term localized impacts from increased routes. Projectwide long-term benefits to soil condition and trend outweigh minor localized impacts.	Same effects as alternative B; no additional impacts from herbicide use.	Same effects as alternative B. Short-term impacts to soils resources from decommissioning. Projectwide long-term benefits to soil condition and trend. Slightly better than alternatives B and C.
Riparian Areas and Wetlands / Wet Meadows	No short-term or long-term benefit to riparian functionality. Without vegetation and prescribed fire treatments, no long-term benefit to riparian functionality; higher risk of downward trend in event of uncharacteristic wildfire.	With vegetation and prescribed fire implementation, there would be no negative impacts with implementation of best management practices; long-term benefit to riparian functionality with reduced risk of uncharacteristic wildfire. With stream, riparian, and erosion control treatments, there will be positive benefits to riparian functionality, upward trend, and improved conditions. With range management treatments, there would be no benefit to riparian functionality. With motorized transportation treatments, there will be minor impacts to riparian areas that will be mitigated with implementation of best management practices. Projectwide long-term benefits to riparian areas, wetlands, wet meadows outweigh minor localized impacts	Same effects as alternative B; no additional impacts from herbicide use.	Same effects as alternative B. Motorized transportation treatments – projectwide long-term benefits to riparian areas, wetlands, wet meadows. Slightly better than alternatives B and C.

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Water Quality and Quantity	<p>Without vegetation and prescribed fire treatments – no short-term disturbance; no changes in compliance with Clean Water Act, no long-term benefit to water quality; continuation of potentially less stable hydrologic regime.</p> <p>Without stream, riparian, and erosion control treatments – no short-term disturbance; no changes in compliance with Clean Water Act, no long-term benefit to water quality; continuation of unstable hydrologic regimes</p> <p>Without range management – no changes in compliance with Clean Water Act, no changes to water quality; no changes to hydrologic regime</p> <p>Without motorized transportation treatments – no short-term disturbance, no changes in compliance with Clean Water Act, and no long term benefit to water quality.</p>	<p>With vegetation treatments – short-term additional sediment, long-term benefit to water quality and hydrologic regime with reduced risk of uncharacteristic wildfire and no changes in compliance with Clean Water Act.</p> <p>With prescribed fire – short term added sediment and ash, long-term benefit to water quality and hydrologic regime with reduced risk of uncharacteristic wildfire and no changes in compliance with Clean Water Act.</p> <p>With stream, riparian, and erosion control treatments – short-term additional sediment, long-term benefit to water quality, and improved hydrologic regime. Improved compliance with Clean Water Act. Potential to meet State water quality standards.</p> <p>Range management treatments would result in no changes in compliance with Clean Water Act.</p> <p>With motorized transportation treatments – short-term impacts to water quality from decommissioning, long-term localized impacts from increased routes. Projectwide long-term benefits to water quality and quantity outweigh minor localized impacts.</p>	Same effects as alternative B; no additional impacts from herbicide use.	Same effects as alternative B. Short-term impacts to water quality from decommissioning; projectwide long-term benefits to water quality. Slightly better than alternatives B and C.



Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
<p>Watershed Cumulative Effects</p>	<p>Without vegetation and prescribed fire treatments – no change to watershed condition classification, and higher risk of downward trend in event of uncharacteristic wildfire.</p> <p>Without other treatments – no change to watershed condition classifications.</p>	<p>With vegetation and prescribed fire treatments – improvement in terrestrial biological indicators resulting in minor upward trend in watershed condition classification in multiple watersheds, and reduced risk of downward trend resulting from potential uncharacteristic wildfire.</p> <p>With stream, riparian, and erosion control treatments – improvement in aquatic biological and aquatic physical indicators resulting in upward trends and improved watershed condition classifications in multiple watersheds.</p> <p>Range management treatments would result in no change to watershed condition classification.</p> <p>With motorized transportation treatments – improvement in terrestrial physical indicators resulting in upward trends and improved watershed condition classifications in multiple watersheds.</p>	<p>Same effects as alternative B</p>	<p>Same effects as alternative B. With motorized transportation treatments, slightly more improvement in terrestrial physical indicators than alternatives B and C.</p>

**Table 25. Comparison of the National Forest System roads by alternative**

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Miles added to the national forest road system on the Gila	0	22	22	4
Net reduction in miles of National Forest System roads on the Gila	0	94	94	126

**Table 26. Comparison of the range resources by alternative**

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Range Resources	No activities are being implemented; therefore, there are no effects to range resources. Without vegetation and prescribed fire treatments, there would be continued encroachment into grasslands and risk of wildfire would continue.	With vegetation and prescribed fire activities, there may be a need to rest all or part of pastures for a short duration. Long-term benefit from grassland restoration and water improvement.	Effects same as alternative B. Herbicide application would move the landscape toward desired conditions in a shorter timeframe compared to only mowing in alternatives B and D.	Effects same as alternative B.

**Table 27. Comparison of recreation resources by alternative**

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Recreation Opportunity – Quality of national forest system trails	0 miles constructed	4.5 miles of trail is constructed through road to trail conversion and 0.3 mile of new construction connecting motorized trail in Dillman Creek area	4.5 miles of trail is constructed through road to trail conversion and 0.3 mile of new construction of connecting motorized trail in Dillman Creek area	4.2 miles of trail is constructed through road to trail conversion. No new construction of connecting motorized trail (0.3 mile)
Recreation Opportunity – Increased opportunity for motorized recreation for off-highway vehicles	0 miles added to the motorized transportation system	18 total miles of national forest system roads (13.8 miles) and user-created routes (4.2 miles) added to the motorized transportation system	18 total miles of closed national forest system roads (13.8 miles) and user-created routes (4.2 miles) added to the motorized transportation system	0.2 mile added to the motorized transportation system from previous travel management decision

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Inventoried Roadless Areas	No activities would be implemented; therefore, current roadless character would be unchanged. Without prescribed fire, the risk of wildfire would continue. The potential of a wildfire could impact naturalness and/or recreation values of roadless areas.	With low-severity prescribed fire there would be some short-term effect to the undeveloped, natural, and opportunities for solitude or primitive unconfined recreation attributes of the Nolan and Mother Hubbard inventoried roadless areas; but would result in a long-term beneficial effect. Temporary effects to solitude and recreation could occur along the roadless boundaries, by such things as sights and sounds of people working, chainsaws, dust, and smoke. Approximately 0.46 miles of road would be changed to trail during decommissioning in Frisco Box Inventoried Roadless Area, improving undeveloped quality.	Same effect as alternative B. No herbicide treatments are located in any of the roadless areas.	Same effect as alternative B.

**Table 28. Comparison of heritage resources by alternative**

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Heritage Resources – Relative Risk	No activities would be implemented, therefore would be no relative risk of potential impact to sites. Without vegetation and prescribed fire treatments, the risk of wildfire and erosion episodes following fire events would continue. With that, the probability that heritage resources may be adversely affected in the future increases.	The relative risk of potential impacts to sites based on acres of archaeological inventory is approximately 76,554 acres of projects using heavy equipment; a subtotal of prescribed fire acres (130,000 to 160,000 acres) determined by high site probability; and approximately 20,283 acres of mowing rabbitbrush. There is a potential for direct and indirect effects to heritage resources with implementation of the various types of projects and associated equipment. Effects would be minimized or prevented through application of design features and best management practices.	The relative risk is the same as alternative B. Herbicide acres are the same as rabbitbrush mowing area. Plus, an additional 8,030 acres may be treated with herbicide for alligator juniper. Effects are same as alternative B.	The relative risk and effects are the same as alternative B.

**Table 29. Comparison of the social and economic resources by alternative**

Resource Element	Alternative A	Alternative B	Alternative C	Alternative D
Environmental Justice – Economics	No activities would be implemented; therefore, there would be no change from the current condition and therefore no disproportionate adverse economic effects to minority or low-income populations.	With implementation of various projects there is potential for economic benefit to local contractors or industries and increased employment including timber or other forest products, fire, or other restoration projects that could be contracted. With potential increase in employment opportunities, there would be no disproportionate adverse economic effects to minority or low-income populations.	Same effects as alternative B	Same effects as alternative B

<b>Resource Element</b>	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>
Environmental Justice – Health and Quality of Life	Without implementation of prescribed burning, smoke emissions would not have health and quality of life consequences to vulnerable populations such as children, the elderly, and individuals with health and respiratory issues. The risk of wildfire would continue and the intensity and duration of smoke emissions will be greater than prescribed burning treatments and will have consequences to vulnerable populations.	With prescribed fire treatments, vulnerable populations will be affected by smoke emissions. But intensity and duration of smoke emissions will be minimized with implementing burn prescriptions, coordination with the state Air Quality Department and advanced notification to allow individuals to engage other methods of reducing smoke impacts.	Same effects as alternative B	Same effects as alternative B
Environmental Justice – Fuelwood as Household Heat Source	Without vegetation treatments, opportunities for fuelwood collection would continue and would not affect low-income families who depend on fuelwood for primary heat source.	With vegetation treatments, the opportunity for additional sources of fuelwood would become available. Families who depend on fuelwood for primary heat source would not be affected.	Same effects as alternative B	Same effects as alternative B

# Chapter 3. Affected Environment and Environmental Consequences

## Introduction

This chapter summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on that environment. The complete analysis documents are part of the project record. It also presents the scientific and analytical basis for comparing alternatives as presented in chapter 2. Analyses looked at changes from the no-action alternative (alternative A).

## Notes on Effects Analysis

This final environmental impact statement examines effects on a landscape scale.

Specialists presented any limitations and assumptions in their analyses in accordance to the Council on Environmental Quality; Regulations for Implementing the National Environmental Policy Act; 40 Code of Federal Regulations section 1502.22; and incomplete or unavailable information [51 Federal Register 15625, Apr. 25, 1986].

There may be variations in values displayed by some of the resource areas for alternatives. The numbers may vary due to resource spatial data compared to planning area data not matching perfectly. Also, depending on the resource area and measure for analysis of effects, the resource area of consideration may be more, less, or a subset of the planning area.

## Assumptions and Limitations Common to All Resources

For analysis purposes, the average width of roads and trails by type or maintenance level used were as shown in table 30.

**Table 30. Average width of roads and trails by type or maintenance level**

Existing and Proposed Roads and Trails	Average Width (feet)
Decommissioned*	0
Operation maintenance level 1 – Closed	12
Operation maintenance level 2	12
Operation maintenance level 3	14
Operation maintenance level 4	20
Operation maintenance level 5	20
Unauthorized roads	16
4x4 trail	6
Temporary roads	10

\*Decommissioned is defined as a route in its natural (pre-road) condition.

## Vegetation

### Assumptions and Limitations

#### Model Limitations

For the purpose of this project the analysis used a 40-year timeframe. Since common stand exam data was collected in various years, the common start year of 2015 was used for the existing condition. Forest Vegetation Simulator model simulated growth to the common start year for the 437 data collection stands. A subset of these inventoried stands was randomly selected and modeled in Forest Vegetation Simulator for each alternative. Since wildlife habitat requirements for Mexican spotted owl and northern goshawk apply to all forest and woodland communities, the subset of inventoried stands were grouped by wildlife habitat and dominant cover type for the simulations. A total of 240 stands were modeled to obtain vegetation trends in growth for each alternative.

Modeling outputs are known to have some variation in their modeling processes, but this is normal for all modeling efforts. Limitations to modeling are as follows:

1) The effects of the alternatives are based on Forest Vegetation Simulator projections and are representative of average stand conditions. Since there are spatial limitations of Forest Vegetation Simulator, stand conditions on the ground may vary from the average stand conditions interpreted from the sample plot data. For example, outputs do not adequately display where openings within forest and woodland canopies occur.

2) Modeling is based upon a subset of stands inventoried for this analysis. The stand inventory although representative of the area did not collect data within every stand since resources are limited, but used data collection stands to represent other stands with similar characteristics.

Forest Vegetation Simulator and Fire and Fuels Extension model results and interpretations must be tempered with professional judgment for full analysis of effects. Professional judgement based on local experience has verified that model outputs are reasonable with values and indicators aligned with desired conditions. All numbers, acres, and percentages used throughout this document are strictly estimates, but provide a baseline to compare alternatives.

#### Analysis Assumptions

There are basic assumptions associated with modeling silvicultural prescriptions and stand growth. It is important to understand that parameters describing stand conditions and the underlying growth of stands are outcomes of an empirical growth model (Forest Vegetation Simulator). These outcomes are statistical in nature and are an attempt to represent future stand conditions over time. Outputs from the modeling represent an average of “what” might occur over time and interpretation should consider the modeling a tool in understanding ecological processes. The output data reflects silvicultural assumptions (model’s underlying equations) and the variability inherent in the input data (common stand exam inventory plots).

- **Assumption 1:** The collected inventory plot data (common stand exam) represent the current “average” stand conditions in the project area.
- **Assumption 2:** The Forest Vegetation Simulator model and the underlying equations of the chosen variant statistically represent future tree and stand growth and mortality. The

model's output of stand conditions provides a statistically nonbiased representation of silvicultural activities and stand conditions over time.

- **Assumption 3:** The modeled outputs from Forest Vegetation Simulator should not be assumed to be exact for all stands where the outputs are applied due to limitations in data collection. The results are meant to be interpreted as general trends on the landscape. During implementation, site-specific stand-level prescriptions will be written for each stand and will be in compliance with authorized activities.
- **Assumption 4:** Forest Vegetation Simulator was used to model the first entry for treatments however, some stands may require subsequent entries to move towards or attain desired conditions. Anticipated effects are displayed 20 and 40 years post-harvest; however, it is plausible and likely that future planning efforts will overlap with the project area and could identify areas needing re-treatment to maintain or move towards desired conditions.

### Data Limitations

Stand exam data collection was designed to capture representative conditions for the vegetation across the project area. Site-specific data was collected for this analysis in woodland and forest vegetation types. Stand Exam data was first collected in 2009 with 901 data collection plots within the planning area to determine conditions of the vegetation. In 2011, the Wallow Fire burned with varying levels of severity on approximately 15,400 acres in New Mexico. Some of the stand exam data collected in 2009 within Wallow Fire area became invalid. In 2014 the project boundary was expanded in response to emphasis on all-lands restoration level planning in which the Gila National Forest responded by proposing ecological restoration treatment across a large landscape. Additional data was collected with 228 data collection plots to supplement data collected in 2009 and to verify changed vegetation conditions in the Wallow Fire area.

Plots followed the common stand exam protocol. Data collection occurred on approximately 42,800 acres or 29.8 percent of the woodland and forested area throughout the planning area. For stands in which data was not collected, data from stands exhibiting similar characteristics based upon imagery from the National Agriculture Imagery Program in geographic information systems was used for analysis.

## Environmental Consequences

The vegetation affected environment is described in chapter 1, "Existing and Desired Condition" section.

### Alternative A

#### *Forest Cover Types*

Forest cover type changes would occur over time as trees die through natural mortality and disturbance events from insect, disease, or wildfire. Tree growth, sprouting, regeneration of other species, and climatic variation may also cause a change in the forest cover type.

Under the no-action alternative, there would not be an increase in growing space and conditions would remain the same in the short term. In the long term, where existing density levels are currently high, competition-induced mortality would occur as densities continue to increase. Depending on the extent of the mortality, newly created growing space would either create openings large enough for new regeneration to establish or be quickly occupied by residual trees. Many of the forest cover types within the Luna project area will not persist at high densities for



long periods as they are generally affected by natural disturbance events such as insects, disease and wildfire.

Under the no-action alternative, the grassland cover type would experience a decline from the existing acreage by about 1 percent in 20 years as woody vegetation continues to regenerate into the grassland and meadow edges (table 31). The grassland would undergo little or no change over the remaining 40-year period due to the slow rate of regeneration and tree canopy closure. All other cover types would be within desired ranges over the 20- and 40-year periods. Ponderosa pine and piñon-juniper woodlands would experience a slight decrease. Oak woodland, southwest white pine and white fir cover types would experience a slight increase over the 20- and 40-year periods. There would also be a slight decrease in 20 years and overall increase in the 40-year period for the Douglas fir cover type.

**Table 31. Forest cover type acres and percentage change in 20 and 40 years under alternative A, no action**

Forest Cover Type	Acres	Percentage Change in 20 years	Percentage Change in 40 years
Grassland/Meadow	21,941	-1	-1
Douglas fir	6,323	-0.4	+0.2
Engelmann Spruce	109	0	0
Oak Woodland	1,414	+1.3	+1.7
Piñon-Juniper	41,713	-0.2	-0.1
Ponderosa pine	87,195	-0.4	-1.2
Riparian	784	Not applicable	Not applicable
Southwestern White Pine	69	+0.4	+0.4
White Fir	6,887	+0.2	+0.2
Reforestation Area	3,954	Not applicable	Not applicable
Rocky Area	942	Not applicable	Not applicable
Total acres	<b>171,331<sup>1</sup></b>	Not applicable	Not applicable

<sup>1</sup> Acreage does not include private land.

### *Stand Density Index*

As density continues to increase, competition among trees would result in density-induced mortality. Health and vigor of the trees would also decline as density increases and stands approach maximum stand density index. Existing grasses, shrubs, and forbs would decline in vigor and growth and individual trees would begin to die creating small openings in the tree canopy as stands reach the threshold of density dependent mortality. Minimum forage would likely be produced under tree canopies without a large-scale disturbance and existing trees would quickly capture the newly available growing space.

Under the no-action alternative, in 20 years, approximately 70 percent of the Luna project area would reach full site occupancy in zones 3 and 4 (table 32). In 40 years, approximately 80 percent of the landscape would reach full site occupancy in zones 3 and 4 (table 32). The percent of the landscape in zones 1 and 2 do not meet desired conditions over the 40-year period.

**Table 32. Stand density index (SDI) percentage of landscape in 20 and 40 years under alternative A, no action**

Zone	Maximum SDI (percent)	Percentage of Landscape Existing	Percentage of Landscape in 20-years	Percentage of Landscape in 40-years	Percentage of Landscape Desired
1	0–25	19	12	9	10–20
2	25–35	33	18	11	20–30
3	35–55	38	46	41	30–50
4	55 <sup>1</sup> –100	10	24	39	10–20

<sup>1</sup> Zones 3 and 4 upper and lower ranges vary between 55 and 60 percent based on review of the existing research 55 percent was used as the respective upper and lower thresholds for zones 3 and 4 for the Luna analysis.

### Vegetation Structural Stage

With the no-action alternative, the existing distribution of vegetation structural stages within the analysis area for ponderosa pine and woodland cover types would change as trees grow. Barring any natural disturbances, both stand density index (table 32) and canopy density (table 33 and table 34) would continue to increase until site capacity is reached. Over a long period (more than 40 years), vegetation structural stage 1 and canopy density class A percentages may increase slowly as older trees die and deteriorate leaving large openings for regeneration. Also, openings may come from mortality from tree competition at high densities, or from abiotic and or biotic causes such as insect or disease infections, wildfire, or other damaging agents.

**Table 33. Ponderosa pine percentage of area by canopy density class under alternative A, no action, from existing to 20 and 40 years compared to desired condition; where canopy density class A = open (0–39%), B = moderately closed (40–59%), and C = closed (60% +)**

Canopy Density Class	Desired Condition (percent)	Existing Condition (percent)	Condition at 20 Years (percent)	Condition at 40 Years (percent)
A	40	36	31	25
B	40	51	43	27
C	20	12	25	48

**Table 34. Woodlands percentage of area by canopy density class under alternative A, no action, from existing to 20 and 40 years compared to desired condition; where canopy density class A = open (0–39%), B = moderately closed (40–59%), and C = closed (60% +)**

Canopy Density Class	Desired Condition (percent)	Existing Condition (percent)	Condition at 20 Years (percent)	Condition at 40 Years (percent)
A	55	13	3	3
B	30	63	43	26
C	15	24	55	71

Based on modeling the no-action alternative, canopy density for ponderosa pine and woodland cover types would become less open (class A) over 20 and 40 years (table 33 and table 34). Over the 40-year period, open and moderately closed classes will drop below desired conditions, with the open category displaying the greater departure. Canopy density for both cover types would greatly exceed desired conditions for the closed class (class C) over the 40 years (table 33 and table 34), following the trend of the stand density index (table 32).

Within the Luna planning area, the model for vegetation structural stages shows changes in percent acres in all diameter classes of ponderosa pine cover type from existing through 20 and 40 years (table 35). In year 20, diameter classes 1 and 5 for ponderosa pine decline and are deficient when compared to desired conditions, unlike vegetation structural stage diameter classes 2, 3, and 4, which are in surplus (table 35). In 40 years, vegetation structural stage classes 1 and 2 are both deficit compared desired conditions. As trees grow over the 20 to 40 years, the percent acres in vegetation structural stage classes 3, 4, and 5 increase, exceeding desired conditions. Vegetation structural stage 6 percent acres does not change over the 40-year modeling period.

**Table 35. Vegetation structural stages by percentage of area for ponderosa pine cover type for existing, 20-year and 40-year conditions compared to desired conditions under alternative A, no action**

Vegetation Structural Stage (VSS) (diameter class in inches)	Desired Condition (percent acres)	Existing Condition (percent acres)	Condition at 20 Years (percent acres)	Condition at 40 Years (percent acres)
VSS 1 (0.0–0.9)	10	22	<1	0
VSS 2 (1.0–4.9)	10	<1	20	<1
VSS 3 (5.0–11.9)	20	30	26	30
VSS 4 (12.0–17.9)	20	25	38	34
VSS 5 (18.0–23.9)	20	16	7	27
VSS 6 (24 +)	20	8	8	8

The existing condition of uneven-aged stand structure for both ponderosa pine and woodland cover types are deficit, 46 percent and 40 percent respectively, compared to desired conditions (90 percent and 100 percent). Over the 20 and 40-year period, the percent for each increase from the existing condition, 53 percent and 43 percent, respectively, at year 40. It is only a small increase and still far below desired conditions of 90 percent and 100 percent.

#### *Old Growth Stand Structural Attributes*

Under the no-action alternative, the percentage of area simultaneously meeting the minimum old growth stance structural attributes (excluding down dead trees, which is unknown) would begin to move toward the desired condition during the 40-year period (provided a large-scale disturbance such as wildfire does not occur). Under this alternative, all minimum old growth variables would be simultaneously met in 20 years in 15 percent of the interior ponderosa pine group, 12 percent of the mixed-species group, and 96 percent of the woodland species group (table 36). Compared to the existing condition the percentage of the ponderosa pine group simultaneously meeting old growth conditions remains would remain unchanged, decreasing slightly for the mixed-species group by 7 percent and increasing for the woodland species group by 8 percent (table 36).

In 40 years, all minimum old growth variables would be simultaneously met over 31 percent of the interior ponderosa pine group, 12 percent of the mixed-species group, and 95 percent of the woodland species group. The degree to which the old growth groups meet various stand structural attributes fluctuates throughout the 40-year period, and tends to increase for all attributes except for meeting the standing dead tree requirements for a give old growth group. Although the minimum variable of down dead is unknown for the various groups, given the amount of standing dead in the area it is concluded that this variable would be met as the other variables are simultaneously met. There would be a high risk of loss of dead and down material, dead standing

material, and live vegetation through wildfire occurrence due to the increasing tree densities over time.

Overall, table 36 shows the trend for old growth under the no-action alternative from existing to 20 and 40 years, with no treatments and no disturbances. All stands are moving towards desired conditions over the 40-year period, with the exception being the mixed species group. Model outputs suggest the degree to which the old growth groups meet various stand structural attributes, fluctuates throughout the 40-year period, and tends to increase for all attributes except for meeting the standing dead tree requirements.

**Table 36. Percentage of designated 20% (identified) old growth area meeting minimum criteria of structural attributes by group from existing through 20 and 40 years under alternative A, no action**

Old Growth Group	Minimum Criteria of Structural Attributes <sup>1</sup>	Percentage of Identified Old Growth Area – Existing Condition	Percentage of Identified Old Growth Area – 20 years	Percentage of Identified Old Growth Area – 40 years
Ponderosa pine	20 live trees in main canopy at least 14 inches in diameter at breast height (DBH)	68	91	98
Ponderosa pine	1 standing dead tree per acre at least 14 inches in diameter at breast height and at least 15 feet	46	36	61
Ponderosa pine	70 to 90 square feet per acre total basal area	98	99	100
Ponderosa pine	40 to 50% total canopy cover	34	48	70
Ponderosa pine	Percent area simultaneously meeting all attributes <sup>2</sup>	12	15	31
Mixed-species	12 to 16 live trees in main canopy at least 18 inches in diameter at breast height	45	59	75
Mixed-species	2.5 standing dead tree per acre at least 14 inches in diameter at breast height and at least 20 feet	85	40	19
Mixed-species	80 to 100 square feet per acre total basal area	100	100	100
Mixed-species	50 to 60% total canopy cover	43	51	64
Mixed-species	Percent area simultaneously meeting all attributes <sup>2</sup>	19	12	12
Woodland	12 to 30 live trees in main canopy at least 9 inches in diameter at root crown	99	100	100
Woodland	1 standing dead tree per acre at least 9 inches in diameter at root crown and at least 8 feet	88	99	96
Woodland	6 to 24 square feet per acre total basal area	100	100	100
Woodland	20 to 35% total canopy cover	97	97	99
Woodland	Percent area simultaneously meeting all attributes <sup>2</sup>	87	96	95

<sup>1</sup> Low site productivity values were used as threshold for each old-growth group for the Luna planning area.

<sup>2</sup> Age and down dead trees are unknown for the group.

## Effects Common to Alternatives B, C, and D

### Forest Cover Types

As in the no-action alternative, changes in tree growth, sprouting, regeneration of other species, and climatic variation may cause a change in the forest cover type acreage within the Luna project area. Under all action alternatives, there would not be a decline in the grassland cover type, at 20 years, as woody vegetation is cut and burned through grassland maintenance treatment. Restoration of the grasslands currently regenerating into piñon pine-juniper woodlands and ponderosa pine forests would increase the grassland component in the Luna project area by 1 percent in the first 20 years. Continued grassland maintenance would retain the 1 percent increase in the grassland cover type forty years post-harvest (table 37).

The majority of the species would fall within the desired percent range for management over the 40-year period (table 37). There would be slight increases for several of the mixed-species cover types including Douglas-fir, white fir and southwest white pine for both the 20- and 40-year periods. These cover types fall within Mexican spotted owl recovery habitat in the Luna project area where it is desirable to have a variety of species present. Piñon-juniper and oak woodlands would also increase in the 20-year period by approximately 0.9 and 0.8 percent, respectively. This increase would be sustained through the 40-year period. The ponderosa pine cover type would sustain the largest decline in cover type decreasing by 4 percent at 20 years, and 6.2 percent at 40 years. This is slightly outside of the desired range for management at 40 years post-harvest.

**Table 37. Percentage change from existing forest cover type acres at 1 year, 20 years, and 40 years post-harvest compared to range of desired percentage for alternatives B, C, and D**

Forest Cover Type	Acres (range of desired percentage change)	Percentage Change 1-Year Post-Harvest	Percentage Change 20-Years Post-Harvest	Percentage Change 40-Years Post-Harvest
Grassland/Meadow	21,941 (+0-2%)	+1%	+1%	+1%
Douglas fir	6,323 (+0-2%)	+0.4	+0.2%	+2.2%
Engelmann Spruce	109 (+0-2%)	0%	0%	0%
Oak Woodland	1,414 (+/-2%)	+0.2%	+0.9%	+0.9%
Piñon-Juniper	41,713 (+/-5%)	+1.6%	+0.8%	+0.8%
Ponderosa pine	87,195 (+/-5%)	-3.9%	-4.0%	-6.2%
Riparian	784 (not applicable)	Not applicable	Not applicable	Not applicable
Southwestern White Pine	69 (+0-2%)	0%	+0.3%	+0.3%
White Fir	6,887 (+0-2%)	+0.7%	+0.8%	+0.9%
Reforestation Area	3,954 (not applicable)	Not applicable	Not applicable	Not applicable
Rocky Area	942 (not applicable)	Not applicable	Not applicable	Not applicable
Total acres	171,331 <sup>1</sup>	Not applicable	Not applicable	Not applicable

<sup>1</sup> Acreage does not include private lands.

Note: The summarization of results includes all stands as part of the modified proposed action alternative including no treatment stands and prescribed burn-only stands. Prescribed burn only stands were not directly modeled in Forest Vegetation Simulator and were modeled as no action stands.

Results were given 1 year post-harvest since mortality was not modeled for the prescribed burning modeled post-thinning treatments.

The decrease in the ponderosa pine cover type is predicted through modeling, but actual prescriptions would be implemented to favor ponderosa pine in the ponderosa pine cover type and where ponderosa pine has transitioned to woodlands. There might be a slight decrease in the ponderosa cover type in some areas due to favoring of other species in Mexican spotted owl recovery habitat, transition from ponderosa pine to Douglas-fir in no-treatment areas, and also in removing encroaching conifers in grassland and meadow restoration treatments. Therefore, while model outputs and professional experience show a net overall reduction in the ponderosa pine cover type under various thinning regimes, the actual amount is largely dependent on the individual stand conditions pre-treatment and how the treatment is applied.

Forest stands would be treated, following principles described in the Rocky Mountain Research Station general technical report GTR-310 (Reynolds et al. 2013) where applicable. Implementation of principles provided in GTR-310, where appropriate, that restore the composition and structure of frequent-fire forests will result in a more open forest structure with a decreased potential for stand-replacing wildfire and epidemic outbreaks of insects and diseases (Fitzgerald 2005; Fulé et al. 2002, 2004; Graham et al. 2004; Roccaforte et al. 2008; Strom and Fulé 2007, as cited in Reynolds et al. 2013).

**Stand Density Index**

Under all action alternatives, 1 year post-harvest, zones 1 and 2 would be above the desired range (table 38), while 23 percent of the landscape in zones 3 and 4 would be at full site occupancy, but are below the desired range.

Modeling for changes in stand density over 20- and 40-year periods show a transitioning of the landscape from zone to zone over time (table 38). The model does not include the possibility of re-entry into areas for treatment activities. Within 20 years, all zones would be within or very close to desired percent of the landscape. Zone 1 would be in surplus by roughly 1 percent, and zone 2 would be at the upper end of the desired range. In 40 years, the percent of the landscape at full site occupancy would increase to roughly 67 percent, with zone 3 still being with the desired range, but zone 4 would be 10 percent in surplus.

**Table 38. Percentage of maximum stand density index (SDI) 1 year, 20 years, and 40 years post-harvest for alternatives B, C, and D compared to desired percentage of the landscape**

Zone	Maximum SDI (percent)	Desired Percentage of Landscape	Percentage of Landscape 1 year Post-Harvest	Percentage of Landscape 20 years Post-Harvest	Percentage of Landscape 40 years Post-Harvest
1	0–25	10–20	35	21	16
2	25–35	20–30	42	30	18
3	35–55	30–50	17	32	37
4	55–100	10–20	6	16	30

The decreases to the stand density indicator are in alignment with recommendations for the management of southwestern forests (Reynolds et al. 2013) because increased density levels create conditions for wildland fires or insects and disease outbreaks. Drought is also a significant stressor to vegetation communities in this area of the United States; the effects of drought are amplified by higher vegetation density levels, as the need for moisture is increased by greater numbers of plants.

Thinning and creation of small group openings would reduce tree competition and release residual trees. The direct effects of thinning would be increased stand and landscape level resistance and resiliency to fire, insects, and disease. Additionally, decreased stand densities would maintain healthy forest conditions during drought cycles. These effects would be apparent immediately following thinning. The majority of the trees removed would be suppressed and intermediate trees with the co-dominant and dominant trees favored for retention. Although some thinning would occur in larger size classes, most thinning would occur in smaller size classes between 1 to 18 inches diameter at breast height. Some harvest areas under this alternative will be limited to less than or equal to 23.9 inches diameter at breast height. In designated Mexican spotted owl habitat stands, growth is expected to be slightly slower than the stands with no diameter limit. Stand density in pockets of larger trees would not be reduced.

Grassland maintenance or meadow restoration treatments would result in a decrease in tree density, which would allow for an increase in native grasses and forbs. There would also be an increase in grasses and forbs in forested areas as the canopy would be open allowing light and moisture to reach the forest floor. The restoration of grass-forb-shrub interspaces and resultant separation of tree canopies and increase in herbaceous plant cover will provide fuels to carry frequent surface fires. Restoration of the characteristic fire regimes should sustain forest composition, structure, processes, and functions (Reynolds et al. 2013).

The direct effects to vegetation from thinning and subsequent fuels treatments would be a reduction to the stand density indicator. Active management, through forest thinning, maintains healthy trees that are less susceptible to high levels of mortality. Individual or small groups of trees may die, but the forest would be retained. Forests managed with appropriate residual density are able to withstand the effects of fire (Agee and Skinner 2005).

Additionally, aside from the changes to the indicator measures for vegetation, fuels reduction work would create landscapes with residual fuel loadings closer to desired conditions. Subsequent prescribed burning treatments post-thinning would result in less surface, ladder, and canopy fuels. This would change the fuel content within the stands and across the landscape, which would affect future wildland fires. These stand and landscape level changes in the thinned stands will result in a discontinuous canopy and decreased crown bulk densities. Research has shown that this along with a reduction in surface fuels and increase in canopy base height from prescribed fire will help create fire resilient landscapes (Agee and Skinner 2005). Maintenance treatments including prescribed fire and mechanical treatments would be needed to maintain or move towards desired conditions.

Stands that will be left untreated with this alternative will continue to get denser and decrease in vigor and health. Grass and forb growth will continue to decline. No openings would be created for seedling regeneration. Growth of trees into the larger size class will be slower than the treated stands.

### *Vegetation Structural Stage*

The action alternatives would result in more uneven-aged ponderosa pine and woodland stands through thinning, burning, and group selection silvicultural treatments. Thinning and prescribed burning stands would reduce competition and release trees to grow at faster rates, than stands that are left untreated. Increases in vegetation structural stage class from one structural stage to the next would occur at a slightly more rapid rate than with the no-action alternative. Creating small openings (regeneration groups up to 4 acres in size outside northern goshawk post-fledging

family areas and up to 2 acres in size within northern goshawk post-fledging family areas) by tree cutting and removal and burning would provide an opportunity for regeneration of small clumps of trees and increase the percentage of the landscape in vegetation structural stage 1. Treatments would be designed to promote structural heterogeneity, leaving a mosaic of groups of trees providing areas of higher basal areas and canopy cover, in addition to scattered individual trees and openings.

One year post-harvest, canopy density within the ponderosa pine cover type would be more open (67 percent in class A) (table 39). Over time, canopy density would progress towards moderately closed and closed classes (table 39). Based on modeling, the ponderosa pine canopy density would near desired conditions over 40 years.

For the woodland cover type, the open (class A) and closed (class C) canopy density classes are deficit from desired conditions (table 40). Moderately closed density class (class B) is the condition over majority of the area. Over 20 to 40 years post-harvest would progress towards more percentage area of closed canopy density (class C), but would not near desired conditions (table 40).

**Table 39. Ponderosa pine percentage of area by canopy density class under alternatives B, C, and D; 1, 20, and 40 years post-harvest compared to desired condition; where canopy density class A = open (0–39%); B = moderately closed (40–59%); and C = closed (60% +)**

Canopy Density Class	Desired Condition (percent)	Condition at 1-year Post-Harvest (percent)	Condition at 20-Years Post-Harvest (percent)	Condition at 40-Years Post-Harvest (percent)
A	40	67	51	43
B	40	31	45	45
C	20	1	4	11

**Table 40. Woodlands percentage of area by canopy density class under alternatives B, C, and D; 1, 20, and 40 years post-harvest compared to desired condition; where canopy density class A = open (0–39%); B = moderately closed (40–59%); and C = closed (60% +)**

Canopy Density Class	Desired Condition (percent)	Condition at 1-year Post-Harvest (percent)	Condition at 20-Years Post-Harvest (percent)	Condition at 40-Years Post-Harvest (percent)
A	55	2	3	2
B	30	93	70	50
C	15	5	27	47

Structural stages for ponderosa cover type for 1 year, 20 years, and 40 years post-harvest are shown in table 41. In year one post-harvest, vegetation structural stages 1 and 5 are surplus of desired conditions. Immediately post-treatment, there would be an increase in vegetation structural stage 1 from established openings. Over time, this acreage would progress to vegetation structural stages 2 through 6. Prescribed burning in the surplus categories in vegetation structural stages 4 and 5 would reduce the amount of smaller trees and enhance the growth and vigor of residual trees promoting their ascendancy into larger size classes over time. This would facilitate stand structural development while also enhancing stand health and vigor through reducing tree density. Stand would become more resilient to disturbances, like insect and diseases. Post-harvest,



there would be an increase in the percentage of acres in uneven-aged structure for ponderosa pine from 46 percent to 64 percent and only a slight increase for woodland 40 percent to 41 percent.

**Table 41. Vegetation structural stages by percentage of area for ponderosa pine cover type for 1-year, 20-years, and 40-years post-harvest conditions for alternatives B, C, and D compared to desired conditions**

Vegetation Structural Stage (VSS) (diameter class in inches)	Desired Condition (percent acres)	Condition at 1 Year Post-Harvest (percent acres)	Condition at 20 Years Post-Harvest (percent acres)	Condition at 40 Years Post-Harvest (percent acres)
VSS 1 (0.0–0.9)	10	34	10	3
VSS 2 (1.0–4.9)	10	<1	23	4
VSS 3 (5.0–11.9)	20	21	14	34
VSS 4 (12.0–17.9)	20	19	27	21
VSS 5 (18.0–23.9)	20	24	20	26
VSS 6 (24 +)	20	1	6	12

In 20 years post treatment, vegetation structural stages 1 and 5 would meet the desired condition, and classes 2 and 4 would be surplus of desired conditions. Vegetation structural stages 3 and 6 would be below desired conditions (table 41). For uneven and even aged stand structure, the ponderosa pine and woodland cover type remain relatively the same as 1 year post treatment, 67 percent and 40 percent respectively.

In 40 years post treatment, vegetation structural stages 1, 2 and 6 would be deficit; vegetation structural stages 3 and 5 would be surplus; and vegetation structural stage 4 would be almost at desired conditions (table 41). For uneven-aged structure, ponderosa pine remains unchanged from 20 years at 67 percent and the woodland group would increase slightly to 44 percent.

Over the 40-year period, the landscape supports a forest composed of uneven aged stands with larger diameter trees. However, the amount of forest openings are reduced.

**Old Growth Stand Structural Attributes**

Under the action alternatives, the percentage of area simultaneously meeting the minimum old growth variables (excluding down dead trees, which is unknown) would begin to move toward the desired condition during the 40-year period (providing a stand-replacing disturbance does not occur).

After the one year post treatment (table 42) there would be a slight decrease in stand densities and for some of the other structural attributes in comparison to the no-action alternative (table 36). However, the percentage of groups meeting all minimum old growth minimum criteria changed from none to the most 2 percent from no-action alternative.

In 20 and 40 years post treatment under the action alternatives, all minimum old growth variables would trend towards desired conditions for all vegetation groups. However, the mixed-species group stays relatively static. Individual structural attributes would increase for all old growth variables to varying degrees. Although the minimum variable of down and dead trees is unknown for the interior ponderosa pine group, the mixed-species group, and the woodland species group, given the amount of standing dead in the area it is concluded that this variable would also be met as the other variables are simultaneously met.

Although the area would be managed with low to moderate average basal areas across the landscape, project design would provide high basal areas and tree canopy cover retaining clumps of dense trees throughout the area. Openings would also be enhanced where feasible and would lower the average basal area and provide a reduction of fuels to reduce potential damage to old growth components in the event of a wildfire. There would be a low to moderate risk of loss of dead and down material, dead standing material, and live vegetation in treated areas through wildfire occurrence due to the low to moderate average tree densities.

**Table 42. Percentage of designated 20% (identified) old growth area meeting minimum criteria of structural attributes by group; in 1, 20, and 40 years post-harvest under alternatives B, C, and D**

Old Growth Group	Minimum Criteria of Structural Attributes <sup>1</sup>	Percentage of Identified Old Growth Area – 1 year post-harvest	Percentage of Identified Old Growth Area – 20 years post-harvest	Percentage of Identified Old Growth Area – 40 years post-harvest
Ponderosa pine	20 live trees in main canopy at least 14 inches in diameter at breast height (DBH)	68	89	95
Ponderosa pine	1 standing dead tree per acre at least 14 inches DBH and at least 15 feet	46	37	62
Ponderosa pine	70 to 90 square feet per acre total basal area	95	95	96
Ponderosa pine	40 to 50 percent total canopy cover	31	41	55
Ponderosa pine	Percent area simultaneously meeting all attributes <sup>2</sup>	13	16	30
Mixed species	12 to 16 live trees in main canopy at least 18 inches DBH	46	59	75
Mixed species	2.5 standing dead tree per acre at least 14 inches DBH and at least 20 feet	45	48	55
Mixed species	80 to 100 square feet per acre total basal area	53	100	100
Mixed species	50 to 60 percent total canopy cover	22	52	64
Mixed species	Percent area simultaneously meeting all attributes <sup>2</sup>	10	12	12
Woodland	12 to 30 live trees in main canopy at least 9 inches diameter at root crown (DRC)	99	100	100
Woodland	1 standing dead tree per acre at least 9 inches DRC and at least 8 feet	88	95	97
Woodland	6 to 24 square feet per acre total basal area	100	100	100
Woodland	20 to 35 percent total canopy cover	97	93	99
Woodland	Percent area simultaneously meeting all attributes <sup>2</sup>	87	89	96

<sup>1</sup> Low site productivity values were used as threshold for each old-growth group for the Luna planning area.

<sup>2</sup> Age and down dead trees are unknown for the group.

## Alternative C – Herbicide Utilization

All other effects are the same as alternative B and D.

Under this alternative, the direct effect to vegetation would be a reduced amount of shrub and woodland tree species. Reducing the presence of these species would have the indirect effect of creating growing space for grass and forb species in grasslands, and also for conifer seedlings in forested areas. The objective of this treatment would be to remove competing species in grassland restoration treatments and to create ideal conditions for grass and forb species to regenerate. Herbicides would also be applied to sprouting alligator juniper in forested areas, which would create growing space for conifer establishment and growth. By decreasing plant competition, the planted and naturally regenerated conifer species would have increased growth rates as they would have more available soil moisture, nutrients and sunlight.

Herbicide application would increase treatment effectiveness and help set back succession of competing shrub and juniper species, which should help, maintain grassland treatments for a longer period of time, and also help facilitate conifer establishment and growth in forested areas. Herbicide application would also be targeted within the wildland urban interface where sprouting of juniper post-thinning could create ladder fuels. In this case, herbicide treatment would help increase the effectiveness of fuel reduction treatments to meet fuels objectives, with treatments lasting longer than with tree cutting alone.

## Cumulative Effects

The 185,586-acre Luna planning area is part of the larger Escudilla Landscape, a 279,470-acre landscape planning area that extends across both the Apache-Sitgreaves and Gila national forests. Twenty-five years was chosen as a benchmark for assessing cumulative effects as this allows adequate time for vegetation to respond to forest vegetation treatment activities such as timber harvest and pre-commercial thinning. There have been numerous vegetation management activities, including mechanical treatments and prescribed fire treatments, within the Luna Restoration Project area over the past 25 years.

Overall, the number of treatments has decreased in the last 25 years compared to the amount of treatments occurring in the 1980s. This decline can be partially attributed to reduction in commercial timber activities across the Gila National Forest and throughout the Southwestern Region. Timber harvest activities across the Gila have declined by over 50 percent, going from an average of 25,000 CCF (100 cubic feet) per year in the early 1980s, to a current average of 10,000 CCF per year. This reduction in timber harvest has in turn reduced the number of roads constructed in support of these activities.

Current activities range from fuelwood collection, commercial thinning, salvage cutting, pre-commercial thinning for wildlife, watershed, vegetation and forest health improvement, overstory removal, and road closures. In recent years (2006 to current), timber sale activities have included the decommissioning of non-system roads following completion of harvest operations. Current and future planning projects also analyze the closure of non-system roads following completion of harvest activities. In addition, incorporation of best management practices and design features is required on all vegetation management projects. Best management practices address Gila National Forest staff responsibilities to implement the Clean Water Act, which is accomplished through implementation and monitoring of best management practices.

On the adjacent Apache-Sitgreaves National Forest, there are 35,105 acres of vegetation improvement, thinning, and prescribed burning projects planned. A recent decision was signed for the 68,000-acre West Escudilla Restoration Project, which includes thinning trees and prescribed fire on the Alpine, and Springerville ranger districts along the New Mexico-Arizona state line. In addition, it is likely there is “Firewise” hazardous fuels reduction work occurring on private lands within and adjacent to the project area. This project would be important to the success of future fire suppression efforts and complements past treatments and those currently occurring or being proposed on adjacent federal, state, and private lands.

Cumulatively, the above activities in combination with prescribed fire would facilitate restoring and sustaining ecological processes in fire-dependent ecosystems and move vegetation and fuel conditions towards their historic fire regimes. Treatments would reduce density, creating more open forest conditions, with increased herbaceous, forb, and woody vegetation production. These treatments would also facilitate regeneration in openings and increase stand structural complexity and diversity at both the stand- and landscape-scale. Change in vegetation composition, stand density, and structure would help create more resilient ecosystems that are better suited to future disturbances. These combined treatments would complement the purpose and need goals for vegetation restoration and fire and fuels management by restoring departed vegetation communities, and reducing the impact of high-severity fire on private inholdings, communities, infrastructure, cultural resources, and livelihoods within the planning area. It should be noted there would be no effects to vegetation outside of the analysis area boundary as a result of this project.

## Fire and Fuels

### Assumptions and Limitations

#### Assumptions

A number of assumptions were made in this analysis and are listed below:

- Current forest plan and other management direction would continue in the future.
- No major disturbance, such as wildfire, blow down or insect epidemics would occur from the baseline year of 2016 until implementation is completed. This analysis discusses future risk and probable effects if a disturbance occurs; it is not a future projection of the occurrence.
- The project area is sufficient to analyze and discuss effects to fire and fuels.
  - ◆ The low-intensity prescribed burning treatments were not modeled in this analysis as they are not within a delineated unit or stand boundary, and due to the uncertainty of the exact location of where the prescribed burns would occur and the size of burn units.
  - ◆ Where appropriate, the vegetation characteristics (canopy base height, canopy cover, stand height, crown bulk density, and fuel model) were modified in treatment units to reflect the expected vegetation conditions after treatment.
  - ◆ Acres of private land and lands of other ownership that lie within the Luna Restoration project area boundary were included in the discussion.
  - ◆ Weather data was obtained for the past 20 years from Luna remote automated weather station. Spatial data including slope, elevation, aspect, crown height, canopy base height, canopy bulk density and fire behavior fuel models were utilized.

## Limitations of the Models

“It should be noted a model is a simplification or approximation of reality and hence will not reflect all of reality” (Stratton 2006). The use of models depends upon sample data, validity of the model itself, and assumptions made by the modeler. All three affect the results. The use of FlamMap 5 in this analysis is to generally characterize and display existing conditions and the nature and magnitude of treatment effects to inform decisions to be made. The modeling results are not to be taken as reality. Fire models are tools to help depict relative change in fire behavior and growth across the landscape. Although there are limitations to fire behavior modeling, the model outputs provide useful information for planning, assessing and prioritizing fuel treatments (Stratton 2004, 2006). While we have a good general understanding of the factors that govern fire behavior, the interactions among these factors and the way in which fire behaves on the landscape are highly complex. As a result, fire behavior and severity can be understood and predicted in general terms, but exact predictions are not possible. Different models have been developed that are widely used and useful to assist in managing fires and developing fuel treatment plans. However, there are key uncertainties in how the simplifying assumptions of models affect their accuracy and as well as uncertainties that result from difficulties of providing adequate input data to operate the models (Graham et al. 2004). Given the uncertainty of any modeling exercise, the results are best used to compare the relative effects of the alternatives, rather than as an indicator of absolute effects (Graham et al. 2004).

