United States Department of Agriculture

Encino Vista Landscape Restoration Project

Preliminary Environmental Assessment

Forest Service Santa Fe National Forest Coyote Ranger District March 2024

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Cover Photo. Photo taken from Santa Fe National Forest Encino Vista lookout tower, facing NE towards Cerro Pedernal and Rio Chama River valley.

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ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
ALP	Alpine and Tundra
AOI	Area of Interest
APE	Area of Potential Effects
ASL	Above sea level
BA	basal area OR Biological Assessment
BI	Burning Index
BLM	Bureau of Land Management
BLM	Bureau of Land Management
CCVA	Climate Change Vulnerability Assessment
CDNST	Continental Divide National Scenic Trail
CFLRP	Collaborative Forest Landscape Restoration Program
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CP	Criteria Pollutant
CPGB	Colorado Plateau and Great Basin Grassland
CWE	cumulative watershed effect
DBH	Diameter at Breast Height
DN	Decision Notice
DRC	Diameter at Root Collar
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMU	Ecological Management Unit
EO	Executive Order
EPA	U.S. Environmental Protection Agency

ERC	Energy Release Component
ERU	Ecological Response Unit
ESA	Endangered Species Act
EVLRP	Encino Vista Landscape Restoration Project
EWSR	Eligible wild and scenic rivers
FIA	Forest Inventory and Analysis
FONSI	Finding of No Significant Impact
Forest	Santa Fe National Forest
FSH	Forest Service Handbooks
FSM	Forest Service Manuals
FuME	Fuel Management Erosion
GHG	Greenhouse Gases
GIS	Geographic Information System
GRAIP	Geomorphic Roads Analysis and Inventory Package
GSE	Ground skidding equipment
HUC	Hydrologic Unit Code
IBA	Important Bird Areas
IDT	Interdisciplinary Team
IFTDSS	Interagency Fuel Treatment Decision Support System
IMPROVE	Interagency Monitoring of Protected Visual Environments
IPaC	Information for Planning and Consultation (USFWS)
IRA	Inventoried Roadless Area
JMS	Jemez Mountain Salamander (*Plethodon neomexicanus)*
JUG	Juniper Grasslands
lbs.	pounds
LMP	Santa Fe National Forest Land Management Plan
MBTA	Migratory Bird Treaty Act
MCD	Mixed Conifer – Frequent Fire
MCW	Mixed Conifer with Aspen
mi	Miles
ML	Maintenance Level
MOU	Memorandum of Understanding
MSG	montane subalpine grasslands
MSO	Mexican Spotted Owl (*Strix occidentalis lucida*)

MVUM	Motor Vehicle Use Map
N	North
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFS	National Forest System
NFSR	National Forest System Roads
NHPA	National Historic Preservation Act
NHT	National Historic Trail
NIRS	National Information Resource System
NMCRIS	New Mexico Cultural Resources Information System
NMED	New Mexico Environmental Department
NMVTM	New Mexico Vegetation Treatment Mapping system
NNM-RAWR	Northern New Mexico Riparian, Aquatic and Wetland Restoration
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NRCS	Natural Resources Conservation Service
NRM	Natural Resource Manager
NWCG	National Wildfire Coordinating Group
O_3	Ozone
ORV	Outstanding Remarkable Values
PA	Programmatic Agreement
PAC	Protected Activity Center
PCT	Pre-commercial Thinning
PDF	Project Design Features
PJ	Pion Juniper
PJG	Piñon- Juniper Grasslands
PJO	Piñon- Juniper Woodlands
PJS	Piñon- Juniper Sagebrush
PM_{10}	particulate matter 10 microns in diameter or smaller
$PM_{2.5}$	particulate matter 2.5 microns in diameter or smaller
PPF	Ponderosa Pine Forest
R3	Southwestern Regional Office
RAWS	Remote Automated Weather Stations
RCNR	Recovery Canyon Nest Roost habitat

RDI	Relative Density Index
RFH	Recovery Foraging Habitat
ROS	Recreation Opportunity Spectrum
Rx	Prescribed Fire
SC	social cost
SCC	Species of Conservation Concern
SFF	Spruce Fir Forest
SFNF	Santa Fe National Forest
SHPO	State Historic Preservation Office
SIO	Scenic Integrity Objectives
SMP	Smoke Management Plan
SOC	Species of Concern
SOPA	Schedule of Proposed Action
SRM EMU	Southern Rocky Mountains ecological management unit
TAP	Travel Analysis Process
TAR	Travel Analysis Report
TEPC	Threatened, Endangered, Proposed and Candidate Species
TES	Terrestrial Ecosystem Survey
TEU	Terrestrial Ecological Unit
Tg	Teragrams
TMDL	Total Maximum Daily Load
TPA	trees per acre
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VCC	Vegetation Condition Class
VDDT	Vegetation Dynamics Development Tool
VOC	volatile organic compounds
VSS	Vegetation Structural Stage
WEPP	Watershed Erosion Prediction Project
WUI	Wildland Urban Interface

Chapter 1: Purpose and Need

1.1 Introduction: Background

The Santa Fe National Forest (SFNF) is proposing the Encino Vista Landscape Restoration Project (Encino Vista or EVLRP), an approximately 130,305-acre vegetation management project located on the Coyote and Cuba Ranger Districts. Roughly 121,648 acres within the project area occurs on National Forest System (NFS), SFNF lands. As a result of resource concerns, particularly related to Treated, Endangered, Proposed and Candidate (TEPC) species and geographic and logistic limitations, some of the proposed activities analyzed in this Environmental Assessment (EA) will occur within a smaller footprint than the overall project area. Currently, frequent-fire forest types within the project area have departed from reference forest and fire return interval conditions which promote healthy, resilient forest. The project was developed based on the need to improve ecosystem and watershed resiliency and reduce the risk of uncharacteristic wildfire events to the surrounding communities of Cañones, Coyote, Gallina, and Youngsville in Rio Arriba County, New Mexico.

The Encino Vista Landscape is a priority landscape for the Santa Fe National Forest and the Rio Chama Collaborative Forest Landscape Restoration Program (CFLRP). The project goal is to move current conditions towards desired conditions, as described in the 2022 SFNF Land Management Plan (LMP), to improve forest health, increase landscape resiliency, and reduce potential wildfire hazard to wildland urban interface (WUI) areas. Proposed actions will be implemented primarily on the Coyote Ranger District, with less than 800 acres of treatment proposed on the Cuba Ranger District of the SFNF.

1.1.1 Project Location

Approximately 119,848 acres of NFS land within the EVLRP area are located on the Coyote Ranger District of the SFNF, south of the communities of Cañones, Youngsville, Coyote, and Gallina, New Mexico, with 1,182 acres located on the of the Cuba Ranger District along the southwestern edge of the project boundary.

The project elevation ranges from between 6,450 and 10,600 feet. Climate of the project area is typical of Climate Division 2 (Northern Mountain Division) and is characterized as a semi-arid continental climate pattern, with bi-modal precipitation, and large diurnal and annual temperature fluctuations (http://weather.nmsu.edu/products/climate-new-mexico/). Depending on the elevation, the annual precipitation ranges between 10 and 35 inches. An estimated 30 to 40 percent of the annual precipitation falls as snow. Summer rainfall occurs as thunderstorms of high intensity and short duration. Snow cover extends from early November to mid- April. Annual snow accumulation ranges between 20 - 92 inches dependent on elevation and aspect. The freeze-free period is an estimated 160 days.

The legal description of the project area is:

Township 20N	Range 4E	Section 5
Township 21N	Range 2E	Sections 1-17, 22-26
	Range 3E	Sections 1-36
	Range 4E	Sections 1-33
Township 22N	Range 1E	Sections 1-6
	Range 2E	Sections 1-30, 32-36
	Range 3E	Sections 6, 7, 10-36
	Range 4E	Sections 1-36

	Range 5E	Sections 4, 5, 6, 7, 8, 9, 17, 18, 19, 30
Township 23N	Range 1E	Sections 7, 13-36
	Range 1W	Sections 13, 23-26, 36
	Range 2E	Sections 19, 27-36
	Range 4E	Sections 21, 22, 25-29, 31-36
	Range 5E	Sections 31, 32

The project area contains thirteen HUC 11 sub-watersheds. The majority of the project is within these sub-watersheds: Coyote Creek, Cañones Creek, Headwaters Rio Puerco, Poleo Creek, Outlet Rio Puerco, Upper Rio Galina and Rio Capulin. Figure 1 shows the project area and its location on the Forest.

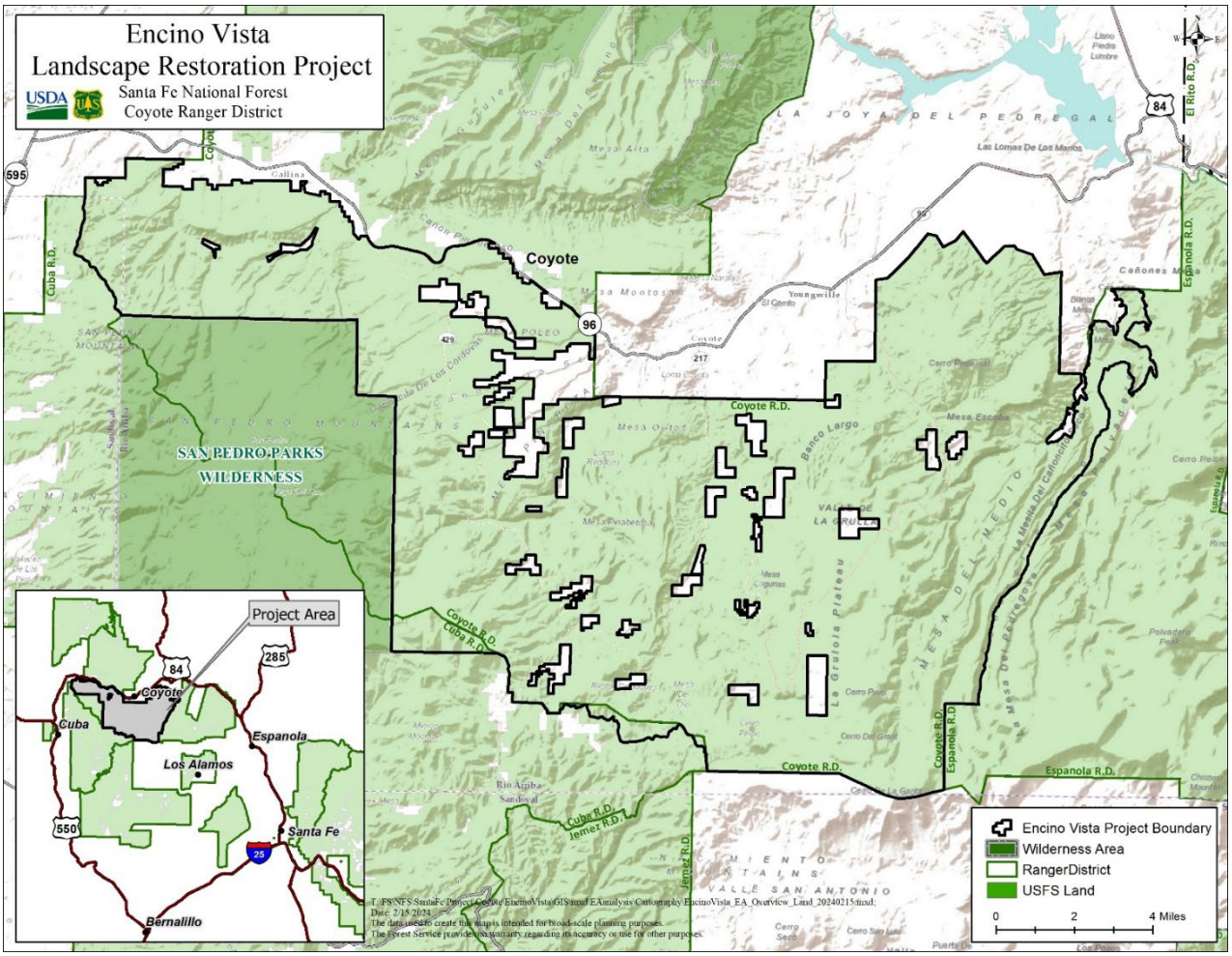


Figure 1 Project Map

1.2 Purpose and Need

Currently, frequent-fire forest types within the project area have departed from historic structures and processes which promoted a healthy, resilient forest. Fire suppression activities have increased the risk for uncharacteristic wildfire across the landscape, threatening watersheds and local communities. Insects and disease have contributed to an overall decline in forest health in the area; especially in mixed conifer with aspen, spruce-fir, and Piñon-Juniper communities. Current forest conditions are dynamic and unpredictable as a result of recent uncharacteristic wildfires, insects and diseases, and climate change.

The ***Purpose*** of the Encino Vista Landscape Restoration project is to restore overall forest health, lower uncharacteristic high severity fire risk, improve watershed health, and protect wildlife habitat across the project area. In order to implement restoration activities and improve forest health, there is also a need to improve and maintain a transportation system in a manner that reduces negative impacts to watershed health and facilitates access to project areas.

The ***Need*** of the Encino Vista Landscape Project is to move the forest toward desired conditions, as described in the SFNF LMP (USDA, 2022b), protect local communities and watersheds, protect and enhance wildlife habitat, and create a resilient forest landscape that may withstand unforeseen disturbances.

This project focuses on forest restoration actions which include:

- Reducing stand densities.
- Reintroducing fire on the landscape.
- Significantly reducing the risk of uncharacteristic high severity wildfire.
- Improving and enhancing wildlife habitat.
- Minimizing road-related resource damage to aid in watershed restoration.
- Improving watershed resiliency to drought and climate change by protecting ground water recharge as well as surface water by improving road conditions and significantly reducing the risk of uncharacteristic high severity wildfire.

Proposed actions include site-specific treatments focused on designated and suitable Federally listed species (Threatened, Endangered, Proposed and Candidate - TEPC) habitat within the project area. These treatments are being developed in compliance with the required Section 7 consultation process, as per ESA (Endangered Species Act 1973) regulations. In other portions of the project area where treatment units are not yet fully planned, unit development will include appropriate project design features and unit adjustments to comply with required guidance for wildlife, cultural, watershed and other resources (Appendix C). This environmental analysis defines vegetation types and conditions throughout the project area, as described in the SFNF LMP (USDA, 2022b) where treatments are likely to occur, along with the suite of tools and prescriptive measures that may be used to achieve the purpose and need. Specific treatment units and prescriptions can be adjusted as ecological conditions change over time within the project area and additional field data is acquired. Site-specific landscape features and current site conditions will be utilized to guide the selection of specific treatments or tools to move areas toward desired conditions and avoid or minimize adverse effects.

1.3 Existing and Desired Conditions

1.3.1 Vegetation and Forest Structure

Existing Conditions

Fire has been a primary factor in controlling the formation and maintenance of species composition and forest structure in the southwestern United States (Touchan et al., 1996). The introduction of heavy grazing, fire suppression and other human activities such as logging and infrastructure development have created an environment that is increasingly susceptible to large-scale, severe wildfire, and insect and disease episodes (Reynolds et al., 2013). Without the appropriate level of disturbances within stands, succession would continue to progress with the gradual replacement of one community of plants by another until a climax, or a stable, endlessly self-replacing stage (SAF, 1998; Smith et al., 1997). For the forests of the southwest, as stands move out of early and into late successional stages, there is an increase of shade intolerant species and a decrease in fire resistance progressively more susceptible to large-scale, severe wildfire.

Within the project area:

1. Forested stands are overstocked, lack horizontal and vertical structure, and have altered species composition.
2. Forest structure is not comprised of the desired range of diameter classes and habitat components, such as openings or interspaces.
3. Tree species composition is departed from desired conditions in native mixed conifer vegetation types.

Desired Conditions of Vegetation and Structure by Ecological Response Unit (ERU)

The SFNF has identified the need to restore forest structure, composition, density, and landscape patterns to create uneven-aged landscapes more resilient to disturbances so natural ecological processes may return to their characteristic roles within the ecosystem. The SFNF LMP (USDA, 2022) identifies vegetation objectives by utilizing ecological response units (ERUs), which are land areas that share similar aspect, elevation, vegetation, soil parent material, and natural disturbances such as fire or drought cycles.

Ponderosa Pine Forest (PPF)

Ponderosa pine forest currently exist in even-aged and uneven-aged structural conditions across the project area. Much of the PPF ERU is departed from desired conditions, as described in the SFNF LMP (USDA, 2022b), and needs thinning to reduce basal areas, restore interspaces and openings, and to create a mosaic of structural stages within the stands. Competition for growing space and resources (light, moisture, and soil nutrients) is high enough that many of these stands no longer have interspaces and have lost the understory grass, forb, and shrub layers. Currently, there is a lack of structural diversity across this ERU as much of the area is dominated by mid-sized trees and is deficient in seedlings, saplings, and larger tree components across the landscape.

Mixed Conifer – Frequent Fire (MCD)

Conditions in mixed conifer - frequent fire (dry mixed conifer) are similar to the ponderosa pine ERU and, due to lack of frequent fire, specifically surface fires in these forest types, there is an increase of shade-tolerant and thin barked trees and shrubs in the understory that would otherwise not survive (Biswell, 1972). Consequently, current conditions are dense, less vigorous, and due to the high competition, contain little to no large individual trees. Dense growing conditions also lead to increased risk of large-scale insect and disease outbreaks.

Temperature, moisture, and elevation play a key role in the species composition of dry mixed conifer as it is not considered homogeneous and integrates with ponderosa pine on warm and dry sites and wet mixed conifer forests on cooler and wetter sites. Due to extensive fire exclusion in dry mixed-conifer stands in the project area, there has been a substantial increase in tree density, especially of shade-tolerant, fire susceptible white fir and Douglas-fir. As a result of current conditions, recruitment of ponderosa pine and Douglas-fir has significantly decreased (Romme, 2009). Additionally, current conditions have undesired closed canopy characteristics, species composition, and a lack of structural diversity with much of the area dominated by young to mid-sized trees.

Mixed Conifer with Aspen (MCW)

Tree species composition varies depending on seral stage, elevation, and moisture availability (USDA, 2022b). Mixed conifer forest with aspen (wet mixed conifer) typically lacks ponderosa pine, has a greater abundance of Douglas-fir and white fir, and, on some sites, includes subalpine/cork bark fir and Engelmann spruce (Romme et al., 2009). The lack or absence of Engleman spruce and cork bark fir is what distinguishes wet mixed conifer ERU from spruce fir forest ERU (USDA, 2022b).