## Affected Environment

Fire regime groups and acres of each for the Luna planning area is displayed in table 43. A fire regime is the pattern, frequency, and intensity of the wildfires that prevail in an area over long periods of time. A fire regime describes the spatial and temporal patterns and ecosystem impacts of fire on the landscape.

Fire regime data was acquired from LANDFIRE (2010) version 1.2.0 data<sup>2</sup>. It is an interagency vegetation, fire, and fuels characteristics mapping program, sponsored by the Wildland Fire Leadership Council that provides nationally consistent and seamless geospatial data products for use in wildland fire analysis and modeling. LANDFIRE data is used as the basis for geospatial wildland fire modeling. It produces a comprehensive, consistent, scientifically credible suite of more than 20 geospatial layers for the United States. LANDFIRE was used to conduct this assessment of fire regime groups within the project area. Approximately 83 percent of the project area is classified as fire regime group I with a 0 to 35 years fire return interval and low to mixed fire severity. Approximately 2 percent of the project area is classified as fire regime group II with 0 to 35 years fire frequency and replacement severity. Seven percent is classified as fire regime group III with a 35 to 200 years fire frequency and mixed to low severity. Almost eight percent of the project area is classified as fire regime group IV with a 35 to 200 year frequency and stand replacement severity, and less than one percent is classified as fire regime group V with 200+ year frequency and replacement to any type of severity.

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<sup>2</sup> Fire regime groups used in the current LANDFIRE databases. These groups have been modified from earlier versions (Hardy et al. 2001, Schmidt et al. 2002 ) to include low-severity fires in fire regime III and fires of any severity in fire regime V. Adapted from Fire Regime Condition Class Guidebook, Version 1.2.1 (Anon 2010 as cited in Somers et al. 2010).

**Table 43. Summary of fire regime groups within the Luna planning area**

Fire Regime Group	Frequency	Severity	Severity Description	Acres of Project Area	Approximate percentage of Project Area
Group I	0 to 35 years	Low/mixed	Generally low-severity fires replacing less than 25% of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75% of the overstory.	153,800	83
Group II	0 to 35 years	Replacement	High-severity fires replacing greater than 75% of the dominant overstory vegetation.	3,592	2
Group III	35 to 200 years	Mixed/low	Generally mixed severity; can also include low-severity fires.	12,890	7
Group IV	35 to 200 years	Replacement	High-severity fires	14,292	8
Group V	200+ years	Replacement/ any severity	Generally replacement-severity; can include any severity type in this frequency range.	444	Less than 1

Condition classes are used to categorize how much key ecosystem components such as species composition, structural stage, and stocking level, have changed in an area due to changing fire regimes. One or more activities, such as fire exclusion, insects and disease, and past management activities, can cause a change in fire regimes (Schmidt et al. 2002).

LANDFIRE (2012) version 1.4.0, data was used for the vegetation departure assessment. Vegetation condition class distribution in the project area is shown below in table 44. Approximately 38 percent of the project area is within vegetation condition class Ia and Ib and has a low departure from the reference condition. Approximately 18 percent is classified as vegetation condition class IIa and IIb and is moderately departed from the reference condition; and approximately 43 percent is classified as vegetation condition class IIIa and is highly departed from the reference condition.

**Table 44. Vegetation condition class distribution in the Luna planning area**

Vegetation Condition Class (VCC)	Acres*	Approximate Percentage of Project Area
VCC Ia, Very Low	1,034	Less than 1
VCC, Ib Low	69,455	37
VCC IIa, Moderate-Low	20,408	11
VCC IIb, Moderate -High	12,835	7
VCC, IIIa, High	80,565	43
VCC IIIb, Very High	0	0

\*Unburnable acres were not included; lands of other ownership within the Luna project area boundary are included.

## Environmental Consequences

### Alternative A

There would be no changes in current management and forest plan would continue to be implemented. There would be no direct effect to fuels under this alternative and no reduction of potential fire behavior. There are no foreseeable vegetation projects or prescribed fire projects proposed within the next five years. The no-action alternative would not move the project area towards desired conditions, nor would it meet the purpose and need; to reduce the impacts of high-severity fire and to implement vegetative treatments to restore departed landscapes at risk of fire.

In the absence of human-caused or natural disturbance such as vegetation treatment activities and wildfire, there would be an increased accumulation of surface and ladder fuels from insect and disease activity, storm damage, and the progression of forest succession, growth and change. Structural changes in vegetation may lead to increase departure from historic fire regimes and ecosystem function. Vegetation condition class departure would be expected to continue away from the desired condition. The result would be increased surface and ladder fuels that affect flame length, surface fuel loading levels (tons per acre) that affect fire intensity and severity, as well as increased tree crown density that make crown fire initiation more likely. Denser crown spacing and ladder fuels may contribute to uncharacteristic wildfire events. Increased fuel loading levels would continue to pose a threat to adjacent private land and ecosystems as fire suppression becomes more difficult. It is likely the ability of firefighters to suppress wildland fire safely and effectively would become more difficult as fire behavior characteristics intensify. Once wildfire transitions to the tree crowns, direct suppression tactics are not effective. Wildfires burning under these conditions would have greater potential to become large and have adverse effects.

Modeling results suggest the majority of the planning area is at risk to crown fire (table 7, MAP 1). In alternative A, the percent of the landscape susceptible to crown fire activity would increase over time.

Wildfires may impact private lands and other resources. Direct suppression tactics by firefighting forces may not be as effective in the project area under the no-action alternative. Tree mortality because of insect and disease activity and natural forest succession would continue into the future and would exacerbate the amount of standing and downed fuels in the project area.

### Effects Common to Alternatives B, C, and D

Implementing Alternative B, C or D would result in a reduction in fuel loading and decrease fire behavior characteristics when compared to the existing condition. Treatments will help to maintain or shift areas towards the desired condition; reducing crown fire potential (table 45).

Crown fire potential refers to the conditions that allow fire to spread through the forest canopy. Modeling results suggest crown fire potential would be reduced to 16 percent of the project area compared to 67 percent under alternative A. Also, model results show 84 percent of the project would transition to surface fire, as compared to 24 percent under the no-action alternative (table 45).

Approximately 83 percent (153,800 acres) of the project area is classified as fire regime group I with a 0 to 35 years fire frequency (low to mixed fire severity) (table 43). With implementation of alternatives B, C, or D, approximately 116,000 acres classified in fire regime group I would be treated, moving towards restoring the natural and historical fire regime (table 45). Additionally

approximately 19,000 acres would be treated in areas classified as fire regime groups II through V. The project area would benefit from the proposed treatments with respect to ecosystem function, forest health, resiliency and reduction in potential fire behavior.

**Table 45. Summary comparison of all alternatives for fire-related concerns in the Luna planning area**

Concern	Indicator/Measure	Alt A	Alt B,C,D
Reduce impact of high-severity fire	Percentage of modeled crown fire (passive and active)	67%	16%
Reduce impact of high-severity fire	Percentage of modeled surface fire	24%	84%
Restore departed landscapes that are at risk of fire	Approximate acres treated in fire regime group I	0	116,000

Implementation of low-severity prescribed fire in the Dry Blue and along the San Francisco Divide is expected to result in mortality of smaller diameter understory trees, brush (ladder fuels), and consumption of dead and down fuels. Single tree torching, isolated group tree torching, or both may occur. After multiple entries, it is anticipated there would be open interspaces of various sizes, groups of trees with interlocking crown, multistoried canopies, and retention of larger-diameter over story trees. Overall, the treatments would move towards the ability to reintroduce fire into a fire-adapted ecosystem.

Mixed-severity prescribed burns are expected to create a mosaic of burned and unburned patches of vegetation. Prescribed burns would result in multistoried canopies, and early seral grass/forb/shrub openings.

It is expected mechanical and prescribed fire treatments would reduce surface, ladder and crown fuels and change the fuel model profile. Raising canopy base heights and reducing tree density in mechanical thinning units would reduce ladder fuels and potential for crown fire initiation. According to Peterson et al. (2005) the most appropriate fuel treatment strategy is often thinning (removing ladder fuels and decreasing crown density) followed by prescribed fire, piling and burning fuels, and mechanical treatments. These treatments would increase protection from severe fires in the future.

Cutting trees for vegetation health and reduction of canopy closure would initially result in increased surface fire intensity and spread rate due to residual activity fuels contributing to existing surface fuel loadings. Treatments would begin to restore ecological processes, including the frequent low- to mixed-severity fire regimes. Proposed treatments are expected to reduce fire behavior potential and the risk of wildfire impacting adjacent private lands, natural resources, and infrastructure.

The resulting treatments would allow the increased use of wildfires to maintain this landscape. The risk of wildfire impacting private lands, natural resources, and infrastructure would be reduced; the landscape would become more resilient.

National Forest System land and adjacent private land would be positively affected from the reduction of hazardous fuels and subsequent modification of potential fire behavior.



**Forest Plan Amendment**

Amending the forest plan to allow a one-time exceedance in the amount of activity fuels treated and prescribed burning implemented would beneficially benefit fire and fuels management. Allowing a greater amount of acres to be treated is correlated to a larger reduction in potential fire behavior across the project area, and acres treated to facilitate restoration towards desired conditions and historic fire regimes.

**Cumulative Effects**

The cumulative effects analysis area was determined to be the area within the project analysis boundary, because it is of sufficient size to manage vegetation, fire behavior and effects on a landscape level. Past, current, and future activities include such things as use and maintenance of trails; developed and dispersed recreation; and administrative facilities, motorized vehicle use, all range management activities, rural and urban development, prescribe burning, fuelwood cutting, and mechanical vegetation management.

For analyzing cumulative impacts to fire and fuels management, only those activities including vegetation treatments and prescribed burning will be used in the analysis. Within the Luna planning area approximately 25,000 acres have received mechanical or burning treatments in the past 25 years. Over 6,000 acres has been treated in the last 12 years (table 46).

**Table 46. Vegetation treatment acres, type, and implementation date in the last 12 years within the Luna planning area**

Name	Acres	Type of Treatment	Year(s) Treated
East Centerfire Prescribed Burn	5,420	Broadcast burn	2006, 2011, 2012
Wallow Site Preparation	181	Piles	2014
Tucson Electric Power Company Transmission Vegetation Project	192	Thinning	2014
Canovas Thinning	636	Thinning	2006

The Wallow Fire in 2011 burned approximately 15,000 acres within the Luna Restoration Project. In 2016, two wildfires totaling 2,394 acres burned within the planning area.

On the Apache-Sitgreaves National Forests, there are 35,105 acres of vegetation improvement, thinning, and prescribed burning projects planned. A recent decision was signed for the 68,000-acre West Escudilla Restoration Project, which includes thinning trees and prescribed fire on the Alpine and Springerville ranger districts along the New Mexico-Arizona state line. In addition, hazardous fuels reduction work occurring on private lands within and adjacent to the project area.

Cumulatively, these activities result in reductions in fire behavior potential to a greater degree than described in the effects of the action alternatives. Activities discussed would cumulatively break up fuel continuity (surface, ladder, and crown fuels) across the landscape. These combined activities would greatly facilitate restoring and sustaining ecological processes in fire-dependent ecosystems and move vegetation and fuel conditions toward their historic frequent low- to mixed-severity fire regimes. These combined treatments would complement the purpose and need goals for fire and fuels management by reducing the impact of high-severity fire on private inholdings, communities, infrastructure, cultural resources and livelihoods within the planning area. It would also support the reintroduction of fire into fire-dependent ecosystems.

Past wildland fire events and management activities have affected the landscape and would continue into the future. The existing condition was influenced by events including; wildfires, fire suppression, fire exclusion, insects and disease, prescribed burning and past timber management activities.

The effects of future wildland fires in the analysis area was not analyzed in detail because it is impossible to predict when and where a wildfire may occur in the future, or the subsequent effects of that fire.

## Wildlife

Species assessed for this project include:

- federally listed endangered, threatened, or proposed (Forest Service Manual 2672.4), and designated critical habitat for these species
- Region 3 regional forester sensitive species (Forest Service Manual 2670.5)
- Gila National Forest management indicator species as listed in the Gila forest plan as amended (1986)
- migratory bird species that occur within the planning area.

## Federally Listed Species

The U.S. Fish and Wildlife Service county list of endangered and threatened species were reviewed to determine the federally listed species that would need to be considered in this evaluation. Table 47 lists the threatened and endangered species and their critical habit, if applicable, that may be within the planning area. Consultation was formally initiated on June 4, 2018, and amended on September 18, 2018 for the newly discovered New Mexico meadow jumping mouse.

The following species were analyzed and found to have no effect from the Luna Restoration Project: least tern (endangered), yellow-billed cuckoo (threatened, and designated critical habitat), Chiricahua leopard frog (threatened, and designated critical habitat), Gila trout (threatened), and Zuni fleabane (threatened). The no effect determinations were due to not being present in the project area.

**Table 47. Summary of federally listed species (endangered, threatened, and experimental) within Catron County and within the Luna planning area**

Scientific Name	Common Name	Status	Critical Habitat
<i>Canis lupus baileyi</i>	Mexican gray wolf	Endangered Experimental	Not applicable
<i>Strix occidentalis lucida</i>	Mexican spotted owl	Threatened	Yes
<i>Empidonax traillii extrimus</i>	Southwestern willow flycatcher	Threatened	Yes
<i>Thamnophis rufipunctatus</i>	Narrow-headed gartersnake	Threatened	Proposed
<i>Zapus hudsonius luteus</i>	New Mexico meadow jumping mouse	Endangered	Not applicable <sup>1</sup>
<i>Tiaroga cobitis</i>	Loach minnow	Threatened	Yes
<i>Meda fulgida</i>	Spikedace	Threatened	Yes

<sup>1</sup>There is designated critical habitat for New Mexico meadow jumping mouse, but none is located within or adjacent to the planning area.

## Mexican Gray Wolf

The Mexican gray wolf is in the process of being reintroduced on the Gila National Forest in New Mexico and on the Apache-Sitgreaves National Forest in Arizona. These wolves have been designated as a nonessential experimental population, pursuant to section 10(j) of the Endangered Species Act as amended.

Re-introduced wolves have been located periodically in the planning area. Multiple wolf packs have used the area for denning and single wolves have been detected moving through the area. The planning area has suitable habitat for hunting and reproducing for the Mexican gray wolf. Key prey species, elk and deer, for the wolf are present in the planning area.

## *Environmental Consequences*

### **Alternative A**

Under alternative A, no project activities would be implemented; therefore, there would be no effect to the Mexican gray wolf in addition to the ones from currently permitted activities.

### **Effects Common to Alternatives B, C, and D**

As defined in the Endangered Species Act section 10 (j) rule for the Mexican gray wolf, “disturbance causing land use activity” means any land use activity that the U.S. Fish and Wildlife Service determines could adversely affect reproductive success, natural behavior, or survival of Mexican gray wolves. The following activities are specifically excluded from this definition under the Endangered Species Act section 10 (j) rule for the Mexican gray wolf:

- legally permitted livestock grazing and use of water sources by livestock
- livestock trailing or drives (only if no reasonable alternative route exists)
- vehicle access over established roads to private property and to areas on public land where legally permitted (only if no reasonable alternative route exists)
- use of lands within the national park or national wildlife refuge systems as safety buffer zones for military activities
- prescribed fire and associated management actions (except in the vicinity of wolf release pens)
- any authorized, specific land use that was active and ongoing at the time wolves chose to locate a den or rendezvous site nearby

Project activities would not preclude occupancy of the area by the Mexican gray wolf. Human disturbance to the Mexican gray wolf as a result of the proposed activities at this time seems unlikely. However, there have been documented wolf dens in the project area. If wolves are found denning during implementations of projects, the Quemado Ranger District staff will coordinate with the Mexican gray wolf field team to minimize or eliminate adverse effects to denning activities.

The decommissioning of roads across the planning area will decrease habitat fragmentation for both the wolf and native ungulates. Implementation of the alternatives may indirectly affect wolves through disturbance to their primary prey base, native ungulates like elk and deer. Activities may cause native ungulates to move temporarily to other locations or further from denning locations, therefore resulting in greater distances to forage.

One of the goals of this project is to improve wildlife habitat conditions through improving browse components for wild ungulates. In the short term, while vegetation is responding to treatments, the change to native ungulates may be relatively undetectable. Compared to the potential long-term benefits to native ungulates and the wolf prey base.

**Rationale for determination:** Under all action alternatives, disturbance to potential denning sites are minimized through avoidance or other features developed in coordination with the field team in relation to the activity being implemented. There are beneficial effects to the species and its habitat through reduction of habitat fragmentation through road decommissioning and improvement of native ungulate (prey species) habitat. A determination of “not likely to jeopardize” is made for all action alternatives.

### Mexican Spotted Owl

The Luna Restoration Project is located in the Upper Gila Mountains Recovery Unit/Ecological Management Unit. Primary constituent elements of Mexican spotted owl critical habitat are high basal area (square footage of trunk) of large-diameter trees; moderate to high canopy closure; wide range of tree sizes (uneven-age stands); multilayered canopy with large overstory trees of various species; high snag basal area; high volumes of fallen trees and other debris; high plant species richness, including hardwoods; adequate levels of plant cover to maintain fruits, seeds, and regeneration to provide for the needs of Mexican spotted owl prey species within mixed conifer, pine-Gambel oak, and riparian forest types.

Currently, Mexican spotted owl habitat on the Gila National Forest is managed according to the direction in the Gila forest plan, which was amended by elements of the 1995 recovery plan for the Mexican spotted owl. With two exceptions, current forest plan direction will be followed. Mexican spotted owl habitat discussed in this report are analyzed using the current forest plan and two project-specific amendments to the forest plan from the 2012 Mexican spotted recovery plan. These two amendments will be as follows:

- 1995 Mexican spotted owl recovery plan precludes cutting conifers in the protected activity centers. This amendment will follow the 2012 Mexican spotted owl recovery plan and allow cutting conifers in protected activity centers, while leaving a 100-acre core area untreated in the protected activity center. A fire risk analysis was done showing the potential for high-intensity wildfire that could severely affect protected activity centers.
- 1995 Mexican spotted owl recovery plan, as incorporated and amended into the forest plan allows for treating up to 10 percent of protected activity centers in a recovery unit. This amendment will follow the 2012 Mexican spotted owl recovery plan to allow for more treatments in protected activity centers.

Within the Luna Restoration Project boundaries, there are 64,293 acres of designated Mexican spotted owl critical habitat. Approximately 17,003 acres are within protected activity centers. Outside protected activity centers, 6,984 acres have been identified as protected habitat under the 1995 recovery plan consisting of mixed conifer (4,725 acres of slopes greater than 40 percent) and ponderosa pine-Gambel oak (2,259 acres of slopes greater than 40 percent). There is approximately 21,816 acres of restricted habitat consisting of mixed conifer (3,018 acres), riparian (784 acres), and ponderosa pine-Gambel oak (18,014).

For the Mexican spotted owl, reducing risk of high-intensity wildfire and reintroducing a fire regime into the ecosystem to maintain fuel loadings at a low level is desirable. The desired future

conditions in areas identified as habitat for Mexican spotted owl include reduction of risk of high-intensity wildfire while maintaining key habitat components.

Within the acres of protected activity centers, “prescribed burning only” treatment is proposed on approximately 8,399 acres and an additional 1,319 acres treated with a combination of prescribed burning, thinning, and associated slash treatments to reduce fire risk. Approximately 31 percent (1,489 acres) of mixed conifer protected (potential recovery) habitat and 19 percent (428 acres) of ponderosa pine-Gambel oak protected habitat would be managed toward threshold habitat conditions within the Luna Restoration Project area. Twenty-nine percent (1,212 acres) of mixed conifer restricted (potential recovery) habitat, and 5 percent (1,033 acres) of ponderosa-Gambel oak restricted (potential recovery) habitat will be designated to be managed toward threshold habitat conditions.

Outside protected activity centers, of the 25,058 acres of restricted (potential recovery) habitat associated with the project, 923 acres have prescribed burning proposed. Within the restricted or recovery habitat associated with the Luna Restoration Project area, treatment of these areas will be managed to promote the primary constituent elements for nesting, roosting, foraging, and dispersing. The remaining 24,135 acres of Mexican spotted owl restricted or recovery habitat will be managed according to the Mexican spotted owl recovery plan recommendations that call for management of the landscape to maintain and create replacement owl habitat, while providing a diversity of stand conditions and stand sizes across the landscape.

Other activities associated with the Luna Restoration Project in Mexican spotted owl protected activity centers include 6.2 miles of road decommissioning, 0.9 mile of fence construction, 1.2 miles of pipeline, 0.1 mile of a trail reroute (with culvert) to eliminate 2 stream crossings, and 1 well with storage and drinkers. In Mexican spotted owl designated critical habitat, other activities would include 47.2 miles of road decommissioning, 2.0 miles of temporary roads for thinning activity access, 4.5 miles of pipeline, 1.1 miles of fence, 0.1 mile of a trail reroute (with culvert) to eliminate 2 stream crossings, 5 wells with storage and drinkers, hardening of 2 stream crossings, 1 French drain sediment structure, and 1 trail barrier to prevent motorized use.

### *Environmental Consequences*

#### **Alternative A**

Taking no action would have no effect to Mexican spotted owls in addition to the ones from currently permitted activities, but the habitat would continue to be at risk of being impacted by wildfires.

#### **Effects Common to Alternatives B, C, and D**

All activities in Mexican spotted owl protected activity centers will be performed outside of the breeding season (March 1 to August 31). If activities need to be done during the breeding season, survey protocols would be implemented to determine if there are owls present or are not breeding before work is allowed to proceed. All activities in Mexican spotted owl habitat are subject to the forest plan amendment in regards to not treating more than 25 percent of a 6<sup>th</sup>-code watershed in a 3-year period, which may be adjusted as monitoring dictates.

Mechanical and hand thinning are proposed in Mexican spotted owl habitat. Thinning trees less than 9 inches in diameter at breast height would reduce basal area in protected activity centers, which in turn would reduce thermal properties. Thinning trees less than 9-inches in protected activity centers would allow the remaining trees to grow at a more rapid pace, increasing the

percentage of basal area in the larger trees. Thinning in designated restricted or recovery habitat, the threshold would be managed to obtain levels of 150 basal area in ponderosa pine-Gambel oak, and 150 to 170 basal area in mixed conifer. Proposed treatments in protected and restricted habitats would help restore the forest to a fire-adapted ecosystem, lessening the probability of a damaging wildfire. The treatments in protected and restricted habitats would leave appropriate percentages for meeting primary constituent elements in the future. Thinning would allow herbaceous plants to establish, providing a food source for prey species. Human activity and noise associated with chainsaws or other mechanized equipment could disturb nesting owls. Performing these actions outside the breeding season will prevent disturbing nesting owls. The potential for vehicles to collide with owls has a very low possibility. This would be minimized due to motorized activity would be occurring during daylight hours when owls are less likely foraging.

Prescribed fire in Mexican spotted owl protected activity centers and designated critical habitat is proposed to be low intensity. This low intensity would remove excess fuels from the forest floor, raising the low-live limb on remaining trees, thus reducing the threat of devastating wildfire to Mexican spotted owl habitat. Some snags might burn up during implementation, while others may be created to take their place. Removing some of the fuels from the forest floor, would allow herbaceous plants to establish, providing additional food sources for prey species. Smoke from prescribed burning might cause owls to leave the nest, possibly putting nestlings at risk. Human activity and noise associated with chainsaws or other mechanized equipment could disturb nesting owls. Implementing these actions outside the breeding season will prevent disturbances to the owls.

Long-term effects would include a reduction of fuel loading which would lessen wildfire intensities, and thinning and prescribed fire would allow for healthier habitat.

For all other proposed treatments, noise and human presence may disturb individual owls, movement of prey species, or modify habitat components for either the owl or their prey species within critical habitat. Activities such as maintenance of sediment control features, road decommissioning, stream and riparian projects within critical habitat would improve and restore habitat conditions and improve watershed conditions. These activities would cause short-term impacts, but there would be long-term benefits to habitat for both Mexican spotted owl and its prey species as areas stabilize and recover.

### **Alternative C – Herbicide Utilization**

Herbicide treatments are proposed on approximately 1,270 acres of designated critical habitat for the Mexican spotted owl in conjunction with thinning of juniper. Treating juniper with herbicide would reduce competition with ponderosa pine and mixed conifer species, which in turn would allow for more rapid growth. Reducing juniper would reduce feed for prey species. The Environmental Protection Agency states, “When used properly, pesticides can play a valuable role in controlling weeds, insects, and other pests. On the other hand, they can harm wildlife if the user does not follow label directions.” (Environmental Protection Agency 2018). Herbicide manufacturers produce label processes on application to prevent effects to general wildlife. Manufacturer labels will be followed to prevent effects to Mexican spotted owls and their prey. Human activity and noise associated with mechanized equipment could disturb nesting owls. Performing these actions outside of the breeding season will prevent disturbance to nesting owls.

**Cumulative Effect:**

Short-term cumulative impacts are anticipated to come from reduced basal area in protected activity centers and a reduction in snags, with ongoing activities coupled with proposed projects. Projects that will decrease basal area short term include thinning conifers (less than 9 inches diameter) in protected activity centers and prescribed fire. Prescribed fire would also reduce snags. Over time, the cumulative impacts from lowered basal area and fewer snags would improve. This improvement would occur because the implementation of these projects are projected to accelerate growth in remaining trees, and prescribed fire would create new snags.

**Rationale for determination:** Thinning and burning activities associated with the Luna Restoration Project will reduce basal area in protected activity centers during the short term (but not drop below threshold values) and will adjust the structure and thermal characteristics. Reducing fuel loading in designated critical habitat could impact prey species in the short term. Reducing juniper could reduce food sources for prey species. Performing actions outside the breeding season or after confirming non-breeding status will prevent disturbing nesting owls. Core areas of 100 acres have been identified, and will not receive mechanical treatment and will not have prescribed fires ignited within them. Modeling has shown thinning treatments in protected activity centers would increase the growth in larger-diameter trees, which in turn would increase the basal area in the larger size classes over the long term.

The Luna Restoration Project would reduce habitat needs in protected activity centers in the short term, but improve conditions in the long term; therefore, the Luna Restoration Project may affect, likely to adversely affect the Mexican spotted owl.

Treatments in designated critical habitat would align with the forest plan, which complements the 1995 Mexican spotted owl recovery plan; therefore, the Luna Restoration Project may affect, likely to adversely affect the designated critical habitat for the Mexican spotted owl.

**Southwestern Willow Flycatcher**

The southwestern willow flycatcher is federally listed and a migratory bird species.

*Environmental Consequences*

**Alternatives A, B, C, and D**

There will be no effect to the species due to southwestern willow flycatchers not being observed within the project area for the last 10 years. Also, the designated critical habitat within the planning area does not contain the primary constituent elements to support the birds.

*Designated Critical Habitat*

There are 208 acres of designated southwestern willow flycatcher critical habitat within the planning area, located along the San Francisco River. The designated critical habitat does not contain the primary constituent elements to support southwestern willow flycatchers. Willow species are in small quantities and not densely grouped. Tree canopy does not fall within the density range of 50 percent to 100 percent. Also, the area does not have open water or marsh openings meeting the one-quarter-acre minimum size.

**Alternative A**

There will be no effect to southwestern willow flycatcher critical habitat, in addition to the ones from currently permitted activities, due to no activities being implemented under this alternative.

### **Effects Common to Alternatives B, C, and D**

No impacts would occur to critical habitat with the implementation of vegetation and prescribed burning treatments and herbicide utilization under alternative C. By applying the design feature of buffering the critical habitat from project implementation activities, no treatments would occur within critical habitat. Therefore no changes to the habitat constituents or vegetation would be altered.

The following activities would occur within critical habitat: construction of new road crossing in Head of Ditch campground, applying rock to roads within Head of Ditch campground, irrigation ditch diversion construction, road decommissioning, and stream restoration activities within San Francisco River and Stone Creek.

The irrigation ditch construction and campground new road stream crossing would remove riparian vegetation during implementation altering the vegetative components in the critical habitat at those specific locations. Those areas would be permanently void of vegetation. The placement of a permanent diversion structure compared to the multiple disturbances to the stream channel from maintenance of the earthen diversion berm; provides an opportunity for the banks to stabilize and over the long term allow recruitment and establishment of vegetation.

Approximately 0.2 mile of road that runs along and crosses the San Francisco River would be decommissioned under the action alternatives. Road decommissioning and other stream restoration activities within critical habitat would cause short-term disturbances but in the long term would have improved stream habitat components and an increase in riparian through planting and natural recruitment.

The removal of riparian vegetation and short-term disturbances from other stream restoration activities and decommissioning within designated critical habitat would be insignificant and discountable. These sites are small and localized but have the potential to provide long-term benefits, although the benefits would not greatly improve or change the primary constituent elements of the critical habitat. Project activities may affect, likely adversely affect the designated critical habitat.

### **Narrow-Headed Gartersnake**

The narrow-headed gartersnake is federally listed as a threatened species. Critical habitat for the narrow-headed gartersnake is proposed. There are approximately 2,781 acres of proposed critical habitat in the Luna planning area located on the San Francisco River and Dry Blue Creek.

Surveys for narrow-headed gartersnake were conducted at the Head of the Ditch campground along the San Francisco River (July 25–28, 2016). None of these species were caught or observed during the survey. Also, very few prey fish were caught. During the surveys, other terrestrial and checkered gartersnakes were found.

### *Environmental Consequences*

#### **Alternative A**

There will be no effect to the narrow-headed gartersnake and its proposed critical habitat, in addition to the ones from currently permitted activities, due to no activities being implemented under this alternative.



### **Effects Common to Alternatives B, C, and D**

The risk of impacts would be minimized to the narrow-headed gartersnake and its proposed critical habitat with the implementation of vegetation and prescribed burning treatments and herbicide utilization under alternative C. By applying the design feature of buffering the proposed critical habitat from project implementation activities, no treatments would occur within proposed critical habitat, therefore no disturbance to the stream or shoreline habitat would be altered.

The following activities would occur within proposed critical habitat: construction of new road crossing in Head of Ditch campground, applying rock to roads within Head of Ditch campground, irrigation ditch diversion construction, road decommissioning, hardening of motorized trail crossings in Dry Blue Creek, and variety of stream restoration activities within San Francisco River and Dry Blue Creek.

During the implementation of these activities, the potential risk to gartersnakes is being harassed by human presence and various machinery sounds or vibrations or crushed between rocks as material is moved or run over by vehicles. Implementation could generate fine sediment impacting proposed critical habitat and also prey species habitat. This is expected to be a short-term impact.

The placement of the irrigation ditch diversion would continue to alter natural flows during periods of irrigation water usage, but reduces fine sediment input and habitat disturbances that result from the multiple entries to maintain the earthen diversion berm. Some fine sediment would still be produced during periodic clean out of the sediment trap but to a lesser degree than previous activities.

The irrigation ditch construction and the new road-stream crossing in the campground would remove riparian vegetation during implementation, altering the vegetative components along the shoreline of the proposed critical habitat at those specific locations. Those areas would be permanently void of vegetation.

Approximately 0.2 mile of road that runs along and crosses the San Francisco River would be decommissioned under the action alternatives. Road decommissioning and other stream restoration activities within proposed critical habitat would cause short-term disturbances but in the long term would have improved stream habitat components and an increase in riparian through planting and natural recruitment.

The removal of riparian vegetation and short-term disturbances from other stream restoration activities and decommissioning within proposed critical habitat would be insignificant and discountable. These sites are small and localized, but have the potential to provide long-term benefits. Surveying for the two gartersnake species prior to implementation and applying buffer around habitat will reduce the risk of disturbance and harm. Project activities may affect, not likely adversely affect the narrow-headed gartersnake and may affect, likely to adversely affect its proposed critical habitat.

### **Spikedace**

Spikedace is federally listed as a threatened species. Critical habitat has been designated and designation included both spikedace and loachminnow.

The Luna Restoration Project will have no effect to spikedace under alternative A. Spikedace have not been found occupying streams within the planning area and closest they have been

detected is 16 miles downstream in the Blue River. Effects to spokedace and its designated critical habitat will be discussed with loachminnow.

### **Loachminnow**

Loachminnow is federally listed as a threatened species. Critical habitat has been designated and designation included both spokedace and loachminnow.

Loachminnow have been found within Dry Blue Creek but have not been found in the since the Wallow Fire in 2011. It is thought that after the fire, ash, debris, and sediment entering the system impacted the fish and its habitat (personal communication: Dustin Myers, fish biologist and Jerry Monzingo, wildlife program manager, Gila National Forest). Loachminnow are located approximately 2 miles downstream of the planning boundary on the San Francisco River.

### ***Environmental Consequences***

#### **Alternative A**

Under the no-action alternative, there would no effect from project activities to loachminnow or to designated critical habitat for spokedace and loachminnow, in addition to the ones from currently permitted activities. The risk of the loachminnow and the designated critical habitat being impacted by wildfires would continue.

#### **Effects Common to Alternatives B, C, and D**

On the San Francisco River, loachminnow and the spokedace and loachminnow designated critical habitat would be indirectly impacted from project activities related to vegetation treatments, prescribed fire, road decommissioning, and stream and riparian treatments. Impacts would primarily relate to runoff of sediment or ash from upland sources or sedimentation directly related to activities within the stream channels. Implementation of design features and best management practices will reduce the amounts of material entering the system and flowing downstream. Compared to alternative A, the amount of sediment, ash, and debris would be much less than the potential impacts after a wildfire.

Within Dry Blue Creek, loachminnow and the designated critical habitat would be directly and indirectly impacted from project activities. As in the San Francisco River, vegetation treatments, prescribed fire, and some stream and riparian treatments may introduce sediment, ash, or debris causing indirect impacts to loachminnow and the critical habitat. Hardening of motorized crossings and stream and riparian projects will have direct impacts. If fish are present, there is a risk of being crushed while rocks are being moved or by equipment driving across the channel. Fine sediment would be suspended for a short while during work; the sediment could impact fish and fill or cover habitat niches for the fish or its prey species. Spokedace may receive some amount of sediment from implementation of these projects.

The impacts would be minimized with the application of the design feature to survey prior to implementing instream activities. If fish are found, they would be captured and held upstream or off-site until work is completed. Also if fish are detected, block nets would be set-up to keep fish from entering the active work site.

Project activities will cause short-term negative impacts to loachminnow and spokedace and loachminnow critical habitat. Stream, riparian, and hardening crossings activities, and reducing the risk sedimentation, ash, and debris from uncharacteristic wildfires through vegetation and prescribed fire, will provide long-term benefits to the species and habitat. The project will result

in a may affect, likely to adversely affect to the loachminnow and to designated critical habitat for loachminnow, and no effect to the spikedace, with a may affect, likely to adversely affect its designated critical habitat.

### **New Mexico Meadow Jumping Mouse**

The New Mexico meadow jumping mouse is federally listed as an endangered species. There is no designated critical habitat located in the planning area. There have been mice found along or adjacent to Dry Blue Creek.

On July 3, 2018, two jumping mice were found drowned in minnow traps while surveying for narrow-headed gartersnakes. Surveys for the New Mexico meadow jumping mouse were conducted along Dry Blue Creek (September 5–8, 2018). No jumping mice were caught during this survey attempt, and very few other rodents were detected.

### ***Environmental Consequences***

#### **Alternative A**

There will be no effect in addition to the ones from currently permitted activities to the New Mexico meadow jumping mouse due to no activities being implemented under this alternative.

#### **Effects Common to Alternatives B, C, and D**

The risk of impacts would be minimized to the New Mexico meadow jumping mouse with the implementation of vegetation and prescribed burning treatments and herbicide utilization under alternative C. By applying the design feature of implementing projects outside of the active season, there would be little risk of mortality to the jumping mouse.

The following activities would occur within suitable habitat: road decommissioning, hardening of motorized trail crossings in Dry Blue Creek, and a variety of stream restoration activities along Dry Blue Creek.

During the implementation of these activities, the potential risk to jumping mice is losing some riparian vegetation habitat in the long term. Project implementation would occur outside of the active season to reduce risks to jumping mice.

Road decommissioning and other stream restoration activities within suitable habitat would cause short-term disturbances but in the long term would have improved stream habitat components and an increase in riparian through planting and natural recruitment.

The removal of riparian vegetation and short-term disturbances from other stream restoration activities and decommissioning within suitable habitat would be small in scale and short in duration. These sites are small and localized, but have the potential to provide long-term benefits. Surveying for the jumping mouse prior to implementation and applying buffer around habitat will reduce the risk of disturbance and harm. Project activities may affect, not likely adversely affect the New Mexico meadow jumping mouse.

## Region 3 Sensitive Species

Sensitive species are defined as “those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by: (a) significant current or predicted downward trends in population numbers or density, or (b) significant current or predicted downward trends in habitat capability that would reduce a species’ existing distribution (Forest Service Manual 2670.5(19)).”

### Environmental Consequences

#### *Alternative A*

Under alternative A, there would be no activities implemented; therefore, there would be no risk of disturbance and therefore no impact to any Region 3 sensitive species. Risk of disturbance from ongoing activities and risk of wildfire would continue.

#### *Effects Common to Alternatives B, C, and D*

The following Region 3 sensitive species occur or may occur within the Luna planning area:

- northern goshawk
- burrowing owl
- common blackhawk
- American peregrine falcon
- bald eagle
- gray vireo
- desert sucker
- Rio Grande sucker
- pale Townsend’s big-eared bat
- Gunnison’s prairie dog
- Allen’s lappet-browed bat
- Arizona montane vole
- Arizona gray squirrel
- Goodding’s onion
- villous groundcover milkvetch
- Mogollon clover

Implementation of the Luna Restoration Project activities results in a determination for each of these species: may impact individuals or habitat, but will not likely contribute to trend toward federal listing or loss of viability.

In general, the fauna species may be impacted from the increase in human presence and equipment use and noise. This may cause a change in the species behavior and if applicable, its prey base. Prey species may move away from areas of work causing increased forage distances or times. If species forage on vegetation or seeds, these sources may be reduced from vegetation and prescribed fire treatments. Noise effects will be of short duration, but vegetation and prescribed fire effects may be longer. Overall, in the long term vegetation conditions would improve.

Currently northern goshawk habitat within ponderosa pine cover type is departed from desired conditions. Modeling of the treatments within the ponderosa cover type shows that the vegetation structural stages after 1 year post-harvest begin to move toward desired conditions over 20 years (see Vegetation section of this chapter), displaying the potential for treatments to improve habitat conditions for the goshawk.

If any of the sensitive plants species are found during project implementation, they will be avoided, removing the risk of any disturbance. The risk of disturbance to these plant species include such things as being crushed, pulled from the ground, or habitat changes from vegetation

or prescribed fire treatments resulting in unfavorable conditions for survival. In the long term, restoration activities would improve conditions and depending on the species has the potential of increasing preferred habitat types.

## **Management Indicator Species**

Management indicator species are identified in the Gila National Forest Plan as amended (USDA Forest Service 1986). Management indicator species are addressed in order to implement National Forest Management Act regulations. They are selected because their population changes are believed to indicate the effects of management activities (36 CFR 219.19(a) (1)). The management indicator species approach is designed to function as a means to provide insight into effects of forest management on plant and animal communities. Species are selected to represent several categories, such as commonly hunted or fished species, non-game species, and threatened and endangered species. They may be used as a tool for assessing changes in specialized habitats, formulating habitat objectives, and establishing standards and guidelines to provide for a diversity of wildlife, fish, and plant habitats.

The Gila forest plan amendment #10 for management indicator species amended the management indicator species list for the Gila National Forest to represent the major vegetation types potentially affected by management actions. Table 48 identifies the management indicator species for the Gila National Forest and rationale for including or eliminating them from the Luna Restoration Project analysis.

### **Mule Deer**

The mule deer is a management indicator species for desert shrub, piñon-juniper shrub, and shrub oak woodland communities. However, there can be other limiting factors to deer population levels other than vegetative conditions. New Mexico's climate and weather patterns are extremely important to deer survival. Periods of significant rainfall produce ample forage and vegetative cover, which improves fawn survival. However, harsh winters or prolonged periods of drought can have devastating effects on fawn survival and overall deer numbers. Other limiting factors such as lack of water, predation, and competition with other species also contribute to the decreasing trend in the mule deer population. The New Mexico Department of Game and Fish manages mule deer populations through annual hunting permits, which also affects population levels. The department is currently striving to achieve increased deer survival, and higher population numbers.

The Luna Restoration Project proposes to treat piñon-juniper, ponderosa pine, and associated grasslands within the project area utilizing a variety of methods. Primary objectives of this project are to improve watershed condition, wildlife habitat, and to reduce accumulated fuels. The desired condition is restored grasslands and more open and healthier forests having a mix of tree species and tree sizes. Uneven aged structural characteristics having low to moderate tree densities are desirable throughout the area. These structural characteristics are important to mule deer because they provide forage that are readily available, critical winter range, and travel corridors.

**Table 48. Gila National Forest management indicator species with associated habitat type and rationale for including or excluding from analysis**

Management Indicator Species	Vegetation Type	Analysis (Yes/No)	Rationale for Elimination or Inclusion
Mule deer ( <i>Odocoileus hemionus</i> )	Desert shrub, piñon-juniper, shrub oak woodland communities	Yes	Habitat exists for this species
Mearn's quail ( <i>Cyrtonyx montezumae mearnsi</i> )	Plains and mountain grassland communities	Yes	Habitat exists for this species
Long-tailed vole ( <i>Microtus longicaudus</i> )	Wet meadows and wetlands	Yes	Habitat exists for this species
Beaver ( <i>Castor canadensis</i> )	Low and mid elevation riparian areas	Yes	Habitat exists for this species
Plain [Juniper] titmouse ( <i>Baeolophus ridgwayi</i> )	Piñon-juniper and shrub oak woodlands	Yes	Habitat exists for this species
Hairy woodpecker ( <i>Picoides villosus</i> )	Ponderosa pine and mixed conifer snag component	Yes	Habitat exists for this species
Mexican spotted owl ( <i>Strix occidentalis lucida</i> )	Mixed conifer community	Yes <sup>1</sup>	Habitat exists for this species
Black hawk ( <i>Buteogallus anthracinus anthracinus</i> )	Riparian habitat at low and mid elevations	Yes <sup>2</sup>	Habitat exists for this species
Northern goshawk ( <i>Accipiter gentiles</i> )	Ponderosa pine community	Yes <sup>2</sup>	Habitat exists for this species
Gila trout ( <i>Oncorhynchus gilae</i> )	Riparian habitat at high elevations	No	Habitat for this species does not exist in the planning area. San Francisco River and its tributaries are not considered for recovery areas for Gila Trout. Currently there is no plan to re-establish Gila Trout in perennial streams within the planning area.
Rio Grande cutthroat ( <i>Oncorhynchus clarki virginalis</i> )	Riparian habitat at high elevations	No	Habitat for this species does not exist in the planning area. Also, the planning area is not within the historical range of the species.

<sup>1</sup> Analysis for Mexican spotted owl is located under the "Federally Listed Species" section of this document.

<sup>2</sup> Analysis for black hawk and goshawk are located under "Region 3 Sensitive Species" section of this document.

### Alternative A

Under alternative A, no treatments would be implemented within associated vegetation types; therefore, there would be no impact to mule deer population from this project.

### Effects Common to Alternatives B, C, and D

For all treatment activities, the presence of human activity and mechanized equipment use and noise could disturb mule deer foraging, distribution patterns, and rearing of young. These disturbances would be over short periods. Treatments would not occur within the various mule deer habitat at the same time, therefore providing the opportunity to utilize other areas without disturbances to the species or its habitat. Disturbances to mule deer from each treatment activity would be short term.

**Mechanical Thinning and Hand Thinning:** The result of the mechanical treatments, such as slash on the ground, ground disturbance, and piles, could disrupt the available forbs for deer for a short period of time.

**Prescribed Burning:** The project will have fire take place on all units but not at the same time. This could result in a short-term disturbance to the mule deer. Fire can effectively alter vegetation structure and composition thereby affecting foraging habitat. The short-term effects of fire are likely to be unfavorable as plant foraging species are initially being reduced; however, mule deer have long evolved with fire and the long-term effects of prescribed fire will help reduce devastating wildfire and would improve foraging habitat.

**Sediment Control:** Installing and maintaining sediment control features would create a short-term disturbance to foraging mule deer through noise and human presence. These activities are spaced out across the project area and would not all occur at the same time, giving mule deer opportunities to utilize other areas in the project.

**Road and All-terrain Vehicle Trail:** Installing user-proposed routes and decommissioning roads would create a short-term disturbance to foraging mule deer through noise and human presence. These activities are spaced out across the project area and would not all occur at the same time, giving mule deer opportunities to utilize other areas in the project. Decommissioning roads would reduce habitat fragmentation, and increase forage where bare dirt currently exists.

**Fences and Water Improvement:** Installing fences and water improvements would create a short-term disturbance to foraging mule deer through noise and human presence. These activities are spaced out across the project area and would not all occur at the same time, giving mule deer opportunities to utilize other areas in the project. Water improvements would improve habitat for deer, allowing them to forage in previously un-watered areas.

**Summary of Effects:** Short-term disturbances will occur during implementation through human presence and reduction of forage. Long-term habitat conditions will improve.

#### *Alternative C – Herbicide Utilization*

Herbicide application would cause short-term disturbances to foraging mule deer through human presence. These activities are spaced out across the project area and would not all occur at the same time, giving mule deer opportunities to utilize other areas in the project. Forage would increase in the long term, due to decreased canopy closure. Manufacturer labels would be followed to prevent impacts to wildlife.

#### *Alternative D*

Not implementing the user-proposed routes would result in less habitat fragmentation to mule deer.

#### *Cumulative Effect:*

This project and the Escudilla West Project located in Arizona would increase short-term disturbances to foraging mule deer through thinning and prescribed burning. Both projects would lead to improved habitat conditions for mule deer in the long term. Livestock grazing activities, fuelwood collection, road maintenance, and recreation activities could increase disturbance to foraging mule deer.

### *Determination of Impact to the Species*

Foraging would be disrupted in the short term, but there would be long-term improvement of habitat conditions for this species. For alternatives B, C, and D, individuals may be affected, but at the forest level, the activities proposed under these alternatives would not adversely affect population trends on the Gila National Forest.

### **Mearn's (Montezuma) Quail**

The Mearn's quail was picked as a management indicator species for plains and mountain grassland communities because good Mearn's habitat reflects the herbaceous conditions in these communities that the Gila National Forest is striving to attain and maintain; based on the types of management that is occurring today under the direction of the forest plan.

There can be other limiting factors to Mearn's population other than vegetative conditions. Quail populations fluctuate from year to year for a number of reasons, primarily local weather conditions and predators. Limiting factors for quail populations include predation, habitat modification and annual precipitation. Annual population fluctuations are positively correlated with the amount of summer precipitation in any given year. The New Mexico Department of Game and Fish manages quail through annual small game hunting licenses. The species is hunted in New Mexico from November through February, which is another factor affecting Mearn's quail population levels.

Spatial arrangement of both grassland and woodland cover types is very important for this species due to its survival strategy, small home range, dispersal distances, and food habits. Adequate horizontal and vertical grass cover must be well distributed across the landscape to meet the cover needs of this species. Excessive cover removal can affect the species by limiting nest building habitat and escape cover.

### *Alternative A*

Implementing the no-action alternative would have no impact to Mearn's quail.

### *Effects Common to Alternatives B, C, and D*

**Mechanical Thinning and Hand Thinning:** Thinning would increase herbaceous plants in the long term, providing additional food sources for Mearn's quail. Some hiding and nesting cover could be removed, displacing Mearn's quail. Thinning activities would not occur across the entire project area at the same time. This gives Mearn's quail the opportunity to utilize other areas until treatments are done.

**Prescribed Burning:** The prescribed burn vegetative treatments would decrease forage and nesting and hiding cover in the short term. The project will have fire take place on the majority of the project area, but not at the same time. This would allow Mearn's quail to utilize other areas during implementation. Mearn's quail has long evolved with fire and the long-term effects of prescribed fire will help reduce devastating stand-replacing wildfire and would overall improve forage and nesting and hiding cover.

**Irrigation Ditch Diversion:** The diversion structure and associated road reroute do not occur in Mearn's quail habitat.



**Sediment Control:** Installing and maintaining sediment control features could reduce forage and nesting and hiding cover in the short term but would lead to better habitat conditions in the long term due to improved watershed conditions.

**Road and All-terrain Vehicle Trail:** Installing user-proposed routes could create habitat fragmentation, and a slight reduction in forage and nesting and hiding cover. Decommissioning roads would decrease habitat fragmentation, and lead to more forage and nesting and hiding cover in the long term. These activities are spaced out across the project area, and would not all occur at the same time, giving Mearn's quail opportunities to utilize other areas in the project.

**Fences and Water Improvement:** Installing fences and water improvements would not impact Mearn's quail and its habitat.

**Summary of Effects:** Forage and nesting and hiding cover will decrease over the short term. Forage and nesting and hiding cover will increase over the long term.

#### *Alternative C – Herbicide Utilization*

Utilizing herbicide on alligator juniper and rabbitbrush will create conditions that will allow herbaceous plants to establish, providing additional forage for Mearn's quail. Manufacturer labels will be followed in applying herbicide.

#### *Alternative D*

Not implementing the user-proposed routes would not increase habitat fragmentation, nor remove forage and nesting and hiding cover.

#### *Cumulative Effect:*

This project and the Escudilla West project located in Arizona would remove forage and nesting and hiding cover in the short term, but both are expected to improve habitat conditions in the long term. Livestock grazing activities, fuelwood collection, road maintenance, and recreation activities could decrease available forage and nesting and hiding cover for Mearn's quail.

#### *Determination of Impact to the Species*

Forage and nesting and hiding cover would be reduced in the short term but would increase in the long term. For alternatives B, C, and D, individuals may be affected, but at the forest level, the activities proposed under these alternatives would not adversely affect population trends on the Gila National Forest.

#### **Long-tailed Vole**

The long-tailed vole is an indicator of wet meadows and wetlands. Within the Gila National Forest, there are estimated 1,710 acres of wet meadows and wetlands. Distribution of the long-tailed vole across the Gila is likely to be larger than delineated wet meadow and wetland vegetation types because the species is also found in moist habitats and along the edges of spruce/fir vegetation and some mixed conifer habitats. On the Gila National Forest, the long-tailed vole has previously been found near Willow Creek in the Mogollon Mountains and in the Mimbres. More recently, surveys conducted by Frey (2005) included a number of additional observations. Long-tailed voles have a very small home range, generally less than 100 meters.

Devastating fire also has the potential to be a major impact on the long-tailed vole since fire within the spruce-fir/mixed-conifer landscape is often stand replacing and thus has dramatic and moderate duration effects to surrounding ecosystem.

#### *Alternative A*

Implementing the no-action alternative would have no impact to the long-tailed vole.

#### *Effects Common to Alternatives B, C, and D*

**Mechanical Thinning and Hand Thinning:** Limited thinning activities are anticipated to occur in long-tailed vole habitat. Long-tailed voles could be inadvertently crushed by humans or equipment during implementation. Thinning would reduce the threat for devastating wildfire surrounding long-tailed vole habitat, which could lead to habitat losing moisture. Loss of moisture could occur through increased sunlight and increased sediment.

**Prescribed Burning:** Prescribed burning would trend current vegetative conditions towards desired conditions. Moving towards desired conditions would improve watershed conditions, which in turn should allow moist conditions in long-tailed vole habitat.

**Irrigation Ditch Diversion:** The diversion structure and associated road reroute do not occur in long-tailed vole habitat.

**Sediment Control:** Sediment control structures do not occur in long-tailed vole habitat.

**Road and All-terrain Vehicle Trail:** Decommissioning roads could result in Long-tail voles being inadvertently crushed. Decommissioning roads would allow the areas to heal naturally and increase habitat. User-proposed routes do not occur in long-tailed vole habitat.

**Fences and Water Improvement:** Fences and water improvements do not occur in long-tailed vole habitat.

**Summary of Effects:** Long-tailed voles may be crushed during implementation. Long-tailed vole habitat would have a lower chance of being impacted by devastating wildfire.

#### *Alternative C – Herbicide Utilization*

Herbicide is proposed to be used to treat alligator juniper. Wet meadows will be buffered 300 feet, and no herbicide will be used in the buffer zone. Manufacturer labels will be followed to prevent impacts to wildlife.

#### *Alternative D*

Not implementing the user-proposed routes would have no impact to the long-tailed vole.

#### *Cumulative Effect*

This project and the Escudilla West project located in Arizona could inadvertently run over long-tailed voles. Both projects would lead to improved watershed conditions. Livestock grazing activities, fuelwood collection, road maintenance, and recreation activities could increase disturbance to long-tailed voles.

### *Determination of Impact to the Species*

Some long-tailed voles may be inadvertently crushed during implementation, but proposed activities will improve conditions in and surrounding habitat in the long term for this species. For alternatives B, C, and D, individuals may be affected, but at the forest level, the activities proposed under these alternatives would not adversely affect population trends on the Gila National Forest.

### **Beaver**

The beaver was selected as a management indicator species for the mid elevation riparian areas that occur in the project area.

Beaver are semiaquatic. They prefer streams and small lakes having nearby growths of willow, aspen, cottonwood, birch or alder. They often are thought of as the “engineers” of the animal kingdom, because they build dams, lodges, and canals. A dam provides an area of still, deep water where a lodge can be conveniently constructed and protected from terrestrial predators, and where building materials and food supplies can be easily floated and kept from being washed away. The impounded water may form ponds many hectares in area.

Beavers are active throughout the year. They feed on the bark, cambium, twigs, leaves, and roots of deciduous trees and shrubs, such as willow, alder, birch, and aspen, and on various parts of aquatic plants, especially the young shoots of water lilies. Beavers anchor sticks and logs underwater to feed on during winter.

North American beavers were among the most widely distributed of mammalian species. Beavers declined drastically in recent centuries, mainly because of excessive human hunting for their valuable pelts. By the early 1900s, only scattered and greatly reduced populations remained. Subsequent programs of regulated harvesting and transplantation have resulted in large-scale reestablishment of the beaver in many parts of the United States and Canada, though not always of the subspecies native to the areas involved.

Observations by Quemado District personnel and New Mexico Department of Game and Fish personnel indicate a drop in beaver population with fewer occupied sites. In part, this may be due to drought conditions that have reduced stream flow and pond retention below levels that are comfortable for beaver security. In addition, many watershed gradient control structures, when first built, provided habitat for beaver have now silted in. Silt catches in these structures decreased the potential reservoir below levels acceptable to beaver. Beaver continue to be trapped and relocated from private land and irrigation ditches to locations on Gila. Few of these relocations have resulted in permanent occupancy of new sites, probably due to the lower potential of the habitat present in these relocation sites.

### *Alternative A*

Implementing the no-action alternative would have no impact to the beaver.

### *Effects Common to Alternatives B, C, and D*

**Mechanical Thinning and Hand Thinning:** Thinning would increase the occurrence of human presence and could cause a disturbance to the beaver. The disturbances will be short term and will not occur across the entire project area at the same time.

**Prescribed Burning:** Prescribed burn vegetative treatments would increase the occurrence of human presence and could cause a disturbance to the beaver. The disturbances will be short term and will not occur across the entire project area at the same time. The short-term effects of fire are likely to be unfavorable as fire could potentially impact the riparian vegetation. The beaver has long evolved with fire and the long-term effects of prescribed fire will help reduce devastating stand replacing wildfire and would overall improve the riparian habitat.

**Irrigation Ditch Diversion:** The diversion structure and associated road reroute would remove some riparian vegetation and increase human presence that could disturb beaver. The vegetation removal is anticipated to be minimal and not have a noticeable impact to the beaver.

**Sediment Control:** Installing and maintaining sediment control features such as hardening stream crossings would create a short-term disturbance to beavers through human presence.

**Road and All-terrain Vehicle Trail:** Installing user-proposed routes and decommissioning roads would create a short-term disturbance to beavers through noise and human presence. These activities are spaced out across the project area and would not all occur at the same time.

**Fences and Water Improvement:** Installing fences and water improvements would not occur in beaver habitat.

**Summary of Effects:** Beavers will be disturbed from human presence and have a loss of some riparian vegetation in the short term during project implementation. Risk of devastating wildfire would be lowered in and around beaver habitat.

#### *Alternative C – Herbicide Utilization*

Herbicide is proposed to be used to treat alligator juniper. Human presence may disturb beavers. No live waters will be sprayed. Manufacturer labels will be followed to prevent impacts to wildlife.

#### *Alternative D*

Not implementing the user-proposed routes would have no impact to beaver.

#### *Cumulative Effect*

This project and the Escudilla West Project located in Arizona would increase disturbance to beaver, and would result in loss of riparian vegetation in the short term. Both projects would lead to improved habitat conditions for beaver in the long term. Livestock grazing activities, fuelwood collection, road maintenance, and recreation activities could increase disturbance to beaver and result in loss of riparian vegetation.

#### *Determination of Impact to the Species*

Some disturbance and loss of riparian vegetation in the short term, but will have improved habitat conditions in the long term for this species. For alternatives B, C, and D, individuals may be affected, but at the forest level, the activities proposed under these alternatives would not adversely affect population trends on the Gila National Forest.

#### **Plain [Juniper] Titmouse**

The plain [juniper] titmouse was selected as management indicator species for the piñon-juniper and shrub oak woodlands habitat found on the Gila National Forest.

Plain titmouse, also known as juniper titmouse, is a resident of deciduous or mixed woodlands, favoring oak and piñon-juniper. The plain titmouse inhabits evergreen trees in dry woodlands of the Southwest. It usually builds nests in natural cavities or old woodpecker holes, primarily in oak trees, but it is capable of excavating its own cavity in rotted wood. Current estimates of habitat indicate approximately 1,630,930 acres of piñon-juniper/shrub oak woodland on the Gila National Forest.

The juniper titmouse is omnivorous preferring insects, but uses fruits and seeds in the fall and winter. The species mates for life and defends territories year-round.

#### *Alternative A*

Implementing the no-action alternative would have no impact to the juniper titmouse.

#### *Effects Common to Alternatives B, C, and D*

**Mechanical Thinning and Hand Thinning:** Thinning would increase the occurrence of human activity, trucks and chainsaws for example, could cause a disturbance in the nesting and roosting of the juniper titmouse. Each of the disturbances will be short term and will not occur in all of the project area at once. This gives the juniper titmouse the opportunity to nest and roost in other areas until treatments are completed. The removal of snags that pose a hazard during implementation may also cause the temporary loss of some nesting habitat.

**Prescribed Burning:** The prescribed burn vegetative treatments would increase the occurrence of human activity and could cause a disturbance in the nesting and roosting of the juniper titmouse. The project will have fire take place on the majority of the project area but not at the same time. This could result in disturbance to the juniper titmouse. The short-term effects of fire are likely to be unfavorable as nesting and roosting species can initially be reduced. Fire activity has the potential to reduce the amount of snags in which the titmouse nests but prescribed burning could promote the hardening of other snags suitable for nesting and create new snags. The juniper titmouse has long evolved with fire and the long-term effects of prescribed fire will help reduce devastating stand-replacing wildfire and would overall improve nesting and roosting habitat.

**Irrigation Ditch Diversion:** The diversion structure and associated road reroute do not occur in juniper titmouse habitat.

**Sediment Control:** Installing and maintaining sediment control features would create a short-term disturbance to nesting and roosting for the juniper titmouse through noise and human presence. These activities are spaced out across the project area and would not all occur at the same time, giving the titmouse opportunities to utilize other areas in the project.

**Road and All-terrain Vehicle Trail:** Installing user-proposed routes and decommissioning roads would create a short-term disturbance to nesting and roosting for the juniper titmouse through noise and human presence. These activities are spaced out across the project area and would not all occur at the same time, giving the titmouse opportunities to utilize other areas in the project.

**Fences and Water Improvement:** Installing fences and water improvements would create a short-term disturbance to nesting and roosting for the juniper titmouse through noise and human presence. These activities are spaced out across the project area and would not all occur at the same time, giving the titmouse opportunities to utilize other areas in the project.

**Summary of Effects:** Snags will be removed, reducing habitat for the juniper titmouse. Short-term disturbances will occur during implementation. New snags are expected to be created through prescribed burning activities.

*Alternative C – Herbicide Utilization*

Herbicide would not affect snags utilized by the juniper titmouse, but may temporarily affect some food sources in the short term. Manufacturer labels would be followed to prevent impacts to wildlife.

*Alternative D*

Not implementing the user-proposed routes would have no impact to the juniper titmouse.

*Cumulative Effect*

This project and the Escudilla West Project located in Arizona would remove snags, but both are expected to create new snags in prescribed burning. Both projects would lead to improved habitat conditions for the juniper titmouse. Fuelwood collection and road maintenance could lead to more snag removal.

This project and the Escudilla West Project located in Arizona could impact the juniper titmouse through noise or human presence. Livestock grazing activities, fuelwood collection, road maintenance, and recreation activities could increase disturbance to the juniper titmouse, and result in more snag removal.

*Determination of Impact to the Species*

Since fire has the potential to increase the number of snags, there would be long-term improvement of habitat conditions for this species. For alternatives B, C, and D, individuals may be affected, but at the national forest level, the activities proposed under these alternatives would not adversely affect population trends on the Gila National Forest.

**Hairy Woodpecker**

The hairy woodpecker was selected as management indicator species for the ponderosa pine and mixed conifer forest snag component habitat found on the Gila National Forest.

It nests in holes dug mostly by the male in live or dead trees or shrubs, at an average height of 30 feet above ground. In most areas, it favors dying parts of live trees, especially where fungal heart rot has softened the heartwood. Limiting factors for the hairy woodpecker include predation and habitat modification. Snags (10 inches or more in diameter at breast height) and an average of five snags per hectare are assumed optimal for woodpecker reproduction, but may not be adequate for foraging. With over 1,341,662 acres of ponderosa pine and mixed conifer vegetation on the Gila National Forest, snag habitat is abundant for this species.

The hairy woodpecker is omnivorous, preferring insects but using fruits and seeds in fall and winter.

*Alternative A*

Implementing the no-action alternative would have no impact to the hairy woodpecker.

*Effects Common to Alternatives B, C, and D*

**Mechanical Thinning and Hand Thinning:** Thinning would increase the occurrence of human activity, trucks and chainsaws for example, could cause a disturbance in the nesting and roosting of the hairy woodpecker. Each of the disturbances will be short term and will not occur in all of the project area at once. This gives the hairy woodpecker the opportunity to nest and roost in other areas until treatments are done. The removal of snags that pose a hazard during implementation may also cause the temporary loss of some nesting habitat.

**Prescribed Burning:** The prescribed burn vegetative treatments would increase the occurrence of human activity and could cause a disturbance in the nesting and roosting of the hairy woodpecker. The project will have fire take place on the majority of the project area, but not at the same time. This could result in disturbance to the hairy woodpecker. The short-term effects of fire are likely to be unfavorable as nesting and roosting species can initially be reduced. Fire activity has the potential to reduce the amount of snags in which the woodpecker nests, but prescribed burning could promote the hardening of other snags suitable for nesting and create new snags. The hairy woodpecker has long evolved with fire, and the long-term effects of prescribed fire will help reduce devastating stand replacing wildfire and would overall improve nesting and roosting habitat.

**Irrigation Ditch Diversion:** The diversion structure and associated road reroute do not occur in hairy woodpecker habitat.

**Sediment Control:** Installing and maintaining sediment control features would create a short-term disturbance to nesting and roosting hairy woodpeckers through noise and human presence. These activities are spaced out across the project area and would not all occur at the same time, giving the woodpecker opportunities to utilize other areas in the project.

**Road and All-terrain Vehicle Trail:** Installing user-proposed routes and decommissioning roads would create a short-term disturbance to nesting and roosting hairy woodpeckers through noise and human presence. These activities are spaced out across the project area and would not all occur at the same time, giving the woodpecker opportunities to utilize other areas in the project.

**Fences and Water Improvement:** Installing fences and water improvements would create a short-term disturbance to nesting and roosting hairy woodpeckers through noise and human presence. These activities are spaced out across the project area and would not all occur at the same time, giving the woodpecker opportunities to utilize other areas in the project.

**Summary of Effects:** Snags will be removed, reducing habitat for hairy woodpeckers. Short-term disturbances will occur during implementation. New snags are expected to be created through prescribed burning activities.

*Alternative C – Herbicide Utilization*

Herbicide would not affect snags utilized by hairy woodpeckers, but may temporarily affect some food sources in the short term. Manufacturer labels would be followed to prevent impacts to wildlife.

*Alternative D*

Not implementing the user-proposed routes would have no impact to hairy woodpeckers.

### ***Cumulative Effect***

This project and the Escudilla West Project located in Arizona would remove snags, but both are expected to create new snags in prescribed burning. Both projects would lead to improved habitat conditions for hairy woodpeckers. Fuelwood collection and road maintenance could lead to more snag removal.

### ***Determination of Impact to the Species***

Since snags will primarily be retained and fire has the potential to increase, the number of snags there would be long-term improvement of habitat conditions for this species. For alternatives B, C, and D, individuals may be affected, but at the forest level, the activities proposed under these alternatives would not adversely affect population trends on the Gila National Forest.

## **Migratory Bird Species**

This assessment identified migratory bird species that occur or have the potential to occur within the Luna planning area. The Forest Service memorandum of understanding with the U.S. Fish and Wildlife Service (December 8, 2008) identifies specific activities for bird conservation, pursuant to Executive Order 13186, signed January 10, 2001, including striving to protect, restore, enhance, and manage habitat of migratory birds, and prevent the further loss or degradation of remaining habitats on National Forest System lands. This includes identifying management practices that impact populations of high priority migratory bird species on National Forest System lands. Agencies shall identify potential impacts to migratory birds and their habitats, avoid or minimize adverse impacts, restore and enhance habitats, and evaluate the effects of actions on migratory birds. Table 49 identifies the species considered in this analysis.

The analysis for following migratory birds:

- Mexican spotted owl and southwestern willow flycatcher are located under the “Federally Listed Species” section of this document.
- Gray vireo, burrowing owl, peregrine falcon, bald eagle, and black hawk are located under the “Region 3 Sensitive Species” section of this document.



**Table 49. List of migratory bird species that occur or have the potential to occur within the Luna planning area and associated habitat types**

<b>Species</b>	<b>Habitat Association</b>
Bendire's thrasher	Inhabits sparse desert shrubland and degraded grassland vegetation. It may also occur in open woodland with scattered shrubs.
Black-chinned sparrow	Moderately dense shrubs from 3-7 feet tall mixed with rocky outcroppings, a large grass component, and scattered large shrubs or trees.
Black-throated gray warbler	Primarily piñon-juniper and, in the far southwest, pine-oak woodland. Prefers large, closed canopy woodland stands, but it often uses edge habitat.
Cassin's finch	Associated with mature coniferous forests and woodlands.
Chestnut-collared longspur	Uses level to rolling mixed-grass and shortgrass uplands, and, in drier habitats, moist lowlands. Prefers open prairie and avoids excessively shrubby areas.
Clark's nutcracker	Inhabits montane forests where preferred, large-seeded pines are locally abundant.
Common nighthawk	Associated with open woodlands, clearings, and fields.
Evening grosbeak	Occupies mature and second-growth coniferous forests including spruce-fir, pine-oak, piñon-juniper, and aspen forests.
Flammulated owl	Associated with open ponderosa pine forest. At higher elevations, the species may be found in mixed conifer habitat, in association with Douglas-fir, white fir, or blue spruce.
Grace's warbler	Prefers park-like stands of mature tall pines.
Juniper titmouse	Open, mixed woodland areas at mid-elevations, and is most common where juniper is dominant. May be present where piñon-juniper is interspersed with oaks, and occurs in largely pine-oak habitat.
Lewis's woodpecker	Requires open canopy forests with large dead or decaying trees for nesting. It breeds in both lowland riparian and montane forest habitats. In New Mexico, breeding occurs most commonly in riparian woodland with large, mature cottonwoods. At higher elevations, Lewis's Woodpecker occurs in ponderosa pine forests with large trees and an open canopy.
Loggerhead shrike	Associated with open country and with short vegetation, including desert grasslands and shrublands and open woodlands or juniper savannahs.
Mexican whip-poor-will	Piñon-juniper woodlands, ponderosa/oak forests, and mixed conifer forests.
Mountain bluebird	Piñon-juniper woodlands, mountain meadows, and sagebrush shrublands. Associated with high open habitats with a scattered tree or shrub component, including savannahs, prairie-forest ecotones, and meadow and alpine tundra edges, and cool desert shrublands.
Mountain plover	Prefers large, flat grassland expanses with sparse, short vegetation, and bare ground.
Olive-sided flycatcher	Associated with openings and edges in coniferous forest habitat. It is generally more abundant in mixed conifer, late-successional forest with less than 40% canopy cover.
Painted redstart	Middle- and upper-elevation riparian woodlands, and adjacent pine-oak woodlands, generally prefers areas with rugged slopes and deeply shaded canyon bottoms.
Piñon jay	Associated with piñon-juniper habitat.
Pygmy nuthatch	Occurs in forests of pine mixed with oak, quaking aspen, maple, Douglas-fir, or white fir.

Species	Habitat Association
Red-faced warbler	Mixed conifer and ponderosa pine forests, typically with a Gambel oak or other deciduous tree component.
Red-headed woodpecker	Associated with both deciduous woodlands and open areas with surrounding trees or isolated woodlots. Prefer woodlands and areas with tall trees with large circumferences, high basal area, and low density of stems in understory
Vesper sparrow	Found in open habitats, including old fields, shrub-steppe, grasslands, and cultivated crop fields. Generally prefers short, sparse, and patchy herbaceous vegetation with some bare ground, and low to moderate shrub or tall forb cover.
Virginia's warbler	Occurs at middle elevations, where coniferous woodland or forest mixes with deciduous shrubs or trees.
Whiskered screech-owl	Occupies canyon areas in montane forests.
Williamson's sapsucker	Inhabits open, mixed coniferous and deciduous forests in mountain areas up to 10,000 feet in elevation.

## Environmental Consequences

### *Alternative A*

For all migratory bird species listed in table 49, there would be no change to the habitat or disturbance to the species, but there still exists the risk of wildfire impacts to forested and woodland cover types. A determination of “no impact” is made for alternative A.

### *Effects Common to Alternative B, C, and D*

For all migratory bird species listed in table 49, individuals may be disturbed by project equipment noise and human presence in the short term. Proposed treatments would improve habitat and reduce wildfire threat in long term. Some habitat elements may decline such as the amount of bare ground, juniper cover types or increase such as amount of larger and mature tree stands, grasslands. Depending on the bird species and their habitat preference, this may be either a positive or a negative impact. During implementation, not all associated habitat types will be treated at the same time, providing opportunity for birds to utilize adjacent or nearby habitat, and therefore reducing disturbance and impacts to individuals from activities and habitat treatments. There may be short-term impacts to individual migratory birds, but alteration to their habitats or being disturbed during treatments, will not negatively affect population levels.

### *Alternative C – Herbicide Utilization*

All other effects are the same as alternative B.

Herbicide application may disturb individuals by noise and human presence in the short term. Rabbitbrush and alligator juniper would be reduced, providing opportunity for growth and increase of herbaceous plants in treatment areas. During implementation, not all associated habitat types will be treated at the same time, providing opportunity for birds to utilize adjacent or nearby habitat, therefore reducing disturbance and impacts to individuals from activities and habitat treatments. To further reduce impacts manufacturer labels will be followed during application. There may be short-term impacts to individual migratory birds, but alteration to their habitats or being disturbed during treatments, will not negatively affect population levels.

### *Alternative D*

All other effects are the same as alternative B.

Not adding user-proposed routes would not impact habitat nor disturb the species. There would be beneficial effects by not having routes crossing through habitats causing fragmentation. Although routes are not added under this alternative, other activities are still being implemented, therefore there may be short-term impacts to individual migratory birds, but alteration to their habitats or being disturbed during treatments, will not negatively affect population levels.

## Air Quality

### Incomplete or Unavailable Information

The following discusses incomplete or unavailable information and its relevance to the environmental effects analysis.

**Air Quality:** Smoke analysis was unavailable for prescribed burning treatments.

Gila National Forest personnel did not attempt any smoke modeling related to prescribed burning treatments. A review was done of smoke monitoring information during past prescribed fires to ascertain length of smoke disturbance. Gila National Forest personnel would also follow the New Mexico smoke management program guidelines to determine burning windows that allow for proper ventilation and dispersion of smoke to protect air quality and human health. This existing information and mitigation is adequate to determine the effects of the action alternatives.

Air quality modeling of smoke, depends on meteorological inputs from current forecasts (2 to 3 days in the future) to be most useful. Prospective modeling, as suggested, without current forecasts to predict smoke months or years in advance, is not a useful predictor of impacts from an individual burn.

### Alternative A – No Action

This alternative has no direct effect on air quality because no treatment activities are proposed.

Under this alternative, no treatments would occur and there would be no anthropogenic emission contribution to degrade air quality. However, this alternative could lead to increased accumulation of ground fuel due to insect and disease activity and continuous natural forest succession. This accumulation of ladder and ground fuels may lead to an increased probability of high-intensity wildfire in the future, which could result in air quality degradation. Air quality can be degraded by smoke from wildfires to the point of human illness in some instances. Hardy et al. (2001) noted emissions from wildfire are typically greater than emissions from a prescribed fire on the same acreage due to greater emission factor, fuel consumption, and fire intensity. Wildfires are also known to result in high levels of emissions, and associated violations of national ambient air quality standards. Smoke from wildfire can cause visual impacts to the surrounding area and create hazardous driving conditions on adjacent state, county, and Forest Service roads for extended periods of time. Should a wildfire occur, dust emissions from fire suppression equipment could also increase. In the short term, air quality impacts from alternative A would be less because prescribed burning treatments and project activities would not occur. In the long term, the no-action alternative would not meet the purpose and need of this project. Previous wildfire activity, natural forest succession and increasing conifer mortality due to insect and disease can influence the amount of material available for consumption in the event of a future wildfire.

Emissions sources contributing to particulate matter and other pollutants would continue to be present. These sources include wood burning stoves, vehicle exhaust, emissions from recreational

campfires, emissions associated with prescribed fire, fugitive dust, and wildfires within or near the project area. Wildfire frequency is expected to continue as it has been observed in the past. A wildfire could lead to negative cumulative effects and would be dependent upon the size and intensity of the wildfire. Visibility impairment and human health impacts due to sudden and dramatic pollutant release are likely with a large wildfire event. Cumulative effects of smoke are unknown because the intensity and size of a wildfire is unknown. Research indicates wildfires can produce nearly twice the amount of smoke as prescribed fire (Huff et al. 1995).

### **Alternatives B, C, and D**

A small amount of fugitive dust is likely to be generated from project activities. This dust is expected to settle quickly and result in minimal short-term impacts to air quality.

Prescribed burning treatments would have direct, short-term impacts on air quality in the project area. All proposed prescribed burning would occur when weather conditions and dispersion forecasts are favorable. Transitory smoke as a result of implementing alternative B, C, or D could produce some smoky days in the local area, and nuisance smoke (smell, see, or haze). Smoke would also be expected to settle into the lower draws and drainages during the evening hours following ignition. The Forest Service will coordinate with New Mexico Environment Department prior to all burning. Air quality management and emissions regulation is the responsibility of the U.S. Environmental Protection Agency and the New Mexico Environment Department, Air Quality Bureau.

The project is 24 air miles northeast of the Gila Wilderness Class I airshed and is not within a recognized area of nonattainment for particulate matter 10, carbon monoxide, sulfur dioxide, ozone or total suspended particulates. Therefore, no analysis is necessary or provided to determine conformity with the State implementation plan for air quality.

Smoke generated from prescribed fire is likely to impact human populations towards the northeast and east, due to predominant wind direction. Some wind variability would occur due to the surrounding topography. If the winds follow the prevailing direction during burning, smoke would drift and disperse over mostly unsettled portions of the Gila National Forest.

The communities of Luna, Cruzville, Apache Creek, Aragon, Reserve, Rancho Grande Estates, and Alpine, Arizona are all within approximately 8 to 15 miles of the Luna Restoration Project and would likely experience the greatest impact from prescribed burning and pile burns. There are other communities greater than 15 miles in any direction in which residents could see, smell, and experience smoke and haze.

In contrast to wildfire, prescribed fires follow a written prescription that allows managers to minimize smoke impacts. Emission reduction techniques can reduce the impacts to air quality while meeting fire-related objectives. These techniques are outlined in New Mexico's smoke management program guidance document (State of New Mexico 2005). The Gila National Forest personnel are responsible for following the State's smoke management requirements. The current Smoke Management regulation in New Mexico is part of the State's Regional Haze Rule, Environmental Protection Air Quality (Statewide) Smoke Management. Title 20 Chapter 2 Part 65 of the 20.2.65.103. The requirements are listed at the New Mexico Environment Department website: <https://www.env.nm.gov/air-quality/smp>.

Overall, there are no measurable differences in regards to air quality between the alternatives. One aspect of the purpose and need for this project is to reduce the impacts of high-severity fire.

Smoke from wildfires can present a risk to public health. Wildfires often result in high levels of emissions, poor visibility, and associated violations of national ambient air quality standards. Vegetation management treatments provide the opportunity on a long-term basis to reduce the magnitude of wildfire air quality concerns. According to Wiedinmyer and Hurteau (2010) wide-scale prescribed fire application can reduce carbon dioxide fire emissions for the Western United States by 18 to 25 percent. The total amount of pollutants released by prescribed burning under alternative B, C or D would be spread out over several years and would occur when emissions would be unlikely to have adverse effects on human health and visibility. After implementation, it is estimated that subsequent wildfires in the project area would produce less pollutants due to less fuel available to burn.

Fugitive dust may be generated in areas where mechanical operations are occurring and with associated vehicle travel. These impacts are expected to stay within the analysis area as dust from roads settles out relatively quickly. There is no measurable difference expected between alternatives as related to dust generated from restoration activities. Best management practices should be effective in retaining protective ground cover, reducing exposed soil susceptible to wind erosion and creation of dust in all action alternatives. This project is not within a State-designated nonattainment area; therefore, no conformity assessment was necessary or completed. Compliance with Clean Air Act would continue.

Air quality as a result of implementing alternatives B, C, or D would result in a short-term increase in pollutants from prescribed fire smoke emissions and fugitive dust. When considering past, present, and reasonably future activities, the activities proposed in the alternatives are not anticipated to result in cumulative effects to air quality.

## Watershed and Soils

### General Assumptions

- No more than 25 percent of a 6<sup>th</sup>-code watershed within a 3-year period would be treated. This percentage may be adjusted up or down based on monitoring and assessment of watershed conditions, after treatments.
- The reduction or elimination of vehicle traffic on a road or trail near a stream will result in less sediment delivered from the road to the stream over time. This relates to the reduction of the amount of loose material on the road surface and also the increase in the amount of vegetative litter and other cover on the road surface. Erosion rates from a closed road may decrease to near background levels as the density of vegetation on the surface of the road increase (Dissmeyer 2000).
- Closed routes without fixed barriers are expected to revegetate minimally. These routes will not disappear from the landscape until decommissioned, and will continue to be a source of sediment and erosion to some degree. They will still be included in road density calculations.
- Best management practices would be properly implemented to aid in mitigating negative impacts to water quality and quantity, soil resources, riparian and wetland resources, and air resources.
- Existing road system has already committed soil resources to loss of productivity.

- Routes that are connected to the drainage network provide some level of sediment transport, regardless of whether drainage is perennial, intermittent, or ephemeral. These sediment inputs vary based on duration and frequency of flow events. During short duration, high-intensity storm events, ephemeral drainages can carry a considerable amount of sediment, some of which is generated by roads.
- The 2015 watershed condition classification incorporated management activities and watershed events that occurred in the past or that are ongoing. The final assessment of watershed condition in 2015 constituted a culmination of these activities, events, or both leading to current watershed condition. The condition classification of each 6<sup>th</sup>-code watershed is considered a result of cumulative watershed effects up to 2015.

### **Incomplete or Unavailable Information**

The following discusses incomplete or unavailable information and its relevance to the environmental effects analysis.

**Soils:** The general ecosystem survey map and associated soil interpretations were partially used to evaluate soils within the Luna Restoration Project.

The general ecosystem survey is mapped at a scale of 1:250,000 and was designed for general assessments and evaluation of projects at the landscape or forestwide level similar to the scope of the proposed action. It is key to acknowledge the general ecosystem survey is a very broad scale survey (1 inch equals approximately 4 miles) and many differences in soils, geology and topography can occur within very short distances. The draft forest terrestrial ecosystem survey map was used to identify erosive soils formed from volcanic sediments. Currently no soil map unit interpretations have been developed to accompany the draft terrestrial ecosystem survey map.

Gila National Forest personnel did not attempt any sedimentation modeling by alternative due to incomplete data. Although complete data was unavailable, ongoing survey information and past ecosystem survey data were evaluated. Best professional judgment was applied to determine the likelihood of soil disturbance from treatments as well as review of best available science and current literature related to vegetation treatments. Best management practices were developed by the interdisciplinary team to mitigate any expected impacts to soils. Therefore, the existing information is adequate to determine the effects of the action alternatives.

**Riparian:** Some riparian systems within the project area did not have recent or completed proper functioning condition assessments.

These include Romero Creek, Centerfire Creek, and some reaches of the San Francisco River. Design for stream stabilization treatments will occur following completion of environmental analysis. Site-specific disturbance related to design implementation is unavailable.

Field inspections, photographic documentation, or both for all riparian systems within the project area had been made within the past three years by members of the project's interdisciplinary team. Best professional judgment was applied to determine resource conditions, trends, proposed treatments, and effects from proposed treatments. The existing information is adequate to determine the effects of the action alternatives.

## Affected Environment

### Watershed Condition

This analysis will address effects at the 6<sup>th</sup>-code watershed level, which range in size from approximately 7,000 to 38,000 acres within the project area.

Watershed condition encompasses both aquatic and terrestrial processes and functions as the quality of water and aquatic habitat are inseparably linked to the integrity of uplands and riparian areas within a watershed. Aspects of a watershed related to geomorphic integrity can be defined in terms of attributes such as slope stability, soil productivity, channel morphology and other upslope, riparian and aquatic habitat characteristics. Hydrologic integrity of a watershed is related primarily to flow, sediment and water quality attributes. Biological integrity can be defined by the aquatic characteristics that influence the diversity and abundance of species. In each case, integrity must be evaluated in the context of the natural disturbance regime, geoclimatic setting and other important factors. The geomorphic, hydrologic, and biologic components are then combined and evaluated as a whole to assess watershed integrity and health.

Three classes are used to describe watershed condition (USDA Forest Service 2004, Forest Service Manual 2521.1):

- Class 1 watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.
- Class 2 watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.
- Class 3 watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.

In March 2011, watershed condition classification was initially completed across the Gila National Forest at the subwatershed level (6<sup>th</sup> code). A review and reclassification of all Gila National Forest watersheds was completed in December 2015. The watersheds were classified as being in one of the three condition classes noted above, as translated to functionality.

- Class 1 = Functioning properly,
- Class 2 = Functioning at risk, and
- Class 3 = Impaired function.

The Luna Restoration Project occupies a portion of nineteen 6<sup>th</sup>-code watersheds, however the majority (98 percent) of the project area falls within 11 of the following 6<sup>th</sup>-code watersheds: Canovas Creek-Coyote Creek, Trout Creek, Stone Creek-San Francisco River, Dry Blue Creek, Spur Draw, SA Creek, Headwaters Centerfire Creek, Outlet Centerfire Creek, Big Canyon-San Francisco River, Hay Vega, Cow Springs Draw. Table 50 provides the percentage of the project area found in all of the 6<sup>th</sup>-code watersheds along with the 2015 watershed condition classification rating.

Watersheds with less than 2 percent of the area in the project will not be evaluated further. Activities in the Luna Restoration Project will not affect all of the indicators used to derive the watershed condition rating.

Current watershed conditions are the culmination of historical activities since the late 1800s and early 1900s, ongoing management activities, climate fluctuations, roads, and recent wildfire.

**Table 50. Summary of watersheds and condition ratings that overlap the Luna planning area. Watershed condition ratings are Class 1 = functioning properly, Class 2 = functioning at risk, and Class 3 = impaired function.**

6 <sup>th</sup> -Code Watershed / Hydrologic Unit Code	Acres in Watershed	Project Acres in Watershed (includes private land acres)	Percentage of Project within Watershed	Percentage of Watershed Occupied by Project	Watershed Condition Rating
Hay Vega 150200010301	7,091	3,236	2%	46%	Class 1
Canovas Creek-Coyote Creek 150200010302	32,466	10,834	6%	33%	Class 2
Cow Springs Draw 150200030703	31,273	6,568	4%	21%	Class 1
Mangitas Creek 150200030505	23,062	2,235	1%	10%	Class 1
Campbell Blue Creek 150400040503	34,218	617	Less than 1%	2%	Class 3
Trout Creek 150400040302	20,934	13,174	7%	63%	Class 2
Stone Creek-San Francisco River 150400040303	35,769	24,276	13%	68%	Class 2
Spur Draw 150400040304	26,179	26,179	14%	100%	Class 2
SA Creek 150400040305	22,560	22,560	12%	100%	Class 2
Headwaters Centerfire Creek 150400040306	18,536	18,536	10%	100%	Class 2
Outlet Centerfire Creek 150400040307	20,591	20,591	11%	100%	Class 3
Big Canyon-San Francisco River 150400040308	16,418	16,418	9%	100%	Class 2
Dry Blue Creek 150400040502	25,048	19,104	10%	76%	Class 2
Starkweather Canyon 150400040309	25,279	636	Less than 1%	3%	Class 2
Cienega Canyon-San Francisco River 150400040311	36,089	188	Less than 1%	1%	Class 2
Centerfire Creek-Blue River 150400040504	17,311	329	Less than 1%	2%	Class 1
Headwaters Saliz Canyon 150400040401	26,228	98	Less than 1%	Less than 1%	Class 1



6 <sup>th</sup> -Code Watershed / Hydrologic Unit Code	Acres in Watershed	Project Acres in Watershed (includes private land acres)	Percentage of Project within Watershed	Percentage of Watershed Occupied by Project	Watershed Condition Rating
Steeple Canyon-Blue River 150400040506	37,760	5	Less than 1%	Less than 1%	Class 2
Upper Pueblo Creek 150400040601	21,554	3	Less than 1%	Less than 1%	Class 2

In 2011, the Wallow Fire burned across acres of the Gila National Forest, within the Luna Restoration Project boundary. This fire originated on the adjacent Apache-Sitgreaves National Forests, and burned during drought conditions, resulted in severe negative impacts to watershed conditions on both national forests along the state line.

Watershed conditions have improved over the last century across the project area, and within the last several years within the Wallow Fire burn scar. However, there are still many localized areas throughout the project area where restoration of ecosystem health and watershed functionality is necessary. Headcuts and gullies are still active in many of the streams, ephemeral drainages, and low-lying swales. A great effort was placed on restoration of these sites in the 1980s. More than 150 erosion control structures were constructed, however little maintenance has occurred on these sites to date. Additional areas have since been identified for erosion control measures and other restoration treatments. The Escudilla Landscape watershed restoration action plan has been developed concurrently with this analysis that details many specifics related to the watershed condition rating for eight of these watersheds and four on the adjacent Apache-Sitgreaves National Forests (USDA Forest Service 2018).

### Effects of the 2018 Owl Fire in the Dry Blue 6<sup>th</sup>-code Watershed

The Owl Fire was a lightning caused fire that started on June 30, 2018 in the vicinity of Aspen Mountain in the San Francisco Mountain Range of the Gila National Forest. It burned into mid-July until monsoon rains put out the fire. A Burned Area Reflectance Classification map was not attainable for this fire due to frequent afternoon cloud build up. Burn severity mapping was done by two helicopter flights and the goal of the mapping was to map only areas of high burn severity. No attempt was made to map moderate, low or unburned areas of the fire. The fire did burn into the Dry Blue 6<sup>th</sup>-code watershed and backed down into Frieborn Canyon with mixed severity covering 792 acres. The slope it backed down on is comprised of mixed conifer vegetation and soils were derived from Gila Conglomerate that tends to be highly erosive. Of the 792 acres of burn in this watershed approximately 61 acres of high-severity burn was seeded with annual barley to try to assist in reducing erosion. From a vantage point on National Forest System road 209 a majority of the burn was visible that occurred in Frieborn Canyon. It is estimated that there was several hundred acres of moderate burn severity that occurred on the slope above the canyon bottom.

Of the 25,047-acre 6<sup>th</sup>-code Dry Blue watershed, only 792 acres or 3.1 percent was affected by the Owl Fire. Areas of high and moderate burn severity on the very steep slope of Frieborn Canyon did experience sheet, rill and small gully erosion. Sediment and ash did make its way into Frieborn Canyon, so short term localized negative effects are occurring. At the 6<sup>th</sup>-code watershed

scale the Owl Fire will not cause a long-term negative effect or downward trend to current watershed condition.

### Soils

Soils within the Luna Restoration Project can be characterized as highly variable. They have been formed primarily from volcanic sediments, basalt, rhyolite, sandstone, and recent alluvium. The soils range from shallow to deep and stable to unstable in nature, with varying amounts of surface and subsurface rock fragments. The topography within the project area ranges from gently sloping elevated plains, valley bottoms, and hills to steep mountains and scarp slopes.

The project area has many acres of soils that were formed from volcanic sediments that are oftentimes referred to as Datil soils. These soils are highly erosive and are typically not very productive.

Table 51 and table 52 display acres and percent of project area by soil condition and erosion hazard rating.

**Table 51. Summary of general ecosystem survey soil condition within the Luna planning area**

Soil Condition	Satisfactory	Unsatisfactory	Unsuited
Acres	155,550	27,560	3,927
Percent	83%	15%	2%

**Table 52. Summary of general ecosystem survey erosion hazard within the Luna planning area**

Erosion Hazard	Slight	Moderate	Severe
Acres	78,422	79,502	27,113
Percent	42%	43%	15%

### Aquatic Resources

Water resources within the project area include streams, wetlands, riparian areas, ponds, and numerous stock ponds and tanks. There are approximately 75 miles of perennial streams and 39 miles of intermittent streams in the project area. The remaining drainages are considered ephemeral, of which there are approximately 634 miles of these systems. There are approximately 205 surface acres of open water within the project area. These acres are mainly associated with stock ponds, and other larger storage reservoirs, when filled to capacity.

The major drainages within the project area are San Francisco River, Stone Creek, Jenkins Creek, Romero Creek, SA Creek, Trout Creek, Canovas Creek, Spur Draw, Centerfire Creek, and Dry Blue Creek. The San Francisco River, Dry Blue Creek, and Stone Creek have experienced direct or indirect effects from the 2011 Wallow Fire. These effects included increased stream flow volumes and peak flow magnitudes, with accompanying excess channel erosion and sedimentation. Spring discharge, a source of perennial water for a number of streams, has increased from the decreased transpiration associated with the loss of over story vegetation. Recovery of the hydrologic regime following wildfire generally occurs within a 5 to 10 year period however, it can take longer.

## Riparian, Wetlands, and Upland Wet Meadows

Riparian areas found within the Luna Restoration Project were evaluated using site visits by members of the interdisciplinary team, proper functioning condition surveys (USDI Bureau of Land Management 1993), or both to determine both riparian potential and functionality. Areas evaluated within the project area are Jenkins Creek, Trout Creek, San Francisco River, Stone Creek, Centerfire Creek, SA Creek, Pace Creek, Dillman Creek, Adair Canyon, Spur Basin Draw, Romero Creek, Dry Blue Creek, and Canovas Creek. Most of the drainages within the planning area are ephemeral in nature, and only flow in response to precipitation or runoff events.

## Water Quality

The potential adverse effects from most forest management activities are non-point sources, as opposed to point sources of water pollution. To ensure compliance with the Clean Water Act, water quality standards are set by the New Mexico Water Quality Control Commission. New Mexico's surface water quality standards define water quality goals by designating uses for waterbodies, setting criteria to protect those uses, and establishing provisions to preserve water quality. These water quality standards are examined for changes on a 3-year rotating basis. The current standards are documented in the New Mexico Administrative Code Title 20, Chapter 6, Part 4 "New Mexico Standards for Interstate and Intrastate Surface Waters" (New Mexico Water Quality Standards). Under section 303(d)(1) of the Clean Water Act, States are required to develop a list of waters within a state that are not in compliance with water quality standards and to establish a total maximum daily load for each pollutant. Reaches of streams that are in some state of nonattainment are documented in "2016–2018 State of New Mexico Clean Water Act Section 303(d)/Section 305(b) Integrated Report Appendix B – Integrated List" (State of New Mexico 2016). Currently there are two waterbodies within the project area included in this report.

### *Headwaters Centerfire Creek and Outlet Centerfire Creek 6<sup>th</sup>-code watersheds*

Centerfire Creek (San Francisco River upstream to headwaters) is in nonsupport of its designated use of "high quality coldwater aquatic life" and "primary contact."

- Probable causes of impairment are identified as nutrient/eutrophication, sedimentation/siltation, specific conductance, water temperature, turbidity, and *E. coli*.
- Probable sources of impairment include low water crossings, channelization, recreational pollution sources, source unknown, drought-related impacts, silviculture, fire suppression, silviculture activities, road and bridge runoff, rangeland grazing, natural sources, and streambank modifications and destabilization.
- Total maximum daily loads for plant nutrients and conductivity were completed in 2002. Total maximum daily loads for turbidity and *E. coli* were scheduled in 2014. Water temperature standards are currently under review.

### *Stone Creek—San Francisco River and Big Canyon—San Francisco River 6<sup>th</sup>-code watersheds*

San Francisco River (Centerfire Creek upstream to Arizona State Line) is in nonsupport of its designated use of coldwater aquatic life.

- Probable cause of impairment is identified as water temperature and benthic macro-invertebrate community.
- Probable sources of impairment are silviculture, fire suppression, rangeland grazing, and source unknown.

- Total maximum daily loads for temperature and plant nutrients were completed in 2002. The reach was delisted for nutrients during the 2010 listing cycle. Water temperature standards are currently under review.