Wet mixed conifer forest types experience several kinds of disturbance, large-scale infrequent fire and frequent insect and disease incursions, wind events and smaller scale fire events. As mixed conifer transitions from dry to wet, less frequent and more severe fires result in mixtures of even- and un-even-aged forest structures (Renyolds et al., 2013). Due to selective logging in the 1950s and ‘60s, wet mixed

conifer stands in the project area have unusual stand characteristics that do not resemble what would have resulted from natural disturbances. Some stands are dominated by a dense growth of small to moderate sized fir trees and shrubs, with little or no Douglas-fir regeneration.

Spruce Fir Forest (SFF)

The spruce fir ERU is often dominated by Engelmann spruce but contains other species depending on elevation. It occurs in the coldest, wettest, and highest elevation sites on the forest (USDA, 2022b). In early stand development, trees are typically even aged due to the large, infrequent stand replacement disturbances. As stands mature over time, gaps are created by small insect and disease outbreaks and windthrow events and eventually form uneven aged structures.

Piñon- Juniper Woodlands and Grasslands (PJO / PJG)

Dominant species in Piñon-Juniper woodlands include two needle piñon, one seed juniper, and alligator juniper. Other juniper species, such as Utah juniper and Rocky Mountain juniper, may also be present (USDA, 2022b). Grassland fire regimes are typically frequent (0–35 years) and low severity, while woodland and sagebrush fire regimes vary from infrequent (35–200 years) moderate severity to infrequent (>200 years) high-severity fires (USDA, 2022b).

The risk for wildfire is also a major concern along the lower elevations and southern portion of the project area due to the high surface fuel loads found in much of the Piñon-Juniper woodlands. Historical fire regimes in Piñon-Juniper vegetation types are highly variable and based primarily on the environmental context, vegetation composition, and structure (Floyd et al. 2004; Triepke et al. 2019). Piñon-Juniper woodlands typically exhibit more closed canopy structure, and a mix of grass and shrub understory. These communities have been described by Romme et al. (2009) as Persistent Woodland, and due to their structural composition, tend to have moderate surface to high-intensity canopy fires, which occur infrequently, but under extreme conditions can reach a landscape scale (Triepke et al. 2019). In the project area, Piñon-Juniper woodlands form the interface with many communities. The potential for high to extreme fire behavior in this fuel type increases wildfire hazard and risk to life and property. There is a need to raise the canopy base heights and increase the canopy spacing in these areas, particularly where they are adjacent to other land jurisdictions and valued resources (Figure 7).

For the EVLRP, Piñon-Juniper woodland ERU will not be treated with the objective of meeting or moving toward the desired conditions for the ERU, as described in the SFNF LMP (USDA, 2022b) but rather to meet objectives related to fire, fuels, and WUI objectives.

1.3.2 Forest Health

Existing Conditions

Forest health is defined by the vigor and condition of the forest stands, and the presence of insects and diseases that affect the sustainability of the forest. Stand density is the dominant factor affecting the health and vigor of the forest. Past activities have produced highly stressed ecosystems, higher densities of small-diameter trees, increased closed-canopy conditions, increased fuel loadings, altered species composition, and reduced site productivity. These conditions have lowered the resilience of existing ecosystems, making them more at risk from stressors (e.g., prolonged drought, nonnative invasive species, climate fluctuations) and disturbance (e.g., more large, uncharacteristic fires, increased insects, and disease outbreaks) (USDA, 2022b).

Climate models predict increasing temperatures and aridity in the southwest with mortality driven by drought rapidly altering species composition and size-class distribution (Ganey et al., 2011). During periods of dryness or drought, limited soil moisture increases the stresses on individual trees, making them less able to resist attack by insects or diseases. Management to reduce drought stress would reduce densities particularly in frequent fire ERUs such as ponderosa pine and dry mixed conifer where open conditions are lacking.

Data from aerial surveys conducted for more than two decades indicate a wide variety of forest insects causing damage and mortality in the project area. The two most prevalent types of damaging insects are bark beetles and defoliators such as western spruce budworm. Since 1997, 13,005 acres of forest have suffered mortality due to bark beetles, and 58,183 acres have been damaged by defoliating insects. These insects are not uncommon to find in the forest at low population levels and often cause undetectable level of damage and mortality. However, when stand densities are high or climate conditions cause stress on trees, these low population levels can explode into epidemic populations.

Dwarf mistletoe is an element of the forest landscape and currently there is a varied level of mistletoe across the landscape, comparable with historic conditions such that it does not impede achieving and sustaining desired uneven-aged forest conditions.

White pine blister rust, an introduced non-native species of rust fungus, is affecting forest stands by reducing diversity of native tree species and threatening health of native pine-dominated ecosystems (Sniezko, R.A. 2006). The effects of this disease are well-known throughout the United States. White pine blister rust poses a threat to southwestern white pine, causing severe mortality throughout its range. Some genetic resistance to this disease has been identified on selected individual white pines throughout the region and for this reason, it is critical that the full genetic diversity of southwestern white pine be maintained throughout its range (Conklin et al. 2009).

Desired Conditions

While insects and diseases are a natural part of functioning ecosystems, the desired condition is to keep these infestations and infections from becoming large scale or more destructive than historically recorded. By managing for appropriate densities for each ERU, overall tree and stand stress can be reduced and allow trees the resources necessary to build resistance to many of the insects and diseases identified within the project area.

1.3.3 Old Growth

Existing Conditions

Old growth forests provide biological diversity and key wildlife habitat for a variety of species. Large and mature trees are found throughout the project area. However, the development of future large, mature trees is limited in areas characterized by dense stands of small to medium sized trees. Existing old growth is also at risk for damage or loss due to high-severity wildfires, insects, and diseases.

Existing conditions for the dominant forest types in the EVLRP, with the exception of PJO, are disproportionate for seral state proportions. Frequent-fire ERUs are currently overpopulated with late closed seral states. Other forest ERUs are deficient of late seral/large tree stages.

Desired Conditions

Desired conditions in the SFNF LMP stress the importance of retaining old growth and for managing vegetation in ways that support its development over time. For the mixed conifer-frequent fire and

ponderosa pine ERUs, old growth would occur throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Old growth characteristics for these ERUs are embedded in the late seral stages of stand development. These characteristics would include old or large trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth would shift on the landscape over time as a result of succession and disturbance. The desired conditions for frequent-fire ERUs include a high proportion of mid to late seral states. Additionally, the desired condition for vegetation forest wide is a healthy and resilient forest ecosystem with a suitable proportion of old, large trees or a percentage of trees that would develop toward old, large trees in the long term.

The SFNF LMP (USDA, 2022) describes old-growth as; *Old-growth forests have accumulated specific characteristics related to tree size, canopy structure, snags and woody debris, and plant associations. Ecological characteristics of old-growth forests emerge through the processes of succession. Certain features—presence of large, old trees, multilayered canopies, forest gaps, snags, woody debris, and a particular set of species that occur primarily in old-growth forests—do not appear simultaneously, nor at a fixed time in stand development. Old-growth forests support assemblages of plants and animals, environmental conditions, and ecological processes that are not found in younger forests (younger than 150 to 250 years) or in small patches of large, old trees. Specific attributes of old-growth forests develop through forest succession until the collective properties of an older forest are evident.*

Executive Order (EO) 14072, Strengthening the Nation's Forests, Communities, and Local Economies was issued by the Biden Administration on April 22, 2022. On December 19, 2023, the U.S. Department of Agriculture published a Notice of Intent in the Federal Register to prepare an Environmental Impact Statement to amend all 128 national forest land management plans to include consistent direction to manage, conserve and steward old-growth forest conditions. National direction relating to this NOI is forthcoming. In the interim, the SFNF will submit the required paperwork for the project for national review. The SFNF will comply with all policies, regulations and laws that guide land management decisions. The SFNF fully intends to manage 'mature and old-growth forests, to promote their continued health and resilience; retain and enhance carbon storage; conserve biodiversity; mitigate the risk of wildfires; enhance climate resilience; enable subsistence and cultural uses; provide outdoor recreational opportunities; and promote sustainable local economic development', as stated in EO 14072.

1.3.4 Fire Regimes and Fire Risk

Existing Conditions

Analysis of natural fire regimes, vegetation condition classes, and the historical fire regimes in the Jemez Mountains combined with current fire danger, fuels and potential wildfire behavior shows that most of the project area does not meet 2022 SFNF LMP desired conditions for wildfire behavior, and existing conditions may result in high intensity, widespread, damaging wildfires.

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention but including the possible influence of aboriginal fire use. The five natural fire regimes are classified based on the average number of years between fires (fire frequency or mean fire interval [MFI]) combined with characteristic fire severity reflecting percent replacement of dominant overstory vegetation. Most of the project area is in fire regime group I and III, and to a lesser extent IV and V (Tables 1, 2) (FRCC, 2008; LANDFIRE, 2020). Much of the project area has not burned in over 100 years (NWCG, 2020a; Margolis et al., 2020).

Table 1. Fire Regime group descriptions.

Fire Regime Group[1]	Frequency	Severity	Severity Description
I	0–35 years	Low / mixed	Generally low-severity fires replacing less than 25 percent of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75 percent of the overstory
II	0–35 years	Replacement	High-severity fires replacing greater than 75 percent of the dominant overstory vegetation
III	35–200 years	Mixed / low	Generally mixed-severity; can also include low- severity fires
IV	35–200 years	Replacement	High-severity fires replacing greater than 75 percent of the dominant overstory vegetation
V	200+ years	Replacement / Any severity	Generally, replacement-severity; can include any severity type in this frequency range

Table 2. EVLRP ERU and Fire Regime Groups

ERUs	EVLRP Project Area Acreage	Fire Regime Group
Mixed Conifer - Frequent Fire	38,130	I
Ponderosa pine forest	31,305	I
Piñon-Juniper grassland	35	I
Juniper grass	5,204	I
Mixed conifer with aspen (Wet Mixed Conifer)	22,570	III
Piñon-Juniper sagebrush	5,061	III
Piñon-Juniper woodland	10,837	III
Spruce-fir forest	3,440	IV

The project area is currently at risk for developing and sustaining high intensity, widespread, damaging fire. Based on Interagency Fuel Treatment Decision Support System (IFTDSS) modeling results, potential wildfire flame lengths over approximately 55 percent of the project area could be greater than 4 feet and too intense for safe and effective fire suppression action by ground resources. Wildfire passive or active crown fire activity could burn forest canopies over approximately 64 percent of the project area (IFTDSS, 2020). In the wildland fire community, the term “hazard” is used to define a variety of conditions or situations where damage to assets by fire is evaluated. Approximately 32 percent of the project area is predicted to be at higher to highest hazard of burning.

Two factors that contribute to stand-replacing crown fires are surface fuels and canopy fuel distribution. Surface fuels (live and dead vegetation including trees and shrubs, litter, duff, fine twigs and debris on the soil surface) and canopy fuels (the biomass in the forest canopy) are substantially more abundant and

contiguous in the project area relative to historic conditions. This uncharacteristic loading of surface and canopy fuels increases the likelihood of stand replacing crown fire, posing a major safety risk to surrounding communities. Fire suppression is the primary reason which has allowed for change in fuels (suppression combined with grazing and logging are the driving factors for change in fuel abundance, type, and arrangement).

Desired Conditions

The desired condition is for reduced fuel loads in areas where vegetative conditions would contribute to high-intensity crown fire, rapid rates of spread and high flame lengths, and where wildfire would cause damage to resources and values at risk (for example, residential properties, critical infrastructure, watershed, MSO (Mexican Spotted Owl) habitat and the WUI. Surface fuel loads should average between approximately 5 to 7 tons per acre in ponderosa pine forest, approximately 10 to 12 tons per acre in mixed conifer-frequent fire forest, and 3 to 12 tons per acre in piñon juniper woodland. In areas characterized by continuous fuels in close proximity to valued resources, there is a need to provide defensible zones where firefighters can safely engage with wildfires. Fuels in this zone should be mitigated to the extent that crown fires would transition to surface fire activity, creating areas with lower flame lengths and fireline intensity, to lower resistance to control and allow direct attack by fire crews with hand tools. Where persistent Piñon-Juniper woodland interfaces with communities, treatments should result in increased canopy base heights and greater canopy spacing to prevent transmission of active crown fire. Mitigating fuel loading and potential fire behavior in WUI areas helps to facilitate forest treatments, including the reintroduction of prescribed fire, in other adjacent ERUs. In ponderosa pine and mixed conifer-frequent fire forest types, meeting the desired conditions for restoration would also achieve desired conditions for wildfire risk reduction by reducing fuels and breaking fuel continuity in frequent-fire forest types.

1.3.5 Roads

Existing Conditions

Existing NFS roads (NFSRs) would serve as the primary access to project areas to facilitate project restoration activities (Table 3). NFSRs are maintained to provide safe, efficient, and economical access for administrative purposes and public use. Many of the roads in the project area are in a degraded condition. These roads do not provide efficient access for public or administrative uses and in many cases, the degraded road system is eroding and delivering sediment to streams (Table 4, Appendix F). The EVLRP area contains approximately 761 miles of NFSRs. Out of the 761 total miles, 362 miles of roads open to the public are identified within the project area, approximately 80 miles of roads will be maintained under the SFNF's annual road maintenance plan. Of the approximately 210 miles (65percent) that have unacceptable levels of erosion[1], and of those, 55 miles are delivering the majority of sediment to streams (Appendix F). The remaining 399 miles of roads are closed to public for motorized use. In which there are 195 miles of maintenance level (ML) 1 roads (closed to all users) and 204 miles of administrative use only roads. Of these 399 miles, 289 miles (78 percent) are badly eroding, and of those, 98 miles are delivering the majority of sediment to streams (Table 4, Appendix F). There are also 44 miles of documented unclassified or undetermined routes.

[1] As analyzed with the GRAIP-Lite model, road miles eroding by more than 0.25 tons of soil per year are considered highly erosive. GRAIP Lite is the Geomorphic Roads Analysis and Inventory Package (GIS only version) developed by the US Forest Service Rocky Mountain Research Laboratory. More information on the assessment method can be found here: https://www.fs.usda.gov/research/rmrs/projects/graiplite

All road maintenance and reconstruction (routine and heavy maintenance) activities will be completed in accordance with applicable Forest Service Handbooks (FSHs) and Manuals, Region 3 State Historic Preservation Office (SHPO) Programmatic Agreement, standards, guidelines, specifications, laws, regulations, and policies. Maintenance of NFSRs may include activities described in FSH 7709.59 such as the following: road blading, drainage structure maintenance, spot borrow and surfacing, clearing of roadside vegetation.

Table 3. Summary of Existing Roads in the EVLRP Area

Encino Vista Project Area Roads	Miles
NFSRs in the project area	761
NFSRs on the MVUM in the project area	362
NFSRs admin use only in the project area	204
NFSRs ML-1 in the project area	195
NFSRs ML-2 in the project area	486
NFSRs ML-3 in the project area	78
NFSRs ML-4 in the project area	1
Unclassified / Unauthorized Routes	44

In 2008, to meet subpart A of the Travel Management Regulation (36 CFR Part 212), the SFNF produced a Travel Analysis Report (TAR)[2], which analyzed and identified a minimal transportation system for the entire Forest, including the EVLRP area. The TAR for the SFNF (USDA 2008) describes the Travel Analysis Process (TAP), which informs future project decisions related to motorized travel management. Development of the TAP was a comprehensive undertaking to match the transportation system to the desired future condition, as determined through existing direction, public input, and agency resource specialist suggestions. As documented, in the TAR, the TAP provides a comprehensive review and technical recommendations for changes to the existing road system and motorized trail network. The TAP is not a NEPA process; it is an integrated ecological, social, and economic approach to transportation planning, addressing both existing NFSRs and future roads. In accordance with the TAR, a project specific analysis identifies recommended road changes (such as decommissioning, changing the road's classification) that are directly related to achieving the purpose of the project.

Desired Conditions

Within the project area, a well-designed and minimal transportation system[3] is desired. The desired parameters include:

- Provide safe transport.
- Accommodate public access.
- Accommodate access for land management and permitted activities.
- Not adversely affect infrastructure, natural or cultural resources.
- Not hinder the movement of wildlife or aquatic species.

[2] The Travel Management Subpart A report (Travel Analysis Process Report) and additional information can be found here: https://www.fs.usda.gov/detail/santafe/landmanagement/projects?cid=stelprdb5362576

[3] Minimum transportation system- The minimum road system needed for safe and efficient travel and for the administration, utilization, and protection of National Forest System lands (36 CFR 212.5(b)(1)).

Actions proposed under the EVLRP decision will include measures to adequately close both unclassified routes and ML-1 routes, as well as improve NFSRs to aid in watershed restoration efforts where feasible, based on the most critical need (Appendix F). Proposed treatment areas are described in the following section (Section 1.3.6, Table 4).

1.3.6 Watersheds

Existing Conditions

The project area contains portions of eleven subwatersheds (hydrologic unit code (HUC) 12 watersheds). The majority of the project area (73 percent) is within four subwatersheds: Cañones Creek, Coyote Creek, Headwaters Rio Puerco and Poleo Creek which provide water resources to the communities of Coyote, Youngsville, Cañones and Abiquiu.

Watershed condition is the state of the physical and biological processes within a watershed; these processes affect soil condition and hydrologic function, which in turn support ecosystems. Watershed condition can be represented by a continuum from naturally pristine to degraded. Naturally pristine indicates the watershed characteristics (e.g., soil condition, ground cover, etc.) which capture, store, and release water, are functioning, ensuring these processes occur at rates similar to those in undisturbed, natural systems. The U.S. Forest Service classifies the condition of subwatersheds into one of three condition classes based on the quality of aquatic and terrestrial habitat: Functioning Properly, Functioning at Risk, or Impaired.

None of the project area watersheds are Functioning Properly and the majority are Functioning at Risk meaning they exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Three watersheds (Cañones Creek, Rito Peñas Negras, and Headwaters Rio Cebolla) are Impaired, meaning they exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition (Table 4). Eight of the eleven watersheds have streams impaired by temperature, nutrients, sedimentation/siltation, and turbidity pollutants (USDA, 2023b).

Table 4. Summary Table of Road Erosion and Delivery, by Watershed

Watershed	Watershed Condition	Road Density (mi/mi^2)	Percent watershed area within project area	Miles of OPEN Road Eroding (>0.25 tons per year)	Percent Delivering Sediment to Streams	Miles of CLOSED Road Eroding (>0.25 tons per year)	Percent Delivering Sediment to Streams
Coyote Creek	Functioning at Risk	4	95%	41	29%	45	30%
Cañones Creek	Impaired Function	3.2	75%	28	26%	31	26%
Headwaters Rio Puerco	Functioning at Risk	3.6	65%	61	27%	73	34%
Poleo Creek	Functioning at Risk	4.5	60%	35	18%	38	26%

The existing condition of project area watersheds not only reflect departed forest structure and fire return interval, but also road condition and density; project area watersheds have some of the highest road densities on the Forest. A dense road system is likely to disrupt the natural hydrologic network and processes by re-routing water, eroding, and contributing sediment to streams.