Water quality related to stream temperature is of major concern in the perennial and intermittent streams located in the Luna project area. Often related to riparian health, temperature is important because it governs the kinds and types of aquatic life that can be present in the stream, regulates the maximum dissolved oxygen concentration of the water, and influences the rate of chemical and biological reactions. Seasonal variations in stream temperature may be caused by changing air temperature, solar angle, meteorological events, and a number of physical aspects related to the stream and watershed. These physical features include upland watershed condition, velocity, vegetation types and canopy cover, stream configuration, and land use.

### Summary of Resource Conditions

**Existing stream crossings** – Negative impacts to riparian areas is occurring as current stream crossings go directly through riparian areas and wetlands. Negative impacts to vegetation in these areas include rutting of wetlands, damage to riparian woody and herbaceous vegetation, and increased sedimentation downstream of crossings.

**Encroaching conifers in riparian areas and upland wet meadows** – Conifers are currently encroaching into floodplains, riparian areas, and fringes of the wet meadows, taking available water, nutrients, and energy that would otherwise be available to riparian and wetland species. Continuation of this encroachment will eventually lead to an ecological conversion of the site to more upland vegetation species, thus reducing wetland and riparian habitat within the project area. This would limit water quantity, in particular, from being available for valuable wetland and riparian habitats.

**Ungulate utilization in degraded riparian and uplands** – Several degraded riparian areas and upland sites have been identified for restoration needs. Water quality impairments have been identified by the State as a result of rangeland grazing with some of the probable causes of impairment notes as sedimentation or siltation and temperature. These causes can be both a direct and indirect result of inadequate woody and herbaceous vegetation, both in uplands and on streambanks.

**Stream and wet meadow stabilization structures** – Stream reaches throughout the project area that have been experiencing increased water flows and sediment delivery due to wildfire and flood events would not receive any treatments. These streams would have to continue to recover at a natural rate. In some of these streams, such as Stone Creek and Centerfire Creek, slow to no recovery is currently occurring. It would take decades for these systems to move towards upward trends without multiple treatments.

**Riparian tree planting** – There are riparian areas and stream systems that currently have excessive sedimentation, unstable banks, lack of vegetation, and high temperatures. Areas that are currently not functioning or in downward trends would maintain this condition and in areas where there are temperature and siltation impairments, these would not improve without improvement to riparian vegetation.

**Head of Ditch irrigation diversion reconstruction** – The current diversion has negative impacts on the adjacent riparian area as heavy equipment is in the channel several times every year, constructing and deconstructing the push-up dam. This disturbance does not allow long-term recovery of riparian woody species, and results in excessive sedimentation at the site and downstream.

**Wet meadows** – Currently there are locations in wet meadows that receive motorized traffic several times throughout the year, even though the routes are closed. Motorized use in wet meadows poses a threat to soil productivity and vegetation. Repeated motorized use can cause soil compaction in these areas, which may result in long-term adverse effects to riparian and wet meadow conditions.

**Erosion stabilization structures** – Currently, the effectiveness of a majority of the existing erosion control structures has diminished over the years or they are no longer functional. Several of these structures have breached, and new headcuts have formed. This has caused excessive sediment that ultimately moves downstream and into riparian areas and wet meadows. Some of the structures are located in upland wet meadows and resultant new headcuts are proceeding to dewater these areas.

**Degraded uplands** – Downstream negative impacts to riparian areas are occurring with excessive sedimentation being generated from degraded uplands. These areas will continue to produce sediment and higher overland flows if herbaceous vegetation is not restored.

**Campgrounds** – Existing road and campsite drainage leads directly to the adjacent waterways of San Francisco River and Trout Creek, thus providing a direct input of sediment. This influx of sediment will continue to hamper improvement of riparian conditions in these areas as it impacts bank stability and riparian vegetation growth.

**Range Management** – Livestock would continue to provide the same pressure at existing water sources including where water source is spring-fed with associated riparian vegetation.

**Motorized Transportation** – There are negative impacts occurring where motorized routes coincide with riparian areas and wetlands/wet meadows. Closed routes continue to discharge runoff and sediment to adjacent waterways. Some closed roads are located in the drainage bottoms of perennial streams, with associated riparian vegetation, where unauthorized use is occurring. Other closed roads cross or are adjacent to wet meadow areas. These routes still receive some amount of unauthorized use and cross-country travel, although unauthorized.

## **Environmental Consequences**

### **Soil Resources**

#### *Alternative A*

#### **Mechanical Vegetation Treatments**

The existing condition of soils and soil loss rates will continue under the no-action alternative. Trends would remain stable in vegetation types where there is adequate vegetative ground cover and canopy cover. Organic soil carbon will accumulate at potential rates and soil fertility will slowly improve if accumulation of organic matter continues at its present rate. Existing amounts of coarse woody material would remain constant, with an increasing amount likely within the Wallow Fire scar as dead trees begin to topple. There would be no disturbance to soils from

vegetation treatments, as vegetative ground cover would remain intact, with no disturbance from landings, skid trails, heavy equipment, or other treatment related impacts. No mowing of rabbitbrush would occur, thus canopy cover in these areas would remain high with very little herbaceous understory in impacted rangelands. No herbicide treatment would occur on either rabbitbrush or alligator juniper, there would be no risk to the soil resource or soil crusts from potential chemical interactions. Infiltration rates would remain the same, as there would be no increase in surface runoff from soil disturbing activities.

Tree encroachment will continue in grasslands and meadows. A study on the Cibola National Forest concluded competition for limited site resources (nutrient stock, water, sunlight, etc.) from a relatively dense juniper overstory was the principal cause for decline in understory productivity and deterioration of soil quality at their study site (Brockway et al. 2001). As woody species encroachment occurs, grass biomass and cover decrease as woody species biomass and cover increase. Additionally, herbaceous species richness and diversity tends to decline as woody species density increases (Van Auken 2009). If site conditions such as this persist, infiltration rates may gradually decrease as water-compacted, bare soil increases and organic matter accumulation decreases.

Ponderosa pine and mixed conifer vegetation types will remain at risk for future soil loss as high tree density and heavy fuel loading in forested stands increases the risk of uncharacteristic high-intensity wildfire. High-severity fire can result in large areal extents of high soil burn severity that can pose negative impacts to soil productivity and site stability. High tree densities can also create conditions where herbaceous ground cover is out-competed for sunlight, precipitation, and nutrients. A reduction in grass under these thick canopies could result in less favorable site conditions over the long term.

Overall, in the no-action alternative there would be no long-term benefit to soil resources, resulting in a potential downward trend in soil condition.

### **Prescribed Fire Treatments**

Ponderosa pine and mixed conifer vegetation types that have high tree densities and canopy cover tend to exhibit heavy fuel loading in the understory. As surface and ladder fuels increase, and tree density increases, the probability of high-intensity uncharacteristic wildfire increases resulting in the potential for high soil burn severity. The loss of canopy cover, ground cover, and organic debris on the soil surface, together with the possible occurrence of hydrophobic soil layers in these areas, would likely lead to considerable increases in soil erosion, loss of soil organic matter, and reduction in long-term soil productivity. This would result in a greater risk of negative impacts to the soil resource under alternative A compared to all action alternatives.

Soils under dense, closed canopy, stands piñon-juniper and in heavily encroached meadows would not realize any increase in herbaceous ground cover or site productivity. Soil condition in these areas would likely stay the same or experience a downward trend. Similar to ponderosa pine and mixed conifer vegetation, if heavy surface fuel loading are present, these areas would be at a higher risk to high soil burn severity in the event of a wildfire.

Soils in grassland and meadow vegetation types would not be affected under alternative A since surface fuel loading is relatively low in these areas. Soils would remain in their existing conditions with the same trends.

### **Stream, Riparian, and Erosion Control Treatments**

Restoration activities would not occur in alternative A. Degraded soil conditions, including excessive erosion and destabilization would continue at their current rate.

In areas where conifers are beginning to encroach into upland wet meadows and riparian areas, soil conditions would likely remain stable for a period of time. However, conifer encroachment would continue to compete with riparian, wetland, and wet meadow species for sunlight, water and nutrients.

In areas where degraded soils are negatively impacting riparian areas, streams, wetlands, and wet meadows, these conditions would continue and cause further detriment to water quality. Sediment control structures would not be cleaned or maintained, and those that are breached would continue to headcut upstream. Soil stability would lessen, stream bank stability would decrease, and erosion rates would continue or worsen.

At the Head of Ditch diversion site, ground disturbance would persist multiple times per year as native soil push-up dams would be installed and removed repeatedly to accommodate irrigation season and in response to flooding events.

The potential for a downward trend in areas currently having negative soil resource issues would occur with implementation of alternative A.

### **Range Management Treatments**

New range improvements consisting of storage tanks, wells, drinkers, pipeline, and pasture division fences would not occur under the no-action alternative. Currently, isolated areas around existing water points receive heavier use from livestock and wildlife, resulting in less herbaceous vegetation and soil compaction. These areas would remain the same, as there would be no improvement in distribution of livestock and wildlife. However, the acres associated with these areas are minimal across the project area. No soil disturbance would occur under this alternative. Soil conditions and trend would remain the same.

### **Motorized Transportation Treatments**

There would be no change to the motorized vehicle transportation system.

This alternative results in the least amount of soil disturbance related to motorized transportation system. However, the absence of road improvements, decommissioning, or reroutes under this alternative would result in negative soil impacts to occur in many locations across the project area. With no road decommissioning, closed routes would continue to provide a pathway for erosion to occur and for sediment to enter the waterway.

Negative impacts to the soil resource would continue at locations where current road conditions are poor and where motorized stream crossings are creating both erosion and water quality issues. Some locations currently have impaired site conditions due to instability and erosion problems resulting from structural crossing issues, heavy ground disturbance from motorized traffic, or both. If these conditions persist in these locations, a downward trend in soil conditions is likely.

### ***Effects Common to Alternatives B, C, and D***

In the development of these alternatives, sensitive soils were identified and considered. Vegetation treatments were excluded from these areas. Prescribed fire was excluded from most areas with sensitive soils, with the exceptions being the north aspect of the San Francisco Divide

and southwest of the community of Luna in Dry Blue Creek and Frieborn Canyon, extending south to the planning boundary. In these areas, low-severity fire may be introduced when fuel conditions, weather conditions, or both lessen fire spread across the landscape.

### **Mechanical Vegetation Treatments**

In these alternatives, where soils are in satisfactory condition, they would continue to be maintained or improved with implementation of best management practices. Vegetation with dense canopies and heavy coarse woody debris fuel loading would see enhancement from vegetation treatments. Vegetative ground cover would be reduced and/or spatially rearranged by proposed vegetation treatments.

Restoration thinning would reduce the risk of forests and woodlands to intense, high-intensity uncharacteristic wildfire behavior that would increase the potential for high soil burn severity. Thinning would also help reduce competition for light, nutrients and water by creating gaps in canopies and reducing woody vegetation basal area. This would aid in restoring an herbaceous component to the understory, which would help carry low-intensity fires.

Heavy equipment used in vegetation treatments will cause varying degrees of soil compaction which can temporarily increase water runoff and delay, reduce, or both the establishment and growth of desired herbaceous vegetation. Short-term increases in soil loss related to ground cover and soil disturbance are expected from mechanical thinning and skidding operations, as well as from the use of existing roads by logging equipment.

Long-term negative impacts to the soil resource from compaction or soil loss are not expected. Site stability and long-term soil productivity are expected to be maintained. Skid trails, staging areas, and landing sites will be scarified and seeded as necessary to reestablish vegetative cover. This should reduce the potential for erosion and sedimentation that could originate from these areas. Roads that are currently adding sediment to the stream system could receive additional erosion control treatments during project implementation. Activity slash can help mitigate some impacts from ground disturbance on site stability and productivity and activity slash would provide long term soil nutrient cycling.

Mowing of rabbitbrush under this alternative is not expected to have any adverse impacts to the soil resource. This activity will be done with rubber-tired equipment, with organic matter generated from mowing left largely in place, serving as organic matter and mulch across the soil surface. These areas of treatment are fairly flat, thus little soil movement is expected to be generated.

It is anticipated that overall soil condition and trends across the project area will be maintained, and over the long term, the trend will improve.

### **Prescribed Fire Treatments**

Proposed prescribed fire treatments within ponderosa pine, mixed conifer, and piñon-juniper vegetation types across the project have the potential to help maintain and/or improve soil conditions. Prescribed fire treatments would reduce surface and ladder fuels. These treatments would reduce the severity of future wildfires that could impact soils.

Pile burning will likely result in localized, negative effects including soil sterilization and total consumption of fine organic materials which can result in loss of litter layer, oxidation of soils,



hydrophobic soils, loss of soil structure, minimal return of native grasses, and an increase in forbs. These effects could also cause a localized decrease in infiltration and an increase in runoff.

Soil conditions in riparian areas, wetlands, and wet meadows would be maintained, as these areas would be buffered. Buffer distances are designed to provide adequate distance for ash and mobilized sediment to drop out prior to reaching riparian and water resources.

Designed low-intensity wildfire in the areas of Dry Blue Creek, Frieborn Canyon, and the San Francisco Divide will limit the severity of impacts to soil resources. Soil conditions are expected to remain the same, with a lessening of risk to high-severity wildfire. High-severity wildfire often results in negative effects to the soil resource. Upward trends would occur over the long term if canopy covers are reduced and more herbaceous ground cover can be restored in these areas.

Prescribed fire can also stimulate more vigorous growth of grass and forb vegetation as well as reduce fuel loading. This can lead to overall improvements in herbaceous cover and maintenance of coarse woody debris into the future. These benefits would not occur under alternative A.

The prescribed fire activities proposed under these action alternatives would help reduce fuel loading and ladder fuels and reduce the risk of future high-severity wildfire; providing for long-term soil protection and soil productivity.

### **Stream, Riparian, and Erosion Control Treatments**

Proposed riparian, stream, and erosion control treatments would maintain satisfactory soils and have the potential to improve impaired soils and reduce current soil loss rates.

These treatments are designed to restore areas where site conditions are currently degraded. The treatments described in chapter 2 of this document would improve infiltration rates and bank stabilization, increase residence time of water in the system, control erosion, reduce sediment movement into the stream, increase vegetation diversity along stream channels, increase herbaceous ground cover in the uplands, reduce direct motorized impacts on riparian and stream channels, and reduce sediment movement into stream channels from motorized crossings.

The action alternatives provide for the improvement of impaired soil conditions as well as help in maintaining satisfactory soil conditions in riparian areas, wetlands, upland wet meadows, and degraded uplands. Upward trends are expected in all of these restoration areas.

### **Range Management Treatments**

Additional watering sites in selected grazing allotments within the project area are anticipated to improve livestock and wildlife distribution. Improvements would not completely eliminate concentrated use at existing watering locations. At new sites, some soil compaction and loss of herbaceous vegetation is likely to occur.

### **Motorized Transportation Treatments**

Road improvements, reroutes, and decommissioning activities proposed under the action alternatives are designed to improve the soil resource over the long term. Road improvements are planned in areas where current routes are leading to erosion and contributing to movement of sediment into the stream system.

Reroutes have been planned in areas where the current route crosses live streams, riparian areas, or both. Reroutes would be in more stable locations with less water and soil resource impacts.

Approximately 116 miles of decommissioning is planned where currently closed routes are no longer necessary for forest management activities. In the short term, approximately 104 miles would be available for decommissioning, while an additional 12 miles could be decommissioned following vegetation and prescribed fire treatments.

Currently, these closed routes continue to provide a pathway for sediment delivery into the stream system and remain a source of ongoing erosion. Decommissioning would provide a barrier thus allowing the roaded area to return to its natural state. In these areas, there would be an increase in vegetation, infiltration rates, soil stability, and a reduction in overland flow and soil loss. Soil conditions that are currently unsatisfactory within the roadbed would improve, with upward trends over the long term.

These alternatives provide for several other motorized transportation treatments, for which the following direct and indirect effects would be realized.

Construction of 3 to 5 miles of temporary roads that would be obliterated following vegetation treatments. Short-term temporary road construction would have negative impacts to the soil resource with removal of herbaceous vegetation and compaction during use. Subsequent obliteration should return the temporary road scar to its natural state. Construction and decommissioning of these temporary roads would result in 3.6 to 6.1 acres of new soil disturbance.

Approximately 4.2 miles of trail tread (3 feet wide) would remain on roads that are scheduled for decommissioning. This motorized treatment would have short-term impacts to the soil resource during decommissioning, long term impacts would remain from the trail tread. This would result in approximately 1.4 acres of long-term disturbance with possible connectivity to waterways.

Reopening of 13.8 miles of motorized routes to all vehicle types would result in long term continued negative impacts to the soil resource. These closed routes are not currently decommissioned, with only a signed closure in place. Compaction, lack of infiltration, loss of soil productivity, and lack of vegetative ground cover would persist in the long term. This results in approximately 20.1 acres of continued commitment of the soil resource.

Addition of 4.2 miles of user-created routes to the motorized system would result in long-term impacts to the soil resource, similar to the above-mentioned reopening of motorized routes. This results in approximately 6.1 acres of continued commitment of the soil resource.

Reopen then close and/or decommission 34.5 miles of currently closed routes for vegetation and/or prescribed fire treatments (22.5 miles would be reclosed and 12 miles would be decommissioned) – This motorized treatment would have short-term negative impacts to the soil resource. Reopening a currently closed route would subject it to renewed compaction and removal of any vegetation gains it might have seen during its closure. Follow-up closure would negate these impacts; however, it may be a few years before this occurs. The roadbed scar would continue to result in some level of soil disturbance in the long term. Roads that would be decommissioned following treatments would see more benefit to the soil resource as they would be returned to their natural state, with an increase in vegetation, infiltration, and some restoration of soil fertility and productivity over the long term. This would affect approximately 51.6 total acres. Approximately 32.7 acres would realize benefits of being reclosed while 17.5 acres would realize benefits of decommissioning.

Construction of 0.3 mile of all-terrain vehicle routes would have both positive and negative impacts to the soil resource. The new routes are being constructed to avoid riparian areas, stream crossings, and perennial water. The reroutes would improve the soil and water resources in these areas over the long term. However, there would be 0.3 mile of new construction and commitment of 0.2 acre of the soil resource to the all-terrain vehicle routes. Overall, the positive outweighs the negative for soil and water resources as the soil, riparian, and water quality benefits are greater than the 0.2 acre of new disturbance across the landscape.

Reopening of 3.5 miles of previously closed routes for administrative use or single purpose use (Tucson Electric Power line access) would have negative impacts on soil resources over the long term, as these roads would not be decommissioned in the future. Compaction, lack of vegetation, reduce infiltration, and loss of soil productivity would persist on these routes. This amounts to 5.1 acres of continued commitment of the soil resource.

Alternative B would have negative impacts between 87.5 to 90 acres to the soil resource, some of which may be mitigated by decommissioning. The same amount of acres would be impacted in alternative C. The 87.5 to 90 acres is more than alternative A and 27.2 acres more than alternative D.

#### *Alternative C – Herbicide Utilization*

##### **Mechanical Vegetation Treatments**

Alternative C vegetation treatments are similar to alternative B, with the exception of the following treatments:

- Herbicide may be used on 30 acres of meadow treatment that is currently proposed under alternative B for mechanical treatment.
- Herbicide may be used in lieu of, or in addition to, all 20,283 acres of rabbitbrush treatment areas proposed under alternative B, dependent on the site.
- Herbicide may be used on up to 8,000 acres of juniper that is currently proposed under alternative B for mechanical treatment.

Herbicide use is proposed in grasslands with rabbitbrush and woodlands with alligator juniper. Herbicides can persist in soils from a few months up to three years depending on soil type and environmental conditions such as soil moisture and temperature. The mobility of herbicides in the soil is determined by the adsorption capacity of the soil, soil moisture, and post application rainfall. Residence time in soils is also dependent soil texture and on the amount of microbial activity occurring in the soil. Soils associated with the rabbitbrush treatments have relatively high clay contents, which will limit the mobility of the herbicide in the soil profile. Herbicide labels and application rates will be adhered to strictly. No negative effects to the soil condition or trend is anticipated with herbicide use in this alternative.

Direct and indirect effects are the same as described in the common to all alternative section, above for prescribed fire, stream, riparian, and erosion control, range management, and motorized transportation.

#### *Alternative D*

Direct and indirect effects are the same as described in the common to all alternative section, above for mechanical vegetation; prescribed fire; stream, riparian, and erosion control; and range management treatments.

### Motorized Transportation Treatments

Alternative D motorized transportation treatments are similar to alternative B, with the exception of the following treatments:

- There would be no reopening of 13.6 miles (19.8 acres) of motorized routes to all vehicle types under this alternative (0.2 mile would be reopened). Instead, these 13.6 miles would be added to road decommissioning miles, bringing the total decommissioned miles to approximately 130 (189 acres) in alternative D. One hundred and eighteen miles would be immediately available for decommissioning, while 12 miles would be ready for decommissioning following vegetation and prescribed fire treatments. There would be an increased benefit to the soil resource under alternative D, compared to alternatives B and C, with almost 14 more miles of road or approximately 20 acres returned to a natural state.
- There would be no addition of 4.2 miles of user-created routes to the motorized system. There would no long-term impacts to the soil resource from continued use of these routes. Currently, all user-created routes are planned to be returned to their natural state. Alternative D has more positive benefits to soil resources under this activity than do alternatives B and C.
- There would be no construction of 0.3 mile of all-terrain vehicle routes. There would be continued negative impacts to the soil resource at the crossing locations of Dillman Creek. However, no construction of a reroute would occur that would negatively impact soil resources in a new roadbed. This area would remain undisturbed and soil productivity, stability, and fertility would remain the same. The current location of the route would continue to have negative impacts over the long term to soil resources. Overall, the negative impacts of leaving this route in the same location would be greater than the negative impacts that 0.3 mile of new motorized trail would have, as the small disturbance of the landscape in uplands would not cause as lasting and continued harm as motorized stream crossings have to multiple resources.

Alternative D provides close to 30 more acres of positive benefit to the soil resource than alternatives B or C, but allows from between 60.6 to 63.1 more acres soil disturbance than alternative A.

Table 53 provides a comparison of acres of disturbance from motorized transportation treatments by alternative. These acres were derived from miles of road and assumed road widths (table 25).

**Table 53. Acres of disturbance by alternative from motorized transportation treatments**

Alternative	Total Acres of Disturbance Related to Motorized Transportation Treatments
Alternative A	0
Alternative B	86.7–89.2
Alternative C	86.7–89.2
Alternative D	60.6–63.1

## Riparian Areas and Wetlands/Wet Meadows

### *Alternative A*

#### **Mechanical Vegetation Treatments**

This alternative would not provide for any mechanical vegetation treatments to reduce heavy fuel loadings and promote conditions that reduce risk of uncharacteristic high-intensity wildfire. High soil burn severities are often a result of uncharacteristic wildfire, leading to severe negative effects to downstream water resources, including riparian areas, wetlands, and wet meadows. Increased overland flow as a result of hydrophobic soils and high soil burn severities can produce excessive flood flows in channels, from even minor precipitation events. Increased runoff volumes and velocities in streams lead to damaged streambanks and riparian areas, often changing channel geometry. Riparian vegetation can be severely damaged during these flood events and often take years to recover. Repeated flooding until watershed stabilization occurs in burned areas will continually set back riparian recovery. This was evident during field review of several streams on the western boundary of the Luna Restoration Project. These streams are currently experiencing increased water flows and sediment delivery from the effects of the 2011 Wallow Fire. The increased flows are causing both vertical and lateral stream instabilities, which have led to tremendous losses of riparian vegetation and have compromised floodplain access. These channels have experienced losses to much of their riparian habitat, with full recovery not expected for decades without restoration efforts. Without vegetation treatments, riparian areas will be placed at high risk for loss and associated downward trends in functionality in the event of an uncharacteristic wildfire.

The existing condition of riparian areas, wetlands, and wet meadows would continue and potentially decline under the no-action alternative. In areas where overstory densities are high, little long-term improvement in hydrologic flow regime will occur without mechanical treatment or other vegetation treatment methods. Wildfires in untreated areas pose a greater risk of negative impacts to riparian areas, wetlands, and wet meadows than wildfire occurring after implementation of vegetation treatments in alternatives B, C, and D.

#### **Prescribed Fire Treatments**

Lack of prescribed fire treatments would result in effects similar to those noted above in the “Mechanical Vegetation Treatments” section. Not implementing prescribed fire treatments will continue to allow heavy fuel loading in the understory. As understory fuels build up and tree density and cover increases, the risk of higher intensity, uncharacteristic wildfire increases as well as the potential for high soil burn severity. The resultant loss of canopy cover, ground cover, and organic debris on the soil surface, together with the possible occurrence of hydrophobic soil layers in these areas, would likely lead to considerable increases in soil erosion, storm runoff response, and sediment movement into waterways. This would result in a greater risk of negative impacts to riparian areas, wetlands, and wet meadows under alternative A compared to all action alternatives.

#### **Stream, Riparian, and Erosion Control Treatments**

Restoration activities to address ongoing negative impacts to streams and riparian areas would not be implemented under alternative A.

### *Effects Common to Alternatives B, C, and D*

#### **Mechanical Vegetation Treatments**

Current conditions of riparian areas, wetlands, and wet meadows would be maintained or improved with the proper implementation of best management practices.

Similar to the “Soils” and “Water Quality and Quantity” sections, areas across the project area with dense canopies and heavy coarse woody debris loading in the understory would see enhancement from vegetation treatments. Restoration thinning would reduce the risk of uncharacteristic wildfire that harms riparian function. Meadow thinning treatments are planned in upland meadows and terraces adjacent to riparian areas. These treatments are designed to thin out conifers that are encroaching upon riparian systems and not for commercial purposes. Limited equipment would be used in these area with no conifers removed that provide for bank stability. Piles would be located outside floodplains.

Heavy equipment used in vegetation treatments is not expected to be used near riparian areas or within wetlands or wet meadows. There may be some temporary increases in runoff and soil movement related to ground cover and soil disturbance from mechanical thinning and skidding operations, as well as from the use of existing roads by logging equipment. Skid trails, staging areas and landing sites will be scarified and seeded as necessary to reestablish vegetative cover. This should reduce the potential for erosion and sedimentation that could originate from these areas and move downstream. Buffer strips have been incorporated into the Best Management Practices and design features to provide protection of waterways and riparian areas. Mowing of rabbitbrush under this alternative is not expected to have any adverse impacts to riparian or wetland resources. These activities are not proposed near these sensitive resources. With proper implementation of best management practices and design features, riparian and wetland resources would be protected from both short-term and long-term negative impacts.

It is anticipated that current conditions of riparian areas, wetlands, and wet meadows would be maintained with implementation of mechanical vegetation treatment, with a lowered risk for long-term negative impacts as a result of uncharacteristic wildfire and encroachment of tree species.

#### **Prescribed Fire Treatments**

Prescribed fire treatments would result in effects similar to those noted in the “Mechanical Vegetation Treatments” section. Heavy fuel loading would be reduced in the understory, lowering the risk of uncharacteristic wildfire, and reducing the possibility for high soil burn severity.

Best management practices and design features restrict the location of pile sites from waterways, riparian areas, and wetlands. Pile burning would not impact these resources. This treatment would not impact riparian areas or wet meadows. Buffer distances are designed for landings and staging areas to provide adequate distance for ash and mobilized sediment to drop out prior to reaching stream courses.

Designed low-intensity wildfire in the areas of Dry Blue Creek, Frieborn Canyon, and the San Francisco Divide will limit the severity of impacts to soil resources in these locations. There are not expected to be negative impacts to downstream riparian resources, with a lessening of risk to high-severity, uncharacteristic wildfire in these areas.

The prescribed fire activities would help reduce fuel loading in the understory, thus reducing the risk from uncharacteristic wildfire, providing for long-term protection for riparian and wetland resources.

### **Stream, Riparian, and Erosion Control Treatments**

Under all action alternatives, a suite of restoration activities to improve water quality and quantity are planned in streams, riparian areas, and uplands to improve degraded conditions. The following would be the effects to riparian areas, wetlands, and wet meadows with implementation of proposed projects:

- Upgrading, relocating, or hardening of existing stream crossings – Implementation of these actions will provide positive benefits to riparian areas, wetlands, and wet meadows. Similar to positive benefit to water quality and quantity, hardening of crossings will help to alleviate impacts to native vegetation growing on the approaches. Less sediment and gravels will be transported downstream of the crossing, which impacts vigor of different types of vegetation. While riparian woody plants may prefer coarser substrate, herbaceous vegetation may not. Several of the proposed crossings include small bridge designs and French drains that will enhance wet meadow habitats or avoid them altogether. This activity poses a positive benefit to riparian areas, wetlands, and wet meadows.
- Removal of encroaching conifers in riparian areas and upland wet meadows – Removal of conifers that are currently encroaching into floodplains, riparian areas, and fringes of the wet meadows would free up available water, nutrients, and energy that could be used by riparian and wetland species. This would also lower the risk these sites currently have for ecological conversion to upland vegetation species, which would reduce wetland and riparian habitat within the project area. This activity protects riparian areas, wetlands, and wet meadows.
- Construction of ungulate exclosures in riparian areas and degraded uplands – This activity will have positive benefits to riparian areas and wetland/wet meadows in the degraded riparian areas and upland sites that have been identified for restoration needs. Effects are similar to those under “Water Quality and Quantity.” The areas proposed for exclusion have a suite of additional restoration activities (riparian planting, stream stabilization, seeding) that will be implemented to improve resource conditions. By alleviated grazing pressure within these areas, it will provide a needed period of rest and recovery for riparian woody and herbaceous vegetation to grow, upland vegetation to recover, and stream banks to stabilize. These restoration efforts, combined, will aid in reversing erosion, lack of ground cover, and destabilized channels. Riparian areas, wetlands, and wet meadows will benefit over the long term. It will likely take several years for these improvements to be realized.
- Construction of stream and wet meadow stabilization structures – This activity would allow stabilization techniques to be employed on several degraded stream reaches and meadows throughout the project area. These activities will aid in restoring stream banks, and channel shape, form, and function back to proper functioning conditions. Sediment input from eroding banks would be reduced, channels would narrow, and flows would be reduced, allowing for an increase in productivity and vigor of riparian and wetland vegetation.
- Riparian tree planting – Riparian tree planting is proposed in locations where there is currently lack of riparian woody vegetation and streambank instability, leading to higher water temperatures and movement of sediment into the stream. By restoring riparian vegetation to these areas, the increased shade would help to reduce stream temperatures.

The increased deep root system provided by these types of plants would aid in bank stability, helping to improve channel shape, form, and function, thus providing for stream stabilization and moving these systems in an upward trend and closer to proper functioning condition.

- Reconstruction of Head of Ditch irrigation diversion – A permanent diversion is planned at the current location for Head of Ditch to eliminate the need for repeated implementation of a native soil push-up dam that diverts all of the water from the San Francisco River (spring to fall). The new facility design would minimize activity in the active channel once it is constructed, thus reducing impacts to riparian vegetation in the immediate vicinity. The current diversion takes all of the stream flow for much of the summer months, with exception of flooding events. The new diversion would provide an opportunity for water right owners to leave their share of water in the river if they do not need it for irrigation. While this may not occur immediately, the new design provides the opportunity for some water to remain in the channel yearlong, thereby increasing water availability for riparian species yearlong.
- Construction of all-terrain vehicle barriers to protect wet meadows – This activity is planned to deter motorized traffic into sensitive resource locations where the road is currently closed but unauthorized traffic persists. The barriers would help protect wet meadows that are currently receiving subject to rutting and disturbance of associated hydric soils. Wet meadow conditions would improve fairly quickly with elimination of unauthorized use, as compaction and rutting would be eliminated, infiltration and percolation would be improved, and movement of sediment would be reduced. This activity would move these systems quickly in an upward trend towards proper functioning condition.
- Maintenance and implementation of new erosion stabilization structures – There are currently more than 160 erosion control structures that were constructed within the Luna Restoration Project area over the last several decades. Many of these are in upland areas, away from riparian areas, wetlands, and wet meadows, however, there are several located in upland wet meadows. Maintenance, reconstruction, or both of these upland wet meadow structures would ensure the longevity of the structures and lower the risk of them breaching which could result in headcutting and subsequent dewatering of the meadow. This activity will be a benefit to these fragile ecosystems and maintain functional conditions, improve functional conditions, or both.
- Native grass seeding in degraded uplands – These activities are planned primarily in uplands that would be adjacent to riparian systems. Improvement in these upland areas would benefit the downstream riparian areas by restoring herbaceous vegetation, which will slow down overland flows and filter water. A reduction in flow velocities and dropping out of sediment prior to reaching the channels will aid in improving riparian condition and moving these areas in an upward trend towards proper functioning condition.
- Water quality improvements in campgrounds – Existing road and campsite drainage that leads directly to the adjacent waterways of San Francisco River and Trout Creek would be improved, thus reducing or eliminating a direct input of sediment. This would also provide a buffer for riparian vegetation from excessive flows off roads and campsites, thus providing riparian protection. This activity would provide improvement to riparian conditions.



### **Range Management Treatments**

The action alternatives propose 14 additional watering sites within the project area. While this activity is expected to improve livestock distribution in allotments within the project areas, there are not expected to be any impacts to riparian areas, wetlands, and wet meadows. New water sites are planned in upland locations and no streamside watering sites are being eliminated.

### **Motorized Transportation Treatments**

Road improvements, reroutes, and decommissioning activities proposed under the action alternatives are designed to protect and improve riparian areas, wetlands, and wet meadows. Road improvements are planned in areas where current routes are leading to erosion and contributing to movement of sediment into the stream system. Reroutes have been planned in areas where the current route crosses live streams and/or riparian areas. Reroutes would be in more stable locations with less water and soil resource impacts. Decommissioning is planned where currently closed routes are no longer necessary for forest management activities. Currently, these closed routes continue to provide a pathway for sediment delivery into the stream system and remain a source of ongoing erosion. Local traffic continues to use these closed routes as they lack an effective closure barrier. Decommissioning would provide the necessary barrier and serve as a deterrent for continued use, thus allowing the roaded area to return to its natural state. In these areas, there would be an increase in vegetation on these former routes, an increase in infiltration rates, and increase in soil stability, and a reduction in overland flow and soil loss. Soil conditions that are currently unsatisfactory within the roadbed would improve, with upward trends over the long term.

There are several other motorized transportation treatments, for which the following direct and indirect effects would be realized for riparian areas, wetlands, and wet meadows.

- Construction of 3-5 miles of temporary roads which would be obliterated following vegetation treatments – These motorized treatments are not planned to occur in riparian areas, wetlands, and wet meadows. Best management practices and design features are incorporated into the project that would prevent indirect impacts from these temporary roads from impacting downstream riparian areas and wetlands. There would be no change to riparian functional condition as a result of this treatment.
- Approximately 4.2 miles of trailhead would be left on roads that are scheduled for decommissioning, with a trail tread of approximately 3 feet in width remaining– This motorized treatment would not have detrimental impacts to riparian areas, and wetland/wet meadows. Decommissioning of a majority of the roadbed would lessen direct connections to riparian areas. The remaining tread would be designed with best management practices and design features that would mitigate water flow from the trail. This treatment is not anticipated to have any measurable impact to the functionality of riparian areas, wetlands, or wet meadows.
- Reopening of 13.8 miles of motorized routes to all vehicle types – This motorized treatment would result in little negative impact to riparian resources. One of the routes proposed crosses a small wetland area of Dillman Creek. This crossing is proposed for hardening, with uninhibited water passage through the crossing. These two treatments, implemented in tandem will minimize negative impacts to this riparian area. The crossing is currently receiving unauthorized use so this treatment will be an improvement over alternative A. The other routes included in the 13.8 miles do not cross riparian areas, wetlands, or wet meadows, thus would have no negative impacts to this resource area.

- Addition of 4.2 miles of user-created routes to the motorized system – The user-created routes proposed for addition in this alternative were all evaluated in the field by Gila National Forest watershed personnel for resource concerns. None of these routes cross riparian areas, wetlands, or wet meadows. The addition of these miles is not anticipated to impact these resources.
- Reopen then close and/or decommission 34.5 miles of currently closed routes for vegetation and/or prescribed fire treatments (22.5 miles would be reclosed and 12 miles would be decommissioned) – This motorized treatment may have short-term minor impacts to riparian resources, where the current roadbed and riparian resources coincide. Reopening a currently closed route would subject it to renewed compaction and removal of any vegetation gains it might have seen during its closure, thus increasing flow velocities down the roadbed and possibly into downstream waterways. Follow-up closure would negate these impacts, however it may be a few years before this occurs. The roadbed scar would continue to result in some level of disturbance in the long term. Roads that would be decommissioned following treatments would see more benefit to the soil resource as they would be returned to their natural state, with an increase in vegetation, increase in infiltration, and some restoration of soil fertility and productivity over the long term. While long-term impacts are not expected with this treatment, until the roads are decommissioned, benefits to riparian areas, wetlands and wet meadows would not occur.
- Construction of 0.3 mile of all-terrain vehicle routes – This motorized treatment would have positive impacts to riparian resources. The locations of these miles are in Dillman Creek where the current route path crosses several times. The reroute will avoid several stream crossings, thus eliminating direct effects to the riparian resource. A reduction in stream crossings will help improve riparian resource functionality. The new reroute is being constructed to avoid riparian areas, stream crossings, and perennial water.
- Reopening of 3.5 miles of previously closed routes for administrative use (Tucson Electric Power line access) – This motorized treatment is not anticipated to have negative impacts to riparian areas, wetlands, and wet meadows as the locations do not coincide.

#### *Alternative C - Herbicide Utilization*

##### **Mechanical Vegetation Treatments**

This alternative's vegetation treatments are common to all action alternatives with the exception applying herbicide treatments on 30 acres of meadow; appropriate areas of 20,283 acres of rabbitbrush; and up to 8,000 acres of juniper.

Herbicide use is proposed in upland rangelands and woodlands. Riparian areas, wetlands and wet meadow areas are not expected to be impacted by use of herbicide, as their locations will not coincide. Application of best management practices will avoid negative effects to waterways. These include mitigation measures such as buffering waterways, avoiding precipitation events, limit use to low winds, and identification and avoidance of any drinking water supplies and sensitive aquatic species locations. No negative impacts to riparian areas and wetlands/wet meadows are anticipated with implementation of alternative C.

### *Alternative D*

#### **Motorized Transportation Treatments**

This alternative's motorized transportation treatments are similar to all action alternatives with the exception of the following treatments:

- There would be no reopening of 13.6 miles of motorized routes under this alternative. Only 0.2 mile would be reopened. Instead, these 13.6 miles would be added to road decommissioning miles, bringing the total decommissioned miles to approximately 130 in alternative D. Approximately 118 miles would be immediately available for decommissioning, while 12 miles would be ready for decommissioning following vegetation and prescribed fire treatments. There would be an increased benefit, although minor, to the riparian areas, wetlands, and wet meadows under alternative D, compared to alternatives B and C. Although almost 14 more miles of road would be returned to a natural state, very few of these miles currently are within or adjacent to riparian areas or wet meadows.
- There would be no addition of 4.2 miles of user-created routes to the motorized system. There would no long-term impacts to the riparian areas, wetlands, and wet meadows from continued use of these routes. Currently, all user-created routes are planned to be returned to their natural state. Some short-term impacts may occur during obliteration of these routes where they are within or adjacent to riparian areas or wet meadows. Alternative D has more positive benefits to these resources under this activity than do alternatives B and C; however, only approximately one-quarter mile of these proposed additions are within a riparian area in Dillman Creek.
- There would be no construction of 0.3 mile of all-terrain vehicle routes. There would be continued negative impacts to the riparian areas, wetlands, and wet meadows crossing locations of Dillman Creek. The proposed reroute is outside of drainages with no impacts to riparian areas, wetlands, and wet meadows. Leaving this route in the same place would continue to provide long-term negative impacts to these resources.

### **Water Quality and Quantity**

#### *Alternative A*

#### **Mechanical Vegetation Treatments**

This alternative would not provide for any mechanical vegetation treatments to reduce heavy fuel loadings and promote conditions that reduce risk of uncharacteristic high-intensity wildfire. High soil burn severities are often a result of uncharacteristic wildfire, leading to severe negative effects to water quality and quantity.

Post fire effects would result in increased runoff volumes and velocities in streams leading to damaged streambanks and riparian areas, and pose risks to downstream values such as in-channel structures and infrastructure adjacent to and/or within floodplains. Several streams on the western boundary of the Luna Restoration Project area are currently experiencing increased water flows and sediment delivery from the effects of the 2011 Wallow Fire. The increased flows are causing both vertical and lateral stream instabilities, which contribute negatively to water quality, in particular, temperature and turbidity. Stream flows are not able to dissipate effectively, thus runoff rates and velocities are high. Stabilizing riparian vegetation has been scoured away causing detachment and movement of channel and bank material.

In addition, within the project area, Centerfire Creek and the San Francisco River do not meet New Mexico State water quality standards. Any future high-intensity wildfires would hamper any water quality improvement to these streams.

The existing condition of water quality and quantity would continue and potentially decline under the no-action alternative. In areas where overstory densities are high, little long-term improvement in hydrologic flow regime will occur without mechanical treatment or other vegetation treatment methods. Wildfires in untreated areas pose a greater risk of negative impacts to water quality, channel stability, and changes to hydrologic regimes than wildfire occurring after implementation of vegetation treatments in alternatives B, C, and D.

### **Prescribed Fire Treatments**

Lack of prescribed fire treatments would result in effects similar to those noted above under “Mechanical Vegetation Treatments.” Not implementing prescribed fire treatments will continue to allow heavy fuel loading in the understory. As understory fuels build up and tree density and cover increases, the risk of higher intensity, uncharacteristic wildfire increases as well as the potential for high soil burn severity. The resultant loss of canopy cover, ground cover, and organic debris on the soil surface, together with the possible occurrence of hydrophobic soil layers in these areas, would likely lead to considerable increases in soil erosion, storm runoff response, and sediment movement into waterways. This would result in a greater risk of negative impacts to water quality under alternative A compared to all action alternatives, with potential for destabilized hydrologic regime.

### **Stream, Riparian, and Erosion Control Treatments**

Restoration activities to address ongoing negative impacts to streams and riparian areas would not be implemented under alternative A.

### **Motorized Transportation Treatments**

This alternative results in the least amount of new disturbance related to motorized transportation as equipment would not be used for road-related ground-disturbing activities. However, the absence of road improvements, road decommissioning, or reroutes under this alternative would continue to allow negative impacts to water quality and water quantity to occur in many locations across the project area over the long term.

The lack of road decommissioning would continue to allow currently closed routes to remain on the landscape. Current road closures do not immediately eliminate hydrologic impacts, especially when unauthorized use continues to occur. Rather, the disturbed surface takes years to stabilize, which depends on the level of success in the closure, underlying soils, vegetative regrowth, and other factors. Roads, including those behind gates and dropped from inventories, continue to produce sediment until they are totally revegetated. The primary effect to water quality related to roads is sedimentation originating from road erosion. Roads are a major source of sediment and contribute more off-site sediment than any other land management activity (Gibbons and Salo 1973, Meehan 1991). Numerous researchers have established that roads are a major source of sediment delivered to streams in otherwise relatively undisturbed watersheds, such as forests and rangelands. Because routes intercept and concentrate water the closer they are to a drainage channel, the quicker water is delivered to the stream channel, potentially increasing runoff response. Roads can also disrupt a watershed’s natural hydrologic flow by capturing surface and subsurface runoff on hillslopes. Unmitigated, the captured runoff can be delivered to stream

systems more rapidly, at higher rates of flow, and can impact the timing and magnitude of natural stream flows. Stream channels will respond to increases in flow rates by widening or deepening in order to carry these greater flow rates. Roads directly alter natural sediment and hydrologic regimes by changing streamflow patterns and amounts, sediment loading, transport, and deposition, channel morphology and stability, water quality and riparian conditions within a watershed (Gibbons and Salo 1973, Dunne and Leopold 1978, Copstead et al. 1997). This can lead to higher peak flows, which may then lead to a higher risk of channel erosion.

The closed routes that are proposed for decommissioning in all action alternatives would continue to discharge runoff and sediment to adjacent waterways in this alternative, in particular where the roadbed is within 300 feet of a stream, or has inadequate drainage features, or is hydrologically connected to the stream network. Road densities would not be decreased thereby reducing potential for improved hydrologic flow regimes. This alternative provides the least benefit to water quality and quantity than any of the action alternatives due to lack of decommissioning alone.

#### *Effects Common to Alternatives B, C, and D*

##### **Mechanical Vegetation Treatments**

For all action alternatives, where water quality and quantity are currently meeting State water quality standards and display a stable flow regime, these indicators would continue to be maintained or improved with the proper implementation of best management practices and design features.

Similar to the “Soils” discussion for all action alternatives, areas across the project area with dense canopies and heavy coarse woody debris loading in the understory would see enhancement from vegetation treatments. Vegetative ground cover would be reduced, spatially rearranged, or both by proposed vegetation treatments. Restoration thinning would reduce the risk of high-severity wildfire that can have severe impacts to water quality as described in alternative A.

Heavy equipment used in vegetation treatments will cause varying degrees of soil compaction which can temporarily increase water runoff and delay, reduce, or both the establishment and growth of desired herbaceous vegetation. Short-term increases in soil loss related to ground cover and soil disturbance are expected from mechanical thinning and skidding operations, as well as from the use of existing roads by logging equipment, which can pose a threat to water quality. Project-specific best management practices and design features are designed to mitigate negative impacts from these activities. There is not expected to be long-term negative impacts to water quality or quantity as a result of mechanized vegetation treatments.

Mowing of rabbitbrush is not expected to have any adverse impacts to water quality and quantity. This activity will be done with rubber-tired equipment, with organic matter generated from mowing left largely in place, serving as organic matter and mulch across the land surface. These areas of treatment are fairly flat, thus there is not expected to be increases in runoff generated from these treatments.

It is anticipated that overall water quality condition and trends and hydrologic regimes across the project area will be maintained and the risk lowered for long-term negative impacts as a result of uncharacteristic wildfire.

### **Prescribed Fire Treatments**

Prescribed fire treatments would result in effects similar to those noted above under “Mechanical Vegetation Treatments.” Heavy fuel loading would be reduced in the understory, lowering the risk of uncharacteristic wildfire, and reducing the possibility for high soil burn severity. Prescribed fire would initially reduce the level of organic debris and mobilize some sediment and nutrients. However careful attention to burning conditions during a prescribed fire is designed to limit the potential of short-term loss of soils and nutrients.

Pile burning will likely result in localized, negative effects to soil resources as described under the “Soils” section. Some effects of pile burning could also cause a localized decrease in infiltration and an increase in runoff. Buffer distances are designed for landings and staging areas to provide adequate distance for ash and mobilized sediment to drop out prior to reaching stream courses.

Designed low-intensity wildfire in the areas of Dry Blue Creek, Frieborn Canyon, and the San Francisco Divide will limit the severity of impacts to soil resources in these locations. There are not expected to be negative impacts to water quality and quantity, with a lessening of risk to high-severity, uncharacteristic wildfire in these areas.

The prescribed fire activities would help reduce fuel loading in the understory, thus reducing the risk from uncharacteristic wildfire, providing for long-term protection for water quality and hydrologic regimes.

### **Stream, Riparian, and Erosion Control Treatments**

A suite of restoration activities to improve water quality and quantity are planned to improve currently degraded conditions in streams, riparian areas, and uplands. The following would be the effects to water quality and quantity with implementation of proposed projects.

- Upgrading, relocating, or hardening existing stream crossings – Implementation of these actions will provide positive benefits to water quality and quantity. Hardening of crossing will help to alleviate the short-term negative impacts of vehicle tires disturbing and mobilizing stream bottom sediments. Improvement at these crossings will also aid hindering the direct flow path of water into the stream by either filtering out some of the sediment or relocating the crossing to a more stable location. Crossings will not be eliminated thus there will still be a hydrologic connection of water and sediment into the stream systems, at a reduced rate. This will be an improvement to water quality and water quantity from alternative A.
- Removal of encroaching conifers in riparian areas and upland wet meadows – Removal of conifers that are currently encroaching into floodplains, riparian areas, and fringes of the wet meadows would free up available water, nutrients, and energy that could be used by riparian and wetland species. This would also lower the risk these sites currently have for ecological conversion to upland vegetation species, which would reduce wetland and riparian habitat within the project area. This activity protects hydrologic regimes in these areas.
- Construction of ungulate exclosures in riparian areas and degraded uplands – This activity will be a positive benefit to water quality and quantity in the degraded riparian areas and upland sites that have been identified for restoration needs. The areas proposed for exclusion have a suite of additional restoration activities (riparian planting, stream

stabilization, seeding) that will be implemented to improve resource conditions. By alleviating grazing pressure within these areas, it would provide a needed period of rest and recovery for riparian woody and herbaceous vegetation to grow, upland vegetation to recover, and stream banks to stabilize. All of these restoration efforts, combined, will aid in reversing erosion, lack of ground cover, and destabilized channels. Water quality and quantity will benefit over the long term. Streams currently not meeting New Mexico's State water quality standards would improve over the long term, in particular where the probable causes for listing have been identified as sedimentation, siltation, and temperature. Increased vegetation within these areas will also reduce runoff rates, allowing more subsurface water to remain in place, improving water quantity and stabilizing hydrologic regimes. It will likely take several years for these improvements to be realized.

- Construction of stream and wet meadow stabilization structures – This activity would allow stabilization techniques to be employed on several degraded stream reaches and meadows throughout the project area. These activities will aid in restoring stream banks, and channel shape, form, and function back to proper functioning conditions. Sediment input from eroding banks would be reduced, channels would narrow, and flows would be reduced, allowing for improvement in water quality (decreased temperature and sedimentation) and water quantity (reduction in flow velocities).
- Riparian tree planting – Riparian tree planting is proposed in locations where there is currently lack of riparian woody vegetation and streambank instability, leading to higher water temperatures and movement of sediment into the stream. By restoring riparian vegetation to these areas, the increased shade would help to reduce stream temperatures. The increased deep root system provided by these types of plants would aid in bank stability, helping to improve channel shape, form, and function, thus providing for stream stabilization. Water quality and quantity under this alternative would improve with this activity.
- Reconstruction of Head of Ditch irrigation diversion – A permanent diversion is planned at the current location for Head of Ditch to eliminate the need for repeated implementation of a native soil push-up dam that diverts all of the water from the San Francisco River (spring to fall). The new facility is planned to minimize maintenance, provide an easy way to switch flows from the main channel to the diversion, minimize effects on the stream and aquatic biota, and to eliminate water ponding behind the facility. The current diversion takes all of the stream flow for much of the summer months, with exception of flooding events. The new diversion would provide an opportunity for water right owners to leave their share of water in the river if they do not need it for irrigation. While this may not occur immediately, the new design provides the opportunity for some water to remain in the channel yearlong, thereby improving water quality and water quantity. In addition, the improvement to the diversion structure will improve stream channel geometry and reduce negative impacts to the site caused by repeated rebuilding of the push-up dam.
- Construction of all-terrain vehicle barriers to protect wet meadows – This activity is planned to deter motorized traffic into sensitive resource locations where the road is currently closed but unauthorized traffic persists. The barriers would help protect wet meadows that are currently receiving loss of soil productivity and soil compaction due to this unauthorized use. Water quality and water quantity would benefit from these barriers, as compaction and rutting would be eliminated, infiltration and percolation would be improved, and movement of sediment would be reduced. This ongoing threat to the identified wet meadows would be removed.

- Maintenance and implementation of new erosion stabilization structures – There are currently more than 160 erosion control structures that were constructed within the Luna Restoration Project area over the last several decades. Lack of maintenance on these structures has led them to reach storage capacity, breach, new headcuts and gullies, or a combination of these things. Maintenance of existing structures and construction of new structures will reduce erosion, control headcutting and gullying, and stabilize uplands where lack of stability and excessive flows have led to severe erosion issues. This activity will reduce sedimentation and siltation downstream into waterways and provide for favorable conditions of flow, thereby improving both water quality and water quantity.
- Native grass seeding in degraded uplands – Negative impacts to water quality and quantity in currently degraded uplands would be reversed if herbaceous ground cover increases on these sites. Herbaceous cover would slow down overland flow, thereby improving infiltration and reducing erosive processes. Some of these sites are severely denuded of vegetation so this would be a slow process, with improvement over the long term to water quality and quantity.
- Water quality improvements in campgrounds – Existing road and campsite drainage that currently leads directly to the adjacent waterways of San Francisco River and Trout Creek, would be improved, thus reducing or eliminating a direct input of sediment. This interrupted connection to the drainage would slow down storm-generated runoff to these streams, providing for a stable hydrologic flow regime and reducing the opportunity for runoff related erosion. This activity would provide improvement to water quality and hydrologic regimes under this alternative.

### **Range Management Treatments**

There are 14 additional watering sites proposed within the project area. In watering locations where the water source is spring fed, less pressure on these springs may occur. The proposed treatments, however, do not provide fencing any of these areas, but rather provide alternate water sources to reduce pressure. This may relieve some water quality and quantity impacts; however, they may not be measurable. Effects to water quality and quantity are expected to improve slightly or not at all under all action alternatives.

### **Motorized Transportation Treatments**

Road improvements, reroutes, and decommissioning activities are designed to improve water quality and quantity over the long term. Road improvements are planned in areas where current routes are leading to erosion and contributing to movement of sediment into the stream system. Reroutes have been planned in areas where the current route crosses live streams, riparian areas, or both. Reroutes would be in more stable locations with less water and soil resource impacts. Approximately 116 miles of decommissioning is planned where currently closed routes are no longer necessary for forest management activities, with 104 miles being immediately available for decommissioning. The additional 12 miles would be ready for decommissioning following vegetation and prescribed fire treatments. Currently, these closed routes continue to provide a pathway for sediment delivery into the stream system and remain a source of ongoing erosion. Local traffic continues to use these closed routes as they lack an effective closure barrier. Decommissioning would provide the necessary barrier and serve as a deterrent for continued use, thus allowing the roaded area to return to its natural state. Proper road obliteration or decommissioning, which returns the road bed and fill slope to the contours of the land and replaces culverts with natural stream channels, offers the best opportunity to restore health to



heavily roaded watersheds and to aquatic habitat downstream. In these areas, there would be an increase in vegetation on these former routes, an increase in infiltration rates, and increase in soil stability, and a reduction in overland flow and soil loss. Long-term sediment reduction would benefit from these activities. Sediment production from roads diminishes over time after proper closure and nonuse. Water quality would see improvements and hydrologic regimes would no longer be influenced by water flow from the roadbeds' unnatural flow paths.

There are several other motorized transportation treatments, for which the following direct and indirect effects would be realized:

- Construction of 3 to 5 miles of temporary roads which would be obliterated following vegetation treatments – This motorized treatment would have negative short-term impacts to water quality and water quantity with removal of herbaceous vegetation and compaction during use. These temporary roads can provide a conduit for surface flows to be directed down the roadbed rather than dissipated across the land surface. Subsequent obliteration should return the temporary road scar to its natural state within a short period of time with proper implementation of best management practices and design features.
- Approximately 4.2 miles of trailhead would be left on roads that are scheduled for decommissioning, with a trail tread of approximately 3 feet in width remaining – This motorized treatment would have benefits to water quality and quantity with decommissioning of a majority of the roadbed. Some impacts to water quality and quantity may occur as flows may be directed down the remaining trail bed. However, proper implementation of trail tread and drainage should alleviate these impacts. There would be minimal long-term disturbance related to the trail tread that may have possible connectivity to waterways.
- Reopening of 13.8 miles of motorized routes to all vehicle types – This motorized treatment would result in some long-term negative impacts to water quality and quantity, somewhat similar to what is occurring under alternative A. These closed routes are not currently decommissioned, with only a signed closure in place. Unauthorized use continues on closed routes, albeit less than an open route receives. The current condition of these routes still provides a conduit for surface water to travel down these routes into waterways. Field review in 2015 determined that most of these routes were in upland areas, with little impacts to water quality and quantity. One route, however, does cross Dillman Creek in a perennial location. This crossing is proposed for hardening under alternatives B and C, which would mitigate concerns to water quality and quantity. Soil compaction and a lack of vegetation would still be present on all of these routes. None of these routes would realize the improvements to water quality and quantity that decommissioning would offer. Compaction, lack of infiltration, loss of soil productivity, and lack of vegetative ground cover would persist in the long term.
- Addition of 4.2 miles of user-created routes to the motorized system – This motorized treatment would result in some long-term impacts to water quality and water quantity. A field review of these roads determined that little water resource issues were currently occurring on these routes. They were located in upland locations, and would have effects similar to those in the above-mentioned reopening of motorized routes.
- Reopen then close and/or decommission 34.5 miles of currently closed routes for vegetation and/or prescribe fire treatments (22.5 miles would be reclosed and 12 miles would be decommissioned) – This motorized treatment would have some short-term and

long-term negative impacts to water quality and quantity. Reopening a currently closed route would subject it to renewed compaction and removal of any vegetation gains it might have seen during its closure. Follow-up closure would negate these impacts; however, it may be a few years before this occurs. The roadbed scar would continue to result in some level of water transport down its surface over the long term if it is not decommissioned. Roads that would be decommissioned following treatments would see long-term benefits to water quality and quantity as they would be returned to their natural state, with an increase in vegetation, increase in infiltration, and disconnected paths to waterways over the long term. Unauthorized use remains a concern on closed roads that would not be decommissioned.

- Construction of 0.3 mile of all-terrain vehicle routes – This motorized treatment would have positive impacts to water quality and quantity. The new route is being constructed to avoid riparian areas, stream crossings, and perennial water of Dillman Creek. Local riding groups have expressed support in using an alternative route if available rather than continuing unauthorized use of Dillman Creek. The reroute provides alternate access to desirable locations without negative resource effects to the stream.
- Reopening of 3.5 miles of previously closed routes for administrative use (Tucson Electric Power line access) – This motorized treatment would have minor negative impacts to water quality and water quantity over the long term as these roads would not be decommissioned in the future. Compaction, lack of vegetation, reduced infiltration, and loss of soil productivity would persist on these routes.

#### *Alternative C – Herbicide Utilization*

##### **Mechanical Vegetation Treatments**

This alternative's vegetation treatments are common to all action alternatives with the exception applying herbicide treatments on 30 acres of meadow; appropriate areas of 20,283 acres of rabbitbrush; and up to 8,000 acres of juniper.

Herbicide use is proposed in upland rangelands and woodlands. Best management practices and design features have been incorporated into the Luna Restoration Project to protect water quality. These include mitigation measures such as buffering waterways, avoiding precipitation events, limit use to low winds, and identification and avoidance of any drinking water supplies and sensitive aquatic species locations. No negative impacts to water quality are anticipated with implementation of alternative C.

No changes are anticipated to water quantity with the implementation of herbicide. Water use by rabbitbrush and juniper would be replaced with water use by herbaceous plants, if the herbicide treatment is effective. There would be no measurable change to water quantity; hydrologic regimes would remain unchanged.

### *Alternative D*

#### **Motorized Transportation Treatments**

This alternative's motorized transportation treatments are similar all action alternatives with the exception of the following treatments:

- There would be no reopening of 13.6 miles of motorized routes to all vehicle types under this alternative (0.2 mile would be reopened). Instead, these 13.6 miles would be added to road decommissioning miles, bringing the total decommissioned miles to approximately 130 in alternative D. One hundred and eighteen miles would be immediately available for decommissioning, while 12 miles would be ready for decommissioning following vegetation and prescribed fire treatments. There would be an increased benefit to the water quality and quantity under alternative D, compared to alternatives B and C, with almost 14 more miles of road returned to a natural state.
- There would be no addition of 4.2 miles of user-created routes to the motorized system – There would be no possible long-term impacts to water quality and quantity from continued use of these routes. Impacts currently are minor on these routes, with the exception of one crossing of Dillman Creek. This route would be obliterated as all user-created routes are planned to be returned to their natural state. Alternative D has more positive benefits to water quality and quantity under this activity than do alternatives B and C.
- There would be no construction of 0.3 mile of all-terrain vehicle routes – There would be continued negative impacts to water quality and water quantity at the crossing locations in Dillman Creek, similar to alternative A. The Dillman Creek route is currently closed however unauthorized use continues to occur.

#### **Watershed Cumulative Effects**

Watershed cumulative effects analyses are focused on the 6<sup>th</sup>-code watersheds of Canovas Creek-Coyote Creek, Trout Creek, Stone Creek-San Francisco River, Dry Blue Creek, Spur Draw, SA Creek, Headwaters Centerfire Creek, Outlet Centerfire Creek, Big Canyon-San Francisco River, Hay Vega, and Cow Springs Draw as more than 2 percent of the project area was within these watersheds.

The existing conditions related to water quality, water quantity, aquatic habitats and biota, riparian areas, roads and trails, soils, range vegetation, forest cover, forest health, fire regime condition class, and invasive species within the Luna Restoration Project area contribute, in whole or part, to cumulative impacts on watershed condition. In 2015, 6<sup>th</sup>-code watershed condition classifications incorporated information related to twelve watershed indicators. This recent assessment provides a “baseline” at which to assess all of the action alternatives versus the alternative A.

### *Alternative A*

Under alternative A, there would be no implementation of mechanical vegetation treatments; prescribed fire treatments; stream, riparian, and erosion control treatments; range management treatments; or motorized transportation treatments. Current watershed condition classifications (table 50) would remain the same, with no improvements to any of the watershed indicators. Watersheds with high concentrations of fuel loading would remain at risk of negative impacts to watershed health if uncharacteristic wildfire occurs.

Implementation of alternative A would result in no change in cumulative impacts to watershed, soil and aquatic condition at the 6<sup>th</sup>-code level, and thus no change to watershed condition classification of any watershed.

#### *Alternative B*

Alternative B proposes implementation of mechanical vegetation treatments; prescribed fire treatments; stream, riparian, and erosion control treatments; range management treatments; or motorized transportation treatments. This alternative addresses forest and watershed health issues at a landscape scale. These activities do result in varying amounts of ground disturbance. Impacts related to mechanical vegetation and prescribed fire treatments, including construction of 3 to 5 miles of temporary roads and temporary reopening and then closing or decommissioning of 34.5 miles of roads and skid trails are expected to be short-lived, with implementation of recommended best management practices and design features, and would not result in negative cumulative impacts. Localized short-term impacts to water quality and soils would occur during implementation of stream, wetland, and upland stabilization projects, as well as disturbance to soils during construction of range improvements. These short-term impacts would result in long-term benefits by stabilizing these degraded systems, thus resulting in positive cumulative impacts. The addition of 0.3 mile of all-terrain vehicle route would have long-term impacts to the soil resource in its location, however the long-term positive cumulative impacts the relocation of routes provides to stream systems would outweigh the localized negative soil impacts. The addition of 4.2 miles of user-created routes, reopening of 3.5 miles of closed routes for administrative use, and reopening of approximately of 13.8 miles of currently closed routes would continue long-term impacts related to these roadbeds that are currently in place. While these road activities would provide no positive cumulative effects to watershed resources, there would be no additional negative impacts as the disturbance currently exists.

Overall, implementation of alternative B with all of the restoration activities planned to benefit watershed, soil, riparian and aquatic resources would result in positive cumulative impacts to watershed conditions. The limited amount of road disturbance remaining would not negatively impact cumulative effects. The treatments projectwide would result in upward trends in watershed condition classification to all of the watersheds with proposed restoration treatments, with some watersheds likely moving to an improved condition class.

#### *Alternative C – Herbicide Utilization*

Alternative C would have the same cumulative effects as alternative B. The only difference in this alternative is the use of herbicide on rabbitbrush and juniper trees, in addition to, or in lieu of, mechanized removal of these species. There would be no additional positive or negative cumulative effects to watershed conditions with the added use of herbicide to vegetation.

#### *Alternative D*

Alternative D is similar to alternatives B and C, minus 4.2 miles of user-created routes added to the system, minus construction of 0.3 mile of all-terrain vehicle routes, and minus reopening of 13.6 miles of closed routes (which would instead be decommissioned). The absence of these activities provides the least amount of disturbance to soils of any action alternative over the long term. The 13.6 miles of closed routes would be decommissioned and the 4.2 miles of user routes would receive restoration treatments. Long-term impacts related to these road beds would be reduced and positive cumulative effects would result. The absence of the 0.3-mile reroute would result in existing negative impacts remaining in Dillman Creek related to stream crossings. As this

disturbance currently exists, there would be no additional negative impacts, but no positive benefits to the stream resource. Similar to alternatives B and C, this alternative would receive all of the other restoration activities planned to benefit watershed, soil, riparian and aquatic resources, which would result in positive cumulative impacts to watershed conditions. This alternative provides the most positive cumulative effects of all action alternatives by reducing the proposed motorized transportation treatments. However, considering the scale of the project area and the reduced number of proposed routes and disturbed acreage between alternatives B, C, and D, the difference in positive cumulative effects is minor.

#### *Summary of Cumulative Effects*

Past and ongoing activities on the Gila National Forest include a variety of actions such as fuelwood harvest, timber sale activities, mining, prescribed burns, fires, road and trail construction and maintenance, rangeland grazing, hunting and camping, wildlife use, off-highway vehicle use, other recreational uses, and water impoundments. Current timber sale activities have been minimal and small, and fuelwood cutting has been dispersed and would continue that way. Mining activities are minimal to nonexistent within the eleven watersheds.

Existing National Forest System roads receive periodic maintenance designed to improve drainage and reduce excessive runoff and sediment into connected drainages. Future runoff and sediment are not expected to increase on existing improved National Forest System roads.

The average road density within the watersheds is fair, ranging between 1 and 2.4 miles per square mile. Roads remain one of the larger contributors of sediment to the drainage network. All action alternatives propose to reduce road densities, mostly through decommissioning of maintenance level 2, high-clearance routes. As noted prior, two stream reaches are currently not attaining State water quality standards. With many roads across the Gila National Forest lacking adequate drainage features, roads have been identified by the State as being one probable source of impairment for Centerfire Creek. Water quality issues would continue to be a concern in these watersheds for stream reaches that are impaired and for those that have designated or occupied habitat for threatened, endangered, and sensitive species. While other perennial streams are not listed as impaired, many of these stream reaches have not yet been assessed by the State of New Mexico. Sediment input would be reduced by decommissioning of routes under all action alternatives but would remain a concern in all perennial and intermittent streams impacted by remaining routes. Motorized crossing will be reduced under all action alternatives, as well as a reduction in stream miles adjacent to perennial, intermittent, ephemeral, and impaired water bodies.

Livestock grazing across the Gila has seen reductions, with added measures taken to either exclude riparian areas or implement riparian specific management along streams. Future impacts should be consistent with current impacts. Fires managed for benefit of natural resources and vegetation treatments would continue to play a role in these watersheds, when possible, in attempts to restore ecosystem health. There are several localized areas within the project area at high risk for current and future resource degradation without attention to best management practices and design features. In particular, those areas having sensitive soils, riparian areas, and wetlands would be most vulnerable.

Reasonable foreseeable actions that are expected to occur include reauthorization of livestock grazing permits, vegetation management projects, and watershed and road/trail improvement projects. In addition, the adjacent Apache-Sitgreaves National Forests are conducting the similar West Escudilla Restoration Project, and are expected to improve watershed conditions at a

landscape scale via vegetation, watershed, and motorized transportation treatments. This neighboring Forest shares four sixth code watersheds with the Gila National Forest, and improvements on its adjacent National Forest System lands would have beneficial cumulative impacts, watershedwide.

Existing watershed, soil, and aquatic conditions were used to determine current watershed condition classification, which can be viewed as a collective assessment of all prior activities, both natural and human, caused, that have cumulatively impacted watershed, soil, and aquatic resources. Careful planning should occur in watersheds that are functioning at risk or impaired, to ensure that future projects are distributed over space and time. Some programs and activities in the project area have localized, short term, adverse effects to watershed, soil, and aquatic resources, however the cumulative effects of past, present and reasonable foreseeable future activities, including the implementation of the Luna Restoration Project, would be beneficial.

In comparison to alternative A, selection of any of the action alternatives would result in positive cumulative effects to watershed condition classification as they provide for the benefit and restoration of multiple watershed resources. Several watersheds are anticipated to move to an improved watershed condition classification over the life of the project due to restoration activities.

## Roads

### Transportation Specific Assumptions

- Motor vehicle use authorized by state law is occurring on National Forest System roads unless there are Gila National Forest-specific prohibitions. Analysis assumes compliance.
- There is some cost for maintenance that will have to be borne by the Forest Service for all National Forest System roads.
- There will be implementation costs regardless of the alternative selected.

### Affected Environment

National Forest System roads are managed for the use and administration of National Forest System lands. Although generally open and available for public use, that use is at the discretion of the Secretary of Agriculture. Through authorities delegated by the Secretary, the Forest Service may restrict or control traffic to meet specific management direction (USDA Forest Service 2008). Roads in the National Forest Transportation System are not public roads in the same sense as roads under the jurisdiction of state and county road agencies. National Forest System roads are designed, constructed, and maintained to provide access for the utilization and management of the national forest and are tracked in the Gila National Forest transportation atlas. National Forest System roads are managed in one of three ways: as closed long term to motor vehicles (closed roads), roads maintained for high-clearance vehicles only (high-clearance roads), and roads maintained for passenger car vehicles.

As of January 1, 2017, the Gila National Forest fully implemented the record of decision for the Travel Management Rule (USDA Forest Service 2005a). Across the entire national forest, there are 3,657 miles of National Forest System roads designated open (operation maintenance levels 2 through 5) to motor vehicle use by the public or by written authorization and 1,407 miles of roads closed to motor vehicle use (operation maintenance level 1) (table 54).

**Table 54. Existing Gila National Forest System roads by operation maintenance level and general description of each maintenance level**

Operation Maintenance Level	Miles
1 - Intermittent service roads during the time they are closed to vehicular traffic	1,407
2 - Roads open for use by high-clearance vehicles	3,261
3 - Roads open and maintained for travel by prudent drivers in standard passenger cars	247
4 - Roads that provide a moderate degree of user comfort and convenience at moderate travel speeds	125
5 – Roads that provide a high degree of user comfort and convenience	24
Total Miles	5,064
Miles open to motor vehicle use (operation maintenance level 2-5)	3,657

There are approximately 587 miles of roads that lie within the Luna Restoration Project area (table 55). The majority, 478 miles, are under Forest Service jurisdiction, of which approximately 298 miles are open to all motor vehicle use (table 56). The remaining 109 miles are a mix of federal, county, or private jurisdiction. Many of these roads provide access for local communities as well as access to and through the area for recreational and business purposes. National Forest System roads within the project area are also used for research, fish and wildlife habitat management, range management, timber harvesting, fire protection, mining, insect and disease control, and private land use.

**Table 55. Roads under other jurisdiction within the Luna Restoration Project area**

Road Jurisdiction	Miles
National Forest System	478
County	76
Private	20
U.S. Highway	14
Total miles	587

Source: Infra, GIS.

Table 56 depicts the breakdown of the existing 478 miles of National Forest System roads by operational maintenance level within the Luna Restoration Project area.

**Table 56. Existing National Forest System roads within the Luna Restoration Project area broken down by operation maintenance level and general description of each maintenance level**

Operation Maintenance Level	Miles
1 - Intermittent service roads during the time they are closed to vehicular traffic	180
2 - Roads open for use by high-clearance vehicles	250
3 - Roads open and maintained for travel by prudent drivers in standard passenger cars	35
4 - Roads that provide a moderate degree of user comfort and convenience at moderate travel speeds	13
5 – Roads that provide a high degree of user comfort and convenience	0
Total miles	478
Miles open to motor vehicle use (operation maintenance level 2 through 5)	298

Source: Infra, GIS.

## Environmental Consequences

Alternative B and C are the same in regards to proposed changes to National Forest System roads. The differences between all of the alternatives are summarized in table 57.

**Table 57. Changes to National Forest System road miles by alternative**

Proposed Changes	Alt A	Alt B	Alt C	Alt D
Road decommissioning	0	116	116	130
Reopen operation maintenance level 1 closed National Forest System roads for permitted use for proposed treatment activities and decommission after activities are completed (included in road decommissioning above)	0	12	12	12
Total road miles removed from national forest road system	0	116	116	130
Reopen operation maintenance level 1 closed National Forest System roads to all vehicle types	0	13.8	13.8	0.2
Add unauthorized roads to National Forest System roads open to all vehicle types	0	4.2	4.2	0
Total additional road miles open to all vehicle types	0	18	18	0.2
Reopen operation maintenance level 1 closed National Forest System roads for permitted use for proposed treatment activities and close after activities are completed (no net change to national forest road system mileage)	0	22.6	22.6	22.6
Construct 3 to 5 miles of temporary roads for proposed treatment activities and decommission upon completion of activities (no change to system miles as temporary roads are not tracked in the forest transportation atlas)	0	3 to 5	3 to 5	3 to 5
Add unauthorized road to National Forest System roads for administrative use or by written authorization only (Tucson Electric Power Company)	0	0.5	0.5	0.5
Reopen operation maintenance level 1 closed National Forest System roads for administrative use or by written authorization only (Tucson Electric Power Company)	0	3.5	3.5	3.5
Total additional road miles for administrative use or by written authorization only	0	4.0	4.0	4.0
Total road miles added to national forest road system	0	22	22	4.0
Net reduction in National Forest System road miles	0	94	94	126

Tucson Electric Power Company has a main transmission line that runs through the project area that they need to access for maintenance, emergency repair, and structure replacements. To accommodate Tucson Electric Power Company needs, all action alternatives (B, C, and D) would reopen 3.5 miles of closed roads and add 0.5 miles of unauthorized roads to the national forest transportation atlas.

Other publics provided comments requesting additional access for recreational activities. Those comments resulted in proposals to reopen 13.8 miles of closed National Forest System roads and add 4.2 miles of unauthorized roads under alternatives B and C. In alternative D, the 13.8 miles are proposed for decommissioning, putting the decommissioning total miles at 130 miles while the 4.2 miles of unauthorized roads would be subject to decommissioning.

Table 57 does not address the decommissioning of unauthorized roads as they are not recognized as National Forest System roads and are not tracked in the Gila National Forest transportation



atlas. The same can be said for the 3 to 5 miles of proposed temporary roads (common to all action alternatives). Temporary roads are not tracked, as they are not intended to become part of the national forest road system. Temporary roads are used for a short period for a specific purpose and then obliterated.

The proposal to reopen 22.6 miles of National Forest System roads in alternatives B, C, and D is to access proposed treatment sites. Reopening these roads will not result in an increase of miles to the road system because these roads would be closed as treatments are completed.

### Trends

Under alternatives B and C, the proposal is to decommission 116 of the 180 existing miles of operation maintenance level 1 roads within the planning area (table 57). Decommissioning 116 miles of roads would be completed once all landscape treatments have been accomplished. The same 116 miles plus an additional 13.8 miles would be decommissioned in alternative D.

The reopening of previously closed roads and adding unauthorized roads to the national forest's transportation atlas would result in more flexibility and increased opportunity for the recreating public. Alternatives B and C would add 18 miles to the existing 298 open miles (table 53) within the planning area. The additional 18 miles would result in an increase of approximately 6 percent of open National Forest System roads within the planning area. The 4 miles that would be added on behalf of Tucson Electric Power Company in all action alternatives would assist them in operating and managing their transmission line. These 4 miles would seldom see traffic as they would be under written authorization to Tucson Electric Power Company and would not be added to the motorized vehicle use map.

Regardless of which action alternative is selected, the reduction to the overall national forest road system is negligible and would do little to help align the Gila National Forest road budget with the maintenance needs. Alternatives B and C would reduce the overall system by 94 miles, approximately 2 percent of the existing national forest road system, and alternative D would reduce the mileage by 126 miles or nearly 2.5 percent. Even though these reductions are small, the watersheds they reside in would benefit (less sediment migration from roadbeds, better water quality, reduced road density, etc.) as well as wildlife habitat (less fragmentation). The Travel Management Rule (USDA Forest Service 2005a) provides flexibility when designating the motorized system. Roads previously closed may be reopened and roads designated for motorized use may be closed at a later date. Even though all the action alternatives propose to reopen roads and add unauthorized routes, the proposals net effect to the national forest road system would result in a mileage reduction due to the decommissioning proposals in all the action-alternatives. There would be some implementation costs associated with the use of the National Forest System roads within the planning area including National Forest System road 3050 (0.2 mile) where drainage features would be maintained and existing berms would be removed or reworked to allow passage (applicable to all action alternatives).

There are also several bridges within the project area that may be used if any of the action alternatives are selected. Six are located on Catron County Road B007 and one is located along National Forest System road 220 at Romero Creek. All these bridges have been evaluated and approved for highway legal loads. The additional traffic associated with proposed treatments (including logging trucks and semi tractors hauling heavy equipment) could also result in the need for additional maintenance on roads operated and maintained by Catron County, specifically

Catron County Roads B007, B080, and B024. Some of the roads on the Apache-Sitgreaves National Forests could also see additional traffic associated with proposed treatments.

There are no measureable maintenance cost savings associated with any of the action alternatives. The Gila National Forest will continue to seek opportunities to better balance the national forest road system with available funding. The more significant benefit is likely to be seen over time once the decommissioned roads identified in any of the action alternatives have been fully reclaimed by the natural landscape. Some of the anticipated benefits include reduced habitat fragmentation, better watershed conditions, and reduced road density.

## Range

### Range Resources

The Luna Restoration Project area includes portions of eight range allotments. Table 58 indicates how many acres of each allotment are located within the project area and have the potential to be impacted by project activities. The Centerfire, Dillman/Trout Creek, Luna, Spur Lake and Underwood Lake allotments are located entirely or almost entirely within the analysis area. The Laney and Mangitas allotments have large portions of the allotment within the analysis area and the Toriette allotment has minimal acres located within the analysis area.

**Table 58. Grazing allotments located within the Luna planning area**

Allotment Name	Total Allotment Acres	Acres Within the Luna Analysis Area	Percentage of Allotment within the Luna Analysis Area
Centerfire	20,551	20,307	99%
Dillman/Trout Creek	9,589	9,589	100%
Laney	26,449	13,343	50%
Luna	44,927	44,927	100%
Mangitas	25,116	6,144	24%
Spur Lake	74,457	62,874	84%
Toriette	39,442	256	Less than 1%
Underwood Lake	13,053	13,053	100%

## Environmental Consequences

### Alternative A

Under the no-action alternative, none of the proposed treatments or activities would be implemented within the planning area. There would be no direct effects to the range resource.

Indirect effects associated with the no-action alternative would include continued encroachment of woody vegetation into neighboring grasslands and canopy closure of forested and woodland vegetation types that could lead to the decrease in the amount and diversity of herbaceous vegetation on the landscape. The fuels reduction projects and prescribed fire activities would not occur, increasing the opportunity for high-severity fire to occur across the landscape and negatively impact the range resource. The proposed watershed treatments would not be implemented allowing for continued degradation of these systems. This could present negative effects to the range resource through continued erosion and loss of soil productivity in these

systems. Water availability to vegetation, livestock and wildlife could be reduced by down cutting of stream banks that can cause the water table to recede and decrease the duration in which precipitation is available for infiltration and use by the surrounding vegetation.

There would be no cumulative effects to the range resource under this alternative.

### Effects Common to Alternatives B, C, and D

The direct effects of action alternatives would include disturbance to the herbaceous vegetation and soils during implementation of the proposed projects that could require rest of a pasture or portion of a pasture. These effects are expected to persist for a short duration and have minimal impacts through the proposed mitigations. This effect is mitigated through the coordination of activities with the range management specialist and the affected permittee to allow for adaptive management to be incorporated into the allotment management plan and to ensure the timing and scale of the project would not place an undue burden on the range resource and livestock management. Adaptive management actions that may occur to mitigate effects include adjustments in pasture rotation schedules, herding, salting and reduced numbers.

The indirect effects of the action alternatives would primarily be of benefit to the range resource. The proposed vegetation, prescribed fire and watershed activities would increase the opportunity for the occurrence and diversity of herbaceous vegetation throughout the analysis area. This, along with the proposed water developments and pasture division, would lead to the improvement of livestock distribution and use across the landscape, allowing for improved livestock management and resilience of the rangeland vegetation during times of drought and unforeseen climate conditions. With any soil disturbing activity the opportunity exists for noxious weeds to become established. The proposed activities would implement strategies to reduce or eliminate the opportunity for introducing weed seed through the implementation of proposed projects. Reseeding when necessary and appropriate would also occur within disturbance sites to decrease the opportunity for noxious weeds to establish and to reduce the exposure of soils to erosion. If noxious weeds immerge within the analysis area, they would be addressed through the environmental assessment for noxious weed management (USDA Forest Service 2000a and 2015 supplement plant list).

### Alternatives B and D

In alternatives B and D, rabbitbrush treatment by mowing alone would likely require several consecutive years of reentry to achieve measurable mortality of rabbitbrush within a given treatment area and has the potential to expose the soils and associated vegetation to increased disturbance. Single entry mowing would likely change the physical structure of the plant community allowing for the growth of herbaceous vegetation for a short duration until the rabbitbrush becomes reestablished. Some acres identified for rabbitbrush treatment cannot be accessed with mowers exclusively; therefore, desired conditions may not be reached on these acres.

Cutting of alligator juniper from grasslands will initially result in increased herbaceous ground cover. This species re-sprouts and within a decade may be of size where it competes with herbaceous ground cover.

## Alternative C

The use of herbicides to treat rabbitbrush and alligator juniper will move the landscape towards desired conditions in a shorter timeframe than alternatives B and D. Herbicide treatments would increase mortality in rabbitbrush and alligator juniper therefore, minimizing re-sprouting of these species. More acres of rabbitbrush treatments could be accomplished utilizing herbicides versus mowing in alternatives B and D, due to access not being limited by topography or other features. The use of herbicides reduces the potential for increased ground disturbance from the need of repeated mowing.

## Cumulative Effects

There would be an increase in herbaceous cover, acres of grassland, and water availability and distribution from implementing alternatives B, C, or D. When considering past, present, reasonably future activities, and activities proposed in the alternatives it is anticipated to result in a positive cumulative effect for range management.

## Recreation

### Affected Environment

The primary recreational opportunities, as identified in the 2011 Gila national visitor use monitoring data and district staff, are dispersed in nature and include; driving to view scenery and wildlife, dispersed camping, big game hunting, hiking cross country and on system trails, horseback riding, off-highway vehicle riding, shed hunting, photography, night sky viewing, bird watching, botanizing, and general nature observation.

There is one developed recreation site in the project area: Head of the Ditch Campground. The campground offers an easily accessible rustic streamside camping experience. It is located approximately 1.5 miles west of Luna, New Mexico on U.S. Highway 180. Its proximity to this major thoroughfare makes it popular with tourists traveling through the region. The campground also receives substantial use during the hunting seasons.

Dispersed camping and picnicking are popular in the Stone Creek, San Francisco River and Trout Creek corridors.

There are fifteen National Forest System trails in the planning area, totaling approximate 39.4 miles. Most trails are restricted to horses, hiking and mountain biking. Two motorized trails are located in the Dry Blue drainage.

Off-highway vehicle riding is popular in the Luna area. Roads provide opportunities for all vehicle types; this includes off-highway vehicles greater than 50 inches in width. The popular utility-task vehicles, which provide side-by-side operation, fall into the greater-than-50-inches category. Low maintenance level roads (maintenance level 2) provide the opportunity for this width of vehicle class as well as the unimproved trail-like experience desired by the off-highway vehicle rider.

Hunting is a major recreational use in the Luna planning area. Hunting seasons and restrictions are administered by the New Mexico Department of Game and Fish. Big game is the primary type of hunting: elk, bear, mountain lion, and deer. Wild turkey hunting is also popular. There are 24 special use permits for outfitter and guides in the project area. Hunting is dispersed in nature; however, some hunting parties revisit the same areas annually.

## Environmental Consequences

### Alternative A – No Action

Under the no-action alternative, there would not be any decommissioning of unauthorized roads and trails. There would continue to be approximately 39.4 miles of National Forest System trail. Head of the Ditch Campground would remain open. Visuals would mostly remain unchanged due to being constrained by existing vegetation conditions, such as tree densities. Hunting and other recreational pursuits would continue. The motorized transportation network would not change from the 2013 travel management decision. Driving for pleasure would continue. Off-highway vehicle recreation would continue on low-level maintenance roads open to the public.

Without vegetation and prescribed fire treatments the potential risk for high-severity wildfires, such as the Wallow Fire, would continue. These fires adversely could affect recreation by damaging infrastructure, including damaging trail networks and accessibility; and heavily modifying the recreational setting.

Low-water fords on the Dry Blue Creek (trails #61 and #64) and Head of the Ditch would remain in their current state and location. Issues with sedimentation and aquatic resource damage would continue.

### *Cumulative Effects*

There are no cumulative effects to recreation due to no activities proposed under the no-action alternative.

### Effects Common to Alternatives B, C, and D

In the short term, there would be some inconvenience to visitors to the Luna Restoration Project area during implementation. Areas or facilities may be temporarily closed to help ensure public safety. It is an expectation that project implementation would result in a more aesthetically pleasing recreational setting.

Thirteen of the 15 trails are located within active treatment areas or would be worked on. Treatments would alter the visuals in the immediate foreground. Affected portions of the trails would be temporarily closed to help ensure public safety. Prescribed fire may result in the creation of snags along trails. If snags fall, they could impact the accessibility along the trail.

People recreating within the planning area could encounter the sights and sounds of equipment and workers during implementation. There would likely be temporary effects to the flow of traffic on these travel ways, such as delays or detours. Treatments would alter the visuals in the immediate foreground such as; slash, piles, landings, skid trails and disturbed ground would be evident in the short term. In the long term, scenic integrity would be improved by restoring structure to vegetation communities, with sight lines becoming more open.

Implementation would temporarily displace opportunities for recreation and hunting. However, implementation would be localized; while work is implemented in one area, other areas within the project area would be open. Some visitors may choose to avoid the area entirely.

Head of the Ditch Campground would temporarily close during construction of the low-water crossing and diversion to help ensure public safety. This is the only developed campground within the project area. During implementation, there are no other opportunities for developed camping

within the planning boundary. Relocation of the low-water crossing would improve access to campground sites located across the San Francisco River.

Motorized trails in the Dry Blue Creek (trails #61 and #64) would be improved through design and construction of six water crossing and rerouting 0.1 mile of trail. This would move towards reducing impacts to threatened and endangered species and their habitat, and reducing sedimentation.

Decommissioned roads would be available to the public to hike, bike, or ride horses on. This recreational experience would likely be enhanced due to the absence of motorized vehicles. In addition 4.2 miles would be added to the foot and horse trail system by leaving a trail tread on National Forest System roads 4023 V; 4029 E, and 4030 W during decommissioning.

Roads open for administrative use only are available to the public for nonmotorized uses, allowing hiking, biking, and equestrian activities.

Roads and trails could be temporarily closed during prescribed fire activities to help ensure public safety. The presence of active fire and smoke could cause some visitors to change their travel plans. Smoke could linger for days in some areas, causing visitors to avoid those locations. Smoke from prescribed fires may have a direct effect to the quality of the recreation experience by temporarily reducing air quality and visibility.

### Effects Common to Alternatives B and C

In collaboration with the Luna Riders, 18.0 miles of closed and user-created routes were identified to be added to motorized transportation system. These select closed system roads and user-created routes were identified for provide access from the community of Luna, access into Arizona, loop opportunities, and to access favorite spots for scenic views and picnicking. Opening existing closed and user-created routes would enhance recreational opportunities through improving connectivity of the road system and enhancing riding experience.

The proposed action during scoping limited the 18.0 miles of road to all-terrain and utility-task vehicles less than 50 inches in width. As proposed in alternative B, these 18.0 miles would be open to all motorized vehicle types; which includes popular utility-task vehicles that allow for side-by-side riding. Therefore, adding roads of this class provides more opportunity for this type of recreation.

In collaboration with the Luna Riders, a new route was identified to connect an open road in the Luna rodeo grounds to a system of open roads in the Stone Creek area. Construction of a 0.3 mile 4x4 trail addresses sensitive riparian resource concerns in Dillman Creek and enhances connectivity of road systems for recreational opportunities. The tread width of 60 inches would provide utility-task vehicle opportunities.

### Alternative C – Herbicide Utilization

The use of herbicides to increase effectiveness of restoration would have a few effects to recreation opportunities. The sights and sounds of herbicide application would be apparent during implementation. Following manufacture instructions and design features related to notification and posting, would minimize any potential negative impacts to Gila National Forest visitors during or from herbicide applications.

Herbicide treatment activities may temporarily displace visitors. Visitors may choose to avoid an area where herbicide treatments have been applied.

Proposed herbicide treatments would likely have an overall beneficial effect to visual quality. Short-term impacts from chemical treatments would include dying vegetation that could be visible. Long-term effects would be beneficial through the enhancement and restoration of areas of grasslands, forested, and woodland areas.

### Alternative D – No Addition of Motorized Routes

The 18.0 miles of closed and user-created routes that were identified in collaboration with the Luna Riders would not be added to motorized transportation system under this alternative to address an issue identified from scoping comments. Therefore, access from the community of Luna, access into Arizona, loop opportunities, and access to favorite spots for scenic views and picnicking would not be provided. Connectivity of the road system to enhance riding experience would remain a public concern, including the connection between the Luna rodeo grounds to a system of open roads in the Stone Creek area.

### Cumulative Effects

Recreation opportunities and scenic quality as a result of implementing alternative B, C, and D would result in cumulative impacts, when considering past, present, reasonably future activities, activities proposed in this alternative, and activities identified in the West Escudilla Project on the Apache-Sitgreaves National Forests.

Recreation opportunities could be cumulatively impacted due to the increased management activities. Road networks along the state line of New Mexico and Arizona could be utilized by both national forests for implementation of projects. This could result in traffic, dust, and noise that could lead to a slight inconvenience and displacement of visitors. This would be of episodic and extent is dependent upon what activity treatment(s) are being implemented.

Cumulative impacts to scenic quality are possible if evidence of multiple activities are visible during the same season. Similar vegetation treatments are planned in the West Escudilla Project. Cumulative impacts to visual resources along the state line would likely only last during implementation. Long-term cumulative impacts are likely to be beneficial as healthy forest conditions are restored.

### Climate Change

Climate change influences environmental factors including the weather, vegetation, habitat, water, and wildlife across the landscape. Depending on the changes to these resources due to climatic change, recreational opportunities or users may change or alter those opportunities and uses. But determining the relation of climate change and recreation uses is not realistically identifiable within the context of this site-specific and project-level environmental analysis.

### Recreation – Inventoried Roadless Areas

Inventoried roadless areas are designated pursuant to 36 Code of Federal Regulations section 294, subpart B, section 294.11. Inventoried roadless areas are identified in a set of maps contained in Forest Service Roadless Area Conservation, final environmental impact statement, and volume 2 (USDA Forest Service 2000b).

This analysis describes the existing condition of the three inventoried roadless areas within the Luna Restoration Project area. This includes all of the Mother Hubbard and portions of the Nolan and Frisco Box inventoried roadless areas.

Low-severity prescribed fire is proposed in the Mother Hubbard and Nolan inventoried roadless areas. There is none prescribed within the Frisco Box Inventoried Roadless Area, but a short section of trail is proposed to be enhanced by reducing its width from a road to single-track trail. This roadless analysis also describes the potential effects to the roadless characteristics and wilderness attributes of the inventoried roadless areas from the proposed treatment activities identified in the alternatives.

The recreational opportunity spectrum classes are not mapped and therefore unavailable. The Gila forest plan prescribes a forestwide standard to manage the three inventoried roadless areas to semiprimitive spectrum of recreation opportunities.

## Affected Environment

The inventoried roadless area contain a variety of vegetation types including piñon-juniper, riparian, ponderosa pine, and mixed conifer at higher elevations. There are no municipal watersheds, but there are perennial water features such as Blue and Colyer Springs, and reaches of Pace, Dry Blue, and Centerfire Creeks in these areas. All roadless areas contain habitat for threatened and endangered species such as Mexican spotted owl, Mexican grey wolf, narrow-headed and northern Mexican gartersnakes and loachminnow but is not the only habitat for these species on the Gila National Forest. Dispersed recreation, such as hiking, hunting, and observing nature, are the main recreational uses.

### Nolan Inventoried Roadless Area

The Nolan Inventoried Roadless Area is 13,050 acres in size with 8,912 acres situated along the southwestern boundary south of the Dry Blue Canyon with a portion of the San Francisco Mountains of the planning area. This roadless area also extends across the state line into the Apache-Sitgreaves National Forests.

Summary of the roadless area characteristics and wilderness attributes of Nolan Inventoried Roadless Area:

- **Natural – The extent to which long-term ecological processes are intact and operating:** Due to decades of fire suppression, ecological processes have departed from historical norms. Forest stand densities have high crown fire potential, which promotes high-severity fire. Long-term ecological processes are impaired, currently.
- **Undeveloped – The degree to which development and uses are apparent to most visitors:** Evidence of human activity is present across much of the area but is subtle in appearance. Fuelwood cutting, recreation use, private land and road building are a few examples of what has contributed to defining the degree to which development and uses are apparent to most visitors and departure from the undeveloped characteristic within the roadless area.
- **Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation:** Solitude is a personal, subjective value defined as the isolation from sights, sounds, and presence of others and from developments and evidence of humans. Primitive recreation is characterized by meeting nature on its own terms, without comfort and convenience of facilities.



Nolan includes areas with more potential for solitude. Topographically constrained areas such as Frieborn and Colyer Canyons provide more isolation from the sight and sounds of civilization than do areas near U.S. Highway 180 or the motorized Dry Blue Creek Trail, where noise associated with motorized vehicles are common.

The area is managed for semiprimitive recreation per the Gila forest plan (USDA Forest Service 1986). A substantial area would likely qualify for semiprimitive nonmotorized (interior) and the periphery would likely qualify for semiprimitive motorized or roaded natural (areas near Horse Mesa and Dry Blue Creek Trail).

- **Special Features:** Colyer Spring is a perennial source of water, which is considered special in this arid region.
- **Manageability:** Nolan Inventoried Roadless Area within the planning area is demarcated mostly by landform and the presence of road and motorized trail. This geography renders it easily manageable. The portion of the roadless area outside the planning area was not considered for manageability.

### Mother Hubbard Inventoried Roadless Area

The Mother Hubbard Inventoried Roadless Area is 5,895 acres in size and is situated entirely within the planning area along the southwestern boundary north of Dry Blue Canyon.