The Northern New Mexico Riparian, Aquatic and Wetland Restoration (NNM-RAWR) project decision signed in July 2021 analyzed for road erosion control, relocation, and decommissioning of administratively used and non-system roads / unclassified routes to hydrologically disconnect them from stream networks. These treatment actions will be considered and implemented, where appropriate, under the NNM-RAWR decision.

Desired Conditions

It is desired that project area watersheds are resilient to stressors including climate change. This means they would be "properly functioning[4]" in that they would:

- Provide a wide range of sustainable ecosystem services including abundant clean water (that meets or exceeds the state's water quality standards and provides for the attainment of designated uses).
- Recharge aquifers.
- Sustain flow regimes (magnitude, timing, duration, frequency, and rate of change) to maintain or enhance essential ecological functions.
- Maintain long-term soil productivity.
- Exhibit a high degree of connectivity where instream flows provide for channel and floodplain maintenance.
- Exhibit stream channel geometries appropriate for the landscape setting.
- Provide for high biotic integrity including connectivity amongst fish populations.

[4] The Santa Fe National Forest analyzed the condition of all watersheds on the Forest in 2016. See https://www.fhm.fs.fed.us/publications/watershed/watershed_classification_guide.pdf for more details on the analysis and metrics.

1.3.7 Wildlife, Fish and Rare Plants

Existing Conditions

A wide diversity of wildlife, fish and rare plant species occur within the project area, including twenty-six At-Risk species (refer to Section 3.8). Two of the species are federally listed under the Endangered Species Act (ESA); Threatened Mexican spotted owl (MSO) (*Strix occidentalis lucida)* and Endangered Jemez Mountain Salamander (JMS) (*Plethodon neomexicanus).* Remaining At-Risk species include twenty-four Species of Conservation Concern (SCC). The SCC species include three fish, one invertebrate, six birds, five mammals and eight plants. Refer to Appendix A to review the SCC species list and the SCC LMP Consistency Report for this project.

Wildlife, fish and rare plant habitat (referred to as 'wildlife habitat') occurs in various states of functionality and condition within the project area. In many cases, existing conditions within forests, woodlands, riparian areas and grasslands are highly departed from historic conditions. Many forested habitat types trend towards less suitable wildlife habitat due to high tree density, lack of old trees, damage from past land uses and lack of open tree canopies. The trend toward closed canopy conditions, higher density of small trees, fire suppression and conifer encroachment into open areas has contributed to increased vertical fuel continuity and unnatural fuel loading over time. Wildlife habitat within the project area has become less suitable as diversity decreases, conifer density increases, and the risk for large, high-intensity, high-severity wildfire risk increases across the Forest. The current risk for large, high-severity fire poses a substantial threat to At Risk species habitat and viability across the project area.

Current forest conditions limit wildlife habitat diversity and quality. However, unnaturally dense forested stands and a closed canopy structure do offer habitat for some wildlife species such as MSO. These same areas offer poor habitat for many species that rely on healthy herbaceous understory for forage, calving or nesting areas such as migratory birds and native ungulates, among others. There is a need to maintain or enhance native understory vegetation and a diversity of habitat components for the wide variety of species that utilize this area.

Desired Conditions

The desired conditions in reference to wildlife habitat are complex. Conditions that provide for a resilient forest ecosystem include a mosaic of forest stand heterogeneity consisting of a diversity of vegetation species, assemblages, patch sizes, age classes, densities, openings and distributions. All of these components can provide dynamic wildlife habitat for species that utilize the project area. Moving toward desired conditions, as outlined above for the ERUs (see Chapter 1), would also improve general wildlife habitat. For example, creating more open stand conditions and openings would stimulate the growth of an herbaceous understory that provides forage, while still retaining areas of denser growth and closed canopy would maintain habitat for species like MSO and some migratory birds. Restoring forest structure with multiple age classes and retaining snags in many project activities would also provide a diversity of habitat types for general wildlife species. Similarly, reaching the desired conditions for wildfire risk would also help protect wildlife habitat from being destroyed in a catastrophic wildfire.

Mexican Spotted Owl

The project area lies with the Southern Rocky Mountains ecological management unit (SRM EMU) for the MSO. EMUs are geographical subdivisions of the owl range established by the U.S. Fish and Wildlife Service (USFWS) to organize owl recovery efforts. At the time of publication of the MSO Recovery Plan, the SRM EMU contained approximately 5.6 percent of MSO owl sites known to occur in the U.S. and in Mexico (USFWS, 2012). Recovery habitat is defined as MSO habitat outside of protected activity centers

(PACs) occurring in mixed conifer, riparian forests, and/or rocky canyons (USFWS, 2012). Forested recovery habitat includes mixed conifer forests outside of PACs. Mixed conifer forest within and adjacent to steep rocky canyons is the primary habitat type used by MSO in the project area for nesting, roosting, foraging, dispersal, or other life history needs. Ponderosa pine forest and other habitats, such as Piñon-Juniper woodlands, may be used for foraging, dispersal, and wintering and are known as other woodland types within the recovery plan. Desired conditions for each MSO habitat are outlined in the MSO Recovery Plan (USFWS, 2012). Desired conditions and methods for the applicable MSO habitat types present within the proposed project area are further discussed in the Threatened and Endangered species section of this document.

Jemez Mountain Salamander

JMS are known to occur in a small proportion of the project area mainly north of the Valles Caldera National Preserve boundary. Detections for the species have only occurred in the highest elevations of the project area. Due to the cryptic nature of JMS and its' fossorial life style, spending the majority of life underground, desired condition information for the species is lacking. Expected desired conditions and methods for the applicable JMS habitat types present within the proposed project area are further discussed in the Threatened and Endangered species section of this document.

Species of Conservation Concern (SCC)

Desired conditions for SCC are found within the SFNF LMP (USDA, 2022b) and are addressed in the SCC LMP Consistency Report (Appendix A).

1.3.8 Recreation and Scenery

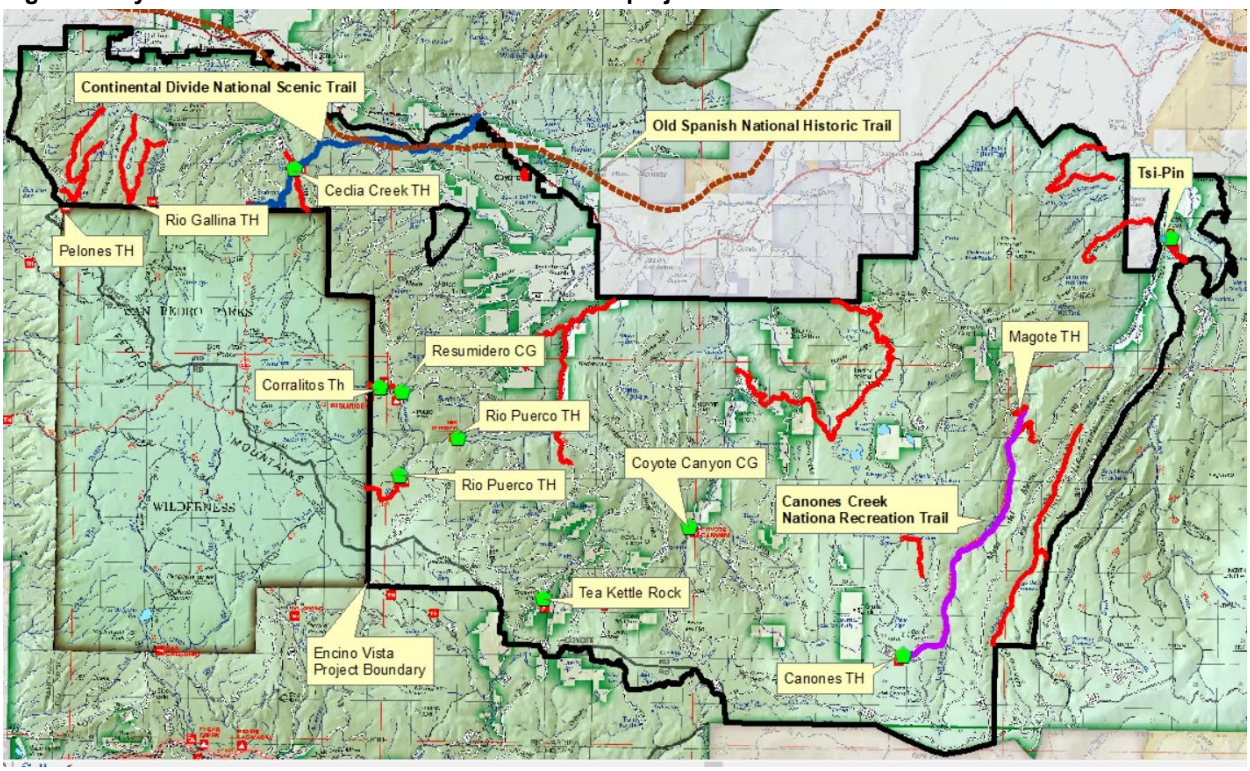
Existing Conditions

The EVLRP area is within the Coyote Recreation Area on the SFNF. Approximately 1.3 million people visit the forest annually and the primary reason for visiting is recreation. The most popular activities within the EVLRP area for visitors include hiking and walking, horseback riding, viewing natural features, viewing wildlife, relaxing, driving for pleasure, nature study, hunting, fishing, camping, and picnicking.

Key recreation and scenic features within the project area include:

- The Continental Divide Trail (one of 11 National Scenic Trails in the nation)
- The Cañones National Recreation Trail
- The Spanish Trail (one of 21 National Historic Trails in the nation)
- The Cañones Creek (listed as 'eligible' as a Wild and Scenic River)
- Tea Kettle Rock (landmark scenic and cultural feature on the Coyote Ranger District)
- Resumidero Campground (Gateway to the San Pedro Parks Wilderness)
- Tsi-pin (National register cultural site available for visitation by permit)

Figure 2 Key recreation and scenic features within the project area



Additional detailed recreation/scenery conditions within the project area are described in Chapter 3.

Desired Conditions

The SFNF LMP (USDA, 2022) provides for desired conditions for recreation and scenery with objectives, guidelines, and management practices for general recreation, developed recreation and dispersed recreation. There are also similar objectives, guidelines and management practices for special categories of national trails, scenery, and wild and scenic rivers, both existing and proposed.

The Recreation Opportunity Spectrum (ROS) is used to describe the type of experience a user may have in the forest from the most primitive to the most developed. The project area is within the spectrum between these two extremes and is described in detail in Chapter 3. These create a diversity of recreation and scenic opportunities and serve as a key marker for the desired conditions for recreation. Mitigations have been developed to lessen the potential for these settings to change and meet desired conditions, as described in Appendix C. Some critical PDFs (Project Design Features) include prohibiting new permanent roads, unauthorized trails, and not impacting existing trails.

There are also specialized desired conditions for key recreation and scenic features; namely the Continental Divide Trail, the Spanish Trail, and the Cañones Recreation trail associated with Cañones Creek, which is eligible as a Wild and Scenic River. The three classifications of trails, National Scenic, National Historic, and National Recreation are all included for trails within the project area. Mitigations to avoid impact, or to improve the desired conditions of these trails are found in Appendix C. These mitigations all protect the viewshed and integrity of the trail itself.

Desired conditions for scenery are associated with the scenery integrity objectives that were developed for all landscapes within the forest. They are defined by how much alteration has occurred to the existing scenic character of the landscape. Desired conditions for scenery are focused on protecting or improving

the existing scenic character. The four scenic integrity objectives are very high, high, moderate, and low. These are described in detail in Chapter 3. Desired conditions for scenery within the project area are particularity focused on the Nationally designated trails and proposed eligible wild and scenic river, Cañones Creek.

Cañones Creek has been listed as eligible as a Wild and Scenic River in the SFNF LMP (USDA, 2022b). Eligible wild and scenic rivers must be managed to protect or enhance the outstanding resources values for which they were determined to be eligible, and to maintain their classification until they are designated or released from consideration. Therefore, the proposed action must not impact and degrade these values. Proposed mitigations and PDFs are listed in Appendix C.

The outstanding resource values for the Cañones Creek are:

- Recreation – Cañones National Recreation Trail, Opportunities for solitude, scenery, and wildlife viewing.
- Scenery - Values related to the enclosed canyon with mesas defining the rims.
- Botanical - Presence of little leaf buttercup.
- Fish- Genetically pure Rio Grande Cut Throat Trout.
- Prehistory – Nearby important cultural site: “Tsi’Pin.”

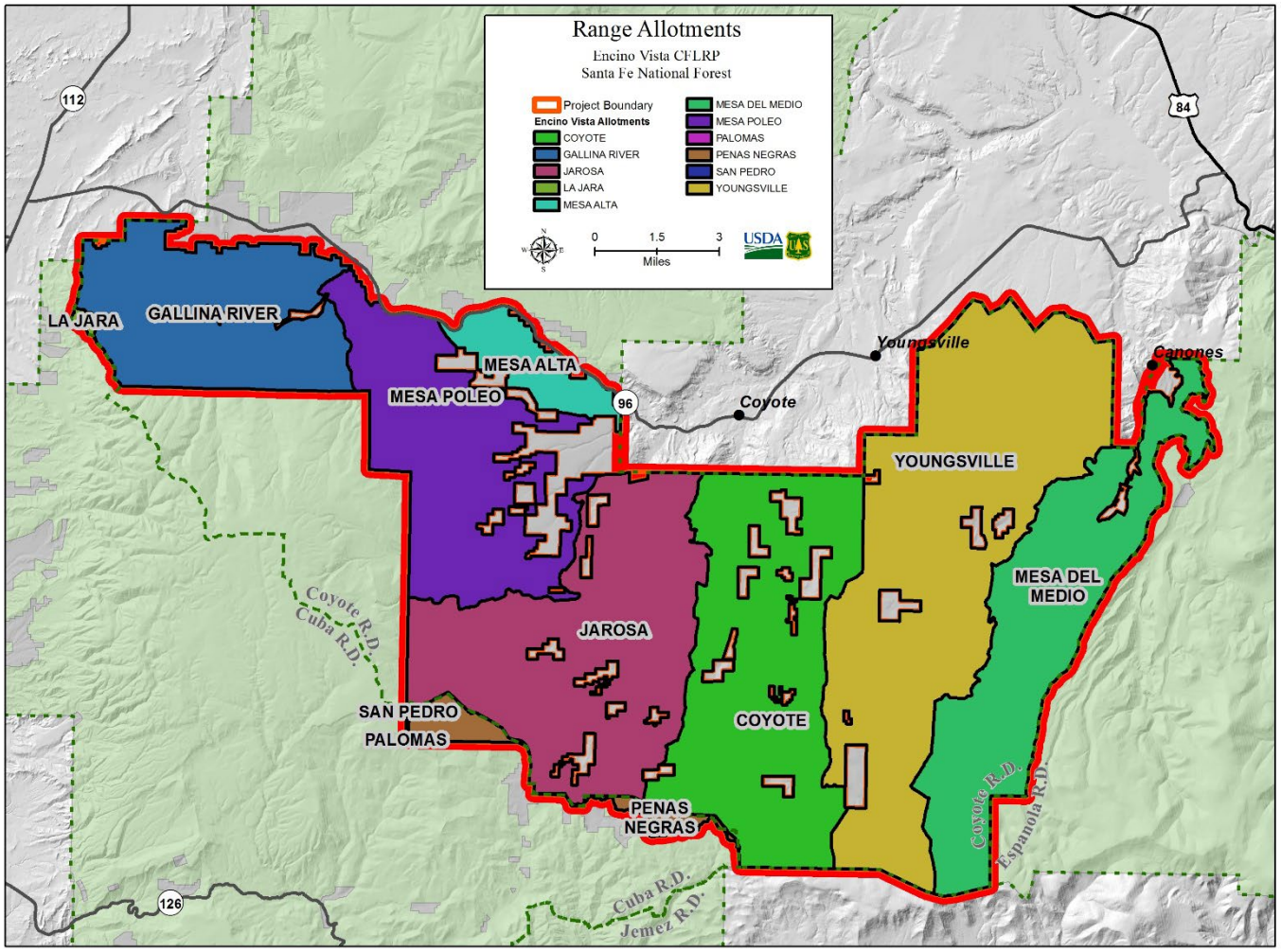
1.3.9 Range

Existing Conditions

There is a long history of ranching and farming in the area prior to the establishment of the SFNF. The ranching tradition in northern New Mexico is long standing, enduring across many generations (USDA, 2022). The EVLRP area is no exception and ranching and livestock grazing continue to be traditional cultural values in the rural communities on the Coyote Ranger District. The EVLRP area contains all or part of 13 grazing allotments: Chicoma, Coyote, Gallina River, Jarosa, Mesa Alta, Mesa Del Medio, Mesa Poleo, Palomas, Penas Negras, Polvadera San Pedro & Youngsville. (Figure 3).

This Environmental Assessment does not analyze grazing permits, grazing allotments, maximum forage consumption or provide for any other type of rangeland decision. Rangeland management on these allotments are addressed in previous NEPA decisions. This Environmental Assessment does analyze the potential impacts of the No Action and Proposed Action alternative on grazing and invasive species. Additionally, this document analyzes issues that were brought forward during public scoping for the proposed project in 2019, as well as the proposed project effects on invasive species and how to minimize their introduction and spread.

Figure 3 Grazing allotments within the EVLRP area.



Desired Conditions

Although this project will not include a range management decision, the SFNF LMP (USDA, 2022b) provides guidance for desired conditions for forest activities relating to grazing. The SFNF strives for sustainable and resilient landscapes which provide for ecosystem sustainability and resiliency. Forest activities should provide for wildlife and rangeland forage, native plant communities, and diverse age classes of shrubs, grasses and forbs relative to site potential, diverse. As well as maintaining grazing opportunities that contribute to social and economic sustainability of the local agricultural business and local employment, as well as traditional and generational ties to the land.

1.3.10 Air Quality and Climate

Poor air quality adversely affects humans, ecological resources, and other values (e.g., scenery) on NFS lands. The goal of air quality management is to meet regulatory standards that protect human health, the environment, and visibility, as well as address and respond to other air quality concerns, such as atmospheric deposition of pollutants in the forest. Human health and environmental standards are defined

in the National Ambient Air Quality Standards (NAAQS) set by the Environmental Protection Agency (EPA) for six common pollutants that are harmful to public health and the environment: carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide, and particulate matter (PM_{10} and $PM_{2.5}$). PM_{10} is particulate matter with a diameter of 10 micrometers or less and $PM_{2.5}$ is particulate matter with a diameter of 2.5 micrometers or less (USDA, 2022b).