Summary of roadless area characteristics and wilderness attributes of Mother Hubbard Inventoried Roadless Area:

- **Natural - The extent to which long-term ecological processes are intact and operating:** Due to decades of fire suppression, ecological processes have departed from historical norms. Forest stand densities have high crown fire potential, which promotes high-severity fire. Long-term ecological processes are impaired, currently.
- **Undeveloped - The degree to which development and uses are apparent to most visitors:** Evidence of human activity is present across much of the area but is subtle in appearance. Fuelwood cutting, recreation use, private land, and road building are a few examples of what has contributed to defining the degree to which development and uses are apparent to most visitors and departure from the undeveloped characteristic within the roadless area.
- **Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation:** Mother Hubbard has areas with more potential for solitude. Topographically constrained areas such as Pace Creek and Dry Blue Creek canyons provide more isolation from the sight and sounds of civilization than do areas near the north boundary or the motorized Dry Blue Creek Trail, east boundary, where noise associated with motorized vehicles are common.

The area is managed for semiprimitive recreation per the Gila forest plan (USDA Forest Service 1986). A substantial area would likely qualify for semiprimitive nonmotorized (interior) and the periphery would likely qualify for semiprimitive motorized or roaded natural (areas near north, east and Dry Blue Creek Trail).

- **Special Features:** Blue Spring is a perennial source of water that is considered special in the arid region.

- **Manageability:** Mother Hubbard Inventoried Roadless Area is demarcated mostly by landform and the presence of road and motorized trail. This geography renders it easily manageable. The exception would be the northern and eastern boundaries might be difficult to locate on the ground.

### Frisco Box Inventoried Roadless Area

The Frisco Box Inventoried Roadless Area is 38,977 acres in size with 8,312 acres situated within the eastern boundary of the planning area. The roadless area contains the Centerfire Creek Valley and contains Upper Cottonwood, Joshua, Howell, and Curio Canyons.

Summary of roadless area characteristics and wilderness attributes of Frisco Box Inventoried Roadless Area:

- **Natural - The extent to which long-term ecological processes are intact and operating:** Due to decades of fire suppression, ecological processes have departed from historical norms. Forest stand densities have high crown fire potential which promotes high-severity fire. Long-term ecological processes are impaired, currently.
- **Undeveloped:** The degree to which development and uses are apparent to most visitors. Evidence of human activity is present across much of the area but is subtle in appearance. Fuelwood cutting, recreation use, private land and road building are a few examples of what has contributed to defining the degree to which development and uses are apparent to most visitors and departure from the undeveloped characteristic within the inventoried roadless area.
- **Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation:** Frisco Box has areas that have more potential for solitude. Topographically constrained areas such as Upper Cottonwood, Joshua, Howell, and Curio Canyons provide more isolation from the sight and sounds of civilization than do areas near the northern boundary where noise associated with motorized vehicles are more common.

The area is managed for semiprimitive recreation per the Gila forest plan (USDA Forest Service 1986). A substantial area would likely qualify for semiprimitive nonmotorized (interior) and the periphery would likely qualify for semiprimitive motorized or roaded natural (areas near Centerfire Creek Valley and northern boundary).

- **Special Features:** Centerfire Creek is a perennial stream, which is considered special in the arid region.
- **Manageability:** The Frisco Box Inventoried Roadless Area is demarcated mostly by landform and the presence of road. This geography renders it easily manageable. The exception is the northern boundary, which is difficult to locate on the ground.

## Environmental Consequences

The effects to the inventoried roadless areas were analyzed using the duration and trend of the effect on roadless area characteristics and wilderness attributes.

### Alternative A – No Action

Under alternative A, no activities would occur. Consequently, fuel loading would continue to increase over the project area. This would create an increased risk of wildfire. The potential event of an uncharacteristic wildfire could impact the naturalness, recreation values, or both in the area.

Alternative A would leave the current roadless character and potential wilderness values unchanged. Any direct or indirect effects of this alternative would be the result of continued natural processes in the area.

- **Natural – The extent to which long-term ecological processes are intact and operating:** Prescribed fire and vegetation treatments would not be reintroduced. The existing downward trend of species diversity, age diversity, and tree density diversity would continue. High-severity wildfire could result in large homogenous-burned areas and elimination of ponderosa pine stands, as can be seen in other cases of severe wildfire in the southwest region.
- **Undeveloped – The degree to which development and uses are apparent to most visitors:** No treatments would occur under this alternative, and no new development or uses would become apparent to visitors.
- **Outstanding opportunities for solitude or primitive unconfined recreation:** The existing condition for solitude would not be immediately affected under this alternative. However, over time conditions could become challenging for visitors to recreate due to forest stand conditions. Forest stand conditions could increase opportunities for solitude, for those who are able and willing to negotiate an increasingly dense and inaccessible area.

Wildfires could dramatically change the landscape, changing how people access or recreate in the roadless areas. In the case of wildfires, sight distance and topography screening could be changed for decades, impacting solitude, as sights and sounds of visitors in the area as well as activities on adjacent lands would more easily be seen and heard.

- **Special Features:** The existing springs and perennial water sources would not be affected under this alternative. However, existing stand conditions would render them susceptible to the effects of high-severity fire.
- **Manageability:** Choosing the no-action alternative would not change the manageability of the area.

### *Cumulative Effects*

Since there are no activities being implemented under alternative A, current activities (for example, grazing, hunting, and hiking) would continue, but there would be no cumulative effects to roadless characteristics and wilderness attributes.

### **Effects Common to Alternatives B, C, and D**

There are no differences in proposed activities between the alternatives B, C and D within the three inventoried roadless areas. Each alternative proposes low-severity prescribed fire within the Mother Hubbard and Nolan inventoried roadless areas and a road to trail conversion in the Frisco Box Inventoried Roadless Area. All alternatives would have some short-term effect to the undeveloped, natural, and opportunities for solitude or primitive unconfined recreation attributes of the area but would result in a long-term beneficial effect.

In summary, the effects from low-severity prescribed fire are expected to be minor and short term. Few characteristics such as plant and animal communities, habitat for threatened and endangered species, and recreation opportunities would expect slightly degrading effects in the short term and then improving in the long term. Prescribed fire may cause direct short-term impacts to air resources from smoke.

Temporary effects to solitude and recreation could occur along roadless boundaries from the greater Luna Restoration Project activities, including sights and sounds of people working, chainsaws, dust and smoke; however, long-term impacts to recreation and opportunities for solitude are not expected to occur.

- **Natural – The extent to which long-term ecological processes are intact and operating:** Prescribed fire would begin modifying the trends caused from past fire suppression and reduce the potential probability of severe wildfires. Prescribed fire would enhance the characteristic of “naturalness” throughout the area, by re-establishing forest characteristics typical of frequent fire ecosystems.

Low intensity prescribed fire would be classified as a type of human manipulation with methods of ignition emulating a lightning fire. No fire line is expected to be constructed. Fire behavior is expected to be low creeping through the understory. The resulting pattern on the landscape would be small patch sizes of burned area (mosaic) with irregular shapes. Over time, as multiple entries are made to meet fuel objectives, vegetation communities within the Nolan and Mother Hubbard roadless areas would begin to move towards conditions that include mosaic of various size and age classes which are more resilient to changing environmental conditions and stressors.

The road to trail conversion in Frisco Box roadless area would restore the subsurface hydrology to the existing road prism that trail number 119 currently uses. Portions of the decommissioned road would revegetate through successional processes.

- **Undeveloped – The degree to which development and uses are apparent to most visitors:** In the short term, visitors to the areas would see isolated patches of blackened and charred vegetation and soils. Although these visible effects of prescribed burning can mimic natural fire disturbances, the public often perceives such blackened landscapes negatively. In the long term, the prescribed burning actions would reduce fuel loading and promote regeneration of trees, shrubs, wildflowers, and other herbaceous plants. This activity would diversify the mosaic of vegetation.

Soil and vegetation disturbance associated from road to trail conversion would be evident to visitors. However, this would be a short-term effect, as the disturbed area would revegetate, leaving single-track trail that is appropriate for the design use (pack and saddle and hiking).

- **Outstanding opportunities for solitude or primitive unconfined recreation:** It is likely portions of the Mother Hubbard and Nolan inventoried roadless areas may be temporarily closed during prescribed fire implementation to ensure public safety and welfare. This would be a short-term effect. Visitors that are temporarily displaced would find comparable opportunities within and outside of the planning area. The degree of primitive recreation is not expected to be affected.

Multiple prescribed fire entries over time would be needed to achieve objectives of reducing the probability of high-severity fire. With multiple entries over time, the sight distance may change from current; but this change would not be to the extent of the potential effects of a wildfire.

Solitude of segments of trail # 119 would be affected during implementation while work is completed. This is a short-term effect, as solitude would quickly be restored after implementation.

It is possible that visitors to, and outside, the inventoried roadless areas would experience the sights and sounds of on-the-ground staff and aerial operations implementing the prescribed fires. Smoke emissions from prescribed fires across the planning area. The duration is expected to be short term and solitude would be restored shortly after implementation.

- **Special Features:** Springs, perennial water sources, and cultural resources are the only known special features in the three inventoried roadless areas. It is not expected that there would be impacts to these features during implementation.
- **Manageability:** All action alternatives would not affect the existing manageability of the roadless areas. Roadless boundaries are not clearly definable on the ground; therefore, the issue of manageability along boundaries is anticipated to continue.

### *Cumulative Effects*

Cumulative effects to roadless resources from all action alternatives would generally be short term and related to an increased presence of people, noise that may affect solitude. These effects would be more evident along the boundaries of the roadless areas where treatments are both inside and outside the areas. In some of the units, there would be a greater sight distance than existing conditions. For several years, visitors could become more aware of other activities in the area as well as on private lands. This effect would not be as great as potential effects from a large wildfire, which would likely denude the landscape of all vegetation. An indirect effect of proposed prescribed fire activities could be displacement of visitors to untreated areas for recreation, mostly because of visuals however, this effect would last for about 1 to 2 years after prescribed fire activities when green-up would occur.

The long-term forest health and resiliency would be most improved under the action alternatives than the no-action alternative due to the development of a less homogenous forest, more diversity of species, and a mosaic of age classes. In the long term, treated areas would be more resilient to wildfire and other natural disturbances, which would more likely maintain the quality of soil, water, and air in the future.

### *Climate Change*

The effects of climate change were considered during the effects analysis of proposed actions to roadless resources. It is expected that climate change effects would increase the length of fire season and increase likelihood of high-severity fire. As discussed in the no-action alternative, the existing vegetation conditions within the roadless areas have potential for a high-severity fire with high crown fire potential. Roadless resources could be at risk to irretrievable outcomes including species and habitat loss until vegetation becomes re-established.

### *Roadless Rule Consistency*

All alternatives comply with the Roadless Area Conservation Rule and applicable forest plan standards as amended by this rule. All action alternatives are within the exceptions identified in 36 Code of Federal Regulations section 294.13(b)(1), in paragraphs (b)(2) through (b)(4), or both. Management activities focus on restoring the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period.

## Heritage Resources

### Gila National Forest History

The Gila National Forest has a rich archaeological and cultural history. The Gila National Forest includes lands that have been used and occupied by humans through the prehistoric era, beginning with the Paleoindian period (circa 10000 B.C. to 5500 B.C.), into the Archaic period (circa 5500 B.C. to A.D. 200). Both the Paleoindian and Archaic period peoples were relatively mobile on the landscape. However, during the Archaic period the transition from a hunter-gatherer lifeways to agricultural lifeways occurred.

Over time, Archaic period peoples began to develop cultural lifeways that would come to be known as the Mogollon Culture. The Mogollon Culture spans two broad time periods: the Pithouse period (circa A.D. 200 to 1000) and the Pueblo period (circa A.D. 1000 to 1450). As the name implies, Pithouse period structures were at least partially subterranean, and dug sub-grade below the surrounding surface. The beginning of the Pueblo period (circa A.D. 1000 to 1400) is marked primarily by the appearance of above ground architecture.

The historic period began in New Mexico with Spanish contact in 1539. On the Gila National Forest and elsewhere in New Mexico, the historic period is divided by the rise and fall of political control by the Spanish (A.D. 1539 to 1821), Mexican (A.D. 1821 to 1848), and American (A.D. 1848 to present) governments (Opler 1983).

Contemporary and historic land uses include mining, ranching, grazing, logging, frontier settlement, frontier military activities, and government land management. Evidence of these activities persists in the archaeological record today. Since the establishment of the Gila National Forest in 1905, ranger stations, administrative sites, lookouts, and recreational areas have been built as well. Finally, Civilian Conservation Corps camps and their constructed infrastructure (for example, roads, bridges and campgrounds) are found across the Gila.

Today, land use in the Gila National Forest continues to follow the multiple use mission of the Forest Service, including grazing, mining, ranching, and vegetation and fuels management. Native American Tribes also continue to use the Gila intermittently for traditional activities including plant gathering and visits to special places. Tribes have not identified any traditional cultural properties or sacred sites within the Luna Restoration Project area through consultation, nor have any been identified as being affected by other projects within the planning area.

### Affected Environment

For around the past 50 years, Forest Service cultural resource specialists, in compliance with sections 106 and 110 of the National Historic Preservation Act of 1966, as amended, have inventoried approximately 17,415 (10 percent) of the 185,586 acre Luna planning area to current professional standards. An additional 50,638 acres have been inventoried within the Luna planning area; these inventories do not meet current standards.

For the Gila National Forest and the Southwest Region (Region 3) of the Forest Service, a cultural resource site is defined as “a locus (location) of purposeful human activity which has resulted in a deposit of cultural material beyond one or a few accidentally lost artifacts” (USDA Forest Service 1987). In practical terms, cultural resource sites include such entities as prehistoric surface structures (pueblos); concentrations of broken pottery sherds, stone tool waste flakes, grinding implements, or a combination of these things; or the remains of historic structures or mines.

The survey endeavors discussed above have recorded 513 heritage resource sites within the planning area. No properties listed in the National Register of Historic Places are located within the Luna planning area. About 209 sites located in the planning area have been determined to be eligible for inclusion in the National Register of Historic Places, and about 37 sites have been determined to be not eligible. About 278 sites remain unevaluated and will require further study before a formal determination of eligibility for inclusion in the National Register of Historic Places can be made. For this project, only sites considered eligible for inclusion in the National Register of Historic Places, and those sites whose eligibility is undetermined, will require treatments to protect them from potentially adverse effects associated with project activities.

## **Analysis**

The National Environmental Policy Act analysis considers only the change to the existing condition. Changes include proposals for vegetation treatment through mechanical means, hand thinning, prescribed burning, herbicide application, or a combination of these treatments. Other treatments include the construction of temporary roads; the decommissioning of roads; the construction, installation, or both of various range management features (wells, fences, storage tanks, etc.); and watershed improvement activities (construction of hardened crossings, erosion control features, riparian exclosure areas, etc.).

For the intent of the current analyses, the area of potential effect for the Luna planning area environmental analysis is considered to be those areas where:

- heavy equipment will be used to implement project activities (vegetation thinning, watershed restoration treatments, range management treatments, treatments to the transportation system, etc.);
- there is a high probability of site location for prescribed burning activities (if these areas fall outside of those where heavy machinery will be used during implementation);
- there is a high probability of site location for areas to be opened up for personal fuelwood collection (if these areas are greater than 500 acres in size); or
- there is a high probability of site location for other methods of herbicide application (with hand pumps, spread from back of all-terrain and utility-task vehicles, etc.).

Gila National Forest personnel believe this area of potential effect adequately measures and addresses the potential direct, indirect, and cumulative effects of the proposed undertakings and are in agreement with those identified in section I, appendix J, of the Region 3 amended programmatic agreement (USDA Forest Service, Region 3 2010).

## **Relative Risk Analysis**

This report uses a relative risk analysis to compare alternatives. Relative risk is considered the potential impact that can result from one action (alternative) measured against the potential impact that might result from a different action (alternative).

For cultural resources, the measure for direct and indirect effects for all actions will be based on the total survey acres needed by different proposed project activities. Since only 10 percent of the Luna planning area has been intensively surveyed, simply using the number of sites potentially affected by undertakings would leave vast areas unaccounted for in the planning area. However, the number of known sites is positively correlated with the miles or acreage of survey, as one increases so does the other. Therefore, the alternatives proposing more miles or acres per action

will pose a higher risk of direct and indirect effects to cultural resources. Conversely, those posing fewer miles or acres per action will pose a lower risk of these effects.

### Background Assumptions

Only 25 percent of 6<sup>th</sup>-code watershed will be treated within a three-year period. While this stipulation is posed in efforts to lessen direct, indirect, and cumulative effects to watersheds, it provides a maximum amount of work that can be conducted within each 6<sup>th</sup>-code watershed within a three-year span. This stipulation also allows for areas to be monitored for treatment effects to resources and lessen the potential for adverse cumulative effects to various program resources.

We assume all areas listed within a particular treatment category (for example, grassland maintenance and restoration, group select commercial and noncommercial thinning, woodland/ponderosa pine transition maintenance and restoration vegetation treatments; decommissioning of roads; and pipeline installation) will receive treatments. This assumption is made due to uncertainties concerning local conditions within the larger planning area. Thus while an area may be listed to receive group select commercial and noncommercial thinning, local conditions may not favor these activities across the entire proposed treatment area.

### Measures

The measure for determining the relative risk of different alternatives is the total acres of archaeological survey needed for different activities associated with the different proposed alternatives. Over much of the larger Luna planning area, there is general correlation between the proportion of an area that has been covered by intensive cultural survey and the proportion of known sites within the planning area. ArcGIS was used to determine how many acres of inventory were needed for the different alternatives.

## Environmental Consequences

### Alternative A

No activities would be implemented under this alternative; therefore, no acres of archaeological inventory are required and therefore no relative risk of potential impact to sites.

The main concern with respect to heritage resources under the no-action alternative is the potential for high-severity wildfire to affect deposits associated with archaeological sites within the proposed project area. Under this alternative, fuel loads within the project area would be allowed to accumulate, increasing the severity and duration of fires that may spread into the area. These concerns are potentially exacerbated if one considers the possibility of increased fire susceptibility brought about by disease and deterioration, which could occur if treatments are not implemented in the project area. If a wildland fire does not spread into the area, these concerns could still adversely affect heritage resources, as trees within site boundaries are more prone to decay, uprooting, partially collapsing on or within deposits, or a combination of these things. Similarly, poorly functioning watershed in the planning area are more prone to severe erosion episodes. Such episodes have the potential to adversely affect heritage resources due to arroyo headcutting and channel cut-bank scouring. These effects will be allowed to continue under the no-action alternative. In short, the no-action alternative increases the probability heritage resources will be adversely affected in the foreseeable future.



## Effects Common to Alternatives B, C, and D

### *Amount of Archaeological Inventory Needed per Alternative*

In general, all action alternatives will require extensive survey for heritage resources and most proposed activities are common to all action alternatives. All areas where heavy machinery will be used in project implementation will require 100 percent intensive inventory. Mechanical treatments shared by all action alternatives include roughly 73,856 acres of mechanical vegetation treatments. The following acres may require heavy machinery for implementation:

- approximately 344 acres of range management treatments
- roughly 1,354 acres of treatments to the transportation system
- in excess of 1,000 acres of watershed restoration treatments

The implementation of treatments using traditional hand tools may require additional inventory especially if these activities require substantial ground disturbance (for example, construction of prescribed fire control line and construction of fence lines) or if they are located in areas determined to contain a high probability for archaeological site location. Hand thinning of vegetation may require additional inventory if heavy machinery (for example, skidder and masticator) will be used afterwards to treat activity fuels. Approximately 25,400 acres of grassland and portions of Mexican spotted owl protected activity centers may be treated by hand thinning. Likewise, areas that are to be burned by prescription will require inventory if these locales are determined to contain a high probability of site location and if these areas were not inventoried previously for other treatments. Roughly 36,000 acres in all action alternatives are planned to be treated solely by prescribed burning. An additional 70,000 to 100,000 acres will be burned by prescription following mechanized treatments in all action alternatives.

The amount of survey needed for the implementation of the different action alternatives is the same with respect to the proposed treatments. The main difference between action alternatives is the potential for additional inventory to implement the treatment of vegetation by the application of herbicide as proposed in alternative C. In alternative C, there is the potential need to survey areas where herbicide will be applied if these areas are determined to contain a high probability of site location. At present, areas where herbicide may potentially be applied cover an area of roughly 43,000 acres. Within this approximately 43,000-acre area, roughly 28,000 acres have been determined to be high site probability areas. Under alternatives B and D, roughly 20,283 acres of grassland will be mowed to treat rabbitbrush. These treatments may require additional inventory depending on the type of equipment used during implementation. Alternative C may actually require only 8,000 more acres of inventory for areas where herbicide will be applied to treat juniper encroachment than alternatives B and D. However, this depends on where implementation will occur within the larger 43,000-acre potential herbicide treatment area.

Under alternatives B and C, roughly 13.8 miles of level 1 closed roads will be reopened to all motor vehicles types, roughly 4 miles of user-created roads will be designated as National Forest System roads and opened to all motor vehicle use, and roughly one-half mile of 4x4 trail will be constructed. These changes are not proposed under alternative D. However, under alternative D, the 13.8 miles of level 1 closed roads that are proposed to be reopened under alternatives B and C will be decommissioned. Under these circumstances, alternative D may require an additional 167 acres of inventory for the additional 13.8 miles of road. However, maintenance work may need to be conducted along the road sections that will be reopened under alternatives B and C to make them operable. Thus, the discrepancies with respect to treatments to the transportation system under all action alternatives amount to negligible changes in the amount of inventory needed prior to implementation.

### *Direct Effects*

Direct effects to heritage resources associated with the proposed undertakings under all action alternatives include those brought about ground-disturbing activities, those potentially associated with the increased visibility of archaeological sites on the landscape, and those potentially associated with the introduction of either prescribed fire or riparian woody species within the planning area. These activities all have the potential to adversely affect deposits associated with heritage resources.

To mitigate the effects associated with the proposed undertakings heritage resources within the different project areas; such things as flagging may be utilized to avoid sites or other alternative methods depending on the activity being performed. In most instances, avoidance of sites will be the preferred mitigation measure. However, in certain circumstances like vegetation thinning and the prescribed burning of areas, other measures may be implemented, such as hand thinning of vegetation within archaeological sites following mechanized treatments or removing additional fuels from archaeological sites. This will increase the likelihood that treatment measures will attain the desired outcome. This is particularly true for areas where high site densities are avoided. This will increase the likelihood that prescribed fire treatments will not adversely affect heritage resources. Hand treatments (for example, cutting rabbitbrush, herbicide application, and other similar activities) would pose no adverse effect to heritage resources.

In the event new heritage resources are discovered during the implementation of any of the activities outlined above, work would cease in the area and a Forest Service archaeologist notified as to its presence. Work may resume in the area surrounding the newly identified archaeological site once appropriate treatment measures have been identified and consulted upon.

### *Indirect Effects*

The primary indirect effects associated with proposed undertakings with respect to heritage resources are the potential for increased erosion rates within or near heritage resources resulting from the loss of canopy and ground cover; the increased visibility of archaeological sites during and after treatment implementation, which could lead to increased looting; and the potential for increased cattle grazing within archaeological sites due to changes in vegetation communities and ground cover. However, because the proposed action stipulates activities will be conducted in stages (for example, in units or individual stands within units), the indirect effects of previous treatments can be monitored to determine if heritage resources are being adversely impacted.

### *Cumulative Effects*

As stated above, cumulative effects refer to the impact of an action on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Since the National Historic Preservation Act was fully implemented in the 1970s, cultural resource surveys have been conducted and potential effects to cultural resources addressed through consultation between the Gila National Forest staff, State Historic Preservation Officer, the Tribes, Advisory Council on Historic Preservation personnel, and interested members of the public. Future projects occurring on National Forest System lands will require appropriate compliance with National Historic Preservation Act including cultural resources inventories and evaluation of effects of the undertaking. If effects are identified, they will be addressed under the section 106 process of the act. Adverse effects will be minimized through avoidance or mitigation measures, as appropriate.

To date, approximately 400 previous projects have been conducted within the planning area and cover a variety of resource areas (for example, engineering, timber, range, heritage, and recreation). Those that have been conducted within the past five years have dealt with impacts associated with the Wallow Fire of 2011 (for example, hazard tree salvage sales and prescribed burning of hazardous fuel loads), those associated with implementation of the Travel Management Rule, and those seeking to improve the rangeland management infrastructure (for example, water systems and tank cleaning). At present, the only projects slated for the foreseeable future are those proposed as part of the current landscape restoration proposal.

Implementation of the proposed treatments, combined with past, present, and reasonably foreseeable activities is not expected to negatively impact heritage resources within the project area. The greatest potential for cumulative impacts to heritage resources in the area come from the potential for increased erosion rates associated with decreased canopy and ground cover. However, archaeological sites in the larger Mogollon area are, more often than not, located on stable landforms which do not experience sediment transfer rates greater than five tons per acre per year regardless of the canopy, ground cover conditions, or both (Toney 2012, Toney and Taliaferro 2009). This value (five tons per acre per year) was that determined to be the extreme erosion rate based on Z-score values for areas on the Gila National Forest and surrounding lands (Toney 2012, Toney and Taliaferro 2009). The majority of heritage resources tend to be located on landforms that experience less than this amount of erosion in a year.

### **Beneficial Effects**

As stated in the analysis of effects associated with the no-action alternative (alternative A), if current conditions are allowed to continue, heritage resources stand a greater chance of being adversely affected by severe erosion episodes as well as wildland fire. The proposed treatments will mitigate the possibility of a catastrophic wildland fire affecting heritage resources, and the proposed watershed restoration treatments will lessen the probability that heritage resources are adversely affected by arroyo headcutting and stream channel scouring within the treatment areas. Similarly, the changes to the transportation system will decrease the probability that motorized travel will impact heritage resources because more miles of road are slated for decommissioning than are being added to the road system.

### ***Effects of Climate Change on Cultural Resources***

The Intergovernmental Panel on Climate Change posits that if emission of greenhouse gases (for example, carbon dioxide, methane, and nitrous oxide) continues along its current trajectory, that global temperatures will continue to rise (IPCC 2014). This will lead to a decrease in cold temperature extremes, an increase in warm temperature extremes, an increase in extreme high sea levels, and an increase in the number of heavy precipitation events in some regions of the world. In some portions of the world, heat waves are expected to increase in frequency and duration and precipitation events are expected to increase in intensity though will become sporadic in their frequency of occurrence (IPCC 2014). All of these general trends have the potential to adversely affect heritage resources in the planning area.

Perhaps the greatest threat that climate change poses to heritage resources is the increased threat of erosion. As temperatures rise, vegetation communities are likely to be affected. Elevational shifts in vegetation communities, extreme fire events, or both could lead to reduced canopy cover available to intercept precipitation and reduce raindrop impact energies and loss of vegetative ground cover (basal area plus litter). This loss of vegetative ground cover combined with more of the precipitation falling in higher intensity storms increases the risk of erosion. This erosion risk can lead to increased sediment delivery to stream channels and potentially altered flow regimes

and stream channel dynamics such as degradation (downcutting) or aggradation. Channel downcutting events, increased arroyo formation, and shifts in stream channel dimension or location have the potential to destroy or damage heritage resources located in the Luna planning area.

## Social and Economics

### Affected Environment

The Luna Restoration Project is located entirely within Catron County. The main community within the planning area is Luna, New Mexico, a nonincorporated area of Catron County with a population of 158 (U.S. Census Bureau 2010). The project is adjacent to Apache and Greenlee counties in Arizona along the state line. These three counties form the social and economic analysis area. County-level data are used for the analysis, since reliable demographic and economic data are readily available.

### Population and Demographics

Each of the counties have experienced positive population growth between 2000 and 2015. Catron County had the smallest estimated change of 1.1 percent over that period compared to Apache County at 3.9 percent and Greenlee County, 5.6 percent. But all are far below the national growth of 12.5 percent (Economic Profile System 2017a).

The median age of the population in Catron County and the community of Luna is approximately 57. The median age of the population in Catron County is much older compared to the other two Arizona counties (median age 33), both states (median age 37), and the nation (median age 37) (Economic Profile System 2017a).

The racial and ethnic composition of the study area offers context for the social analysis. Table 59 shows the racial and ethnic breakdown of the counties and their respective states. The majority of the residents self-identify as white in Catron and Greenlee counties. Apache County differs with having a higher percentage of American Indians than the other counties. Greenlee County almost half of their population self-identified as Hispanic or Latino. Racial identification within Catron and Greenlee counties are similar, but for ethnic composition Catron and Apache counties had similar trends.

Compared to state information, different ethnic and racial compositions of the counties varied from state percentages. Noticeable differences between each of the states and their respective counties are the variability of the ethnic breakdowns and the difference in percent population in White and American Indian populations across the analysis area (table 59).

**Table 59. Racial and ethnic breakdown of counties within the analysis area**

Area	Ethnicity Non-Hispanic	Ethnicity Hispanic	Race White	Race African American	Race American Indian	Race Asian Pacific Islander	Race Other
Catron County	82%	18%	96%	Less than 1%	Less than 1%	0%	1%
Greenlee County	53%	47%	89%	2%	4%	Less than 1%	1%
Apache County	94%	6%	23%	1%	72%	Less than 1%	2%
New Mexico	52%	48%	39%	2%	9%	1%	2%
Arizona	70%	31%	56%	4%	4%	3%	2%

Note: Ethnicity relates to identification as either Hispanic/Latino or not. Hispanic/Latino individuals may identify as any members of any racial groups. The “Other” group includes two or more races.

Source: Economic Profile System 2017a.

### Lifestyles, Values, Beliefs, and Attitudes

Firewood gathering on the Gila National Forest is particularly tied to livelihoods in some of the communities. Wood for fires continues to be widely used either aesthetically or as the primary heat source within homes. Approximately 46 percent of the housing units in Catron County rely on wood as their primary heat source (U.S. Census Bureau 2000). In comparison, the community of Luna, New Mexico within Catron County estimates 60 percent of the housing units rely upon wood (U.S. Census Bureau 2006–2010 American Community Survey). Apache County also has a high reliance of wood as heat source at 50 percent. In contrast, Greenlee County reports more than 75 percent of the housing units rely on utility gas as primary heat source (U.S. Census Bureau 2000). The use of wood for heating homes may be tied to long-term customs, traditions, and culture of the community.

The Gila National Forest is currently undergoing forest plan revision. Participants relayed concerns regarding the forest and natural resource management (USDA Forest Service 2017b):

- there is a desire for the maintenance of quality recreational experiences
- there is wide recognition of the overgrown conditions of many of the forest types and juniper encroachment of the grasslands
- there is concern about the increased risk of uncharacteristic wildfire, and threats to private property and adjacent communities
- there is broad interest in fuel management strategies such as thinning and prescribed fire
- many people would like to see more timber harvesting and grazing to support local economies
- there is concern about diminishing water supplies and water quality, and conditions of the forest, wildlife habitat and watershed health

### Employment and Income

Per capita income in the study area is lower than the per capita income per state and nation. Apache County has the lowest per capita income compared to other two counties (table 60).

**Table 60. Per capita income and percentage of labor or non-labor source and unemployment for counties in the analysis area, state, and nation**

Geographic Area	Per Capita Income (2015 dollars)	Labor (2015)	Non-Labor (2015)	Unemployment (2016)
Catron County	\$20,685	38%	62%	8.2%
Greenlee County	\$21,994	77%	23%	7.6%
Apache County	\$13,011	62%	38%	11.3%
New Mexico	\$24,012	75%	25%	5.3%
Arizona	\$25,848	75%	25%	6.7%
United States	\$28,930	78%	22%	4.9%

Source: Economic Profile System 2017a.

The percentage of people below the poverty level in Catron County is 17 percent, which is less than the New Mexico level of 21 percent. Poverty level in Greenlee County is 14 percent and Apache County 37 percent, with Arizona being at 18 percent. Apache County has the highest percentage of people below the poverty line. Catron and Greenlee counties are comparable to the national level of 16 percent (table 61).

**Table 61. Median household income and percentage of persons in poverty in 2015**

Geographic Area	Median Household Income	Percentage of persons below poverty line
Catron County	\$42,973	17%
Greenlee County	\$51,628	14%
Apache County	\$31,757	37%
New Mexico	\$44,963	21%
Arizona	\$50,255	18%
United States	\$53,889	16%

Source: Economic Profile System 2017a.

### *Forest Products Related Employment*

According to the Gila National Forest Assessment Report (USDA Forest Service 2017b):

...the mill in Reserve, New Mexico employs eight people at the mill and up to ten people on timber sales. There are also approximately five active smaller mills that purchase timber to produce rough-cut lumber and other forest products on a limited scale and at least seven fuelwood businesses based upon sales of permits. The number of employees in these businesses is not known and many may be self-employed businesses with no paid employees. In 2013, timber-related jobs accounted for less than one percent of private sector employment within the four counties: Catron, Sierra, Grant and Hidalgo; that the Forest is situated (Headwaters Economics 2016). Catron County has the largest percent of the total timber-related employment due to the number of permits sold and the location of these businesses.

Employment in timber related jobs for 2015 (Economic Profile System 2017b) in Catron County was approximately 3.5 percent of the total private employment and 1.3 percent in Apache County. No timber-related employment comprised private employment in Greenlee County.

## Environmental Consequences

### Alternative A

There would be no change in management within the planning area. Fuelwood gathering would still be allowed, access on the current motorized road and trail transportation system would continue. However, no restoration projects would occur. If a high-severity wildfire were to occur in the area, there is a potential for temporary impacts to recreational uses or enjoyments such as hunting, scenery or visual conditions. Smoke emissions generated would be greater and unplanned, causing impacts to those sensitive to smoke. Damage to infrastructure such as power lines, communication systems, etc. within the planning area as well as property damage could result in substantial costs for repair, replacement, or restoration.

With no proposed vegetation treatments, there would be no opportunity generated for economic benefit to local contractors or industries and employment associated with timber or other forest products that could be contracted. This lack of opportunity would be the same for not implementing any of proposed treatments.

### *Cumulative Effects*

There are no activities being implemented under alternative A, current activities (for example, grazing, hunting, and hiking) would continue. There are currently no other management activities within the planning area that would improve forest and watershed health relative to existing conditions. The Apache-Sitgreaves National Forests is currently implementing the West Escudilla Project, which includes vegetation management projects, prescribed burning, and other restoration activities. Since alternative A would not prescribe additional treatments, it would not cause cumulative effects related to smoke emissions from prescribed fire. However, the risk of uncharacteristic wildfire and associated smoke emissions would be highest under this alternative.

### Effects Common to Alternatives B, C, and D

The supply and demand for timber is driven by regional and national needs and markets. Demand for woody material is largely driven by fuelwood needs and other local demand for woody material for rough-cut lumber, fuelwood, and other specialty products from local mills. With approximately 74,000 acres of forest and woodland to be treated, the Gila National Forest would be able to contribute to the demand for forest products and needs of local mills located in or adjacent to the planning area. There is the potential for economic benefit to local contractors or industries and increased employment associated with timber or other forest products that could be contracted.

The range of projects to be implemented under all action alternatives of the Luna Restoration Project have the potential for providing various employment and economic opportunities for local individuals, contractors, or industries.

Activities such as herbicide utilization under alternative C, smoke from prescribed fires, increased vehicle traffic on roads, and increased noise from equipment and vehicles have the potential for social consequences. Activities would be periodic and occurring across differing locations across the planning area. This may prevent individuals from partaking in various outdoor activities or recreating in their favorite places; and may be displaced for short periods and may have less pleasure in their alternate locations.

Under alternative D, there would be a loss of motorized recreational opportunity compared to alternatives B and C. Alternative D does not add to the motorized transportation system closed and user-created routes that would provide loop and access in and around the community of Luna. This would not be favorable for members of the community who collaboratively worked with the Forest Service to identify these routes.

### *Environmental Justice*

The goal of environmental justice is for agency decision makers to identify impacts that are disproportionately high and adverse with respect to minority and low-income populations and identify alternatives that will avoid or mitigate those impacts. None of the alternatives would reduce employment and income relative to current conditions, therefore, no disproportionate adverse economic effects would occur.

Smoke emissions from prescribed fire or wildfire can have health and quality of life consequences and is most likely to affect vulnerable populations—children, the elderly, and individuals with health or respiratory issues. The intensity and duration of emissions are variable, but prescribed fires follow a written prescription that allows managers to minimize smoke impacts. The Forest Service is also required to work with the New Mexico Environmental Department, Air Quality Bureau to ensure smoke impacts to human health are avoided or minimized. The advance notice associated with prescribed burns allows individuals with sensitivity to smoke to engage in averting behavior, reducing the negative quality of life impacts.

Households that rely upon fuelwood as their primary heat source would be able to continue to collect fuelwood and with vegetation treatments, the opportunity for additional sources may be realized. None of the alternatives are expected to adversely affect low-income families who depend on fuelwood.

### *Forest Plan Amendments*

The amendments to exceed acres per decade to treat activity fuels with prescribed fire; wildlife habitat improvement structures and acres; vegetation treatments in Mexican spotted owl habitat would have both negative and beneficial impacts on social and economic considerations and environmental justice. The ability to treat more acres of activity fuels with prescribed fire will contribute to negative impacts of smoke emissions on social and environmental justice considerations but would contribute to the associated vegetation treatments by reducing the risk of wildfire. The amount and type of restoration activities and employment and income would not change from previously described under alternatives. Amendments would assist in accomplishing restoration efforts across the landscape.

### *Cumulative Effects*

Within the planning area, current activities (for example, grazing, hunting, and hiking) would continue. There are no other ongoing vegetation or prescribed burning activities within the Luna planning area, but restoration efforts within the larger Escudilla Landscape have started on the Apache-Sitgreaves National Forests with implementation of the West Escudilla Project. There is a potential for increase in employment and income, but it is not expected to significantly change the current percentages of forest product related employments in the three counties.

Ongoing prescribed fires from the Apache-Sitgreaves National Forests and Luna Restoration Project will contribute to smoke emissions, potentially affecting the health and quality of life of individuals who live near or visit the Gila National Forest. Together, both could cause cumulative



effects to health and quality of life for individuals who are sensitive to smoke. However, the cumulative effect of these treatments would go toward decreasing the risk of a wildfire, decreasing the impacts of smoke emissions from that type of event.

## Short-term Uses and Long-term Productivity

The National Environmental Policy Act requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (National Environmental Policy Act section 101).

The implementation of any of the treatments within the action alternatives does not jeopardize the long-term productivity of the Gila National Forest. As described in chapter 3, implementing the action alternatives would improve forest and woodland stands health and improve wildlife habitat, including habitat for threatened, endangered, and sensitive species. There would be reduction in the risk of large uncharacteristic wildfires and its impacts to the landscape, watersheds, species, and human health and quality of life. As described throughout chapter 3, the overall implementation of the action alternatives would improve resources such as range condition, wildlife and aquatic habitat, soil conditions, and others. Actions like erosion control and reducing risk of wildfire would reduce impacts to sensitive resources like water quality, cultural resources, and air quality.

## Unavoidable Adverse Effects

For all action alternatives, smoke emissions are unavoidable adverse impacts that have the potential to affect health and quality of life for individuals who are sensitive to smoke. The potential impacts of smoke are addressed in the “Air Quality,” “Recreation,” and “Social and Economics” sections. The adverse effect would be reduced or minimized with Gila National Forest personnel following written prescriptions for prescribed fires, working with State Air Quality Departments, and advance notice, allowing individuals with sensitivity to smoke to engage in averting behavior, to reduce the negative impacts of smoke.

There is a risk of introduction, establishment and spread of invasive plants to new locations with ground disturbing activities with mechanical equipment, prescribed fires, and adding new motorized routes. Implementation of design features and monitoring were included to reduce this risk.

Adding motorized routes to the system may cause a loss of soil productivity under all alternatives. Alternative B and C with 13.8 miles of roads being added to the system will result in more bare ground than alternative D, which adds 0.2 mile of road. There will be a loss of soil productivity in varying degrees and time for the other motorized transportation activities like temporary roads, reopening roads and then closing again, and decommissioning.

## Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those lost for a period of time, such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

All resources were evaluated to determine if there would be irreversible or irretrievable commitment of resources. Except for following resources, no other resources identified irreversible or irretrievable commitments.

### Watershed and Soils

Alternative A already possesses an intrinsic commitment of the soil resource from closed roads that are not decommissioned. Continuation of closed roads, without attempts to decommission would allow this commitment to continue, with little possibility of soil conditions returning to their natural state.

The selection of any of the action alternatives allows for decommissioning of between 114 and 130 miles of travel routes, which would aid in reversing and retrieving soil resource conditions. Timeframes for recovery will vary, dependent on type of decommissioning implemented and site conditions, including parent material, soil depth, available nutrients, climatic conditions, and herbaceous recovery.

The addition of roads for administrative and recreation opportunities range from 4.2 to 17.8 miles for the action alternatives. Impacts to soil conditions on these miles would result in additional area of irreversible and irretrievable commitment of soil resources.

### Heritage

There is a relatively low risk of irreversible commitment of heritage resources across all action alternatives. This risk of irreversible commitment primarily arises from the potential for ground disturbing activities to completely destroy archaeological sites. In general, this risk of irreversible commitment of resources is the same across all action alternatives as they essentially share similar proposed ground disturbing activities.

### Inventoried Roadless Areas

Irreversible or irretrievable commitments of roadless resources could occur under alternative A. In the event of a wildfire due to continuing existing stand conditions (crown fire potential), the roadless resources could be at risk to irretrievable outcomes, including species and habitat loss, until vegetation becomes established. Special features, such as perennial water sources, could be affected by post-fire erosion and debris flows. There are no irreversible commitments.

There would be no irreversible or irretrievable commitments to roadless resources with action alternatives B, C, or D. The likelihood of severe wildfire and the associated impacts would be reduced in the treated areas, lowering the risk of an irretrievable effect.



# Preparers and Contributors

## List of Preparers

**T. H. Buhl – Fire Management Specialist**, USDA Forest Service, Enterprise Program. Education: Undergraduate education in Fire Technology, American River College and Range Science, Montana State University. Experience: Fire Management Specialist (2009 to present) Enterprise Program; Assistant Fire Management Officer (2006–2009). Other Forest Service experience includes fire operations positions on national forests in Region 1 and Region 2 (2000–2006), and timber and range management (1998–2000).

**Ralph Fink - District Range Staff**, USDA Forest Service, Quemado Ranger District, Gila National Forest. Education: B.S. Secondary Education, Natural Sciences from Chadron State College and M.S Range Science, Plant Systematics and Floristics from New Mexico State University. New Mexico Licensed Pesticide Applicator. Experience: 10 years as a Forest Service Range Management Specialist in Southern New Mexico, Forest Botanist (1 year) and District Range Staff (2016 to present).

**David Fothergill – Forest Landscape Architect**, USDA Forest Service, Enterprise Program. Education: B.S. Biology, University of Kentucky; Master of Landscape Architecture, University of Oregon. Experience: 15 years public land management in recreation planning and ecological restoration.

**Kathleen Hawkos – GIS Specialist**, USDA Forest Service, Gila National Forest. Education: M.S. Geography with emphasis in GIS. Experience: Technical background in GIS spatial analysis, special management areas needs assessments, ABV survey; GIS data collection, organization, maintenance and distribution; GIS and Infrared Imagery Interpretation for fire support; Southwestern Regional cartographic map production and technical support; project lead on Quad Atlas production for Southwestern Region forests; development and maintenance of the Southwestern Region Motor Vehicle Use Map website. GIS Specialist (2004–2012; 2016 to present) and Cartographic specialist (2012–2016) with the Forest Service, Southwestern Region.

**Timothy Hendricks – District Wildlife Biologist**, USDA Forest Service, Gila National Forest, Quemado Ranger District. Education: B.S. Forestry and Wildlife Management with a minor in chemistry. Experience: Firefighter (2 years); Fuels Specialist (9 years); Wildlife Biologist (4 years) working on habitat and endangered species management, species consultation, and National Environmental Policy Act projects.

**Emily Irwin – Quemado District Ranger**, USDA Forest Service, Gila National Forest, Quemado Ranger District. Education: B.S. Forestry Northern Arizona University. Experience: 30 years of service with the Forest Service in the Southwestern Region, with 3 years as the Quemado District Ranger. Background in fire and fuels management.

**Carolyn Koury – Hydrologist**, USDA Forest Service, Gila National Forest. Education: B.S. Speech Communication, Northern Arizona University; M.S. Hydrology, University of Arizona. Experience: hydrologist on the Apache-Sitgreaves National Forest (1994–2002); forest hydrologist (2002 to present) on the Gila National Forest.

**Natalie Morgan – Silviculturist**, USDA Forest Service, Enterprise Program. Education: B.S. Forest Resource Management and B.A. in Spanish Literature from the University of Montana; M.S. Forestry, Northern Arizona University. Experience: 11 years in the Forest Service in Regions 1 and 2. Forester trainee (2008–2011); Forester (Silviculture) (2011–2016); Silviculturist (2016 to present) with the Enterprise Program.

**Lisa Mizuno – Environmental Coordinator**, USDA Forest Service, Gila National Forest. Education: B.S. Oceanography with a minor in biology, Humboldt State University; M.S. Interdisciplinary degree in fisheries and estuaries, Humboldt State University. Experience: fisheries biologist on the Six Rivers (1991 to 1999) and San Bernardino (1999 to 2003) national forests. Interdisciplinary planner and assistant National Environmental Policy Act coordinator (2003 to 2011) and environmental coordinator (2011 to present) on the Gila National Forest, assisting, reviewing, and leading team on various forest projects.

**Michael Natharius – Soil Scientist**, USDA Forest Service, Gila National Forest. Education: B.S. Agriculture with major in soil science. Experience: terrestrial ecological unit inventory, riparian inventory, vegetation inventory and monitoring, burned area emergency response team leader and member, and interdisciplinary team specialist. Soil scientist (1991 to present) with the Forest Service, Southwestern Region.

**Rex A. Null – Civil Engineer**, USDA Forest Service, Gila National Forest. Education: B.S. Civil Engineering, New Mexico State University. Experience: project manager for Burn Construction (2 years) and Civil Engineer (1991 to present) on the Gila National Forest.

**Matthew Taliaferro - Archaeologist** USDA Forest Service, Gila National Forest. Education: B.A. Anthropology; M.A. Anthropology; Ph.D. Anthropology. Experience: 15 years of Section 106 and 110 CRM work in the Southern United States, geographic information sciences, peer-review process, lithic analysis, ceramic analysis. Archaeologist (2010 to present) with the Forest Service.

## List of Contributors

**Jason Cress – Fuels**, USDA Forest Service, Tonto National Forest (Formerly Gila National Forest, Quemado Ranger District).

**Colleen Nicholas – District Archaeologist**, USDA Forest Service, Gila National Forest, Reserve and Quemado ranger districts.

**Brian Park – GIS Coordinator**, USDA Forest Service, Gila National Forest.

**Gabe Partido – Timber and Fuels Program Manager**, USDA Forest Service, Gila National Forest.

**Laura Vallejos – Resource Forester, Silviculturist**, USDA Forest Service, Gila National Forest.

**Roger A. Williams - District Natural Resource Officer**, USDA Forest Service, Gila National Forest, Quemado Ranger District.

**Wayne Witty – Range Technician**, USDA Forest Service, Malheur National Forest (formerly Range Management Specialist, Gila National Forest, Quemado Ranger District).

The Forest Service consulted the following federal, state, and local agencies, tribes and other organizations during the development of this environmental impact statement:

## Federal, State, and Local Agencies

Apache-Sitgreaves National Forests

Bureau of Land Management, Socorro Field Office

Catron County Commission, County Manager, and Emergency Manager

New Mexico Department of Game and Fish

New Mexico Environmental Department

New Mexico State Forestry Division

U.S. Fish and Wildlife Service

## Tribes

Alamo Navajo Chapter

Fort Sill Apache Tribe

Mescalero Apache Tribe

Pueblo of Acoma

Pueblo of Laguna

Pueblo of Zuni

Ramah Navajo Chapter

The Hopi Tribe

The Navajo Nation

San Carlos Apache Tribe

White Mountain Apache Tribe

Ysleta Del Sur Pueblo

## Others

Luna Irrigation Ditch Association

Luna OHV Riders

## Distribution of the Environmental Impact Statement

The draft environmental impact statement was distributed to 190 individuals, organizations, tribes, and local, state, and federal agencies who specifically requested a copy of the document and those who submitted comments during public comment opportunities. The final environmental impact statement was distributed to individuals, organizations, tribes, and agencies who requested a copy or commented during public involvement opportunities. The environmental impact statement is available on the Gila National Forest website at [Luna Restoration Project](#) and available for review at the Quemado Ranger District office.

Copies of the draft and/or final environmental impact statements were mailed or provided electronically to the following federal agencies, federally recognized tribes, state and local governments, and organizations:

Advisory Council on Historic Preservation	Ramah Navajo Chapter
Alamo Navajo Chapter	Salado Soil and Water Conservation District
Apache-Sitgreaves National Forests	San Carlos Apache Tribe
Bureau of Land Management	San Francisco Soil and Water Conservation District
Catron County	State Historic Preservation Office
Center for Biological Diversity	The Hopi Tribe
Ecological Restoration Institute	The Nature Conservancy
Federal Aviation Administration	The Navajo Nation
Federal Highway Administration	The Quivera Coalition
Fort Sill Apache Tribe	U.S. Army Corps of Engineers
Mescalero Apache Tribe	U.S. Coast Guard
New Mexico Department of Agriculture	U.S. Department of Energy
New Mexico Department of Game and Fish	U.S. Department of the Navy, Energy and Environmental Readiness Division
New Mexico Department of Transportation	U.S. Environmental Protection Agency
New Mexico Environmental Department	U.S. Fish and Wildlife Service
New Mexico Environmental Department, Air Quality Bureau	USDA Animal and Plant Health Inspection Service, Policy and Program Development
New Mexico Environmental Department, Surface Water Quality Bureau	USDA National Agricultural Library
New Mexico Farm and Livestock Bureau	USDA Natural Resources Conservation Service
New Mexico State Forestry Division	USDI Office of Environmental Policy and Compliance
New Mexico Wilderness Alliance	White Mountain Apache Tribe
NOAA Fisheries Service	WildEarth Guardians
Pueblo of Acoma	Ysleta Del Sur Pueblo
Pueblo of Laguna	
Pueblo of Zuni	

# Glossary

**Administrative use** - Authorized motor vehicle use on roads or trails to carry out forest management activities. This also includes use by permittees as authorized by permit or written authorization to conduct authorized activities.

**Decommission** - Demolition, dismantling, removal, obliteration, disposal, or a combination of these things of a deteriorated or otherwise unneeded asset or component, including necessary cleanup work. This action eliminates the deferred maintenance needs for the fixed asset. Portions of an asset or component may remain if they do not cause problems nor require maintenance. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998).

**Forest Transportation Atlas** - A display of the system of roads, trails and airfields of an administrative unit. (36 CFR 212.1, Forest Service Manual 7705)

**National forest transportation system** - The system of National Forest System roads, National Forest System trails, and airfields on National Forest System lands. (36 CFR 212.1, Forest Service Manual 7705)

**Maintenance levels** - Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria. (Forest Service Handbook 7709.59, 62.32)

- **Level 1** - These are roads that have been placed in storage between intermittent uses. The period of storage must exceed 1 year. Basic custodial maintenance is performed to prevent damage to adjacent resources and to perpetuate the road for future resource management needs. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are “prohibit” and “eliminate” all traffic. These roads are not shown on motor vehicle use maps. Roads receiving level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic but may be available and suitable for nonmotorized uses.
- **Level 2** - Assigned to roads open for use by high clearance vehicles. Passenger car traffic, user comfort, and user convenience are not considerations. Warning signs and traffic control devices are not provided with the exception that some signing, such as W-18-1 “No Traffic Signs,” may be posted at intersections. Motorists should have no expectations of being alerted to potential hazards while driving these roads. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either to:
  - ◆ discourage or prohibit passenger cars; or
  - ◆ accept or discourage high clearance vehicles.
- **Level 3** - Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. The Manual on Uniform Traffic Control Devices is applicable. Warning signs and traffic control devices are provided to alert motorists of situations that may violate expectations. Roads in



this maintenance level are typically low speed with single lanes and turnouts. Appropriate traffic management strategies are either "encourage" or "accept." "Discourage" or "prohibit" strategies may be employed for certain classes of vehicles or users.

- **Level 4** - Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. Manual on Uniform Traffic Control Devices is applicable. The most appropriate traffic management strategy is "encourage." However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times.
- **Level 5** - Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated. Manual on Uniform Traffic Control Devices is applicable. The appropriate traffic management strategy is "encourage."

**Motor vehicle** - Any vehicle that is self-propelled, other than: (1) A vehicle operated on rails; and (2) Any wheelchair or mobility device, including one that is battery-powered, that is designed solely for use by a mobility-impaired person for locomotion, and that is suitable for use in an indoor pedestrian area. (36 CFR 212.1, 36 CFR 261.2, Forest Service Manual 7705, Forest Service Handbook 2309.18.05)

**National Forest System road** - A forest road other than a road which has been authorized by a legally documented right-of-way held by a state, county or other local public road authority. (36 CFR 212.1, 36 CFR 251.51, 36 CFR 261.2, Forest Service Manual 7705, Forest Service Handbook 7709.56.40.5)

**Road decommissioning (1)** - Activities that result in the stabilization and restoration of unneeded roads to a more natural state. (36 CFR 212.1)

**Road decommissioning (2)** - Activities that result in restoration of unneeded roads to a more natural state. (Forest Service Manual 7705, Forest Service Manual 7734)

**Temporary road or trail** - A road or trail necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road or trail and that is not included in a national forest transportation atlas. (36 CFR 212.1, Forest Service Manual 7705)

**Unauthorized road or trail** - A road or trail that is not a forest road or trail or a temporary road or trail and that is not included in a national forest transportation atlas. (36 CFR 212.1, Forest Service Manual 2353.05, Forest Service Manual 7705)

**Written authorization** - A written document that authorizes specific activities; may be a permit, letter or other written document.

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# Appendices

## Appendix A: Response to Comments on the Draft Environmental Impact Statement

This appendix documents the Gila National Forest responses to comments received during the 45-day comment period for the draft environmental impact statement (DEIS) for the Luna Restoration Project.

The following is the list of agencies, tribes, groups, and individuals who provided substantive comments to the DEIS. The comment identification (ID) code and sequential comment number(s) were used for tracking between this appendix and the original comment, which can be found in the project record.

Comment ID Code	Commenter
CBD	Center for Biological Diversity; Joe Trudeau
EPA	Environmental Protection Agency, Region 6; Keith Hayden
FC	Faith Capps
HOPI	The Hopi Tribe; Stewart B. Koyiyumptewa
JP	Jean Public
NMDA	New Mexico Department of Agriculture; Jeff M. Witte
NMDGF	New Mexico Department of Game and Fish; Mark Watson
OEPC	Office of Environmental Policy and Compliance, Department of the Interior; Stephen Spencer
TEP	Tucson Electric Power; Jasmine Rucker
TN	Todd North
TP	Thomas Paterson
WEG	Wild Earth Guardians; Madeleine Carey

In some cases, the Forest Service response to a comment refers to analysis documents, which are included in the project record. Detailed reports of all resources analyzed are part of the project record and available upon request.



## Air Quality

### Smoke Management

**Comment 1:** Concern that smoke generated from prescribed burning would have impacts to air quality and impact health of individuals or population in surrounding areas. Concern that there are not adequate smoke mitigation measures to avoid or minimize smoke impacts. (EPA-1, TN-5)

**Response:** In the EIS under the Environmental Justice section, it states that the Forest Service is required to work with the State Air Quality Department, that is, New Mexico Environment Department, Air Quality Bureau. This corresponds to the design feature on EIS page 25 which states: “All burning would be coordinated and conducted in accordance with New Mexico Environmental Department, Air Quality Bureau smoke management rule. Emission reduction techniques would be utilized when possible to minimize impacts to sensitive receptors.”

The New Mexico Environment Department’s air quality bureau has authority over air quality in all areas of New Mexico except Bernalillo County and Tribal Lands. Prior to implementing prescribed burning, several requirements must be met including: registering the burn at least two weeks prior to planned ignition, and the Gila National Forest must notify New Mexico Environment Department by 10 a.m. the day prior to ignition. Burns are required to be timed when atmospheric conditions promote smoke dispersion to minimize impacts to the public. A complete list of requirements prior to burning can be found at the New Mexico Environment Department website: <https://www.env.nm.gov/air-quality/smp>.

Advance notices would be implemented to aid individuals in reducing or altogether avoiding smoke from prescribed fires (EIS page 167). Additional design features describing the advance notices were added to the Design Features Common to All Prescribed Burning Activities section.

**Comment 2:** Concern that implementation of prescribed fire treatments would increase or cause impacts to such things as air pollutants, haze, visibility and not stay within compliance with regulations (EPA, Clean Air Act, air quality standards). (TN-1)

**Response:** The current Smoke Management regulation in New Mexico is part of the state’s Regional Haze Rule, Environmental Protection Air Quality (Statewide) Smoke Management. Title 20 Chapter 2 Part 65 of the 20.2.65.103. The requirements are listed at the New Mexico Environment Department website: <https://www.env.nm.gov/air-quality/smp>.

Prior to implementing prescribed burning several requirements must be met, including the requirement that the Gila National Forest uses emission reduction techniques. Each prescribed fire could use a host of emission reduction techniques on any individual burn, depending on the timing and individual unit. A list of approved emission reduction techniques are listed at the New Mexico Environment Department website: <https://www.env.nm.gov/air-quality/smp>.

When there are multiple burns going on in New Mexico and Arizona that have the potential to impact the same airsheds, there will be coordination calls hosted by New

Mexico Environment Department and the Gila National Forest staff participates to coordinate burning.

Permission to burn is based on air quality, dispersion forecasts. Public announcements are posted at [nmfireinfo.com](http://nmfireinfo.com). Prescribed fire would occur when weather conditions and smoke dispersion forecasts are favorable as forecasted by the National Weather Service and the New Mexico Environment Department. All prescribed fire operations are conducted under the guidelines set forth in a prescribed fire plan developed by fire managers specifically for units in the project area. Prescribed fire plans address parameters for weather, air quality and contingency resources. Prescribed fire would occur when emissions are unlikely to have adverse effects on human health and visibility.

The Gila National Forest cannot guarantee that an exceedance would never, as weather situations may change unexpectedly. In the event that adequate ventilation does not occur as expected, the Gila National Forest would seek remedy that could include temporary shutdown of operations, relocation of personnel, consultation with New Mexico Air Quality Bureau or other mitigation measures.

**Comment 3:** Concern that implementation of prescribed burn treatments would not cause visibility impacts to designated Class 1 areas including the Gila Wilderness. (TN-2)

**Response:** The current Smoke Management regulation in New Mexico is part of the state's Regional Haze Rule, Environmental Protection Air Quality (Statewide) Smoke Management. Title 20 Chapter 2 Part 65 of the 20.2.65.103. The requirements are listed at the New Mexico Environment Department website: <https://www.env.nm.gov/air-quality/smp>.

The purpose of this rule is to protect visibility at Class 1 Areas in New Mexico, and it is assumed that by following the requirements visibility is protected at Class 1 Areas. Further, modeling would be inappropriate in this case. Air quality modeling of smoke, depends on meteorological inputs from current forecasts (2 to 3 days in the future) to be most useful. Prospective modeling, as suggested, without current forecasts to predict smoke months or years in advance, is not a useful predictor of impacts from an individual burn.

See also Air Quality, Smoke Management Comment 3 for more information.

**Comment 4:** Concern that best available sciences was not used due to the lack of modeling for smoke emissions in the analysis of prescribed fire treatments to determine achievement of air quality regulations. (TN-3)

**Response:** The Forest Service will coordinate with New Mexico Environment Department prior to all burning. Air quality management and emissions regulation is the responsibility of the U.S. Environmental Protection Agency and the New Mexico Environment Department, Air Quality Bureau. The current Smoke Management regulation in New Mexico, is part of the state's Regional Haze Rule, Environmental Protection Air Quality (Statewide) Smoke Management; Title 20 Chapter 2 Part 65 of the 20.2.65.103. The requirements are listed at the New Mexico Environment Department website: <https://www.env.nm.gov/air-quality/smp>.

Air quality modeling of smoke, depends on meteorological inputs from current forecasts (two to three days in the future) to be most useful. Prospective modeling, as suggested, without current forecasts to predict smoke months or years in advance, is not a useful predictor of impacts from an individual burn.

**Comment 5:** Request by commenter to know what smoke monitoring network exists in the surrounding New Mexico counties to ensure compliance with air quality standards. (TN-4)

**Response:** New Mexico Environmental Department operates current air quality monitors in Dona Ana County. The Gila National Forest often deploys temporary air quality monitors to assess the impacts of individual burns in the areas affected including, Grant, Catron, Socorro, and Sierra counties. Other smoke monitors are located at Deming Airport, Luna County and Los Lunas monitor in Valencia County (<http://nmaqinow.net/>).

**Comment 6:** Concern that smoke from the implementation of prescribed fire treatments will interfere with the use and enjoyment of private land near the project area. (TN-7)

**Response:** Prescribed fire would be used when weather conditions and dispersion forecasts are favorable (that is, how fast smoke dissipates). All prescribed fire operations are conducted under the guidelines set forth in a prescribed fire plan developed by fire managers specifically for units in the project area. Prescribed fire plans address parameters for weather, air quality and contingency resources. Prescribed fire would occur when emissions are unlikely to have adverse effects on human health and visibility or adjacent property. The potential effects of smoke are discussed in the Air Quality section of the EIS (pages 106–108).

Smoke produced during prescribed fire operations may have temporary impacts as described in the EIS. Landowners will be notified when activities will be initiated and the Gila National Forest will follow State Air Quality regulations during implementation.

See also Air Quality, Smoke Management Comment 1 for more information.

## **Clean Water Act**

**Comment 1:** The Forest Service must ensure compliance with the Clean Water Act. (WEG-23)

**Response:** The State of New Mexico Environment Department is responsible for assessment of waterbodies to determine if they are meeting state water quality standards. The Gila National Forest reviewed the 2016–2018 State of New Mexico Clean Water Act Section 303(d)/Section 305(b) Integrated Report Appendix B – Integrated List. Two waterbodies were identified from the list that occur within the planning area: Centerfire Creek and San Francisco River (EIS page 114).

The Gila National Forest worked closely with the New Mexico Environment Department Surface Water Quality Bureau to develop projects within the Luna Restoration Project area that aimed to improve water quality. The New Mexico Environment Department co-authored the Escudilla Landscape Watershed Restoration and Protection Strategy to ensure that it met the requirement of the Environmental Protection Agency’s Watershed Based Planning elements.

## Climate Change

**Comment 1:** Concern is the impact to the forest's capacity for carbon storage should the desired condition for tree density per acre is achieved. (TN-6)

**Response:** Forests are in continual flux, emitting carbon into and from the atmosphere, and storing carbon as biomass. The primary influence on biomass carbon stock are plant growth, which increases carbon stock, decay, and decomposition which slowly decreases carbon stock, and disturbances in the form of fire and harvest. As forest and grassland ecosystems are constantly changing through natural succession and disturbance, biomass carbon stock also changes through time. It is recognized that some land management activities such as vegetation treatments and prescribed fires may reduce carbon storage even while moving toward the objectives. But the reduction of carbon storage or uptake is short term. As stands develop and vegetation regenerates, carbon uptake would slowly increase.

Carbon removed from forests as harvested wood can also remain stored rather than returning to the atmosphere for a long time, depending on the mix of wood products produced or burned as a substitute for fossil fuels (Heath et al. 2011). The net annual contribution to the total forest carbon budget depends on harvest and the use or disposal of harvested materials. It is recognized that some land management actions may reduce carbon storage even while moving toward restoring an ecosystem.

The current overall biomass carbon stock over the entire Gila National Forest is about 116 percent of reference conditions for vegetation types across the forest (USDA Forest Service, Gila National Forest 2017). The Luna Planning area is only about 5 percent of the entire forest. Vegetation and prescribed fire treatments planned in the Luna Planning area would not be implemented all at one time, but scattered over the project area over the next 8 to 10 years, extending up to 20 years or until objectives are met (EIS page 14). A project this size, broken down into smaller treatment units and implemented over a period of multiple years; would for a short period in localized treatment units have reductions in carbon storage and uptake. But as vegetation in these areas begin to develop and become more productive and diverse, carbon uptake would increase slowly, which has the potential to offset carbon stock reduction in subsequent later treatments across the planning area. Overall, the potential for this project to have an impact on total forest carbon stock is negligible.

**Comment 2:** The DEIS must analyze the impacts of the project on climate change and effects of climate change on the project area. (WEG-18)

**Response:** Climate change is addressed in the EIS on pages 150, 156, 162 and in cultural, fuels, recreation, vegetation, and watershed/soils reports.

As previously mentioned, carbon removed from forests as harvested wood can also remain stored rather than returning to the atmosphere for a long time, depending on the mix of wood products produced or burned as a substitute for fossil fuels (Heath et al. 2011). The net annual contribution to the total forest carbon budget depends on harvest and the use or disposal of harvested materials. It is recognized that some land management actions may reduce carbon storage even while moving toward restoring an ecosystem. While treatments such as group selection thinning from all age classes may encourage more trees in some areas, other areas within the planning area will be

maintained as grasslands and meadows. Overall, the restoration goals of the project will greatly reduce the potential for large amounts of carbon stock to be consumed in large wildfires such as the Wallow Fire (2011) and White Water-Baldy Fire (2012).

See Climate Change Comment 1 for more information.

## Cultural Resources

**Comment 1:** The Hopi Tribe requested the forest ensure that appropriate notification and documentation be provided to The Hopi Tribe and State Historic Preservation Office for sites that may be adversely affected or discovery of remains, cultural features or deposits. (HOPI-1)

**Response:** The Gila National Forest thanks Hopi Cultural Preservation Office for their review and comments. In accordance with Section 106 and Native American Graves Protection and Repatriation Act, the Gila National Forest will notify The Hopi Tribe if any inadvertent discoveries or identification of adverse impacts are made during the course of the project implementation.

## Invasive and Noxious Weeds

**Comment 1:** Concern treatment sites may be overrun with cheatgrass. (CBD-25)

**Response:** Cheatgrass has been documented to occur within the project area for over 30 years. Within this timeframe, this grass has not become a dominant species in these ecosystems.

There are design features common to all activities to reduce the potential of introduction or spread of invasive and noxious weeds on page 36 of the EIS. Page 38 of the EIS includes a monitoring element to periodically monitor implementation sites for detection and effectiveness of design features to prevent spread or introduction.

**Comment 2:** Concern non-native grass and herb seeds will be used in stream restoration activities; and needs to be analyzed. (CBD-26)

**Response:** Page 34 of the EIS states: “Sourcing of seed material will follow Region 3 (Southwestern Region) guidance on weed free materials.”

## Motorized Transportation System

**Comment 1:** Tucson Electric Power appreciates access solutions provided in all action alternatives, facilitating access for management of the powerlines. (TEP-3)

**Response:** Thank you. The Forest Service values the ongoing coordination with Tucson Electric Power to ensure the continued maintenance and management of the powerlines in conjunction with forest management.

**Comment 2:** Concern the closure of National Forest System Road 4127 W off of 4127 U in the Steel Flat area does not allow access into Arizona via connection to route 8372. (FC-1)

**Response:** National Forest System Road 4127 W is a short route off of 4127 U which leads to the New Mexico-Arizona stateline connecting to 8372. At the stateline, the landownership becomes private. The Gila National Forest inquired whether the Apache-Sitgreaves National Forests had an easement or right-of-way through the private land during its travel management planning. The Apache-Sitgreaves National Forests

responded that they had no easement or right-of-way. So based on the negative response, 4127 W was closed under the Gila National Forest's Travel Management Record of Decision in 2013.

During recent discussions with the Apache-Sitgreaves National Forests regarding route comments received on this project, another review of their records discovered a deed for a right-of-way dating back to 1952 through the private property along road 8372.

Based on this new information, the Gila National Forest will make a correction to the route designation and making it a road open to all motorized vehicles and reflect the correction in the next version of the motor vehicle use map.

**Comment 3:** Concern the closure of National Forest System Road 4127 Y/4019 U off of 4127 U does not allow access into Arizona via connection to route 8378. (FC-2)

**Response:** National Forest System Road 4019 U is designated for administrative or written authorization use only to access the private land. The closed spur 4127 Y that connects to 8378 at the stateline has been closed for a long period of time. This route is also within critical habitat for the Mexican spotted owl.

During recent discussions with the Apache-Sitgreaves National Forests, 8378 crosses in and out of parcels of private land for which they do not have any easements or right-of-ways through.

Based on the long-term closure of the road and no legal access on the Arizona side, the Gila National Forest is not going to consider opening 4127 Y and 4019 U to public motorized access at this time.

**Comment 4:** Concern that the implementation of motor vehicle barricades and road decommissioning will impact the ability to use motorized vehicles for management of range allotments. (TP-2)

**Response:** The Gila National Forest values our relationship with our stakeholders and is committed to working with permitted livestock producers to develop design features that would minimize the burden placed on them. Permittees are encouraged to be involved in the design and implementation process to ensure their concerns are addressed.

The access permitted for off road travel to permitted livestock producers is not unlimited. The permittee must demonstrate a specific need that cannot be addressed through alternative forms of access in order to justify an alternative course of action. This would occur through coordination with the permittee during annual operating meetings or at other times as needed.

The following text is included in the annual operating instructions regarding motorized uses:

Gila National Forest Travel Management Decision signed in September 2013 was implemented in 2016 on the Quemado Ranger District. This rule prohibits cross country motorized travel and has restricted all motorized vehicle travel on the Gila National Forest to authorized motorized routes only on Gila National Forest Plan.

Some motorized uses are exempt from the prohibitions of the designation process (36 CFR 212.51(a)): "Motor vehicle use that is specifically authorized under a written

authorization issued under Federal law or regulation” (CFR 212.51(a)(8)) is one of the exempted uses. The permittees and/or their employees must comply with all Gila National Forest Travel Management regulations, except those allowed under this authorization as described below:

- i. The permittees and/or their employees will be authorized for off road or unauthorized travel routes on their specific grazing allotment(s) to carry out the necessary activities for grazing and livestock management. This includes range improvement maintenance and/or reconstruction as designated in their grazing permit, placement of salt or other supplements, and for emergency livestock health purposes.
- ii. It is prohibited to operate any vehicle off National Forest System lands, State or County roads in a manner which damages or unreasonably disturbs the land, wildlife, or vegetative resources (36 CFR 261.15(h)). Moist soils are especially susceptible to damage through rutting or compaction; therefore, use of motorized vehicles on saturated soils should be avoided.
- iii. Utilize roads or trails designated for motor vehicle use to access range improvements, salting grounds, or livestock emergencies where possible. This includes trails and roads open for public use, those specified as “administrative use only,” and keeping within fence rights-of-way while accomplishing fence maintenance where possible.

**Comment 5:** Develop an action alternative that foregoes road building on steep slopes and sensitive, erodible soils where it may increase erosion or impair ecosystem productivity. (CBD-28)

**Response:** The Luna Water-Air-Soils Report (USDA Forest Service, Gila National Forest 2018) includes a map of the sensitive soils and discusses that the Draft Terrestrial Ecosystem Survey was used to identify sensitive Datil soils and used in the early stages of project development for consideration during restoration activity development. Page 119 of the EIS states: “In the development of these alternatives, sensitive soils were identified and considered. Vegetation treatments were excluded from these areas. Prescribed fire was excluded from most areas with sensitive soils, with the exceptions being the north aspect of the San Francisco Divide, and southwest of the community of Luna in Dry Blue Creek and Frieborn Canyon, extending south to the planning boundary. In these areas, low-severity fire may be introduced when fuel conditions, weather conditions, or both lessen fire spread across the landscape.” Temporary and new route construction would follow best management practices to mitigate soil erosion concerns.

**Comment 6:** Concern DEIS fails to adequately analyze the travel management system, including baseline conditions, direct, indirect and cumulative impacts the Gila National Forest’s travel analysis report, the minimum road system, and additional decommissioning opportunities. (WEG-16)

**Response:** The Gila National Forest, including the Quemado Ranger District, has already implemented the motor vehicle use map based on the 2013 decision implementing the 2005 Travel Management Rule. The road system as it is has already been assessed and the existing road system was included in cumulative effects analysis and the changes proposed by alternatives to the motorized system was assessed.

The travel analysis process for the Gila National Forest is not a decision process. The travel analysis process provides the framework and the explanation of the Gila National Forest process from which recommendations for designation are outlined that may be examined in the environmental analysis process. The travel analysis process indicates that appendix L and summary table 4 identified the minimum road system. But the minimum road system may be changed by adding or removing routes to address other issues or opportunities that may arise during an environmental analysis process and thus refining the minimum road system. Per the Travel Management Rule (2005) “Designations of National Forest System roads, National Forest System trails, and areas on National Forest System lands pursuant to § 212.51 may be revised as needed to meet changing conditions. Revisions of designations shall be made in accordance with the requirements for public involvement in § 212.52, the requirements for coordination with governmental entities in § 212.53, and the criteria in § 212.55...”

Opportunities for all-terrain vehicle and utility-terrain vehicle use identified as part of the purpose and need and routes proposed in alternatives B and C were result of a series of meetings and field visits with members of the Luna Community (2015).

The Travel Management Rule alternatives did not include decommissioning opportunities but under Other Recommendations and Opportunities included: “Review roads recommended for non-motorized use, for the potential to decommission (Appendix N). Give priority to those roads identified by the coarse filter – stream buffer analysis and threatened and endangered species and their habitat.” All closed roads in the planning area were reviewed by an interdisciplinary team for consideration of decommissioning and over 100 miles were identified to be included in the proposed action for this project.

**Comment 6:** Concern that request and inquiries regarding the management and definition of temporary roads was not provided. (WEG-17)

**Response:** The definitions of temporary and administrative use are provided in the glossary of the EIS. A temporary road is not a forest road or trail and is not included in a forest transportation atlas (36 CFR 212.1, Forest Service Manual 7705).

Temporary road construction utilization, and decommissioning is based on when the unit is ready for treatment. Treatment may done by the Gila National Forest, agreement, contract, or other means. The duration and decommissioning of a temporary road is based on the treatment type and specifications of the agreement, contract, etc. regarding construction, maintenance, and decommissioning.

## National Environmental Policy Act

**Comment 1:** The Department of Interior has no substantive comments at this time. Bureau of Land Management and U.S. Fish and Wildlife Service has requested to stay informed during the planning process. (OEPC-1)

**Response:** Thank you for your comments on the Luna Restoration Project. We will maintain the Bureau of Land Management and U.S. Fish and Wildlife Service on the mailing list of future notifications on this project.

**Comment 2:** Supports alternative D with modifications. (CBD-8, WEG-17)

**Response:** Thank you for your comment.



There are differing opinions regarding which alternative the Forest Supervisor should select. The forest supervisor will select an alternative based on the analysis presented within the final EIS and public input.

**Comment 3:** Concern that proposed treatments are not thoroughly refined or provide site-specific baseline conditions and would require additional environmental analysis to implement projects. (CBD-9, CBD-23, WEG-6)

**Response:** The project maps display where specifically activities would occur and are referenced to in the proposed activity tables in chapter 2 of the analysis. The analysis completed by resource specialists utilized the points and polygons for assessing each of the particular activities. The analysis for vegetation and fuels except where noted, is site specific based on data from individual plots and stands across the project area. Actions proposed and design features apply either throughout the project area or to specific locations or areas (chapter 2).

Individual treatments sites or activities would be reviewed by specialists as outlined in design features prior to implementation to ensure appropriate application of actions proposed as well continue the interdisciplinary coordination which went into developing the entire restoration project. The concern that surveys are required for wildlife and aquatic species prior to implementation is not for determining the location of the activity. Species habitat and distribution are known to be within or may be influenced by proposed activities. Surveys would indicate presence or absence and appropriate techniques to employ reduce impacts to the species and/or its habitat during project implementation.

Site-specific data was collected for the analysis, for example, weather data was obtained for the past 20 years from the Luna remote automated weather station and individual plots and stands were collected across the project area in woodland and forest vegetation types.

Site-specific data was collected for this analysis in woodland and forest vegetation types. The Forest Vegetation Simulator was used to model a representative sample of the data collected. The Forest Vegetation Simulator is the USDA Forest Service's nationally supported framework ensuring consistency among forests in vegetation growth and yield modeling. The Forest Vegetation Simulator is an individual-tree, distance-independent, growth and yield model (Dixon 2002). It has been calibrated for specific geographic areas (variants) of the United States. The Central Rockies variant is used in New Mexico. A Forest Vegetation Simulator Steering Team monitors and guides requests for system refinement. The fifteen member Forest Vegetation Simulator Steering Team includes a mix of Forest Service field and research personnel, other agencies, and various other personnel with the purpose of providing strategic guidance to the Forest Vegetation Simulator group in development, enhancement, and application of the model using best available science. For more information and documentation about the Forest Vegetation Simulator model <https://www.fs.fed.us/fvs/documents>. For additional references and background information for Forest Vegetation Simulator model.

**Comment 4:** Concern that factors for baseline conditions are not included, particularly the condition of rabbitbrush and alligator juniper. (CBD 16)

**Response:** Rangeland vegetation condition is an element under the watershed condition and part of the rating for the watersheds. There is close interrelationship between soils,

hydrology, and vegetation condition. Rangelands reflect native or desired non-native plant composition and cover (USDA Forest Service 2011). Baseline watershed cumulative effects were addressed in the 2015 Watershed Condition Classification. These results were considered as part of watershed cumulative effects which included effects to soil conditions and range vegetation. Terrestrial Ecological Unit Inventory information was used as part of vegetation treatment planning for suitable project areas. The rangeland vegetation condition is described as: function/structural groups and number of species are slightly to moderately reduced; the reproductive capacity of perennial native or naturalized plants to produce seeds or vegetative tillers is somewhat reduced but is still sustainable over the long term.

Terrestrial Ecological Unit Inventory coverage was used in identifying historic grasslands that are in need of restoration including areas associated with woody encroachment.

**Comment 5:** Concern all past activities are not being included or is inconsistent in the cumulative effects analysis such as livestock grazing, fire suppression, chaining, herbicide use, and other vegetation treatments. (CBD-10, WEG-5, WEG-19)

**Response:** Thank you for identifying that prescribed fire is missing from the list of activities that would continue in the no-action description. This was an error as the East Centerfire project is still active as well as districtwide pile burning activities. In regards to the list of activities other than prescribed fire, activities for cumulative effects will vary depending on the resource by how they bound their cumulative effects analysis by time and extent. Ongoing vegetation treatments are occurring on the Apache-Sitgreaves National Forests just across the stateline from the Luna Restoration Project.

Chapter 3 of the EIS for the Luna Restoration Project documents the required hard look at environmental consequences. The analysis in chapter 3 includes a summary of each resource report's direct, indirect, and cumulative effects of the proposed project. Literature cited is listed in the EIS reference section and additional literature for each resource may be found in the analysis reports.

**Comment 6:** Concern that a paragraph on page 5 of the DEIS appears to make the entirety of the Wallow Fire appear destructive and cause for landscape scale issues. (CBD-15)

**Response:** On page 5 of the EIS, the 2011 Wallow Fire being the most recent fire was included in the background discussion related to the community of Luna and describes impacts to forest resources from the fire and post-fire events. The purpose to include the Wallow Fire is displayed in the last paragraph of the Background section (page 5 EIS): "The Wallow Fire and postfire impacts on the landscape, watersheds, habitat, forest facilities, infrastructure, and community of Luna highlights the range of possible future impacts from wildfires on stakeholders and lands managers."

The planning area existing conditions are displayed on pages 5–13 of the EIS. This includes vegetation, fuel conditions, watershed, aquatics, and wildlife. Various resource issues are described that have no relation to or have incorporated the Wallow Fire or post-fire impacts into the existing condition.

**Comment 7:** Monitoring and adaptive management requirements are needed that are robust and have qualitative triggers for adaptive management elements. Not having these are not meeting National Environmental Policy Act requirements. (CBD-30, WEG-24)

**Response:** We understand that these systems are in flux and can be influenced by both natural and human disturbances including proposed activities across the landscape. Desired conditions presented in chapter 1 of the EIS are presented as range of values or percent, which allows a level of adjustment in implementation across the identified treatment areas and over time. Should there be a need to alter implementation, change to policy, or change in conditions, the Gila National Forest will review the changes and existing environmental analysis and determine if a supplemental environmental impact statement is needed per National Environmental Policy Act requirements.

Chapter 2 of the EIS includes design features common to all implementation activities and design features specific to the type of activities, which are to minimize or avoid impacts to resources. Monitoring is outlined on pages 37–38 of the EIS which includes best management practices monitoring and implementation and effectiveness monitoring. The Escudilla Landscape Watershed Restoration and Protection Strategy includes a section that details project monitoring and evaluations. The monitoring section of the watershed restoration and protection strategy is referenced in the EIS.

Monitoring and surveys for federally listed wildlife species will be implemented as outlined in biological opinion issued by U.S. Fish and Wildlife for this project.

**Comment 8:** The DEIS articulates a flawed statement of purpose and need. (WEG-3)

**Response:** Chapter 1 describes the existing and desired conditions from which the purpose and need for the project was established. Per section 1502.13, the Purpose and Need Statement “shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action.” We feel that the purpose and need frames up what the Gila National Forest is trying to accomplish and why the project is necessary, which is reflected in the proposed action and subsequent alternatives developed from public comments.

For clarification, the “need” statement “improve water quality by hardening stream crossings and performing road maintenance” would not limit other road related activities to improve water quality. There are other statements such as “implement treatments in watersheds that are not properly functioning” and “improve rangeland, wildlife, aquatic and riparian habitat” which allows for other activities.

**Comment 9:** The DEIS lacks a reasonable range of alternatives. (WEG-4)

**Response:** Comments generated from scoping centered around the issues (EIS pages 17–18) of vegetation management related to treatments on juniper and rabbitbrush; fuels treatments within mixed conifer and Mexican spotted owl habitat; and routes regarding motor vehicle types and access. Alternatives were developed based on significant comments. Alternatives within the EIS meet the stated purpose and need. The final reasonable range of alternatives was approved by the Forest Supervisor on 2/12/2017.

Based on information provided in the comments from WildEarth Guardians, an alternative was considered but eliminated from detailed study and added to the final EIS.

**Comment 10:** The DEIS cumulative effects states “current activities range from fuelwood collection, commercial thinning, salvage cutting, pre-commercial thinning for wildlife, watershed vegetation and forest health improvement, pre-commercial thinning, over story removal, road closures, and fuels reduction thinning.” However the no-action alternative states there are currently no ongoing vegetation, prescribed fire, or other restoration type projects within the panning area. These two statements are contradictory and must be clarified. The DEIS does not provide sufficient baseline data and fails to take a “hard look” at the direct, indirect, and cumulative impacts. (WEG-5)

**Response:** Thank you for identifying that prescribed fire is missing from the list of activities that would continue in the no-action description. This was an error as the East Centerfire project is still active as well as districtwide pile burning activities and was corrected in the final EIS. In regards to the list of activities other than prescribed fire, activities for cumulative effects will vary depending on the resource by how they bound their cumulative effects analysis by time and extent. Ongoing vegetation treatments are occurring on the Apache-Sitgreaves National Forests just across the stateline from the Luna Restoration Project.

Chapter 3 of the EIS for the Luna Restoration Project documents the required hard look at environmental consequences. The analysis in chapter 3 includes a summary of each resource report’s direct, indirect, and cumulative effects of the proposed project. Literature cited is listed in the EIS references section and additional literature for each resource is listed in the resource specialist reports.

**Comment 10:** DEIS does not ensure the integrity of the models used, the data used in the models, and accuracy of the model’s assumptions. (WEG-7)

**Response:** The Forest Vegetation Simulator was used to model a representative sample of the data collected. The Forest Vegetation Simulator is the USDA Forest Service’s nationally supported framework ensuring consistency among forests in vegetation growth and yield modeling. The Forest Vegetation Simulator is an individual-tree, distance-independent, growth and yield model (Dixon 2002). It has been calibrated for specific geographic areas (variants) of the United States. The Central Rockies variant is used in New Mexico. A Forest Vegetation Simulator Steering Team monitors and guides requests for system refinement. The fifteen member Forest Vegetation Simulator Steering Team includes a mix of Forest Service field and research personnel, other agencies, and various other personnel with the purpose of providing strategic guidance to the Forest Vegetation Simulator group in development, enhancement, and application of the model using best available science. For more information and documentation about the Forest Vegetation Simulator model go to: <https://www.fs.fed.us/fvs/documents>.

The Fuels Report describes the methodology, data, and models for the analysis. Fire regime data was acquired from LANDFIRE (2010) version 1.2.0 data. It is an interagency vegetation, fire, and fuels characteristics mapping program, sponsored by the Wildland Fire Leadership Council that provides nationally consistent and seamless geospatial data products for use in wildland fire analysis and modeling. LANDFIRE data is used as the basis for geospatial wildland fire modeling. It produces a comprehensive, consistent, scientifically credible suite of more than 20 geospatial layers for the United States. LANDFIRE (2012) version 1.4.0, data was used for the Vegetation Departure assessment.

## Forest Plan Consistency

**Comment 1:** The DEIS fails to explain how the project complies with the existing Forest Plan and also how it relates to the Gila forest plan revision process. (WEG-1)

**Response:** The Gila National Forest is required to be under a forest plan at all times. Until the revised forest plan is completed, the 1986 Gila forest plan will be followed and projects will be developed within the existing standard and guidelines. We cannot pre-determine what elements will be approved or changed under the revision process in the development of the Luna Restoration Project. Also, it would not be practical or prudent for the Gila National Forest to not continue moving forward with planning and implementation of identified areas of concern and needed management.

When the new forest plan is implemented there will be a transition, but it is not expected that the revised plan be used to re-evaluate or change decisions that have been made under the previously existing forest plan. A smooth and gradual transition to the new forest plan is anticipated, rather than one that forces an immediate reexamination or modification of all contracts, projects, permits, and other activities that are already in progress. As new project decisions, contracts, permits, renewals, and other activities are considered, conformance to the new plan direction is expected.

**Comment 2:** The Project is inconsistent with the 1986 Gila Forest Plan including the following: DEIS fails to meet the standard of being in compliance with recovery plans as it pertains to the analysis of project impacts on Mexican spotted owl and Mexican grey wolf; DEIS did not analyze the impacts of projects on wild turkey habitat (CO2); DEIS fails to give site-specific information in the projects impacts on sensitive soils or analyze the direct, indirect, or cumulative impacts; DEIS fails to discuss whether proposed water development will be utilizing newly, or legally, appropriable waters; and DEIS fails to analyze or provide monitoring information for insect and disease outbreaks; current or predicted and their impacts. (WEG-2)

**Response:** The project is consistent with the 1986 Gila forest plan except for those standard and guidelines outlined on EIS pages 34–35 for which project specific amendments were identified to better implement the Luna Restoration Project. The comment addresses the following specific plan elements:

Compliance with recovery plans: The Gila National Forest has prepared a biological assessment for the Luna Restoration Project in consultation with U.S. Fish and Wildlife Service and applicable recovery plans were referenced during preparation of the document including Mexican gray wolf and Mexican spotted owl. The biological assessment and the environmental impact statement (EIS pages 81–90) present the analysis of impacts to federally listed species.

Wild turkey habitat: There are additional species in the Gila forest plan to manage habitat for, which include deer, elk, squirrel, etc. Planning area is within management areas 3B, 3C and 3D of the Gila forest plan. The forest plan provides direction to support populations of these species and integrate habitats to provide primary components (nesting, roosting, foraging 3B (page 102), 3C (page 108) and 3D (page 114)).

Although the turkey and other species are not specifically addressed in the analysis, implementation of the project will improve nesting and foraging habitat for wildlife species similar to those wildlife species analyzed. Species may be displaced during

implementation due to human activity, but not all suitable areas will be treated at the same time, which would allow movement to adjacent areas. Habitat components would improve in the long run with treatment and the reduced risk of wildfire.

**Sensitive soils:** The Luna Water-Air-Soils Report includes a map of the sensitive soils and discusses that the Draft Terrestrial Ecosystem Survey was used to identify sensitive Datil soils and used in the early stages of project development for consideration during restoration activity development. Page 119 of the EIS states: “In the development of these alternatives, sensitive soils were identified and considered. Vegetation treatments were excluded from these areas. Prescribed fire was excluded from most areas with sensitive soils, with the exceptions being the north aspect of the San Francisco Divide, and southwest of the community of Luna in Dry Blue Creek and Frieborn Canyon, extending south to the planning boundary. In these areas, low-severity fire may be introduced when fuel conditions, weather conditions, or both lessen fire spread across the landscape.”

**Acquisition of Water Rights:** Page 28 of the EIS discloses the procedures and contingency of implementing the proposed water developments. The EIS states: “Installation of these improvements is contingent on the Gila National Forest’s ability to meet the requirements of the New Mexico Office of the State Engineer. The improvements would require the appropriate licenses or water use agreements prior to implementation. In the event the Gila National Forest is unable to obtain a license, an alternative water source could be considered provided the effects of using that water source do not differ from the effects disclosed in this analysis.”

**Monitoring of insect and disease activities:** Insect and disease monitoring occurs at a regional level which includes flights and analysis. The Gila National Forest coordinates with region on flights and provides specific locations that include sites of concern from field observations, vegetation treatment areas, or large burn areas. The restoration project purpose is to move toward a healthy and resilient system. The Vegetation (Silviculture) Report appendix 1 Luna Restoration Project Treatment Details for Vegetation Treatments provides optional treatments where insect and/or disease infestation is found in the unit.

## **Prescribed Burning**

**Comment 1:** Tucson Electric Power requests advanced coordination and at least 2 weeks advance notification of any prescribed fire activities near or within the powerline corridor. (TEP-2)

**Response:** Design features for prescribed fire activities on page 26 of the EIS includes notification and coordination with Tucson Electric Power and Navopache Electric Cooperative. Wording was added for notification “at least 2 weeks in advance.”

**Comment 2:** Opposed to prescribed burning proposal which impacts air quality and the associated health impacts to individuals. (JP-1)

**Response:** The Forest Service will coordinate with New Mexico Environment Department prior to all burning. Air quality management and emissions regulation is the responsibility of the U.S. Environmental Protection Agency and the New Mexico Environment Department, Air Quality Bureau.

See Air Quality; Smoke Management, Comment 1, for additional information.

**Comment 3:** Opposed to burning vegetation, which removes habitat, kills habitat, and removes food sources for wildlife. (JP-2)

**Response:** The general goal is to introduce low or mixed intensity fires into the area to mimic nature's methods for producing healthy forests and reducing fuel loading that can contribute to larger scale wildfire that can cause longer-term negative effects to wildlife habitat. There are desired conditions (EIS page 13) and the project's purpose and need (EIS pages 13–14) that reflect the importance of wildlife habitat and fire risk. The effects of prescribed fire treatments are described in the wildlife section of the EIS and within wildlife analysis documents located in the project record.

**Comment 4:** Fuel treatments (mechanical and prescribed fire) should be limited to WUI. (WEG-8)

**Response:** Fire researchers, Finney and Cohen (2003), suggest that wildland fuel management extending perhaps many kilometers away from urban locations is critical to reducing the likelihood that wildland fires will spread to urbanized areas and pose ignition threats.

Research has also determined that treatments intended to reduce fuels around communities at risk, rather than individual structures, need to go beyond the home ignition zone (Graham 2004). While individual home-by-home treatments can help reduce the risk of loss of individual homes, relying solely on such treatments would forego strategic opportunities for controlling fires within this wildland urban interface area.

## Range Management

**Comment 1:** Concern that allotments within the Luna planning area have not gone through Section 7 consultation with U.S. Fish and Wildlife Service. (CBD-19)

**Response:** All allotments within the Luna planning area have undergone Endangered Species Act Section 7 consultation with U.S. Fish and Wildlife Service.

## Water Systems

**Comment 1:** Concern that open trenches can trap and cause mortality of wildlife during construction of trenches and installation of pipelines for water systems and that the final EIS incorporate best management practices to reduce impacts. (NMDGF-4)

**Response:** We agree with the New Mexico Department of Game and Fish concerns regarding trenches and possible impacts to wildlife. We will incorporate the provided guidelines from the Department's letter into the project design features.

**Comment 2:** Concern about wildlife mortality associated with water tanks and proposed new tanks should be required to have wildlife escape ramps installed. (NMDGF-6)

**Response:** Wildlife escape ramps are part of the Gila National Forest's design criteria for all water troughs located on the national forest. We will add to the design features for drinkers, troughs or tanks that wildlife escape ramps would be installed.

**Comment 3:** Concern the request for a new well and storage tank in Hi Clark corral to provide water to stock held in the trap and corral; was not included as one of the range improvements addressed in the DEIS. (TP-3)

**Response:** The range improvement in the Hi Clark corral was not included, as it does not meet the purpose and need of the Luna Restoration Project. Although it would meet the need to “provide permanent water supplies to support wildlife and livestock” (EIS page 14); it does not meet the need to “improve rangeland, wildlife, aquatic and riparian habitat” (EIS page 14). While Gila National Forest personnel do not disagree that this improvement would be beneficial from a livestock production standpoint, improvements to livestock handling facilities would not meet the need or intent of the larger restoration proposal and would need to be addressed through a range management analysis.

**Comment 4:** Concern regarding the increase in water improvements and what alternative water sources would be authorized if wells are not permitted and associated impacts to public lands. (CBD 31, WEG-15)

**Response:** The Luna Restoration Project proposes new range water developments under all action alternatives. The proposed water developments would aid in livestock distribution, thus providing relief from grazing pressure in several areas and decrease dependence on riparian habitat as a water source.

“Additional tanks could be installed as needed to improve functionality” was in reference to storage tanks only not water troughs. The placement of additional storage tanks could be necessary to insure proper function of the water system and availability of water year round to the troughs.

All water developments within the Gila/San Francisco River and Little Colorado River basins must be approved by the New Mexico Office of the State Engineer who ensures the development is without detriment to existing surface water rights or impairment to existing ground water rights, and is not contrary to the conservation of water within the state nor detrimental to the public welfare of the state. Should other types of water developments be needed if wells are found to be not feasible, separate environmental analysis would be required.

## Restoration Project Support

**Comment:** Supports restoration efforts of restoring forest, woodland, and grasslands to reduce catastrophic wildfire and increase ecological resilience. Supports restoring riparian areas and watersheds, improving water quality; and benefitting wildlife and wildlife habitat. (NMDA-1; NMDGF-1, CBD-1)

**Response:** Thank you for your comments, interest, and support for the variety of restoration proposals within the Luna Restoration Project.