Existing Conditions

As stated in the SFNF LMP (USDA, 2022b), "Air quality and visibility conditions in the SFNF are within regulatory levels and the trends based on projected emission inventories appear to be stable or improving for most pollutants. In fact, the air quality the public experiences in and around the forest is typically some of the best in the country. The main challenge in the future to both the ambient air quality and visibility in the forest could come from land use both on and off the forest, climate change and drought, which can contribute to windblown and fugitive dust; and wildfires, which can be a significant source of particulate matter."

The SFNF is experiencing adverse effects of anthropogenic climate change such as extended and severe drought, higher temperatures, and increased size and severity of fires, and will likely be impacted by additional climate change effects in the future. Wildfire risk is elevated due to altered forest stand structure (and composition), where densely forested conditions and increased fuel loadings have developed over time when coupled with the absence of historical fire events in frequent fire systems, and altered temperature and precipitation patterns creating conditions conducive to fire ignition and spread.

Desired Conditions

Regarding air quality, desired conditions direct that air quality meets or surpasses New Mexico and Federal ambient air quality standards. Regarding climate change, desired conditions for this project include simultaneously increasing resistance and resilience to the effects of climate change while also minimizing contributions to climate change through project activities (e.g., emissions, carbon release) to the extent possible. The proposed project works toward meeting these desired conditions through reducing the risk of a large, severe wildfire occurring within or in proximity to the treated environment, retaining a forested condition (e.g., avoid land use change, widespread tree mortality, or type conversions which can occur after severe disturbance) to retain above-ground carbon on the landscape in living, growing trees, and by promoting healthier forests which can withstand changes in temperature, precipitation, and extended drought conditions, while sequestering carbon from the atmosphere. Working towards desired conditions would also include maintaining stable belowground carbon storage within the project area through the use of project design features that minimize soil disturbance during project activities.

1.4 Decision to be Made

Based on the purpose and need for the EVLRP, the scope of the project is limited to a decision focusing on vegetation and road management. Based on the analysis in this EA, the Coyote District Ranger (responsible official) will decide:

- If the proposed management activities combined with design criteria, would have significant impact(s) that would trigger the need to prepare an Environmental Impact Statement (EIS).
- Whether the proposed management activities combined with project design criteria would have no significant impact(s). If the responsible official decides to carry out activities, the responsible official will decide on the amount and type of activities within the range of alternatives analyzed

(36 CFR 220.4(c)(5)). Then the responsible official will determine whether to move forward by issuing a Finding of No Significant Impact (FONSI) and Decision Notice (DN).

1.5 Public Involvement

The SFNF initially added this proposed project to the Schedule of Proposed Actions (SOPA) in January 2019 and it was originally listed as the Cañones Vegetation Project (USDA, 2019b). The project name was changed to EVLRP in the July 2019 SOPA. Public meetings were held on October 2, 2019 and December 11, 2019 to solicit public input in designing the proposed action. The SOPA is posted online and also distributed to interested individuals, groups, state and local agencies, and Native American tribes and can be accessed on the SFNF Website at: http://www.fs.usda.gov/santafe. The initial detailed project proposal was provided to individuals, groups, and agency representatives, for comment during scoping on November 19, 2019 and can also be accessed on the project webpage at: https://www.fs.usda.gov/project/?project=54965.

1.6 Tribal Consultation

The first round of scoping for Tribal consultation under NEPA occurred via correspondence sent on November 15, 2019 from former Coyote District Ranger Rich Nieto. The original tribal consultation letter was sent to leadership from the following federally recognized Nations and Pueblos: the Jicarilla Apache Nation, the Torreon and Star Lake Chapters of the Navajo Nation, the Ohkay Owingeh Tribe and to the Pueblos of Cochiti, Jemez, Nambe, Pojoaque, San Felipe, San Ildefonso, Sandia, Santa Ana, Santa Clara, Santo Domingo, Tesuque, and Zia. There were no responses to this letter.

On September 20, 2021, National Historic Preservation Act Section 106 consultation requests from Coyote District Ranger, Mark Sando, were sent to leadership and staff of the following federally recognized Tribes, Nations and Pueblos: the Commanche Nation of Oklahoma, the Hopi Tribe, the Jicarilla Apache Nation, the Ohkay Owingeh Tribe, the Ute Mountain Ute Tribe, the Southern Ute Tribe and the Pueblos of Picuris, Pojoaque, Nambe, Jemez, Nambe, San Ildefonso, Santa Clara, Tesuque, Zuni and Taos. Responses expressing appreciation for the outreach and a desire to be kept informed were received from the Hopi Nation and the Pueblo of Pojoaque on October 5 and 14, 2021 respectively.

When the project was ‘reinitiated’ under the new LMP in 2022, previous scoping information was reviewed and incorporated into this EA (Section 1.7). Updated trial consultation letters were sent out on February 23, 2024 to 22 federally recognized Nations and Pueblos, prior to release of the draft EA for public comment.

1.7 Scoping Issues

Thirteen comments were submitted in letters and emails (USDA, 2019e). The interdisciplinary team (IDT) reviewed all of communications that were received. Comment summary is provided below and further detail is provided in the Encino Vista Scoping Content Comment Analysis, available online at https://www.fs.usda.gov/project/?project=54965.

After considering all scoping comments received, the deciding official determined that no significant issues were presented and decided to move forward with development of an Environmental Assessment.

Table 5. Scoping comments issues and topics with location of topic.

Area of Concern	Topics Commented	Resource information location
Riparian Health	Non- Native Species, Riparian protection	Chapter 3.11
Wildlife	Jemez Mountain Salamander, Migratory Bird Treaty Act, Sensitive Species, Mexican Spotted Owl (MSO), Habitat	Chapter 3.8, Appendix A; Appendix B; Appendix C
Vegetation Management and prescribed fire	ERUs, use of small animal ruminants Diameter caps, aspen & meadow treatments, implementation, slash management, snag retention, old growth, use of fire, fuelwood, Southwestern White Pine,	Chapter 3.2; Chapter 3.3, Appendix C
Archaeological and Cultural areas of importance	Cultural surveys and protections	Chapter 3.7
Roads	Travel Management, new road construction, temporary roads, social roads, decommissioning of roads, road improvements,	Chapter 3.4, Appendix C
Soils	Soil compaction	Chapter 3.11, Appendix C
Public Health	Smoke from prescribed fires	Chapter 3.3; Appendix C
NEPA	More detailed maps, additions to project development, mitigation measures, best available science, need for EIS, public involvement, Forest plan amendment	Chapter 1, Appendix C; Appendix D
Social/ Econ	Community involvement	Chapter 3.13
Rangeland management	Incorporation into proposed action, impacts on grazing	Chapter 3.9
Water	Water quality in streams and acequias, water quantity,	Chapter 3.11, Appendix C; Appendix D
Climate Change	Impacts on forest resources, mycorrhizal fungi, climate disruption	Chapter 3.6; Chapter 3.10
IRAs	Details on IRAs, IRA protections	Chapter 3.12

Chapter 2: Proposed Action and Alternatives

2.1 Alternatives Considered and Eliminated from Detailed Study

During project scoping, scoping comments resulted in one recommended alternative, The Santa Fe Conservation Alternative (Encino Vista Scoping Content Comment Analysis, 2020).

- **Thinning**
    - Limited hand thinning (up to 9") only in dry pine and mixed conifer outside of IRAs.
    - Stumps cut down to the ground.
    - No thinning adjacent to the WUI for the purpose of protection of structures or communities except within 150 feet of structures, and for fire fighter safety zones.
    - Maximum trees removed in most thinned areas to 80 BA.
    - Leave more tree groupings (50% minimum) and maintain a shrub understory. Utilize a wildlife habitat-based determination of tree and vegetation retention.
    - Identify riparian area concerns and create plan to protect.
- **Slash management**
    - Pile burning of activity fuels.
    - Reevaluate slash management timing and methods to avoid potential bark beetle outbreaks, and sterilization of soil under slash piles. No slash over 3" left on the ground during the dry season.
- **Prescribed burning**
    - Utilize managed wildland fire and pile burning wherever possible. Utilize minimal broadcast prescribed burns only in areas that are not accessible for pile burns.
- **IRAs**
    - No thinning in IRAs
    - Identify Roadless Area concerns and develop a policy to restore.
- **Monitoring** (key means of reaching desired outcomes of healthy forest habitat and protection of public health)
    - Test plots for monitoring purposes
    - Soil sampling - plot number and spacing to be determined.
    - Baseline species evaluation (i.e. population capacity and presence/absence)
    - Improved air quality standards and monitoring to protect sensitive (human) population.
- **Reclamation and restoration**
    - Reclamation of any USFS roads deemed unessential in Travel Management Plan
    - Hand building of structures (example Zuni bowls) in arroyos to slow flood waters
    - Planting native, stream side vegetation where appropriate to slow floodwaters
    - Reintroduction of beaver where appropriate
- **WUI and community forests**
    - Develop a program to support fire-proofing of structures and surrounding 100 feet, at least through increased outreach and education. This should be a homeowner responsibility.

  - If possible, support development of an alternative egress for communities with a single egress
  - Leave most areas that the public uses for recreation, including forests adjacent to communities, natural and intact
  - Take into greater account the need to preserve areas that are special to communities, such as Cougar Canyon
  - Increased law enforcement to protect against unsafe fire behavior by forest visitors.
- **Scenic quality**
  - Maintain the scenic quality of all treated areas. Develop a standard for acceptable scenic quality.

This alternative was reviewed by the EVLRP IDT and was eliminated from further consideration, based on the rationale provided below.

Does not Meet the Purpose and Need

Recommended element: Thinning - Limit thinning (up to 9-inch dbh) to only dry pine and mixed conifer outside of IRAs. No thinning adjacent to the WUI except within 150 feet of structures and for fire-fighter safety zones.

Rationale for dismissal: Removing understory trees would be effective at reducing the stocking of ladder fuels within treated stands. However, it can be expected that crown bulk densities would not be substantially changed from the implementation of these treatments. As a result, it can be reasonably expected that there would be little to no substantial change on the risk of active crown fire within treated stands following a 9-inch dbh cap. The effects of this treatment are expected to be rather short-lived, meaning effects would diminish as regeneration reestablishes within treated stands.

Recommended element: Maximum trees removed in most thinned areas to 80 BA.

Rationale for dismissal: This recommended alternative element does not take into account the different ERUs that occur in the project area. The recommended 80 BA target may be an acceptable lower limit for a target post-treatment BA range for the spruce-fir and mixed conifer with aspen ERUs. However, the target is on the higher end of the desired stocking range for the mixed conifer-frequent fire ERU and just within the desired range for ponderosa pine forest ERU (see Table 6).

Given local growth rates, it can reasonably be expected that stand stocking would be in excess of desired range within 10 to 20 years after initial vegetation thinning treatment of mixed conifer-frequent fire and ponderosa pine stands, depending on factors such as tree size, species composition, and relative health and vigor.

The suggested 80 BA threshold for treatment does not accurately reflect existing conditions and desired conditions within the project area. For example, an even-aged ponderosa pine stand of 5-inch dbh trees could have roughly 600 TPA and be stocked to roughly 80 feet² per acre (80BA). This stand would be at a 44% relative density index (RDI) or percentage of maximum stand density index and would be considered to be “High Density.” An even-aged stand of 12-inch dbh ponderosa pine trees would be stocked with approximately 100 TPA. This stand would have a 30% RDI and would be considered to be of “Moderate Density.” Finally, a stand of 24-inch dbh ponderosa pine trees would be stocked to approximately 25 TPA, would have an RDI of 24%, and would be considered to be just on the edge of “Low Density” and “Moderate Density.” Stands with high RDI are characterized by overcrowding, higher mortality and lower vigor, leading to poor forest health and limited resiliency to disturbance. Thus, a blanket target of 80BA across these variables would not be desirable treatment target to meet the purpose and need of the proposed project. Sources used to inform this response are Curtis 1970, Long 1985, and Triepke et al. 2011.

Recommended element: Leave tree groupings (50% minimum) and maintain a shrub understory.

Rationale for dismissal: The recommendation to leave tree groups of 50% minimum and maintain shrub understory is not consistent with the desired conditions for the project area described in the 2022 SFNF LMP. There are 10 different ERUs within the project area with significant variation in structural and species diversity, and native understory composition; this recommendation does not reflect this diversity and the treatment needs necessary to reach desired conditions of all ERUs. The purpose and need for this project is to restore the ecological process of fire to a landscape that has not seen fire in multiple decades. This lack of fire has led to high tree densities that require thinning prior to the safe and effective reintroduction of fire to the landscape. Targeting smaller diameter ladder fuels with thinning facilitates the application of prescribed fire, allows safe access for firefighters and aids in mitigation of crown fire potential.

If the intent of this comment was to suggest that 50% of any particular treatment area be left as tree groupings, then this alternative would not meet the purpose and need for this project because these conditions would facilitate crown fire spread during a wildfire.

Recommended element: Pile burn activity fuels.

Rationale for dismissal: The limitation of pile burning only for the disposal of activity fuels would limit the ability of the forest restoration and resiliency treatments to shift the project area towards the desired conditions identified in the EA Chapter 1. The ecological process of fire is thoroughly documented in literature specific to the SFNF (Margolis and Balmat 2009; USGS 2020). Broadcast prescribed fire would be utilized in frequent fire ERUs where this ecological process is recognized.

Recommended element: Utilize managed wildland fire and pile burning. Minimal use of prescribed fire.

Rationale for dismissal: The recommendation for minimal use of prescribed fire would limit the ability of the U.S. Forest Service to implement forest restoration and resiliency treatments to shift the project area towards the desired conditions identified in the EA Chapter 1 because prescribed fire is a cost-effective tool that allows for treatment of larger areas when compared to the use of pile burning only. Similarly, given current vegetation conditions, the use of prescribed fire presents less risk as a management approach for the project area when compared to the use of managed wildland fire. Once vegetation conditions are changed, using wildland fire as a tool becomes more feasible.

Recommended element: No thinning in IRA.

Rationale for dismissal: Approximately 13,024 acres (10%) of the total project area consists of IRAs. Based on the IDT review and analysis conducted for the EVLRP Proposed Action, it is expected to at the least maintain the nine roadless area values and characteristics identified for IRAs in the project area as defined in the 2001 Roadless Area Conservation Rule.

Recommended elements: Identify IRA concerns and develop policy to restore. Reclamation of U.S. Forest Service roads deemed unessential in the SFNF's Travel Management Plan.

Rationale for dismissal: The recommended elements to a) identify IRA concerns and develop a policy to restore and b) reclaim roads deemed unessential would not meet the purpose and need the EVLRP project. An analysis of IRAs and road improvements is included in this analysis. It is in the prevue of the SFNF to enforce the Travel Management Plan while implementing the EVLRP.

Recommended elements: Monitoring for reaching desired outcomes of healthy forest habitat and protection of public health.

Rationale for dismissal: The US Forest Service has National policy which guides monitoring implementation of NEPA decisions (FSH 1909.15). The 2022 SFNF LMP will also guide monitoring for reaching desired conditions and reducing wildlife species impacts from proposed actions. Monitoring has been included in the development and planning of the EVLRP.

Outside the Scope of the Encino Vista Landscape Restoration Project

Recommended element: Hand build structures in arroyos to slow flood waters.

Rationale for dismissal: The hand building of structures in arroyos is outside the scope of the EVLRP. Actions included in the Northern New Mexico Riparian, Aquatic, and Wetland Restoration Project that may be occurring within the project area concurrently with project activities are covered under a separate decision and as a result, were not included as a part of this NEPA analysis.

Recommended element: Reintroduce beaver where appropriate.

Rationale for dismissal: The reintroduction of beaver is outside the scope of the EVLRP and would not meet the purpose and need for the project. The reintroduction of beaver in the Jemez Mountains could be considered under a different proposed project that has better-aligned goals and objectives. In addition, any proposed project involving the reintroduction of wildlife populations would be conducted by the New Mexico Department of Game and Fish.

Recommended element: Increase law enforcement to protect against unsafe fire behavior.

Rationale for dismissal: Law enforcement to address unsafe fire behavior is an administrative action and does not require review under NEPA to implement. The SFNF implements measures to manage for unsafe fire behavior, such as closing the SFNF to the public when fire danger is high. These measures can be taken without being included in the EVLRP Proposed Action or alternatives.

Recommended element: WUI program to support “fire proofing” and defensible space.

Rationale for dismissal: Developing a WUI program for completing mitigation activities on private lands is outside the jurisdiction of the U.S. Forest Service.

Recommended element: Develop alternative egress.

Rationale for dismissal: Developing alternative egress for NFS lands is an action for Travel Management Planning and is outside the scope of the EVLRP EA.

Recommended element: Preserve community valued areas- Cougar Canyon

Rationale for dismissal: The area described as Cougar Canyon is outside of the EVLRP area. Other specific areas valued by the community have not been identified through scoping comments.

2.2 No Action Alternative (Alternative A)

Forest Service NEPA regulations allow an EA to document consideration of a no action alternative by utilizing the effects analysis to compare the impacts of the proposed action and the current condition with expected future conditions if the proposed action were not implemented (CFR 220.7(b)(2)(ii)). This EA includes an analysis of the no action alternative to provide a baseline for comparing the effects of the proposed action alternative and a clear description of why the no action alternative would not meet the purpose and need for the project.

Under the no action alternative, none of the proposed treatments or activities described in the Proposed Action alternative would occur. There would be no progress in moving stand structures, species composition, tree densities, forest health issues and other forest conditions towards desired conditions as outlined in the 2022 LMP and no actions to address potential threats of uncharacteristic wildfire.

2.3 Proposed Action Alternative (Alternative B)

Current conditions within the project area do not meet desired conditions as described in the 2022 SFNF LMP. The SFNF proposes to identify and implement vegetation management and road treatments within the EVLRMP area. Within the total project area of 130,305 acres, there are approximately 74,693 acres of stands suitable for varying treatment types which include: mechanical thinning, hand thinning, mastication, fuels redistribution, and use of prescribed fire. The total treatment area represents approximately 57 percent of the EVLRP acreage.

Under Alternative B, part of the proposed action includes conducting commercial and non-commercial vegetation thinning using mechanized equipment and / or hand crews. This alternative proposes management of forest density, species composition and structure by implementation of uneven-aged group selection cutting in specified areas. Prescribed fire would be used to reduce natural and activity fuels in both thinned and un-thinned areas. Opportunities for timber or other biomass products would be produced, and costs would be incurred for thinning and burning treatments under Alternative B.