## Riparian Enclosures

**Comment 1:** Concern the responsibility of construction and maintenance of riparian enclosures will be placed on allotment permittees. (NMDA-2)

**Response:** The Gila National Forest values our relationship with our stakeholders and is committed to working with permitted livestock producers to develop design features that would minimize the burden placed on them. We would encourage them to be involved in



the design and implementation process to ensure their concerns are addressed. This includes maintaining access to water resources for livestock operations, such as water gaps and alternative waters.

The Forest Service is responsible for the construction and major maintenance of these proposed exclosures. The Gila National Forest is looking at installing effective, but low maintenance designs, such as pipe and cable fencing.

Some minor maintenance responsibility would be necessary on the part of the permittee to ensure livestock safety and permit compliance and functionality.

**Comment 2:** Opposed to all exclosures due to limiting the ability of elk to roam. (JP-3, WEG-9)

**Response:** The purpose of the exclosure proposals are to allow time for riparian, stream and bank restoration projects to establish (EIS page 33). During scoping (Scoping Content Analysis document), a commenter pointed out that exclosures would need to be of adequate height to keep elk out of riparian areas, due to being able to cause damage to riparian and impact stream systems. In order to have an effective treatment it is necessary to exclude wildlife such as elk. Most exclosures will be small in size. These are temporary exclosures and are not meant to permanently exclude livestock and wildlife from riparian areas.

Stone Creek, Centerfire Creek, Spur Lake Draw, and Adair Spring are drainages identified for proposed exclosures (EIS table 18 on page 32). These drainages are spread across the planning area except for Spur Lake Draw and Centerfire Creek. These two drainages at their closest points are about a mile apart (EIS MAP 10). The distance between and the varying size of exclosures should not limit wildlife (elk) movement during implementation.

**Comment 3:** Opposed to exclosures which will impact the ability of cattle to have access to water. (TP-1)

**Response:** The Gila National Forest values our relationship with our stakeholders and is committed to working with permitted livestock producers to develop design features that would minimize the burden placed on them. We would encourage them to be involved in the design and implementation process to ensure their concerns are addressed. This includes maintaining access to water resources for livestock operations, such as water gaps and alternative waters.

At Adair Spring, the proposal is protect the spring itself and surrounding vegetation. The exclosure would be concentrated around the spring and livestock would still have access to water flowing down Adair Canyon from the spring. If needed, alternative water source near the spring could be developed for livestock management needs.

See Riparian Exclosures Comment 1 for additional information.

**Comment 4:** Exclosures should be maintained to keep livestock from accessing stream and riparian areas. (CBD-18)

**Response:** The purpose of the exclosure proposals are to allow time for riparian, stream and bank restoration projects to establish (EIS page 33). During scoping (Scoping

Content Analysis document), a commenter pointed out that exclosures would need to be of adequate height to keep elk out of riparian areas, due to being able to cause damage to riparian and impact stream systems. In order to have an effective treatment it is necessary to exclude wildlife such as elk. These are temporary exclosures and are not meant to permanently exclude livestock and wildlife from riparian areas.

**Comment 5:** Concern that riparian exclosures may affect southwestern willow flycatcher, loach minnow, narrow-headed garter snake, northern Mexican gartersnake (CBD-27), and beaver. (WEG-14)

**Response:** Southwestern willow flycatchers are not known to be present in project area. The primary constituent elements needed for Southwestern willow flycatchers are not present. Exclosures are not proposed in loach minnow, narrow-headed gartersnake, nor northern Mexican gartersnake habitat.

Beaver was selected as a management indicator species for the mid-elevation riparian areas that occur in the project area, but there are no known beaver within the project area. Mid-elevation riparian, as defined by the management indicator species update for the forest plan area, do not occur in areas where riparian exclosures are proposed to be constructed.

## Vegetation Treatments

**Comment 1:** Request to the forest to ensure that resulting woodland vegetation and grassland restoration treatments adjacent to Tucson Electric Power transmission line discourages growth into the line and corridor. (TEP-1)

**Response:** The Gila National Forest will coordinate with Tucson Electric Power as well as other partners during development and implementation of treatment prescriptions in areas adjacent to infrastructure to maintain or move toward vegetation management goals of each party.

**Comment 2:** Concern vegetation management projects will not be coordinated with permittee regarding timing and pasture rest/rotation of cattle. (TP-4)

**Response:** Permittee coordination is identified as a design feature in the EIS (page 25 for prescribed fire; page 35 common to all action alternatives) to minimize effects to the range resource and effects are analyzed in EIS page 146 in the Range section.

**Comment 3:** Request for the forest to incorporate the collaboratively developed products and design features from 4FRI. (CBD-2)

**Response:** The Vegetation (Silviculture) Report includes appendix 3 Luna Restoration Project Old and Large Tree Implementation Strategy. This strategy will follow direction found in the Gila National Forest Plan, which provides direction on the minimum criteria for the structural attributes used to determine old growth by forest cover type name.

Additional old and large trees may be retained when not in conflict with meeting the desired conditions for this project. Protection measures for old and large trees in logging operations are incorporated into the sale contract. The Gila normally designates trees for either removal or leaving by painting the tree. If it is a cut tree mark, large trees that will not be cut would not be painted. In a leave tree mark, large trees that would be left would

be painted. Other protections include felling trees away from leave trees and pulling slash back away from the trees.

**Comment 4:** Concern the DEIS did not include detailed prescriptions for the various vegetation types. (CBD-4)

**Response:** Text was added to the final EIS in chapter 2 under the Vegetation Treatments section to provide details regarding the treatment of various vegetation types in the project area. Also, the Vegetation (Silviculture) Report appendix 1 Luna Restoration Project Treatment Details for Vegetation Treatments includes example summaries of typical treatment prescriptions. Specific treatment prescriptions will vary based on individual on-site evaluation by a certified Silviculturist coordinating with Forest Service resource specialists (soils, wildlife, recreation, fuels, and timber), partners such as New Mexico State Forestry, New Mexico Game and Fish, and stakeholders such as adjacent landowners, permittees, and utilities during implementation prescription development. This coordination would continue throughout treatment implementation to insure design features listed in the environmental impact statement and decision and appropriate best management practices are applied.

**Comment 5:** Concern there is a lack of information explaining the “four zones” concept under the Stand Density Index section. (CBD-5)

**Response:** Text was added to the final EIS in chapter 1 under the Stand Density Index section to provide an explanation of the four zones.

Stand stocking density is the measurement of tree spacing within a stand and can be thought of in terms of the degree of crowding among trees in a stand. This can be measured in trees per acre, square feet of basal area, or expressed as an index of stocking, such as stand density index. The four zones refer stand density index which is the resource indicator used in the Luna Restoration project analysis. Long (1985) divided the stand density index into four zones based on the percentage of the overall density of a tree stand relative to the biological maximum density, a species-specific value (Triepke et al. 2011).

The stratification of stand density index in table 2 (EIS page 7) provides a useful means for discussing stand dynamics relative to species composition and the implications of varying the timing, scale, and intensity of density management to affect the variety of stand and tree characteristics (Long 1985, Long et al. 2004, Shaw and Long 2010 as cited in Triepke, Higgins et al. 2011). Regeneration of desired species can be initiated by maintaining stand density in zone 1, based on maximum stand density index of desired species; open canopy stands with grassy understories and large diameter trees with long, heavy-limbed crowns can be developed by targeting densities in zones 1 and 2; stands of moderate crown closure and intermediate sized trees with thrifty, well-pruned crowns can be developed by targeting densities in the upper half of zone 2 and the lower half of zone 3; clumpy, irregular stands containing groups of varying ages can be developed through periodic creation of canopy openings (zone 1), where growing space for tree regeneration is made available for seedling establishment; longevity of existing large diameter trees could be enhanced by thinning adjacent smaller trees to create zone 2 or 3 growing conditions; and avoiding density related mortality and maintaining forest vigor can be achieved by maintaining densities at or less than the lower half of zone 3.

For the Luna Restoration Project, four zones are used to depict a generalized relationship between growth and relative density across the landscape. Percentage of maximum stand density index for zones 1 and 2 are as described by Long 1985 as cited in Triepke, and Higgins et al. 2011. Percentage of maximum stand density index for the upper limit zone 3 and lower limit zone 4 ranges between 55–60 percent. Fifty-five percent was used as the respective upper and lower thresholds for zones 3 and 4 for the Luna Analysis since at about 55 percent of maximum stand density index, some trees in a stand will begin to die from competition (Drew and Flewelling 1979). Also, when modeling the alternatives, the defaults for density related mortality was used. By default in the Forest Vegetation Simulator model, density related mortality begins when the stand density index is above 55 percent of maximum stand density index, and stand density peaks at 85 percent of maximum stand density index. The 55 percent value is referred to as the lower limit of density related mortality, and the 85 percent value is the upper limit (Dixon 2002; Vegetation (Silviculture) Report).

Since this is a measure of density and not an action, best management practices do not apply.

**Comment 6:** Concerned there is uncertainty regarding historic range of variability for dry and wet mixed conifer forests. Concerned that regionally derived management directives (GTR) are not tailored to the Luna area and are not associated with the Terrestrial Ecosystem Units in the project area. (CBD-6)

**Response:** The Vegetation (Silviculture) Report appendix 1 Luna Restoration Project Treatment Details for Vegetation Treatments includes example summaries of typical treatment prescriptions. During prescription development, site-specific parameters and modifications to these example prescriptions occur following site visits. Prescriptions developed for mixed conifer forest and ponderosa pine-Gambel oak forest and riparian will follow the Gila forest plan direction for Mexican spotted owl. Woodland and ponderosa pine forests not within Mexican spotted owl protected activity centers will follow the Gila forest plan direction for northern goshawk.

**Comment 7:** Concern that ongoing livestock grazing and the outcome of proposed treatments are assessed. (CBD-14; CBD-17)

**Response:** As stated in the EIS on page 14, this environmental analysis will not change previous range management decisions. The moderate to conservative utilization guidelines within the grazing decisions have not been shown to contribute to the displacement of native grass communities by rabbitbrush. The removal of rabbitbrush would aid in promoting diversity and vigor of more desired rangeland plants in selected areas. All vegetation and prescribed fire treatments will be coordinated with range permittees to appropriately manage grazing activities during and after implementation stages. Coordination may occur during annual operating instruction meetings.

See Vegetation Treatments Comment 2 for more information.

**Comment 8:** Concern that piñon-juniper is intentionally being removed “en masse” to meet restoration goals and that treatment of piñon-juniper ecosystems would result in an even aged stand condition. (CBD-21)

**Response:** The Gila forest plan gives direction to maintain all species of native trees in the landscape. The Forest Service is not planning to remove all piñon-juniper from the

area. Thirty-seven percent of woodland will not receive any treatment. Twenty-seven percent of woodland would be treated with prescribed fire only (no mechanical, hand, or herbicide). Thirty-six percent of woodland would be treated following Gila National Forest Plan guidelines for northern goshawk habitat. The intent is to leave a mosaic of vegetation densities (overstory and understory), age classes, and species composition well distributed across the landscape.

Appendix 1 Luna Restoration Project Treatment Details for Vegetation Treatments in the Vegetation (Silviculture) Report includes example summaries of typical treatment prescriptions including treatments for woodland.

It is not the intention to manage all piñon-juniper in an uneven aged condition. The desired condition of uneven aged condition for woodland is specific to northern goshawk habitat to manage for uneven age conditions to sustain a mosaic of vegetation densities (overstory and understory), age classes, and species composition well distributed across the landscape (Gila forest plan). This is achieved primarily through tree cutting prescriptions, which are more selective than prescribed burning. Within the Luna landscape, 60 percent of the piñon-juniper woodland is currently in an even-aged structure, 21 percent of the piñon-juniper woodland designated old growth will receive no treatment and 13 percent would be burned with no tree cutting. With the no-action alternative, 59 percent would be even-aged structure in 20 years and 57 percent would be even-aged structure in 40 years. With the action alternatives, 60 percent would be even-aged structure in 20 years and 56 percent would be even-aged structure in 40 years (Vegetation (Silviculture) Report).

**Comment 9:** Concern a robust site-specific review of landscape-scale patterns was not included in the DEIS. Specifically shift and transition in vegetation extent to ensure treatments are designed in line with ecological trends. (CBD-22)

**Response:** Based on the existing information for the Luna Project area, treatments are designed to increase the resiliency of the vegetation to future disturbances such as insect, disease, fire, drought, and other climatic changes across the landscape.

More information is provided in in the Vegetation (Silviculture) Report appendix 1 Luna Restoration Project Treatment Details for Vegetation Treatments and appendix 3 Luna Restoration Project Old and Large Tree Implementation Strategy.

**Comment 10:** Provide a map of past chaining treatments on the Luna landscape. Use this map to determine best site-specific management strategies. (CBD-24)

**Response:** Chaining treatments to improve forage production occurred in the late 1950s through the 1970s and were deemed not effective in controlling smaller trees (Gila forest plan page 32). The status of any maps or information being available for locations of chaining activities during that time period is unknown.

## Herbicide Treatments

**Comment 1:** Concern herbicide treatments are being applied over large area; become airborne; and impact non-target plant and animal species. (JP-4, TN-8, CBD-11)

**Response:** The proposal for the use of herbicide to treat alligator juniper and rabbit brush is not a broad application across 30,000 acres. The proposal is to address areas within the

30,000 acres of grassland, woodland, and forested vegetation types that have been encroached by these species; and to avoid undesirable vegetation states that lack diversity or dominated by single species. The EIS page 22 describes the objective of rabbitbrush treatment to be: "...manage rabbitbrush and reduce the occurrence of dense stands or monocultures of rabbitbrush; not to eliminate rabbitbrush across the planning area. For alligator juniper, locations would be identified where allowing the juniper to re-sprout would not meet vegetative treatment objectives, such as, but not limited to, wildland urban interfaces."

Only herbicide products that have been registered with the Environmental Protection Agency for rangeland, forestland, or aquatic use and have a Forest Service human health and ecological risk assessment, and are approved through the 2000 environmental analysis would be considered for this project. It is required to follow the product label during implementation and includes such things as use around water sources, soil types, and under what weather conditions. Following product label reduces risk to resources. Design features and best management practices were compiled by the interdisciplinary team (EIS pages 23–24) that include additional guidelines and requirement for proper wind speeds during application to reduce the potential for herbicide drift, and to minimize risks and spread within waterways, specified soil types, and impacts to wildlife species. Applications would be done by hand sprayer for liquids, hand spreader for granules or powder, or spreader or sprayer operated off a small tractor or all-terrain vehicle; there would be no aerial applications.

A vegetation management plan implementing the utilization of herbicides would be developed to identify site-specific activities designed and effectiveness monitoring for an individual treatment area.

**Comment 2:** Concern there is no evidence linking chemical treatment of rabbitbrush & juniper to improve biodiversity, grassland health, or improvement in watershed condition. (CBD-13)

**Response:** The purpose of herbicide treatments is not to remove these species from the landscape but to decrease the abundance of these species within grassland ecosystems to allow for competition by other species and return these areas lacking of diversity and dominated by single species to a more desirable and functional state.

**Comment 3:** It is unclear how the use of herbicides was brought forward in an alternative and factors that determine the buffer zone and being able to identify and apply appropriate mitigation measures to reduce impacts to sensitive resources. Concern that specific herbicides for use are not identified and impacts to resources are not disclosed. (CBD-20)

**Response:** Page 17 of the EIS identifies the issues that were generated by scoping comments. Cutting of juniper and rabbitbrush was considered not to be an effective means of treating and managing these vegetation types. Based on interdisciplinary team discussion of options of potential effective treatment methods to treat these vegetation types and meet objectives (page 5, 6, 12, and 13 of Scoping Comment Analysis) herbicide and pushing (for juniper sp.) were some methods discussed. The team decided to look at the option of herbicides. The New Mexico State University Circular 597 – Chemical Weed and Brush Control for New Mexico Rangelands (5/2014) was reviewed as part of the decision process.

Buffers are a mitigation that was included to further reduce the opportunity of herbicide drift onto private lands, as well as avoiding surface waters. Several other mitigations were identified in the EIS (pages 23–24) to address potential drift on National Forest System lands.

Similar to burn plans that are developed prior to implementing prescribed fires, a vegetation management plan implementing the utilization of herbicides would be developed by an interdisciplinary team to include such things as objectives, techniques, and monitoring elements as well as the design features identified in the environmental impact statement and appropriate best management practices, permitting, and handling of materials.

The State of New Mexico licenses all certified herbicide applicators applying herbicide in the state. Region 3 (Southwestern Region) of the Forest Service requires that anyone applying herbicide be directly supervised by a certified applicator and that any contract herbicide application be overseen by a certified applicator within the agency.

See Herbicide Treatments Comment 1 for more information.

## Wildlife

**Comment 1:** Concern the Arizona montane vole, which is known to be in 2 locations within the planning area, was not included in the analysis as part of the U.S. Forest Service Region 3 sensitive species analysis. There is concern that projects could adversely affect the Arizona montane vole. (NMDGF-2)

**Response:** Thank you for identifying that the Arizona montane vole was missing from the document. It does occur in the project area and we corrected this in the final EIS.

Implementation of this project would improve Arizona Montane Vole habitat within the project area. The project does have the potential to cause short-term impacts to this species for all action alternatives, but will not cause a trend toward federal listing or affect the viability of the species.

**Comment 2:** Baseline condition and authorized activities need to analyzed for impacts of fragmentation on wildlife habitat by alternative. (CBD-29)

**Response:** Impacts to wildlife from motorized routes include mortality from collisions with vehicles, modification of animal behavior (for example, displacement and avoidance of roads by wildlife, human-caused disruption of breeding), Alteration of terrestrial habitat (for example, edge creation and habitat fragmentation), and increased contact and exploitation by humans. Decommissioning roads would have the reverse impacts to wildlife after the use ceased, and the area revegetated itself over time. Fragmentation is addressed in the EIS in the wildlife section pages 81–106 and roads section pages 141–145. Decommissioning of roads in the planning area would improve habitat and connectivity for wildlife while also assist in moving watersheds toward properly functioning conditions, both of which are part of the purpose and need for the Luna Restoration Project (EIS pages 13–14).

**Comment 3:** Concern regarding the treatment methods on Gambel oak, which is an important browse and acorn source for multiple wildlife species. The Department requests the forest consider Gambel oak treatments include: retain mosaic of all sizes and age classes; retain tree-form Gambel oak 30-36 cm; and retain patches of pole-sized Gambel oak 7-15 cm. (NMDGF-3)

**Response:** The Gila National Forest looks forward to ongoing coordination with New Mexico Department of Game and Fish on wildlife habitat management. The Gila National Forest will coordinate site visits with the Department to develop appropriate Gambel oak treatment prescriptions across the project area.

In most cases, Gambel oaks are retained in cut units therefore meeting the treatment prescriptions provided in the comment. Example silvicultural prescriptions and guidelines related to various vegetation stands and Gambel oak may be found in the Vegetation (Silviculture) Report appendix 1: Luna Restoration Project Treatment Details for Vegetation Treatments.

**Comment 4:** Concern that forest treatment guidance is lacking for the northern goshawk. (CBD-7)

**Response:** Implementation prescriptions will follow established northern goshawk guidelines in areas outside Mexican spotted owl habitat outlined in the Gila forest plan. The Vegetation (Silviculture) Report appendix 1 Luna Restoration Project Treatment Details for Vegetation Treatments includes example summaries of typical treatment prescriptions, including treatments for northern goshawk habitat.

**Comment 5:** Concern the DEIS does not provide information on the existing status and condition of sensitive species nor direct, indirect or cumulative effects. Agency should also consider impacts to species of conservation concern that has been developed during the Forest Plan Revision process. (WEG-12)

**Response:** Information on existing status and condition of sensitive species, along with direct, indirect and cumulative impacts are included in the biological evaluation (pages. 15-48).

The list of species of conservation concern is still draft and we are not required to analyze those species until the revised forest plan has a decision and is being implemented. But the list was reviewed and was comparable to the sensitive species list for species within the planning area.

**Comment 6:** Concern the DEIS does not provide information on the existing status and condition of management indicator including mule deer. (WEG-13)

**Response:** Baseline data and impacts are shown in the Management Indicator Species and Migratory Bird Report.

Mule deer is a management indicator species for desert shrub, piñon-juniper shrub, and shrub oak woodland communities because good mule deer habitat conditions reflect the vegetative conditions in these communities. Mule deer habitat for this project is on approximately 32,908 acres. Overall mule deer habitat for the Gila National Forest is approximately 1,679,402 acres.



Short-term disturbances for mule deer would be associated with avoiding areas during implementation due to human presence and noise associated with work. These short-term avoidance factors would also cause a shift in foraging areas for mule deer.

Known fawning areas would be avoided during the fawning season.

Installing user proposed routes, and decommissioning roads would create a short-term disturbance to foraging mule deer through noise and human presence. New user routes that are proposed would result in habitat fragmentation. These activities are spaced out across the project area, and would not all occur at the same time, giving mule deer opportunities to utilize other areas in the project. Decommissioning roads would reduce habitat fragmentation, and increase forage where bare dirt currently exists.

This project and the Escudilla West project located in Arizona would increase short-term disturbances to foraging mule deer through thinning and prescribed burning. Both projects would lead to improved habitat conditions for mule deer in the long term. Livestock grazing activities, fuelwood collection, road maintenance, and recreation activities could increase disturbance to foraging mule deer.

**Comment 6:** Concern the DEIS does not disclose why the southwestern willow flycatcher has disappeared from the area and what the Forest Service is doing to restore its habitat. (WEG-21)

**Response:** There are no records of occurrence for Southwestern willow flycatcher in the project area. The designated critical habitat lacks the primary constituent elements required for Southwestern willow flycatchers. Vegetation treatments proposed would improve habitat conditions. The Southwestern willow flycatcher is fully addressed in the biological assessment (June 2018) and submitted to U.S. Fish and Wildlife Service for formal consultation.

## Consultation

**Comment 1:** The Forest Service fails to provide information regarding consultation and conference efforts. There is no description of consultation or conference processes it has been involved with to date to assess the effects of project on ESA-listed species and habitat in project area. (WEG-22)

**Response:** On October 10, 2017, the Forest Service began coordinating the consultation process with U.S. Fish and Wildlife Service staff from the office in Albuquerque, New Mexico regarding the Luna Restoration Project. Main discussion points included an overview of the proposed project activities and general discussion regarding possible effects. The U.S. Fish and Wildlife Service indicated that consultation on this project was a high priority, and that additional meetings may be necessary to review specific elements of the project proposal such as where adverse effects might occur, and how to reduce the potential for take. The Gila National Forest worked with Shaula Hedwall, U.S. Fish and Wildlife Service, on developing the Mexican spotted owl monitoring plans related to treatments in protected activity centers.

An official species list was requested on April 24, 2017, an updated list was requested on September 12, 2017, January 23, 2018, and again on May 3, 2018.

Formal consultation (Cons. # 02ENNM00-2017-F-0491) was initiated June 4, 2018, and amended on September 19, 2018 for the New Mexico meadow jumping mouse. The Gila National Forest is awaiting a final biological opinion.

### Mexican Gray Wolf

**Comment 1:** The DEIS does not provide information on the habitat conditions and requirements of the Mexican Gray Wolf or potential impacts to the species, its habitat, or its prey. (WEG-10)

**Response:** The Mexican gray wolf is fully addressed in the biological assessment (June 2018) that was submitted to U.S. Fish and Wildlife Service for formal consultation on the Luna Restoration Project. Effects are summarized in the EIS on pages 82–83.

Wolf groups (or packs), usually consist of a set of parents (alpha pair), their offspring from the current year and previous years, and possibly unrelated wolves that have been accepted into a pack. Den sites can be used year after year by the same wolves. Wolf packs usually live within a specific territory that they defend to the exclusion of other wolves and often non-specifics, such as coyotes. Territories range in size from 84.5 km<sup>2</sup> (50 mi<sup>2</sup>) to greater than 1,609 km<sup>2</sup> (1,000 mi<sup>2</sup>) and is dependent on how much prey is available and the prey's seasonal movements. Their ability to travel over large areas to seek out vulnerable prey, and their social structure makes wolves good hunters. Wolves are habitat generalists and typically only require adequate prey to survive. Historically, Mexican wolves were associated with montane woodlands characterized by sparsely- to densely-forested mountainous terrain and adjacent grasslands in habitats where ungulate prey were numerous. Today, elk (*Cervus elaphus*) are the preferred prey of Mexican wolves in the Blue Range Wolf Recovery Area. Other sources of prey include deer (*Odocoileus virginianus* and *Odocoileus hemionus*), small mammals, and occasionally birds.

There are wolves in the project area. The Forest Service will work with the Mexican gray wolf field team to avoid disturbing dens through forest management activities, including thinning, burning, roads/trails, herbicide application, sediment control, fencing and water improvements. If a wolf pack or individual wolves begin denning within the project area, active mitigation will help minimize any direct effect to Mexican gray wolves from the proposed action. These elements are included as design features common to all action alternatives in the EIS page 36.

Implementation of the preferred alternative may indirectly affect, through disturbance, Mexican gray wolves that may occur in the project area. This project has the potential to have an impact on the wolves' primary prey base. Since one of the goals of this project is to improve wildlife habitat conditions for wild ungulates, effect to wolves primary prey base will be relatively undetectable in the short term and or likely beneficial in the long term.

### Mexican Spotted Owl

**Comment 1:** The Department supports experimental thinning of trees less than 9 inches DBH and application of low intensity prescribed burns to reduce the potential of high severity fires in treated Mexican spotted owl protected activity centers. (NMDGF-5, CBD-3). Management treatments should be consistent with the U.S. Fish and Wildlife Service Biological Opinion (CBD-3).

**Response:** Thank you for your comment and support for the treatment proposals within Mexican spotted owl protected activity centers within the Luna Restoration Project.

The Gila National Forest is in consultation with the U.S. Fish and Wildlife Service. The Biological Assessment for the Luna Restoration Project was submitted to the Service on June 4, 2018. Applicable recovery plans were referenced during preparation of the biological assessment and treatments proposed within the EIS. The EIS and record of decision reference the U.S. Fish and Wildlife Service Biological Opinion and implementation will be consistent with and follow the reasonable and prudent measures and corresponding terms and conditions along with conservation measures outlined within the document, including survey and monitoring for threatened and endangered species.

**Comment 2:** Concern that herbicide treatments in Mexican spotted owl critical habitat (1,270 acres) will reduce food for prey species. (CBD-12)

**Response:** Treating juniper with herbicide would reduce competition with ponderosa pine and mixed conifer species, which in turn would allow for more rapid growth thus improving some Mexican spotted owl habitat components over time. Reducing juniper would reduce feed for prey species and therefore may potentially in the short-term indirectly impact Mexican spotted owl through the impacts to prey species.

The Environmental Protection Agency states, “When used properly, pesticides can play a valuable role in controlling weeds, insects, and other pests. On the other hand, they can harm wildlife if the user does not follow label directions.” (EIS page 85). Herbicide manufacturers produce label processes on application to prevent effects to general wildlife. Manufacturer labels will be followed to prevent impacts to Mexican spotted owls, and their prey.

Human activity and noise associated with mechanized equipment could disturb nesting owls. Performing these actions outside of the breeding season will prevent disturbance to nesting owls.

**Comment 3:** The DEIS does not provide monitoring information on the Mexican spotted owl nor provide sufficient analysis of current habitat conditions and effects. (WEG-11, WEG-20)

**Response:** The Mexican spotted owl is fully addressed in the biological assessment (June 2018) that was submitted to U.S. Fish and Wildlife Service for formal consultation on the Luna Restoration Project. Effects are summarized in the EIS on pages 83–86.

The ecology and status for Mexican spotted owls is located in the biological assessment . Monitoring has been conducted in the project area in 2016 and 2017 (Biological Assessment for the Luna Restoration Project).

Modeling using the Forest Vegetation Simulator predicts the primary constituent elements will improve under the action alternatives, versus the no action. This data is shown in appendix A of the biological assessment. The assumptions and data limitations of the modeling is provided in the EIS (pages 62–63) and the Vegetation (Silviculture) Report. A summary of the Habitat Features for Mexican Spotted Owl (Threshold Stands) is located in the EIS pages 72–73.

Thinning and prescribed fire would allow herbaceous plants to establish, providing food sources for owl prey species. Herbicide use may remove some food sources for prey species; however, where herbicide is proposed for use is within piñon-juniper stands and rabbitbrush stands that do not contain the primary constituent elements of critical habitat. Fences and water improvements would lead to better distribution of grazing ungulates and improved ground cover for owl prey species. However, these range improvements will require disturbance to vegetation, may reduce snags in the vicinity of the improvement, and impact hardwoods if they occur at site of improvement. Road decommissioning would reduce habitat fragmentation of habitat and allow revegetation of the road tread, which would lead to better habitat for Mexican spotted owl prey species and reduce motorized noise disturbance. Fences and water improvements would lead to better distribution of grazing ungulates, in turn improving habitat for prey species.

Proposed activities within protected activity centers including thinning, prescribed burning, road decommissioning, fence construction, and motorized trail re-alignment may indirectly affect the Mexican spotted owl by altering habitat components for both the owl and owl prey base within protected activity centers. Prescribed burning may remove hardwoods, snags, and downed woody debris. The effects from prescribed burning to the species are neither insignificant nor discountable. Prescribed fire will reduce owl prey base habitat (food and cover) during the short term and will likely reduce large woody debris over a longer period (replacement period). The effects to individual owls will likely not be measurable and will not likely rise to the level of harm or harassment. However, the effects to habitat and subsequent impacts to owls are likely to occur. Maintaining low-intensity and low-severity fire will reduce these impacts but they are likely to occur at some level. Thinning of conifer trees less than 9 inches diameter at breast height in a manner that maintains threshold conditions will allow for development of larger trees and increased basal area in larger diameter classes and will allow for increased herbaceous ground cover and improve owl prey base habitat. Road decommissioning will return existing closed roads to a more natural state over time. Initial response on decommission roads will include increased herbaceous cover and eventually the establishment of trees. Returning closed roads to conditions that are more natural will improve habitat conditions for Mexican spotted owl in the long term. Construction of fences will potentially require the removal of vegetation within the path of the new fence and future maintenance will include the removal of downfall or snags on or near the fence.

All of these activities could indirectly affect the owl through changes to habitat features such as reduction in large woody debris on the forest floor, reduction in the number of snags, short-term decreases in ground cover where the activity occurs. These indirect effects to the owl in designated critical habitat are likely to occur, however they are likely not measurable and actual harm or harassment of owls will not be detectable. Indirect effects to the Mexican spotted owl are likely to adversely affect individuals inhabiting protected activity centers, where treatments are proposed. These protected activity center treatments would reduce habitat needs to individual nesting owls in the short term, until remaining vegetation responded and grew into larger trees.

Current livestock grazing has conservative utilization rates that are considered light to moderate. This utilization has little to no impact on prey species. Cumulatively, prey species could have lower amounts of available forage available outside of the breeding season (seasonal restriction for implementation).

## Appendix B: Comment Letters from Federal and State Agencies and Tribes

In compliance with section 102(c) of the National Environmental Policy Act, which states, "...comments and views of the appropriate Federal, State and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council of Environmental Quality and to the public..." the following comment letters are provided in this appendix:

<b>Commenter's Name</b>	<b>Organization</b>
Stewart B. Koyiyumptewa	The Hopi Tribe
Jeff M. Witte	State of New Mexico, Department of Agriculture,
Stephen R. Spencer, PhD	United States Department of the Interior, Office of Environmental Policy and Compliance
Matt Wunder, PhD	State of New Mexico, Department of Game and Fish
Cheryl T. Seager	United States Environmental Protection Agency, Region 6

Many of the letters received were scanned images, which makes them inaccessible to users of assistive reading devices. Therefore, to accommodate all readers, we reproduced the primary text of each letter here, omitting logos and stylized letterheads. Letters are arranged in order by the date received. Copies of the original letters are available for viewing from the project record.

## Letter from The Hopi Tribe

Timothy L. Nuvangyaoma  
Chairman

Clark W. Tenakhongva  
Vice-Chairman

May 18, 2018

Adam Mendonca, Forest Supervisor  
Attention: Lisa Mizuno, Environmental Coordinator Gila National Forest  
3005 East Camino Del Bosque  
Silver City, New Mexico 88061

Re: Luna Restoration Project, Draft Environmental Impact Statement

Dear Supervisor Mendonca,

This letter is in response to your correspondence dated May 2, 2018, with an enclosed draft Environmental Impact Statement regarding the 185,586-acre Luna Restoration Project on the Quemado Ranger District. The Hopi Tribe claims cultural affiliation to earlier identifiable cultural groups in New Mexico. The Hopi Cultural Preservation Office supports the identification and avoidance of prehistoric archaeological sites and Traditional Cultural Properties, and we consider the archaeological sites of our ancestors to be "footprints" and Traditional Cultural Properties. Therefore we appreciate the Forest's continuing solicitation of our input and your efforts to address our concerns.

In the enclosed letter dated May 31, 2016, the Hopi Cultural Preservation Office reviewed the Scoping Action. We have now reviewed the enclosed draft Environmental Impact Statement and understand approximately 10% of the planning area has been surveyed for cultural resources and 513 sites have been identified. We also understand all alternatives will require extensive survey including 73,856 acres of mechanical treatments.

Therefore, if the cultural resource surveys of the areas of potential effect identify prehistoric sites that may be adversely affected by project activities, please provide us with copies of the cultural resources survey report and any proposed treatment plans for review and comment. In addition, we recommend that if any cultural features or deposits are encountered during project activities, these activities will be discontinued in the immediate area of the remains, and the State Historic Preservation Office will be consulted to evaluate their nature and significance. If any Native American human remains or funerary objects are discovered during construction they shall be immediately reported as required by law.

If you have any questions or need additional information, and please contact Terry Morgart at the Hopi Cultural Preservation Office at [tmorgart@hopi.nsn.us](mailto:tmorgart@hopi.nsn.us) or 928-734-3619. Thank you for your consideration.

Respectfully,

Stewart B. Koyiyumtewa, Interim Manager  
Hopi Cultural Preservation Office

Enclosure: May 31, 2016 letter  
xc: New Mexico State Historic Preservation Office  
Emily Irwin, District Ranger, Quemado Ranger District, P.O. Box 159, Quemado, NM 87829

## Letter from the State of New Mexico, Department of Agriculture

Susana Martinez  
Governor

Jeff M. White  
Secretary

May 23, 2018

Mr. Adam Mendonca, Forest Supervisor  
ATTN: Luna Restoration Project  
3005 East Camino del Bosque  
Silver City, NM 88061

Dear Mr. Mendonca:

New Mexico Department of Agriculture (NMDA) respectfully submits the following comments in response to the Draft Environmental Impact Statement for the Luna Restoration Project (EIS) in the Quemado Ranger District of the Gila National Forest (Gila NF).

NMDA maintains a strategic goal to promote responsible and effective use and management of natural resources, which is specific to our mission within state government: dedication to the promotion and enhancement of New Mexico's agriculture; natural resources; and social, economic, and cultural agricultural heritage.

NMDA supports efforts to improve forest health by reducing high tree densities, restoring riparian areas and watersheds, and returning lands to a more productive state. Overly dense stands of woody vegetation impede herbaceous forage production to the detriment of livestock and some wildlife and increase the likelihood of catastrophic wildfire. Water quality can be impacted by degraded riparian areas and watersheds.

### **Stream and Riparian Restoration**

Our comments are specific to the potential effects this project may have on livestock grazing allotments in the area. We are concerned with how parts of the EIS will be implemented, specifically stream and riparian restoration. According to the EIS, the Gila NF intends to construct multiple riparian exclosures for the purpose of restoring riparian vegetation and improving watershed conditions. We encourage the use of exclosures to be site-specific to the restoration area in order to minimize the impact on grazing allotment permittees. Construction and maintenance of exclosures could increase costs to allotment permittees. We encourage implementation of projects be done in consultation and coordination with affected grazing allotment permittees to ensure low cost access to water for cattle while restoring riparian areas and streams.

### **Conclusion**

NMDA agrees with the need for this EIS and recognizes the value of vegetation treatments; range improvements; and riparian, stream, and watershed restoration to the health of the national forest. Thank you for the opportunity to comment on this proposal. NMDA requests you continue to keep us informed about the Luna Restoration Project. Please contact Gizelle Hurtado, Ph.D., (575) 646-8024, if there are any questions pertaining to these comments.

Sincerely,

Jeff M. Witte

**Letter from the United States Department of the Interior,  
Office of Environmental Policy and Compliance**

OFFICE OF THE SECRETARY

Office of Environmental Policy and Compliance 1001 Indian School Road NW, Suite 348  
Albuquerque, New Mexico 87104

ER 18/0220

File 9043.1

June 25, 2018

Adam Mendonca

Forest Supervisor

ATTN: Luna Restoration Project

3005 East Camino del Bosque

Silver City, NM 88061

Dear Mr. Mendonca:

Thank you for the opportunity to review and comment on the U.S. Forest Service's Draft Environmental Impact Statement (DEIS) for the Luna Restoration Project, in Catron County, New Mexico.

The Department of the Interior has no substantive comments at this time. However, the Bureau of Land Management (BLM) and the Fish and Wildlife Service (FWS) have requested to be kept informed during the planning process.

Should you have any questions, please contact Catie Brewster, Planning and Environmental Assistant, BLM (505.954.2044; [cbrewster@blm.gov](mailto:cbrewster@blm.gov)), and Ted Koch, Assistant Regional Director, Ecological Services, FWS (505.248.6671; [ted\\_koch@fws.gov](mailto:ted_koch@fws.gov)).

Sincerely,

Stephen R. Spencer, PhD  
Regional Environmental Officer



## Letter from the State of New Mexico, Department of Game and Fish

Susana Martinez  
GOVERNOR

Alexandra Sandoval  
DIRECTOR AND SECRETARY TO THE COMMISSION

Donald L. Jaramillo  
DEPUTY DIRECTOR

June 25, 2018

Mr. Adam Mendoca, Forest Supervisor  
ATTN: Luna Restoration Project  
Gila National Forest  
3005 E. Camino del Bosque  
Silver City, NM 88061

### **RE: Luna Restoration Project Draft Environmental Impact Statement; NMDGF No. 18445**

Dear Mr. Mendoca:

The Department of Game and Fish (Department) has reviewed the Luna Restoration Project Draft Environmental Impact Statement (DEIS) and conducted a planning area site visit with Quemado Ranger District staff.

The Department supports the Quemado Ranger District's efforts to Implement the Luna Restoration Project, which includes a wide variety of proposed types of projects including wildland urban interface (WUI), thinning only, prescribed fire only, thinning and prescribed fire, riparian vegetation restoration, spring, and stream protection using pipe rail and 8-foot fence, stream bank stabilization, hardening of motorized stream crossings, motorized vehicle barriers, and motorized trail reroutes. The Department believes that implementing these projects will increase ecological resilience and benefit wildlife and wildlife habitats on the Quemado Ranger District. The DEIS uses best available science to achieve desired future conditions for forest woodlands, grasslands, riparian and aquatic habitats.

In New Mexico, riparian and aquatic habitats are critical to the survival of many species of wildlife. Approximately 80% of all sensitive and special-status vertebrate species in New Mexico depend upon riparian or aquatic habitat at some time during their life cycle (Biota Information System of New Mexico 2000). During the field visit, Department and Quemado Ranger District staff observed multiple impaired riparian and aquatic habitats across the planning area. Page 12 of the DEIS states "*Aquatic and riparian obligate species are being impacted by impaired watersheds. High sediment loads and temperatures, lack of woody debris in the channel, lack of mature, multi-story riparian vegetation, and exotic species are some of the conditions present.*" Therefore, the Department strongly supports Implementing the multiple aquatic and riparian habitat restoration proposals included in the DEIS. Examples include the proposed work at Adair Springs to protect springs and spring runs from livestock trampling by installing pipe rail or cable fence, while still providing nearby locations for livestock watering. These actions will promote re-establishment of mesic vegetation to stabilize banks and protect native Rio Grande suckers (*Catostomus plebeius*), longfin dace (*Agosia chrysogaster*) and amphibians that were observed in Adair Springs.

Mr. Adam Mendoca  
25 June 2018  
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The Department also supports riparian restoration projects such as on Stone Creek, where polygons of 8-foot tall wildlife exclusion fencing will be constructed to protect native willow and cottonwood plantings from livestock and ungulate browsing. Enclosures of 0.5 to 200 acres in size will be constructed to allow establishment and survival of the riparian vegetation plantings.

Research has shown high-severity fire to be detrimental to Mexican spotted owls (MSO) when burns within protected activity centers (PACs). The Department supports experimental thinning of trees  $\leq 9$  inches diameter and breast height and application of low intensity prescribed fire within a portion of PACs in the planning area. One hundred acre core areas will remain untreated within each treated PACs. Effects of treatments on MSO occupation will be compared against untreated control PACs and, if beneficial, will be applied to additional PACs. Thinning and prescribed fire should significantly reduce the potential for high severity fire in treated PACs. To minimize disturbance to MSO, treatments will not occur during the nesting period of 1 March to 31 August.

Page 20 of the DEIS, **Wildlife Habitat**, states “*Cut and prescribe burn Gambel oak and mountain mahogany stands to promote new growth and sprouting in various locations across the planning area*”. As stated in our 29 June 2016 comments on the Proposed Action, Gambel oak (*Quercus gambelii*) is an important component of productive wildlife habitat. Gambel oak provides browse and acorn mast crops for deer, turkey, and many other game and non-game mammals and birds; and cover and nesting structure for wildlife (Reynolds et al. 1970). Southwestern ponderosa pine forests with Gambel oak are documented to support higher bird diversity and abundance than ponderosa pine forests without Gambel oak (Jentsch et al. 2008). The Department requests that all Gambel oak treatments include the following measures.

- Emphasize retaining a mosaic of all sizes and age classes of Gambel oak.
- Retain tree-form Gambel oak in the 30-36 cm diameter range to maximize acorn production for game and non-game wildlife (Clary and Tiedemann 1992), and large-diameter Gambel oak for nesting and roosting habitat for game and non-game wildlife (Clary and Tiedemann 1992).
- Retain patches of pole-sized Gambel oak in the 7-15 cm diameter at breast height range for nongame bird Species of Greatest Conservation Need. Increased bird diversity has been documented in ponderosa pine forests with Gambel oak stands of this size class (Jentsch et al. 2008).

The Department requests that oak treatment prescriptions are clarified within the final EIS.

Page 27, **Range Management**, discusses burying pipelines that will be installed to facilitate better distribution of livestock. Open trenches can trap and cause mortality to wildlife, especially small mammals, amphibians and reptiles, and can cause Injury to large mammals. Periods of highest activity for many of these species include nighttime, summer months and wet weather. To avoid unnecessary mortality of wildlife, the Department recommends implementing the following guidelines when constructing trenches and installing new water lines.

- Keep trenching and back-filling crews close together, minimizing the amount of open trench at any given time. Utilize concurrent trenching and backfilling when possible.

Mr. Adam Mendoca  
25 June 2018  
Page-3-

- Avoid leaving trenches open overnight. Where trenches cannot be back-filled immediately, escape ramps should be constructed at least every 300 feet. Escape ramps can be short lateral trenches or wooden planks sloping to the surface. The slope should be less than 45 degrees (1:1). Trenches that have been left open overnight should be inspected and animals removed prior to backfilling, especially where endangered species occur.
- Trench during the cooler months (October–March)

The Department requests that an explanation be provided within the final EIS regarding how trenching activities will be mitigated to reduce potential mortality to wildlife.

Arizona montane vole (*Microtus montanus arizonensis*) is known from only two locations in New Mexico: Centerfire Bog, and a meadow 1.2 miles west of the junction of Forest Road 385 and Jenkins Creek. The Arizona montane vole is state-listed as Endangered under the New Mexico Wildlife Conservation Act and is a U.S. Forest Service Region 3 sensitive species. In New Mexico, this species is restricted to dense, tall grass and sedge wet meadow habitats. Although the Arizona montane vole is not analyzed in the DEIS, the long-tailed vole (*Microtus longicaudus*) is analyzed as an indicator species, and occupies similar wetland and wet meadow habitats. As with the long-tailed vole, projects could adversely affect the Arizona montane vole through direct mortality from motorized vehicles, and/or short-term habitat destruction. However, the Department believes that proposed restoration projects will ultimately improve habitat conditions for these vole species by reducing conifer encroachment into meadows, reducing potential for high severity wildfire and associated watershed degradation and restoring streams, springs and wet meadow habitats. The proposed use of plantings, along with pipe rail and 8-foot fencing to exclude livestock and foraging ungulates, will facilitate riparian and wetland vegetation recovery.

Department staff are aware of, and have documented, a small steel tank at Bill Knight Springs that has caused mortality to bats attempting to drink. Installation of new water tanks are proposed in the DEIS, although no commitment is made to install wildlife escape ramps within these tanks. We therefore recommend that all new water tank installations be required to include wildlife escape ramps, and exclude support wires or other features that create collision hazards for volant wildlife. Old tanks should be retrofitted to include these features whenever possible, and such language be added to the DEIS to reflect this commitment.

We appreciate the opportunity to comment on your project. If you have any questions, please contact Mark Watson, Habitat Specialist, of my staff at (505) 476-8115, or [mark.watson@state.nm.us](mailto:mark.watson@state.nm.us).

Sincerely,

Matt Wunder, Ph.D.  
Chief, Ecological and Environmental Planning Division

cc: USFWS NMES Field Office  
Jacob Davidson (Habitat Manager, NMDGF)  
Daniel Lusk (Southwest Regional Habitat Biologist, NMDGF)  
Jim Stuart (Non-game Mammologist, NMDGF)  
Erin Duvuvuei (Non-game Ornithologist, NMDGF)  
Leland Pearce (Herpetologist, NMDGF)

Mr. Adam Mendoca  
25 June 2018  
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#### Literature Cited

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## Letter from the United States Environmental Protection Agency, Region 6

June 28, 2018

Adam Mendonca

Forest Supervisor

Attn: Luna Restoration Project

3005 E. Camino del Bosque

Silver City, NM 88061

Subject: Luna Restoration Project, Draft Environmental Impact Statement, Gila National Forest,  
Luna, New Mexico (CEQ# 20180092)

Dear Mr. Mendonca:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the Luna Restoration Project. Our review is provided pursuant to the National Environmental Policy Act (NEPA), Council of Environmental Quality (CEQ) regulations (40 CFR Parts 1500 - 1508), and our NEPA review authority under Section 309 of the Clean Air Act.

Based on our review of the DEIS, we have rated all Alternatives with Environmental Concerns (EC-2) (see enclosed "Summary of Rating Definitions"). Our review has identified potential environmental impacts in Chapter 3 of the DEIS that should be considered in the decision making process. The smoke from prescribed fires could impact the EJ population in the adjacent counties. The USDA should collaborate with the New Mexico Environment Department to avoid or minimize the smoke impact to human population. We recommend that the USDA provide the necessary mitigation assistance and/or coordination to protect individuals with sensitivity to smoke from adverse impacts associated with the proposed project. Responses to EPA comments should be placed in a dedicated section of the FEIS and should include the specific location where the revision was made. If no revision was made, please provide an explanation.

EPA appreciates the opportunity to review this DEIS. When the Final Environmental Impact Statement is released, please send one CD to the address above (mail code: 6EN-WS). If you have any questions, please contact Gabe Gruta, the lead reviewer for this project, at (214) 665-2174 or [gruta.gabriel@epa.gov](mailto:gruta.gabriel@epa.gov).

Sincerely,

Cheryl T. Seager Director

Compliance Assurance and Enforcement Division

Enclosures: Summary of the EPA Rating System

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