2.3.1 Treatment Types Proposed – Silvicultural Prescriptions

Group Selection Thinning with Regeneration Opening

Key elements of this treatment create residual groups of trees, scattered individual trees, and open grass-forb shrub interspaces between tree groups. This silvicultural treatment would remove selected groups of trees to promote the health and vigor of selected residual trees and clumps of trees that meet the desired species composition, tree form, and size distribution to be carried over into the post-harvest stand.
The intermediate group selection method would be used on both existing uneven and even-aged stands. By creating small gaps and regeneration openings, advance regeneration can be recruited into the newly available growing space and create additional age classes (Smith et al., 1997). This can be used to move even aged stands toward an uneven condition, starting as two aged stand 10-15 years after treatment and eventually, with additional entries, three or more age classes. Existing uneven-aged stand structures would be maintained as uneven-aged stands and managed over time to develop a balance of age classes in a mosaic of tightly interspersed structural groups. All trees greater than 24” in DBH would be retained regardless of health or condition.
Objectives for treatment within the ponderosa pine, dry mixed conifer, wet mixed conifer, and spruce fir are to:

- Reduce overall stand density to improve health and vigor.
- Promote an uneven-aged structure.
- Reduce fuel loading and the threat of uncharacteristic wildfire.

Table 6 displays the prescriptive elements for each ERU that is prescribed a group selection and any alterations to the treatment made by habitat requirements.

Table 6: Prescriptive summary for each ERU utilizing group selection silvicultural method.

Prescriptive Element	Ecological Response Unit			
	Ponderosa Pine	Dry Mixed Conifer	Wet Mixed Conifer	Spruce Fir
Target Residual BA	20-80	30-100	60-150	80-150
Residual Tree Group/Clump Size	2-40 trees and typically <1ac	2-40 trees and typically <1ac	.25-2 acres	.25-5 acres
Interspace Distance Between Groups/Clumps (Tree Lengths)	1-2	1-2	.5-1	.5-1
Regeneration Opening Size (Acres)	.5-4	.5-2	.5-2	.5-2
Percentage of Stand in Openings (%)	10-20	10-20	5-20	5-20
Goshawk PFAs	10-20% increase in BA	10-20% increase in BA	10% increase in BA	10% increase in BA
Goshawk Nest Areas	Multi-aged, more dominant large trees, and denser canopies are common to all ERUs with Goshawk nest areas			
Mexican Spotted Owl Nesting/Roosting Recovery Minimums	N/A	>30% of diameter distribution is within both the 12-18" and >18" DBH classes. Minimum BA is 120 BA with 12 trees per acre over 18" in DBH.		N/A
Jamez Mountain Salamander	N/A	Minimum residual BA of 60-80 BA and a minimum of 50-60% canopy cover.		

Fuels Reduction in Wildland Urban Interface

As related to this project, the Piñon-Juniper woodland ERU will not be treated with the objective of meeting or moving toward the desired conditions identified by the region. This ERU would be treated to meet objectives related to fire, fuels, and WUI.

The Proposed Action is not anticipated to have a substantial effect upon old growth or large trees within the project area. Fuels reduction treatments include an upper diameter limit of 12" diameter at root collar (DRC). Given these limits, no large trees would be removed by thinning or mastication operations, unless considered a safety hazard.

Stand Improvement with Pre-Commercial Thinning

This treatment applies a pre-commercial or non-commercial thinning designed to enhance stand conditions with treatments varying in intensity to meet site objectives. Primary objectives for stand

improvement within this project area are to increase growth and vigor of desired trees, but also to improve species composition, reduce potential fire severity risk, reduce susceptibility to insects and disease, and to enhance species specific habitat.

Fuels Treatments

Fuels treatments will be selected on the basis of existing site-specific conditions. Treatments may occur within all ERUs within the EVLRP area, though focused within Ponderosa Pine, Mixed Conifer frequent-fire, Mixed conifer with Aspen, Spruce Fir Forest, and Piñon/ Juniper ERUs. Desired conditions for ERUs and fire risk are in the EVLRP are as stated in Chapter 1 and align with the 2022 SFNF LMP (USDA, 2022). Fuels treatments proposed are pre commercial thinning and prescribed burning. Pre commercial thinning may be conducted up to approximately 26,700 acres. Prescribed burning treatments maybe conducted up to approximately 74,690 acres. Mechanical fuels treatments or mastication is categorized as pre commercial thinning and may be conducted up to 4,500 acres. Pre commercial thinning treatment are expected to take 10-15 years to complete and realistic feasibly of accomplishing up to 2000 acres of PCT maximum annually. Summarized treatments can are displayed in Table 7. Treatments will focus on primarily small diameter thinning and prescribed fire to reduce fuel loading, remove excess slash from silvicultural treatments, and reintroduce fire to frequent fire ERUs and reduce the risk of uncharacteristic wildfire. Small diameter will be considered trees less than or equal to 9 inches at DBH (Diameter at Breast Height) or 12-inch DRC (Diameter at Root Collar) for the entire project area. Piñon- Juniper ERUs desired conditions are for the sole purpose of protecting the wildland urban interface. If existing site-specific conditions are within MSO or JMS treatments be aimed at meeting those habitat desired conditions as described in Chapter 1 and Table 2.1.

Forest products that could result from fuels treatments including fuelwood, posts and poles may be sold through personal use and commercial wood product contracts. Actual availability of these products would be dependent upon treatment implementation and objectives.

Small-Diameter Thinning Treatments

Small-diameter thinning would be used to reduce surface fuels, ladder fuels, and crown continuity in order to reduce extreme fire risk. Treatments are focused on reintroducing fire, maintaining low to moderate intensity fire in PPF, MCD and PJ ERUs, and moving ERUs towards desired conditions as described in Chapter 1. Small-diameter thinning would be accomplished using chain saws, and other equipment as appropriate. Treatments may utilize hand piling, lop and scatter, machine piling for slash management and mastication. Treatments may occur on slopes over 40 percent but will be limited to non-mechanized equipment. These treatments would be used within WUI areas to meet WUI desired conditions as described in the 2022 SFNF LMP. Treatments are aimed at creating a safe and successful conditions for prescribed fire implementation. Table 7 describes an approximate maximum number of acres proposed for small diameter thinning.

Mastication

Mastication treatments may be conducted up to 4,500 acres. Mastication treatments will used to reduce or arrange surface and ladder fuels to allow for successful implementation of prescribed burning. Treatments are focused on reintroducing fire, maintaining low to moderate intensity fire in PPF, MCD and PJ ERUs, and moving ERUs towards desired conditions as described in Chapter 1. Treatments will solely focus on unit perimeter prep buffering up to 150 feet along FS roads, with slopes less than 40 percent. Creating a buffer along FS roads allow for strengthened control lines in order to reintroduce fire on the landscape. No matrix mastication treatments are proposed under this decision.

Prescribed Burning

Prescribed burning may be conducted on up to approximately 74,600 acres over the life of the project and up to 8,000 acres (Table 7) per year. Broadcast, maintenance, jackpot, and pile burning are all types of prescribed fire activity that would occur within the project area. Prescribed fire may be used as a stand-alone treatment if existing site-specific conditions are appropriate. Prescribed burning would typically be used to reintroduce fire, as a maintenance treatment to maintain desired conditions at respective fire regime condition class (USDA, 2022), or as required for the removal of residual fuels from thinning activities.

Prescribed fire units would be designed by utilizing FS system roads, natural barriers, defensible topographic features, and other similar features as containment boundaries. These containment boundaries may require hand- or machine-constructed containment lines. Due to the limitations of these possible containment features, there may be incidental inclusions of portions of non-targeted ERUs, such as non-frequent fire ERUs. In order to locate these containment features appropriately to safely and successfully conduct a prescribed fire.

A prescribed fire plan (burn plan) must be completed prior to the ignition of all planned prescribed fires. Burn plans are official site-specific implementation documents prepared by qualified personnel and approved by the agency administrator and include criteria for the conditions under which the fire would be conducted to meet management objectives. Prescribed fire planning has been updated as directed in the Chief's National Prescribed Fire Program Review (USDA, 2022c). All prescribed burns conducted on the SFNF must adhere to the New Mexico Air Quality Bureau and New Mexico Smoke Management Plan (SMP). Each prescribed burn and burn plan must receive approval from the SFNF Forest Supervisor before that prescribed burn may be implemented.

Prescribed fires may be ignited either by hand or by aerial ignition (using helicopters or drones) carrying specialized equipment to ignite surface fuels or a combination of both ignition methods. The method of ignition for each prescribed burn unit depends on personnel safety, current and predicted weather, topography, vegetation, and the intensity of the fire needed to meet pre-established goals for the burn. Prescribed fires are typically planned during or immediately following monsoon season, during winter, or at any other times of the year when fuels and soils have sufficient moisture to reduce damage to the residual trees, to meet resource objectives, and to confine the fire to the desired burn footprint. Burning operations will be limited to air quality and weather conditions, allowing for safe execution of ignition operations with qualified fire personnel. Prescribed burning will be staggered across treatment units, planned over several burning periods, and other emission reduction techniques whenever feasible to limit smoke impacts on a given area. In order to reduce the potential for soil movement and erosion, no mechanical equipment associated with prescribed fire use will occur on slopes greater than 40 percent.

Table 7. Proposed Prescribed Fire treatments (in acres) by Ecological Response Unit.

Ecological Response Unit(s)	Total acres within Encino Vista Footprint	Acres Proposed for Small Diameter thinning (PCT)	Acres proposed for prescribed fire Rx
PJ Woodland, PJ Grassland, PJ Sagebrush, and Juniper Grasslands	21,135	4,531	4,531
Mixed Conifer – Frequent Fire	38,130	10,656	33,646
Mixed Conifer – Aspen	22,570	2,404	7,591
Spruce Fir Forest	3,440	995	3,142
Ponderosa Pine Forest	31,305	8,166	25,783
Total	121,615	26,752	74,693

Road Activities

Actions proposed under the EVLRP decision will include measures to adequately close both unclassified routes and ML-1 routes, as well as improve NFSRs to aid in watershed restoration efforts where feasible, based on the most critical need (Appendix F).

Treatments proposed for the EVLRP are aimed at facilitating restoration activities and improving watershed resiliency through maintenance of roads/ road segments. Up to 362 miles of open MVUM roads, of the 761 total miles of existing National Forest System Roads (NFSRs), would serve as the primary access for restoration activities. The GRAIPLite model [1] indicates that approximately 55 miles of the 281 miles are priority road segments [2] delivering >.25 tons/year to streams. Road segments identified using the GRAIPLite model will need to be further evaluated on the ground for road maintenance and improvement for treatment to aid in watershed resiliency and rehabilitation. No permanent or new NFS roads would be constructed as part of this project, though up to 8 miles of temporary roads may be utilized to accommodate silviculture treatments. Opportunity to utilize known unclassified/ unauthorized routes would be preferred. In order to minimize new disturbance, as well as decommissioning of all temporary roads will occur upon implementation completion.

Table 8. Summary of Existing Roads in the EVLRP Area

Encino Vista Project Area Roads	Miles
NFSRs in the project area	761
NFSRs admin use only in the project area	203
NFSRs ML-1 in the project area	195
NFSRs ML-2 in the project area	486
NFSRs ML-3 in the project area	78
NFSRs ML-4 in the project area	1
Unclassified / Unauthorized Routes	44

Table 9. Summary of Existing and Proposed Changes to Roads in the Commercial Treatment Areas

Encino Vista Proposed Commercial Treatment Area Roads	Miles
NFSRs Total	81
NFSRs admin use only	44
ML-1	15
ML-2	55
Unclassified / Unauthorized Routes (known)	1
Proposed Changes	**Miles**
Temporary Status change of ML-1 to ML-2 (admin use only)	14
Proposed temporary roads for access	8

Within the project area, 7,903 acres are currently identified as meeting the criteria for mechanical commercial thinning treatment, which includes 84 miles of NFSRs required to accompany treatments (Table 9). Approximately 40 miles of these NFSRs are on the MVUM (open to the public) and 44 miles are in storage or for administrative use only. The NNM-RAWR decision applies to the 44 miles of administrative use only and ML 1 roads as well as any unclassified routes (non-system roads) identified in the treatment areas. Approximately 14 miles of ML-1 roads would be temporarily upgraded to ML-2 for restoration activities and then placed back into storage (ML-1). For ML 2, maintenance and reconstruction activities may be included as well as curve-widening to allow for larger vehicles to access sites. Up to approximately 8 miles of temporary roads could be created and for the completion of silviculture treatment activities. Once treatment activities no longer require the use of such temporary roads, these temporary roads will be obliterated or reclaimed. For any temporary road routes, previously disturbed areas would be used whenever possible to limit disturbance, including old logging routes or unclassified routes. though, temporary roads may be constructed to access treatment areas where previously disturbed routes do not exist. Skid trails and landings will be determined on-site but will not occur in sites that have sensitive cultural resources or are sensitive riparian or wetland areas; or are protected habitat.

As described in Chapter 1, all the watersheds in the project are functioning at-risk or impaired. Road maintenance will focus on reducing sedimentation, erosion and adjacent resource damage within these watersheds. In order to create resiliency and improve watershed function up to approximately 55 miles of the 281 miles are proposed for drainage and road surface improvements to reduce the sedimentation and adjacent resource damage. These roads should be further evaluated for decommissioning, closure and storage, or relocation, if appropriate. These roads are closed to public motorized access in accordance with the Travel Management Rule, Subpart B but may have not been effectively closed on the ground. They are intended to exist on the landscape without maintenance, without user created impacts, or causing adjacent resource damage. Road decommissioning includes a variety of activities which disconnect the road from the hydrologic system. This means, to the extent possible, water is returned to its natural flow paths. Decommissioning activities may include but not limited to; out sloping the road prism, recontouring the road prism to more closely match the natural contours of the landscape, decompaction of the road surface, seeding, mulching, and removing culverts or other constructed drainage features. Roads would be stored with improved road drainage features (e.g., large water bars), removed culverts, and placing closure device at entrance. Road closure would be achieved through a variety of methods including gates, berms, tank-traps, bollards, boulders, or disguise techniques. Actual treatments would be based on site specific conditions.

If, through monitoring or as conditions change, other areas are identified as meeting the criteria, they may also be treated in like manner.

[1] GRAIP = Geomorphic Roads Analysis and Inventory Package. More information about the GRAIP-Lite model can be found here: https://www.fs.fed.us/GRAIP/GRAIP_Lite.html. These interpretations of the GRAIP-Lite results do not incorporate non-motorized uses of these roads; these uses would need to be factored into final road treatment decisions. As is true for any model, ground-truthing should occur before making decisions based on model results.
[2] The list of priority road segments for road closure, storage or decommissioning can be found in Appendix F.

Chapter 3: Affected Environment and Environmental Consequences

3.1 Introduction

This section summarizes the potential impacts of the proposed action and no action alternatives. Full specialist reports are available for reference in the Project Record. Chapter 3 describes the physical and biological resources and socioeconomic environment that may be affected by the alternatives presented in

Chapter 2, and the effects the alternatives may have on resources. The sections covering "Affected Environment" and "Environmental Consequences" are combined in this chapter to provide a concise depiction of the potentially affected resources and predicted effects under the different alternatives.

The environmental effects analysis forms the scientific and analytic basis for the comparison of alternatives.

3.2 Vegetation Resources

Human impacts began to influence ecological conditions with the Ancestral Pueblo people in southwestern Colorado and northwestern New Mexico as far back in history as 1 A.D. As populations increased during this time, so did agricultural and subsistence activities across large extents of land area (Romme et al., 2009). The period of Indigenous settlement lasted until approximately 1300 A.D. before the region was abandoned during the Little Ice Age which lasted until the early 1800s. (Romme et al., 2009; Peterson, 1994). By the late 1800s, European settlement caused a decline of the natural fire regimes in ponderosa pine ecosystems with extensive livestock grazing and overall reduction of fine, surface grass fuels (Sackett et al., 1996). Fire suppression in the early 1900's further reduced the ecological role of fire on the landscape and caused increased regeneration and eventually stagnation of naturally regenerated stands and an uncharacteristic accumulation of fuels (Sackett et al., 1996). The combination of increased fuel loading, dense sapling thickets, a dry climate, and frequent lightning-and human-caused ignitions, has resulted in a drastic increase of severe wildfires in recent decades (Sackett et al., 1996). By the mid-20th century, nearly all the old growth ponderosa pine forests of this region had been logged leaving few old-growth pine stands with most stands currently dominated by relatively small, young trees lacking large old trees and snags (Romme et al., 2009).

Stands proposed for treatment within the EVLRP area are approximately 100 years of age on average. This age coupled with dense conditions and high accumulation of fuels allude to having regenerated due to high severity stand replacing fires or insect and disease outbreaks.

Affected Environment

The proposed treatment stands were selected by hydrology considerations, slope and road analysis, potential skid trails, proximity to gravel roads, and need for thinning due to overstocking and the risk level of fire, insects, and disease. These stands are organized by Ecological Response Units (ERU) which are mapped ecosystem types based on biophysical themes that represent the range of conditions (e.g., dominant species, vegetation associations, soils, landscape features, or climate that prevail under natural disturbance regimes (e.g., fire, insects, and disease) (USDA, 2022b).

Each ERU is described in Section 1.3.1 of this EA, with more detailed information provided in the SFNF LMP (2022). Table 10 displays the total acres of each ERU found on the SFNF and within the project boundary.

Table 10 Estimated acres of each ERU within the EVLRP area, compared with total acres Forest wide.

Ecological Response Unit(s)	Total SFNF Acres	Total acres within Encino Vista Footprint
Ponderosa Pine (PPF)	403,914.57	31,305
Mixed Conifer – Frequent Fire (MCD)	429,966.60	38,130
Mixed Conifer with Aspen (MCW)	40,174.07	22,570
Spruce-Fir (SFF)	250,481	3,440
Piñon-Juniper Woodland (persistent), Piñon-Juniper Grassland, Piñon-Juniper Sagebrush, and Juniper Grasslands (PJO, PJG, JUG) (WUI Rx)	372,333.31	21,135
Total	1,496,869.55	121,615

Environmental Effects

No Action Alternative

No vegetation management activities are proposed under Alternative A. This alternative does not make any progress in moving stand structures, species composition, tree densities, forest health issues and other forest conditions towards desired conditions as outlined in the SFNF LMP (2022). This alternative would continue a deferred treatment strategy that has existed across many parts of this landscape for decades which would ultimately increase the issues that are currently being seen in terms of forest health and likelihood of uncharacteristic wildfire.

No opportunities for timber or other biomass products would result from the project and no costs would be incurred for thinning or burning treatments. The primary forest vegetation management direction found in the SFNF LMP (2022) is to develop or maintain sustainable uneven-aged forest structure. Under Alternative A, no conifer regeneration openings would be created, and even-aged stands would remain even-aged in structure for the next several decades. Over time, no new age classes would be created and/or managed until the existing stands have natural mortality due to age or natural disturbances (i.e. fire, insects, wind).

Western spruce budworm would increase as stands become denser and overall stress from tree competition would encourage outbreaks from other insects and disease. Dwarf mistletoe infection in ponderosa pine and Douglas-fir would continue to intensify in areas with current infections, and the size of the current infection centers would slowly spread over time. Ponderosa pines with heavy infections of dwarf mistletoe are more likely to be attacked by bark beetles (Kenaley et al. 2006). With no action, dwarf mistletoe would continue to impact regeneration, reduce cone production, reduce DBH and height, and reduce survival of sapling-sized trees. Over time (2 to 4 decades) this would severely limit sustainability of uneven-aged stands and interrupt the progression of existing age classes into larger trees over time, wherever infection occurs.

Mixed conifer forest stands would continue to be dominated by shade tolerant species or would continue to convert to dominance of these species over time. No forest habitat would be treated to improve health and vigor of the stand, or to manage forest structure towards desired conditions. Natural meadows and openings would not be maintained, and encroachment would continue to take over natural grasslands.

If stands were to continue to grow without any fuels reduction treatments such as commercial thinning, pre-commercial thinning, and prescribed burning, there would be an increase in the threat of uncharacteristic large stand replacing fires.

Proposed Action Alternative

Under Alternative B, part of the proposed action includes conducting commercial and non-commercial vegetation thinning using mechanized equipment and / or hand crews. This alternative proposes management of forest density, species composition and structure by implementation of uneven-aged group selection cutting in specified areas. Prescribed fire would be used to reduce naturally occurring and fuels resulting from treatments in both thinned and un-thinned areas. Opportunities for timber or other forest products could be created, as well as cost recovery for thinning and burning treatments under Alternative B.

Group Selection Thinning with Regeneration Opening

The intermediate group selection method would be used on both existing uneven and even-aged stands. By creating small gaps, or regeneration openings, recruitment can increase in newly available growing space and create additional age classes (Smith et al., 1997).

While each ERU may have slightly different objectives, this silvicultural method would achieve the desired results. Detailed descriptions of the objectives within each ERU and how the group selection method would achieve those objectives are found within this section and further information is available within the silviculturist specialist report.

Ponderosa Pine (PPF)

Stand density would be reduced to a basal area range of 20-80 BA. Through implementation of a group selection thinning, trees would be removed to create groups and clumps of residual trees in varying shapes and sizes. These groups of residuals would contain 2-40 trees and would be comprised of a range of tree sizes (VSS) and ages. These residual groups and clumps of trees and would typically be under 1 acre in size with interspaces up to 1-2 tree lengths between clumps with few individual trees scattered throughout.

Regeneration openings 0.5-4 acres in size would be implemented over 10-20 percent of the stand area. These openings would be irregular in shape and no wider than 200ft or 1.5-2 tree lengths. Openings would be distributed randomly across the stand to build a mosaic of structural stages but would be strategically placed when an opportunity to improve forest health concerns such as dwarf mistletoe

occurs. When regeneration openings exceed one 1 acre in size, 5 to 10 desirable seed trees per acre would be retained, and 3 to 5 of these seed trees should be at least 15 inches DBH and larger. Snags would be left, when possible, to promote desired habitat characteristics.

Interspaces are not to be confused with regeneration openings. The interspaces are open spaces between residual groups of trees that have ground cover of grasses, forbs and shrubs. Figure 4 shows the current conditions of an uneven aged ponderosa pine stand. The image displays the open grass/forb interspaces between tree groups, clumps of trees in varying sizes and age classes, and a larger opening that contains a group of regeneration that would become another story in the canopy that would continue to contribute to a complex vertical structure.

Thinning of the overall stand density and the implementation of interspaces and regeneration openings, can reduce fuel loading and ladder fuels which decreases the risk of fire moving into the canopy. Prescribed burning in these stands post treatment would reintroduce fire that is characteristic of a frequent fire forest and would maintain much of the desired conditions into the future.

Figure 4 Photo of a ponderosa pine stand displaying desired conditions (Reynolds et al., 2013).

Mixed Conifer – Frequent Fire (Dry Mixed Conifer) (MCD)

Due to fire suppression, stands have had an increase in shade tolerant species such as white fir, aspen, and if given enough time, spruce. These species, under low intensity frequent fire, would not have persisted in these stands. Site specific prescriptions would aim to create a more fire resistant overstory by promoting species such as ponderosa pine and Douglas-fir. By reducing density, implementing interspaces and

regeneration openings, and favoring fire resistant species, these stands would be less likely to have large scale stand replacing fires.

Depending on site quality, stands would be thinned with a group selection to a target basal area of 30-100 BA. On productive sites, stands would likely be less open as there are enough resources to support more trees compared to less productive sites and stands on south facing slopes where interspaces would be much greater and more open. These stands would have thinning implemented by group selection similar to the ponderosa pine ERU with residual trees in groups and clumps that range in size and age. Residual clumps would also be less than one acre in size and consist of 2-40 trees. Regeneration openings would be implemented as described in the PPF ERU, with the exception that openings would not exceed 2 acres in size.

Mixed Conifer – with Aspen (Wet Mixed Conifer)
Depending on site specific qualities, similar to the MCD ERUs, density can range according to productivity, aspect, and soils. After implementation of a group selection, densities would range from 60-150 BA. Residual groups and clumps of trees would vary in size between 0.25 and 2 acres in size depending on if the stand trends more towards a drier composition and environment, which would allow for smaller and more frequent residual groups. Interspaces would be smaller at 0.5-1 tree length distance from dripline to dripline. Large trees (VSS 5 and 6) are deficit and should be priority for retention and enhancement. Similar to other ERUs, treatment priority would be to leave trees that are more resistant to fire such as Douglas-fir. The group selection method would be applied similarly to the other ERUs with gaps up to 2 acres and over 5-20 percent of the stand area depending on windthrow potential. When openings exceed 1 acre, three to five seed trees per acre would be retained. Aspen is declining on the landscape as stands shift into a mid and late successional condition. Where aspen occurs in these ERUs temporary openings may be created in identified areas up to 30 acres in size but averaging 1-5 acres.

Spruce-Fir (SFF)
In western coniferous forests, late successional stages are dominated by the climax, shade-tolerant species such as the true firs (grand fir, subalpine fir, white fir, and silver fir) and spruces (Engelmann, blue, and white), which are all hosts for the western spruce budworm (Brookes, 1985). Not only do dense stands cause stress on trees when competing for resources, but a closed canopy increases the ability for budworm spread and defoliation.

The group selection cutting method would be considered in spruce-fir stands with irregular to even aged structure (Alexander, 1987). Residual groups may be large, up to 5 acres in size, but would typically be around 0.5-1 acre and would have some interlocking crowns and individuals as part of the clump. Target basal areas would be between 80 and 150 BA with interspaces between residual clumps. These clumps would not exceed 1 tree length from dripline to dripline. Stand density can vary with species composition, management objectives, productivity, diameter distribution, etc. but basal area of $\geq$ 200 BA is considered overstocked (Alexander, 1987). To help prevent the spread and outbreak of western spruce budworm, species composition should be shifted toward more early successional species, as per 2022 SFNF LMP. Large trees (VSS 5 and 6) are deficit and should be priority for retention and enhancement.

The openings associated with the group selection would be up to 2 acres in size (Alexander, 1977) and over 5-20% of the stand area depending on windthrow potential. When openings exceed 1 acre, three to five seed trees per acre would be retained. Aspen clumps would also be promoted in this ERU and temporary openings can be created in identified areas up to 30 acres in size, but averaging 1-5 acres.

Reforestation (planting)

Reforestation management methods will be used to promote restoration of tree species in areas affected by the Black Feather fire (2023). The Black Feather fire was a 2,198-acre lightning-caused fire which started on August 5, 2023. The fire footprint is located approximately 9 miles south of Gallina, NM, near the Peñas Negras Trail in the San Pedro Parks Wilderness. Planting would be based on specific site conditions and field reconnaissance. Currently there are approximately 678 acres identified for planting through field reconnaissance and SFNF spatial data review, with planting efforts focused on the following species: Douglas fir, Englemann spruce, and Ponderosa pine.

Fuels Reduction in Wildland Urban Interface

For the EVLRP, Piñon-Juniper woodland ERU will not be treated with the objective of meeting or moving toward the desired conditions for the ERU, as described in the SFNF LMP (USDA, 2022b) but rather to meet objectives related to fire, fuels, and WUI objectives.

The restoration of both structural diversity and spatial pattern would be achieved over time through the restoration of fire upon the landscape as an ecological process, i.e., repeated application of low intensity prescribed fire as well as natural fire which may or may not be managed in order to meet management objectives.

Piñon-Juniper ERUs

Following the necessary mechanical fuels treatments, prescribed fire would be applied with decreased risk of non-characteristic fire behavior (high-severity and high-intensity crown fire). Prescribed fire would include the burning of piles and jackpot burning for slash management purposes. These treatments are intended to reduce fuel loads, modify forest structure composition, and improve forest resiliency. Fuels management (surface, ladder, and canopy) methods may include: mastication, thinning, and prescribed fire to reduce the risk of uncharacteristic high intensity/severity fire within treated areas to meet WUI objectives (Agee and Skinner 2005).

The Proposed Action is not anticipated to have a substantial effect upon old growth or large trees within the project area. Fuels reduction treatments include an upper diameter limit of 12” diameter at root collar (DRC). Given these limits, no large trees would be removed by thinning or mastication operations, unless considered a safety hazard. Recommendations stemming from newly developed USGS research that analyze for effects of wildfire and management activities and address PGO mortality and regeneration will be incorporated into project implementation as appropriate (Phillips et. al. 2024).

Stand Improvement with Pre-Commercial Thinning (PCT)

This treatment applies pre-commercial or non-commercial thinning designed to enhance stand conditions with treatments varying in intensity to meet site objectives in each ERU. Stands identified for non-commercial thinning are dense overstocked young stands with an average tree size below merchantability.

Stand improvement thinning would improve diameter growth rates by reducing tree competition and density. When trees are released by cutting a competing tree, any prompt acceleration of growth is largely from an increase in water and nutrients supplied by the roots (Smith et al. 1997). Primary objectives for stand improvement within this project area are to increase growth and vigor of desired trees, but also to improve species composition, reduce potential fire severity risk, reduce susceptibility to insects and disease, and to enhance species specific habitat. If these stands were left, by maintaining dense, competitive conditions in these stands, trees would continue to grow with

weak roots, short narrow crowns, long slender boles without much taper, and high live crown ratios which do not contribute to a tree's tolerance to high winds (Smith et al. 1997). Not only would these stands take a very long time to reach maturity due to the many years they would reside in stem exclusion and under heavy competition, but the tree characteristics caused by competitive growing conditions do not result in desirable habitat in the future.

Table 11 presents the approximate maximum number of acres that could receive silvicultural treatments within the PPF, MCD, MCW, SFF and PJ ERUs. These figures are based on SFNF data, GIS data, LIDAR imagery, and state and transition modeling. The actual acres that would be treated would be dependent on site-specific conditions following field recognizance.

Table 11 Proposed silvicultural treatments (approximate acres) by Ecological Response Unit.

Ecological Response Unit(s)	Total acres within Encino Vista Footprint	Commercial Thinning Acres	Pre-commercial Thinning Acres
Ponderosa Pine	31,305	2,274	8,166
Mixed Conifer – Frequent Fire	38,130	2,109	10,656
Mixed Conifer with Aspen	22,570	1,439	2,404
Spruce-Fir	3,440	1,380	995
Piñon-Juniper Woodland, Piñon-Juniper Grassland, Piñon-Juniper Sagebrush, and Juniper Grasslands	21,135	0	4,531
Total	121,615	7,202	26,752

Old Growth

The SFNF LMP, provides descriptions for old growth by ERU, minimum criteria for old growth classification, as well as guidance for the management of old growth on the SFNF (USDA 2022).

Midscale GIS data was used to allocate old growth in each of the forest types found in Table 11. Due to the limitation of data the allocations may not meet all the criteria in Table 11. For instance, dead and down woody material data is not available in midscale data sets. Therefore, the old growth allocations will be ground verified as the project is implemented. Some stands maybe dropped from is allocation and other maybe be added. Stands that are close to meeting old growth criteria may receive a treatment to move the stand closer to old growth in a shorter time frame.

Some areas managed for wildlife habitat, i.e., Mexican Spotted Owl (MSO) nest/roost areas (Cores) and replacement nest/roost areas as well as Northern Goshawk post-fledgling family areas and nest areas, are considered as old growth areas due to the desired structural and density characteristics of these areas.

3.3 Fire and Fuels

Fuels include snags and coarse woody debris, as well as smaller diameter woody debris, needles, leaves, grasses, and other flammable materials on the forest floor. Fuels also include ladder fuels, which are shrub or tree species that create vertical connectivity from the forest floor to the dominant canopy layer. The presence of ladder fuels in frequent-fire forests greatly increases the risk of crown fires, increasing fire

intensity (damage to forests) and severity (damage to soils) often leading to fire spread over larger areas. Fuel moisture is a key component of the flammability of fuels. The drier the fuels, the greater the likelihood that fuels will burn when contacted by an ignition source (e.g., lightning, humans) (USDA 2022).

Fire behavior is the way a fire reacts to the influences of fuel, weather, and topography. Fire behavior is typically modeled at the flaming front of the fire and described most simply in terms of fireline intensity (flame length) and in rate of forward spread. Generally, higher flame lengths are produced in shrubs and forest stand fuels. Faster rates of spread occur in grass and herbaceous fuels. The implications of observed or expected fire behavior are important components of suppression strategies and tactics, particularly in terms of the difficulty to control rate of spread and effectiveness of various suppression tactics.

Affected Environment

Analysis of natural fire regimes, vegetation condition classes, and the historical fire regimes in the Jemez Mountains combined with current fire danger, fuels and potential wildfire behavior shows that most of the project area does not meet 2022 SFNF LMP desired conditions for wildfire behavior. Current conditions may result in high intensity, widespread, damaging wildfires.

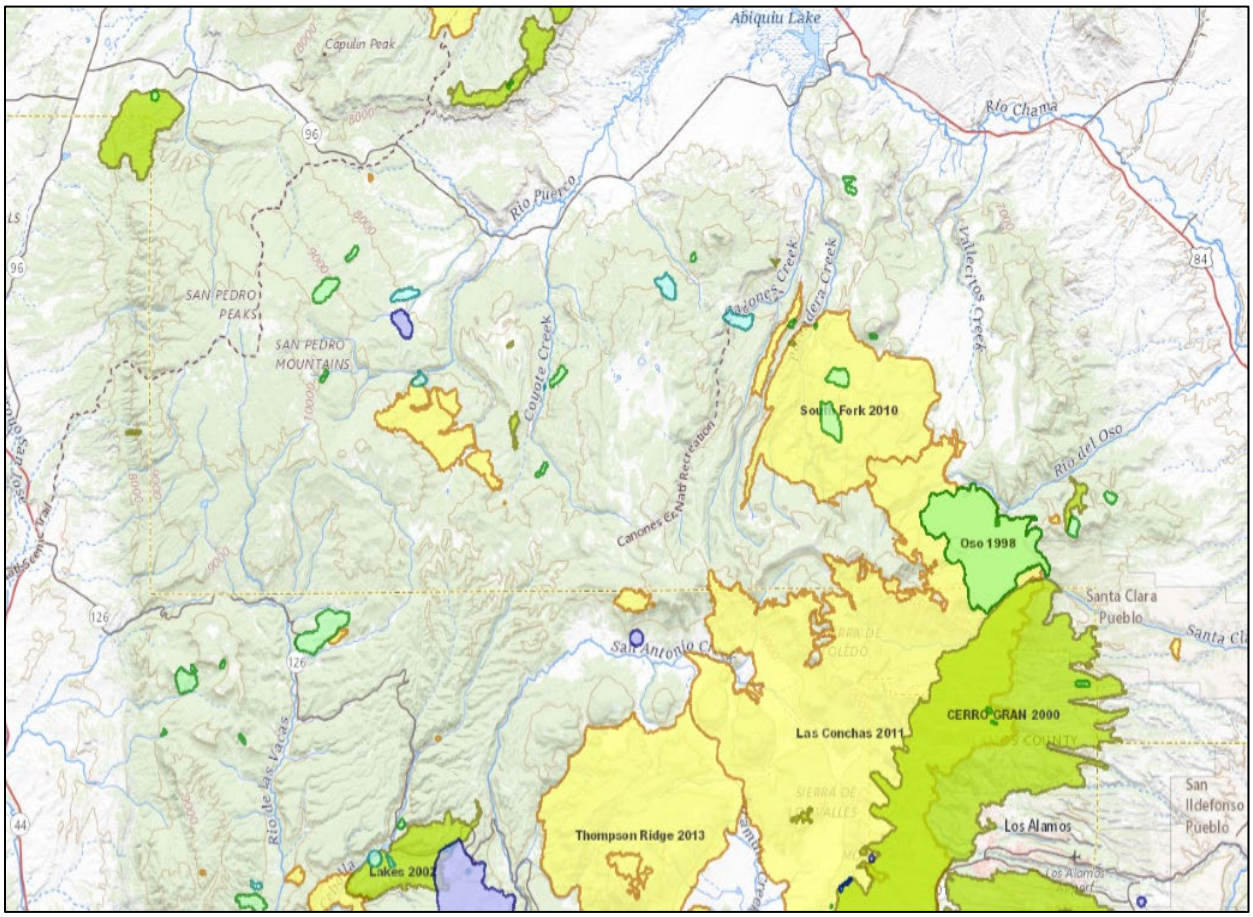


Figure 5. Fire History map of the project area (Landfire, 2020).

A natural fire regime is a general classification of how fire would move across a landscape in the absence of modern human intervention, not including the possible influence of aboriginal fire use. The five natural

fire regimes are classified based on the average number of years between fires (fire frequency or mean fire interval) combined with characteristic fire severity reflecting percent replacement of dominant overstory vegetation. Most of the project area is in fire regime group I and III, and to a lesser extent IV and V ((Table 12) (FRCC, 2008; LANDFIRE, 2020). Much of the project area has not burned in over 100 years (NWCG, 2020; Margolis et al., 2020).

Table 12. Fire Regime Group Descriptions and Ecological Response Unit acreages.

Group	Frequency (years)	Severity	Severity Description	Ecological Response Unit	Project Area Acreage
I	0 – 35	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	Mixed Conifer - Frequent Fire	38,130
				Ponderosa pine forest	31,303
				Piñon-Juniper grass	35
				Juniper grass	5,204
II	0 – 35	Replacement	High-severity fires replacing greater than 75% of the dominant overstory vegetation	Colorado Plateau / Great Basin Grassland	0
				Montane / Subalpine Grassland	3,440
III	35 – 200	Mixed / low	Generally mixed-severity; can also include low-severity fires	Mixed Conifer - Frequent Fire	38,130
				Mixed conifer with aspen (Wet Mixed Conifer)	8,463
				Piñon-Juniper sagebrush	5,061
				Piñon-Juniper woodland	10,837
IV	35 – 200	Replacement	High-severity fires	Mixed conifer with aspen (Wet Mixed Conifer)	8,463
				Spruce-fir forest	14,106
				Sagebrush shrubland	1,053
V	200+	Replacement / any severity	Generally, replacement-severity; can include any severity type in this frequency range	Spruce-fir forest	14,106
				Piñon-Juniper sagebrush	5,061
				Piñon-Juniper woodland	10,837

Research considers the historic reference period to be prior to European-American settlement when extensive land-use patterns changed with the introduction of grazing, fire suppression, and forest fragmentation. The projected changes to vegetation derived from the analyses were given a departure rating based on the degree to which they differed from desired condition. Fire regime departure ratings help build a greater picture of ERU condition in the planning area when compared with the departure ratings determined by the Vegetation Dynamics Development Tool (VDDT) models. These departure ratings help prioritize which ERUs are the most departed from the historical reference condition, so that focused treatments would be directed where they will be the most effective at restoring ecosystem function. Table 13 shows the VDDT values for the various ERU's with the project area (USDA 2022).

Table 13. Degree of Seral State Departure from Reference Conditions for selected ERUs within the project area.

ERU Name	Departure	Departure Index
Ponderosa pine forest	High	97
Colorado Plateau/Great Basin	High	93
Mixed conifer-frequent fire	High	74
Spruce-fir forest	Moderate	54
Mixed conifer with aspen	Moderate	47
Juniper grass	Moderate	45
Piñon juniper woodland	Low	28

Vegetation Condition Class (VCC) describes categories that indicate the general level to which current vegetation varies from the simulated historical vegetation reference conditions. Due to fire exclusion most of the forest stands in the Jemez Mountains are in VCC IIa: moderate to low vegetation departure; IIb: moderate to high vegetation departure; and to a lesser extent Ib: low vegetation departure; IIIa: high vegetation departure; and IIIb: very high vegetation departure. (LANDFIRE, 2014. IFTDSS, 2020).

The Coyote RAWS is located on the north end of the project area at 8,800' ASL and has provided data 1997-2020. The National Fire Danger Rating System shows a decrease in annual Energy Release Component (ERC)[5] and an increase in Burning Index (BI)[6] indices from 2007-2020. The BI is the potential flame lengths and ERC is the potential total heat release per unit area in the forested stands in the Jemez Mountains if the area burns under 90th percentile wildfire conditions (Figure 6) (NWCG, 2020).

[5] Energy Release Component (ERC) - The computed total heat release per unit area (British thermal units per square foot) within the flaming front at the head of a moving fire.
[6] Burning Index (BI) - An estimate of the potential difficulty of fire containment as it relates to the flame length at the head of the fire. Doubling the burning index indicates that twice the effort will be required to contain a fire in that fuel type as was previously required, providing all other parameters are held constant. The BI number represents a flame length measured in feet and is based on a specific fuel model and fire weather and fuel moisture conditions inputs used in the National Fire Danger Rating System model. Example: A BI of 60 is the equivalent to a 6-foot flame length.

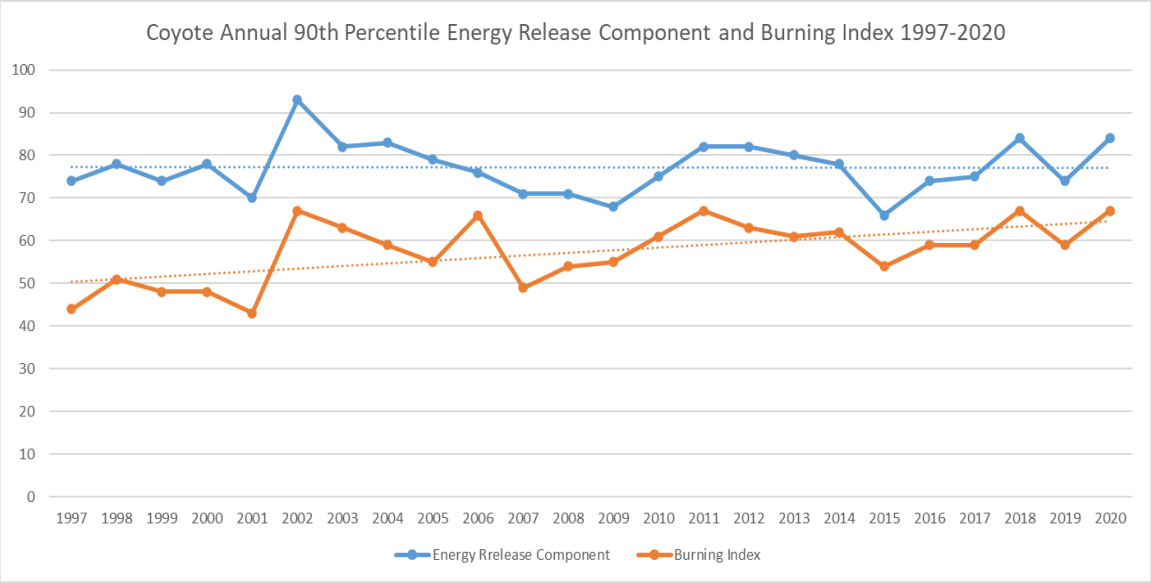


Figure 6. Coyote RAWS 90th percentile burning index and energy release component from 1997-2020.

Environmental Effects

No Action Alternative

Current management plans would continue to guide management of the project area. No prescribed burning, vegetation and restoration treatments, or road maintenance, would be implemented to accomplish project goals within the project area, unless approved through a separate NEPA document and decision. Without implementing the treatments, forest conditions would continue to depart from desired conditions. The risk of uncharacteristic fire severity would continue to increase within the project area. Forest structure would continue to be somewhat homogenous and would continue to be dominated by a single age class. Forests would lack the desired level of diversity in structure, composition, and density. Forest susceptibility to insects and disease (e.g. bark beetles and mistletoe) would continue to increase. Ultimately, the landscape would not be moved toward desired conditions, and as such, the no action alternative would not meet the purpose and need for the project.

Forest surface, crown foliage and branchwood fuel loads in the project area would continue to range from approximately 18-39 tons per acre and would continue to increase over time (Table 14). This is a result of fire exclusion that has caused unnaturally dense forest stands with high amounts of ladder and surface fuels. Modeling of very high wildfire behavior shows the project area is currently at risk of sustaining high intensity, widespread, damaging fire over most of the project area.

Wildfire flame lengths over approximately 55 percent of the project area would be greater than 4 feet and too intense for safe and effective fire suppression action by ground resources. Results from the modeling shows the very high fire danger wildfire behavior burning conditions covering the project area would continue under the no action alternative. Wildfire passive or active crown fire activity would burn forest canopies over approximately 64 percent of the project area. About 32 percent of the project area is at higher-highest risk of burning, 31 percent middle hazard, and 37 percent lowest-low hazard (IFTDSS, 2020).

Proposed Action Alternative

Removal of small diameter trees will decrease trees per acre and decrease basal area. Understory thinning eliminates some of the lower portion of the forest canopy, increasing the overall crown base height of the remaining forest canopy. Increasing crown base height reduces the potential for surface fires to transition into the forest canopy by increasing the distance between surface fires and the aerial fuel layer, thereby increasing the surface fire intensity required to ignite the crowns (Agee and Skinner 2005; Cram et al. 2006, Graham et al. 2004; Peterson et al. 2005). Decreasing crown bulk density reduces the ability of fire to spread horizontally through the forest canopy, if it transitions from the surface layer into the aerial layer (Agee and Skinner 2005; Graham et al. 2004; Peterson et al. 2005).

Implementation of the proposed action would reduce project area surface and ladder fuels and create strategically located shaded fuel breaks along ridges and forest roads. The Proposed Action would thin forest stands using tree felling and mastication. Activity slash and masticated fuels would be reduced by piling and burning, jackpot and broadcast burning. Residual slash fuels would be managed by pile or jackpot burning to reduce surface fuel loadings prior to broadcast prescribed burning. Forest stand thinning and prescribed burning would reduce surface, ladder, and crown fuels in dense stands. Post treatment fuel loading should be reduced to amounts that should produce average flame lengths no greater than 4 feet under the 90th percentile wildfire burning conditions. Table 1 shows estimated pre and post prescribed burning fuel loading. Post treatment PPF surface fuel loads would be one ton less per acre than the desired condition range, and MCD would be two tons higher than the desired condition range.

Table 14. Estimated pre-burn and post-burn Surface, Crown Foliage, and Branchwood fuels.

ERU	Estimated Preburn Surface, Crown Foliage and Branchwood Fuels (tons per acre)	Estimated Postburn Surface, Crown Foliage and Branchwood Fuels (tons per acre)	Estimated Postburn Surface Fuels (tons per acre)
Mixed Conifer – frequent fire	33	18	14
Mixed Conifer with Aspen	37	17	11
Piñon Juniper Woodland	18	11	4
Ponderosa Pine Forest	18	9	4
Spruce-Fir Forest	39	20	12

Post treatment wildfire behavior modeling shows that the project area would generally meet 2022 SFNF LMP wildfire behavior desired conditions, standards, and guidelines.

Modeling was completed for the project area using low severity prescribed fire only[7], and light[8] and heavy[9] thinning treatment prescriptions followed by low severity prescribed fire (IFTDSS, 2020). All of the treatment types are considered to be effective in reducing wildfire behavior and integrated hazard and meeting desired conditions during the first few years after treatments are completed. In areas treated with prescribed burning only, wildfire behavior and integrated hazard would increase in 2-5 years and would be highest in 6-10 years after initial treatment. Compared to prescribed burning only, wildfire behavior and integrated hazard would decrease in areas that are treated with light thinning and prescribed fire and would be lowest in areas treated with heavy thinning with prescribed fire. Additional information is

[7] Low Severity Fire: Fire with resulting mortality of above ground vegetation <25%.
[8] Light Thinning; Pile Burn - Thins the stand to ~80% of present density by removing understory up to 8" DBH. Subsequent pile burning of thinned material.
[9] Heavy Thinning; Pile Burning - Thins the stand to ~35% of present density with no upper diameter limit.

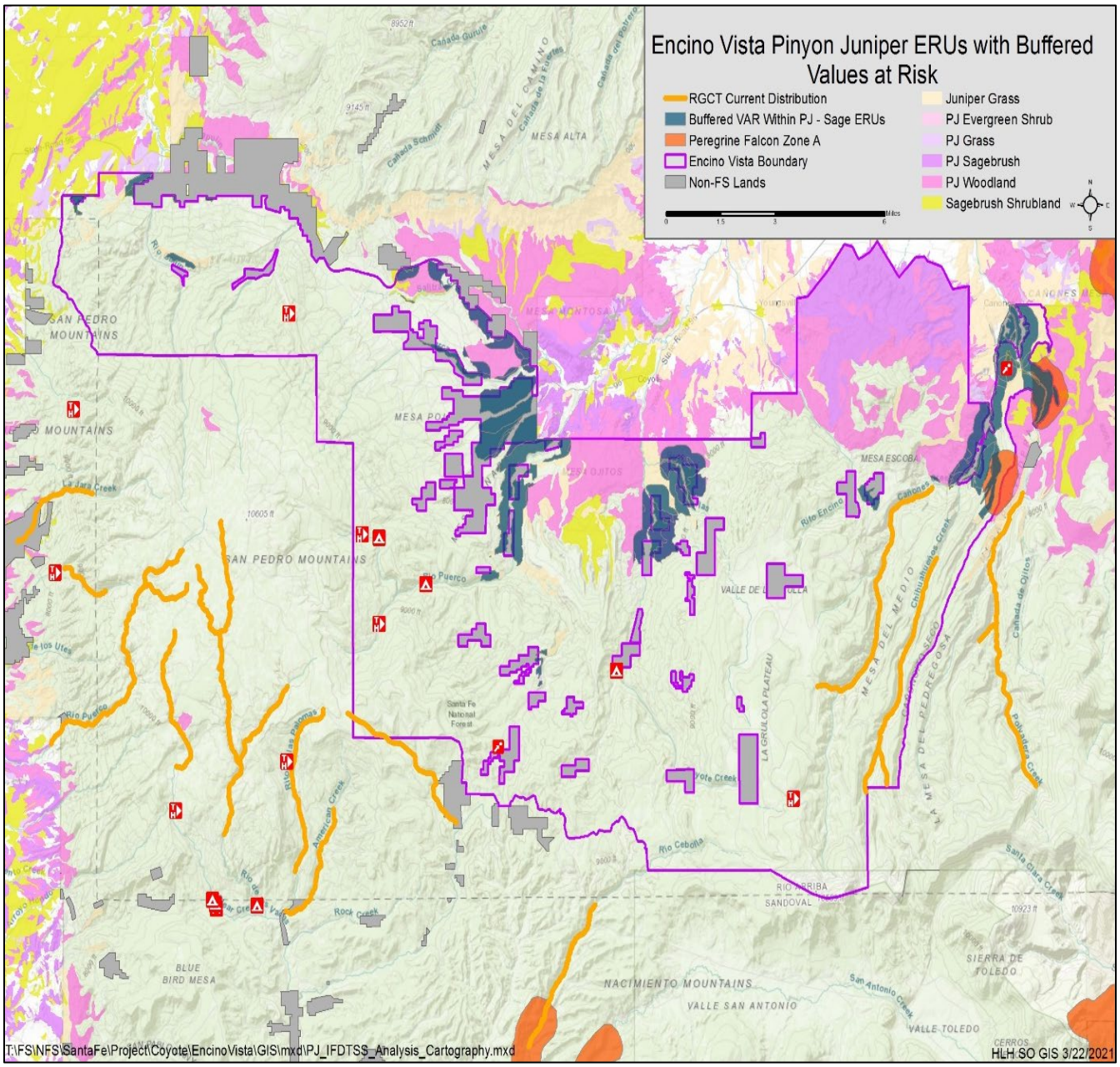
provided in the Fuels, Wildfire Behavior, Air Quality and Climate Change specialist reports, located in the Project Record. Modeling results recommend that the entire project area could be treated with either prescribed burned only, light thinned/piles burned, or heavy thinned/piles burned followed by prescribed burning.

Public Health and Safety

The implementation of the proposed action and other planned projects would reduce wildfire behavior near homes and improve the protection of homes and infrastructure resources located along the Forest boundary that are at risk from damage by wildfires. The goal of the treatments would be to reduce wildfire average flame lengths to <4 feet, reduce crown fire activity and fire ember and fire brand production, and increase firefighter safety and fire suppression effectiveness as described under Resource Indicators and Measures.

Fuel treatments that reduce crown fire potential on lands adjacent to homes and other values at risk would reduce the potential ignition of from windblown fire embers and brands. Fuel treatments that are up to 1,000 feet wide would reduce the number of embers and brands that would reach homes adjacent to the treated area. These buffer areas should be field verified to confirm that treatments would be needed in piñon Juniper vegetation types in order to reasonably protect the values at risk under 90th percentile wildfire burning conditions. Implementation of emission reduction techniques, coordinating with the State of New Mexico, and complying with all NM Environmental Department regulations will also contribute to public health.

Figure 7 Map showing 1,000 foot-wide buffer areas in Piñon-Juniper vegetation types adjacent to values at risk.



Wildfire Burning Conditions 2-5 Year Post Treatment Period

Compared to the no action alternative wildfire scenario the number of acres burning with flame lengths <4 feet would increase:

- Prescribed Burning Only – 271%
- Light Thinning/Prescribed Fire – 303%
- Heavy Thinning/Prescribed Fire – 300%

Compared to the no action alternative wildfire scenario the number of acres burning with surface fire would increase:

- Prescribed Burning Only – 278%
- Light Thinning/Prescribed Fire – 285%
- Heavy Thinning/Prescribed Fire – 286%

Wildfire Burning Conditions 6-10 Year Post Treatment Period

Compared to the no action alternative wildfire scenario the number of acres burning with flame lengths <4 feet would increase:

- Prescribed Burning Only – 142%
- Light Thinning/Prescribed Fire – 302%
- Heavy Thinning/Prescribed Fire – 300%

Compared to the no action alternative wildfire scenario the number of acres burning with surface fire would increase:

- Prescribed Burning Only – 188%
- Light Thinning/Prescribed Fire – 245%
- Heavy Thinning/Prescribed Fire – 287%

Fuel treatments that reduce crown fire potential on lands adjacent to homes would reduce the potential ignition of homes from windblown fire embers and brands. Fuel treatments that are up to 1,000 feet wide would reduce the number of embers and brands that would reach homes adjacent to the treated area.

Cumulative Effects

Review of USDA data and the New Mexico Vegetation Treatment Mapping system (NMVTM 2021) covering the project area indicates thar approximately 23,000 acres of vegetation and fuels management treatments have been completed since 2010, within roughly 18 percent of the project area (Table 15).

Table 15. Project area Vegetation and Fuels management activity from 2010-2019 (acres).

Vegetation and Fuels Management Activity	Acres
Compacting and crushing	237
Forest health, precommercial, commercial thinning	5,189
Herbicide sagebrush	7,454
Pile burning	590
Piling of fuels	1,005
Prescribed burning	7,852
Remove Piñon Juniper	400
Total	**22,727**

3.4 Roads

Roads and transportation under this Environmental Assessment includes additional maintenance to the SFNF transportation system within the EVLRP area. Routine or regular maintenance will occur along with this additional road work activities.

Affected Environment

Existing National Forest System Roads (NFSRs) would serve as the primary access to project areas to facilitate restoration activities. NFSRs are maintained to provide safe, efficient, and economical access for administrative purposes and public use. Routine maintenance of NFSRs may include activities described

in FSH 7709.59 such as the following: road blading, drainage structure maintenance, spot borrow and surfacing, clearing of roadside vegetation.

Information related to the forest transportation road network was obtained from the Natural Resource Manager (NRM) Roads and Access and Travel Management applications. The system of roads includes primitive, unsurfaced roads typically maintained for resource protection, not user comfort, and aggregate surfaced roads maintained for varying degrees of user comfort. In addition to passenger vehicles and high clearance vehicles, many of these roads are used by off highway vehicles, hikers, mountain bikers, and horseback riders. These system roads may have been constructed during past timber harvest activities and are not considered all-weather roads. Although they may have been designed for primary use by a standard log truck at the time, they may require curve widening and intersection realignment to accommodate log trucks and equipment used for this project's activities.

As detailed in the Encino Vista Watershed Specialist Report, the GRAIP-Lite model (Nelson et al., 2019) analysis was used to inform the analysis for this project. The GRAIP-Lite model is a geospatially based analysis tool that predicts and routes sediment from roads through the hydrologic network. The model is based on empirically measured road erosion rates, road slope (from a digital elevation model), roads data, vegetation data, and traffic estimates (based on maintenance level assumptions). The model was used to determine which road segments are likely to be most erosive and which are likely delivering the most sediment to streams. Based on the modeling, the highest priority road segments for treatment are those segments the model shows are delivering the most sediment to streams (>0.25 tons per year). The analysis indicates 155 miles of road segments open to the public (on the MVUM) should be further evaluated for road drainage and surfacing improvements. Additionally, 100 miles of road segments not open to the public (not on the MVUM) should be further evaluated for road drainage improvements or decommissioning. Appendix F includes the project's Road Atlas and List of Priority Roads resulting from the GRAIP-Lite modeling. Roads and road segments are listed by watershed and amount of sediment delivery by ton.

Table 16 Encino Vista Restoration Project Roads

Encino Vista Landscape Restoration Project Roads by Maintenance Level	**Miles**
ML1: Basic Custodial Care	195
ML2: High Clearance Vehicles	486
ML3: Suitable for Passenger Cars	78
ML4: Moderate Degree of User Comfort	1
ML5: High Degree of User Comfort	0
Total	761

[1]MUVUM total roads shown are a combination of ML-2 thru ML-4 roads that are open to the public.

Table 17 Summary of Existing Roads in the Encino Vista Project Area

Encino Vista Project Area Roads	Miles
NFSRs Total	761
MVUM Total[1]	362
NFSRs admin use only	203
ML-1	195
ML-2	486
ML-3	78
ML-4	1
Unclassified / Unauthorized Routes (known)	44

Table 17 summarizes the existing roads mileages and MVUM maintenance levels in the project area. Maintenance Level (ML) 3-4 roads listed in the table are on the annual road maintenance schedule and were analyzed per this decision. ML 2 roads are on a rotating schedule and are typically maintained every 3-5 years, ML 1 roads are in storage and only receive basic custodial maintenance when necessary to prevent damage to adjacent resources or for infrastructure protection. All road maintenance and reconstruction activities are done in accordance with applicable Forest Service Handbooks (FSHs) and Manuals, Region 3 SHPO Programmatic Agreement, standards, guidelines, specifications, laws, regulations, and policies. Maintenance of NFSRs may include activities described in FSH 7709.59 such as the following: road blading, drainage structure maintenance, spot borrow and surfacing, clearing of roadside vegetation. Replacement of modern in-kind (same size and length) culverts and cattleguards is also included in routine maintenance while constructing new wing ditches or turnouts, road widening, laying back banks, or other new ground disturbance outside the existing road prism are not routine maintenance.

The NNM-RAWR decision signed in July 2021 analyzed for road erosion control, relocation, and decommissioning of administratively used and non-system roads to hydrologically disconnect them from stream networks. These treatment actions will be considered and implemented, where appropriate, under the NNM-RAWR decision. Maintenance treatments on National Forest system roads that are not on the Motor Vehicle Use Map and were found to be unneeded by the Subpart A, travel management plan will be considered, and actions implemented, where appropriate, under the NNM-RAWR decision. Roads that do not meet this definition will be considered and treatments implemented under normal operation and maintenance activities.

Environmental Effects

No Action alternative

Without actions to restore ecosystem resiliency and watershed function, the persistent and elevated risk of large, high intensity wildfire would continue to threaten water quality and soil productivity and increase risk of flooding (Rhoades et al., 2019; Neary et al., 2003). In the event of a large, high intensity wildfire, the effects to the transportation system have been shown to be extreme. Massive debris flows occur, entire sections of roads are washed out, drainage crossing structures that functioned before the fire no longer function post-fire. This has been documented during multiple recent fire events on the SFNF. Furthermore, the large number of miles of road in poor condition may not be improved, closed, stored,

and/or decommissioned, resulting in persistent erosion and sedimentation and disruption to the hydrologic network. Regular routine maintenance would continue on ML-3 and ML-4 annually, as well as ML-2 roads on approximately three-to-five-year intervals. No Maintenance on ML-1, closed, or administrative use only roads is expected to occur. Without reducing sedimentation and erosion from the NFSRs, the watersheds within the EVLRP will likely remain functioning at risk or in impaired condition. Thus, not meeting the purpose and need of the project or desired conditions of creating resiliency and improved watershed function as described in Chapter 1.

Under the No Action Alternative, these activities would continue as capacity and allocations allow. The influx of sediment from road maintenance operations would continue as roads are maintained on this schedule. No additional maintenance would occur, and traffic patterns would continue as in the past.

Proposed Action alternative

The GRAIP-Lite model results indicate up to 500 miles of road need drainage improvements and surfacing to reduce erosion and sedimentation because these road segments produce more than 0.25 tons of eroded soil per year. These roads represent maintenance level 1-4 and are both currently open or closed to the public. The model results indicate 100 miles of closed roads (currently closed to public motorized access and not on the MVUM) are delivering >.25 tons/year per road segment to streams. These road segments are considered priority areas for road decommissioning, closure/storage, or relocation.

As described in the Encino Vista Watershed Specialist Report (USDA, 2023) all the watersheds in the project are functioning at-risk or impaired. Road maintenance will focus on reducing sedimentation, erosion, and adjacent resource damage within these watersheds. In order to create resiliency and improve watershed function up to approx. 55 miles of road segments for drainage and road surface improvements to reduce sedimentation and adjacent resource damage. These roads segments were shown to deliver >.25 tons/year per road segment to streams. These road segments may be considered priority areas for road maintenance and improvement. These roads should be further evaluated for decommissioning, closure and storage, or relocation, if appropriate. Any roads that are closed to public motorized access in accordance with the Travel Management Rule, Subpart B but may have not been effectively closed on the ground will be evaluated for effective closure treatment. Road decommissioning includes a variety of activities which may include but are not limited to; out sloping the road prism, recontouring the road prism to more closely match the natural contours of the landscape, decompaction of the road surface, seeding, mulching, and removing culverts or other constructed drainage features. With the intent to disconnect that particular road or system from the hydrologic system.

Within the project area, 7,202 acres have been identified for mechanical commercial thinning treatment, which includes approximately 81 miles of NFSRs required to facilitate commercial thinning (Table 18). Approximately 40 miles of these NFSRs are on the MVUM (open to the public) and 41 miles are in storage or for administrative use only. The NNM-RAWR decision applies to the 41 miles of administrative use only and ML 1 roads as well as any unclassified routes (non-system roads) identified in the treatment areas. Approximately 15 miles of ML-1 roads would be temporarily upgraded to ML-2 for restoration activities and then placed back into storage (ML-1). For ML 2, maintenance and reconstruction activities may be included as well as curve-widening to allow for larger vehicles to access sites. Up to approximately 8 miles of temporary roads could be created for the completion of silviculture treatment activities. Once treatment activities no longer require the use of such temporary roads, these temporary roads will be obliterated or reclaimed. For any temporary road routes, previously disturbed areas would be used whenever possible to limit disturbance, including old logging routes or unclassified routes. Temporary roads are constructed to access treatment areas and would only be constructed in areas

where previously disturbed routes do not exist. Skid trails and landings will be determined on-site but will not occur in sites that have sensitive cultural resources or are sensitive riparian or wetland areas; or are protected habitat.

Table 18 Summary of Existing and Proposed Changes to Roads in the Commercial Treatment Areas

Encino Vista Proposed Commercial Treatment Area Roads	Miles
NFSRs Total	81
NFSRs admin use only – confirm all covered under riparian EA	44
ML-1	15
ML-2	55
Unclassified / Unauthorized Routes (known)	1
Proposed Changes	**Miles**
Temporary Status change of ML-1 to ML-2 (admin use only)	14
Proposed temporary roads for access	8

Cumulative Effects

The spatial boundaries for analyzing the cumulative effects to transportation are any road that insects the project area; the transportation system acts together as an entire network. The proposed action would contribute incrementally to temporary and localized increases in traffic, and to roadway wear-and-tear caused by increased traffic volumes, including trucks and other heavy vehicles. The cumulative analysis considers other past, present, and reasonably-foreseeable future projects in or near the project area that will take place concurrently with the proposed action and therefore may also contribute to these impacts, resulting cumulative effects. As discussed above, the proposed action's impacts to transportation and roads resources would be less than significant with the implementation of road maintenance PDFs and BMPs (Appendix C, Part 2). Given this consideration, and accounting for the temporary and localized nature of the proposed action's effects and design features, the proposed action would not result in any cumulative impacts.

In the long-term, the proposed action is expected to result in an improved transportation network within the project footprint, improved watershed function, and improved Forest health. Short-term adverse effects to watershed resources are possible, they are largely expected to be avoided or mitigated through the effective implementation of project design criteria, best management practices, and monitoring. NFSR's which were identified in the SFNF Travel Management Decision (2008) as open to the public will remain open to the public. Forest users may have impeded traffic flow during road work activities or maintenance.

If no treatments are implemented (the No Action Alternative), the transportation network will not receive additional maintenance beyond the normally scheduled annual maintenance and routes in a degraded condition will continue to contribute sediment to waterways negatively impacting watershed health. If the case of uncharacteristic wildfire, the NFSR system could be heavy impacted due to post fire erosion and flooding. Which may result in long term negative impacts to the transportation system and overall watershed function within the project area.

3.5 Air Quality

Affected Environment

Air quality and the values dependent on-air quality in the Santa Fe NF are generally in good condition or are improving as most pollutants are decreasing because of stricter regulations. However, modeled critical loads from nitrogen deposition are being exceeded, primarily for lichens. Conditions are expected to continue to improve due to projected emissions. Of greater concern are impacts to visibility and ambient air quality conditions associated with particulate matter, which are expected to increase as a result of larger, more severe wildfires and increases in fugitive dust as the effects of climate change are realized (USDA 2022c).

Fine particle pollution is the principal pollutant of concern in wildland fire smoke for the relatively short-term exposures typically experienced by the public. The individual particles in wildland fire smoke are very small; collectively, they are visible to the naked eye as smoke. Particles in wildland fire smoke are primarily PM10 and smaller particles. PM10 are particles 10 microns in diameter and smaller. The <PM2.5 particles form about 70% of PM10. In other words, the vast majority of PM10 particles are the smaller <PM2.5 size particles.

Besides PM, components of smoke with implications for human health include carbon monoxide (CO), a colorless, odorless gas produced by incomplete combustion of wood or other organic materials. At high levels, CO can cause dizziness, nausea, and impaired mental function. Carbon monoxide levels are highest during the smoldering stages of a fire, especially near the fire, and mostly affects fire personnel. Carbon monoxide breaks down quickly and generally does not impact the public.

Smoke also contains a number of toxic air pollutants such as aldehydes (including formaldehyde and acrolein) and organic compounds such as polycyclic aromatic hydrocarbons and benzene. Acrolein and formaldehyde are potent eye and respiratory irritants. Benzene is a known carcinogen that can cause headaches, dizziness, and breathing difficulties. These compounds also mostly effect fire personnel who work near fires.

Ground level ozone (O3) is a secondary pollutant in that it is not emitted directly from wildland fires but can form downwind when volatile organic compounds (VOC's) and nitrogen oxides (NOx) react in the presence of sunlight. Wildland fire smoke is an important source of VOCs as well as a source of NOx. While there are instances in which ozone levels can be affected by wildland fire emissions, typically the NOx involved in ozone formation originates from urban and industrial sources, such as vehicles and power plants (NWCG, 2018).

Nuisance Smoke

Nuisance smoke is generally public reports or complaints about smoke. Nuisance smoke can range from people seeing smoke on the horizon to persons who are concerned about possibly being exposed to smoke and people who are affected by smoke exposure. Smoke emissions from uncontrolled wildfires would remain unregulated and adverse effects will continue into the foreseeable future. Uncontrolled wildfires generally produce more smoke and is less predictable compared to emissions from prescribed burning. Consequently, uncontrolled wildfire smoke will have the greatest impacts to human health. For prescribed burning, the State of New Mexico's Smoke Management Program is tasked with overseeing the documentation and investigation of smoke complaints and with verifying the severity of smoke impacts and the potential for exceedances of the health standards. If smoke emissions threaten to cause or causes exceedances of the human health standards, the state has the responsibility to coordinate or enforce emissions reduction actions and to provide health advisory outreach to affected communities.

Air Quality Health Standards

Recent air quality in the forest area has been good and the area complies with the National Ambient Air Quality Standards (NAAQS). Particulate and ozone monitoring data from the Coyote Ranger District, Taos, and Santa Fe stations closest to the project area are shown in Table 19.

Table 19 shows the available PM2.5 annual concentration data for the Santa Fe and Taos air quality monitoring stations[10]. On February 7, 2024, the U.S. Environmental Protection Agency (EPA) announced a final rule to strengthen the nation's National Ambient Air Quality Standards (NAAQS) for fine particle pollution, also known as fine particulate matter (PM2.5) or soot. EPA is setting the level of the primary (health-based) annual PM2.5 standard at 9.0 micrograms per cubic meter (µg/m3) to reflect new science on harms caused by particle pollution. The table also shows available annual ozone data for the Coyote Ranger District and Santa Fe stations[11]. The NAQQS level for (EPA, 2024) ozone is 0.070 ppm. The data shows annual concentrations sometimes reaching the threshold (2017, 2018), but typically remaining below cautionary levels (EPA, 2021).

Table 19. Annual PM2.5 and ozone data for three local Air Quality monitoring station in the project vicinity.

Year	Coyote Ranger District Annual 8-Hour Ozone (ppm)	Santa Fe Annual PM2.5 (ug/m3)	Santa Fe Annual 8-Hour Ozone (ppm)	Taos Annual PM2.5 (ug/m3)
2005	-	5	-	-
2006	-	5	-	-
2007	-	5	0.063	-
2008	-	5	0.066	-
2009	-	4	0.059	-
2010	-	4	0.064	-
2011	-	5	0.064	-
2012	-	5	0.068	-
2013	0.066	3.5	0.068	-
2014	0.065	2.7	0.064	-
2015	0.064	2.3	0.062	-
2016	0.063	2.5	0.064	-
2017	*0.070*	4.9	0.065	9.4
2018	*0.070*	3.7	0.069	6.2
2019	0.061	2.9	0.066	4.9
2020	0.064	4.5	*0.069*	5.9
2021	0.068	5.4	*0.065*	5.8
2022	0.062	2.8	*0.067*	4.6

[10] PM2.5 averaging time 1-year annual mean, averaged over 3 years.
[11] Ozone averaging time 8 hours - annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years.

Visibility

The Class I areas in northern New Mexico are Bandelier Wilderness, San Pedro Parks Wilderness, Pecos Wilderness and Wheeler Peak Wilderness. The Forest Service cooperates with the state and other federal agencies in monitoring air quality conditions through the Interagency Monitoring of Protected Visual Environments (IMPROVE) program. The nearest IMPROVE monitoring sites are located for Bandelier National Monument, San Pedro Parks Wilderness and Wheeler Peak and Pecos Wilderness (IMPROVE 2021). Each site has shown similar improvement in the visibility conditions represented by the 20 percent most impaired days and 20 percent clearest days which is mostly reflected by reductions in sulfate and may be a result of emissions control technology improvements at coal-fired electric generating stations in the Four Corners (USDA 2022b; NMED, 2020).

Environmental Effects

No Action Alternative

Nuisance Smoke

Nuisance smoke from wildfires would continue to occur at current levels and would probably increase over time as increases to forest fuels accumulations and stand densities causes potentially greater fire behavior intensity and fire size, or extent. Climate change, or global warming, is forecast to also cause an increase in the occurrence and severity of droughts and drier and warmer fire seasons resulting in increasing wildfire intensity and extent. Nuisance smoke complaints from prescribed burning and wildland fire use would be managed under the State's smoke management program described under Consistency with Relevant Laws, Rules, and Policy below.

Air Quality Health Standards

Exceedances of air quality human health standards would follow the same path as nuisance smoke. Table 25 below shows the amount of criteria air pollutants that the project area could produce under 90th percentile wildfire burning conditions.

Visibility

Wildfire smoke emissions would result in impacts to air quality within and near the project area. Wildfires could affect air quality and visibility on National Forest System lands and the surrounding areas depending on the location of the fire and wind conditions. When wildfires occur, they would burn unnaturally heavy fuels over large areas causing adverse air quality and visibility impacts for as long as the wildfire event occurs. Visibility would likely be compromised during wildfires, and depending on the size of the wildfires, the fires could adversely impact visibility at nearby Class I areas. Reduced visibility may also indicate elevated levels of particulates due to dust storms and wood burning stove emissions during winter months.

Proposed Action Alternative

Nuisance Smoke

In the short term, under the proposed action nuisance smoke would generally be the same as the no action alternative. As the project is implemented the potential for uncontrolled wildfire emissions would be reduced and replaced by controlled prescribed fire emissions and, overtime, may reduce the reports of nuisance smoke connected to the project.

Air Quality Health Standards

The quantity of emissions emitted from a wildfire or prescribed fire is directly proportional to the amount of biomass combusted. Implementation of the proposed action would reduce future wildfire smoke emissions and air quality impacts and mitigate the potential long-term loss of stored carbon. In a comparison of wildfire emissions with prescribed fire emissions, Liu et al. (2017) found that airborne particulate matter "from wildfires is substantially larger than that from prescribed fires, which may reflect different fire behavior and fuel conditions between prescribed fire and wildfires." A study by Meigs et al. (2009) found that mixed-conifer forests that burned at low to moderate intensities (prescribed fire conditions) were a slight carbon sink and those that burned at high-intensity were a large carbon source. In their evaluation of ponderosa pine forests, they found that stands burned at low-severities were carbon neutral, with moderate-severity stands a source and high-severity stands were a large source. The total emissions per unit area are directly related to the amount of biomass consumed by the fire. Prescribed fire is typically lower intensity and consumes less biomass than wildfire, leading to lower per unit area emissions (Wiedinmyer and Hurteau, 2010). Empirical measurements of wildfire versus prescribed fire emissions show that particulate matter emissions are larger from wildfire (Liu et al., 2017).

Mechanical fuel treatments and prescribed fire would have minimal impacts on air quality. Fuels management and preparation of the treatment areas for prescribed burning could improve the effectiveness of a response to unplanned wildfire by lowering fuel loading across the landscape, thereby resulting in beneficial impacts to regional air quality. Modeled emissions data from implementing the proposed action is available in the Fuels, Wildfire Behavior, Air Quality, and Climate Change (hereafter: FF-AQ-CC) specialist report, which is included in the project record.

Smoke impacts would be minimized by timing and scheduling prescribed burning to be completed during periods when transport wind direction, ventilation and other atmospheric parameters are favorable. While detailed smoke impacts at the time of a prescribed fire depend on many factors, prescribed fire plans are required to follow the New Mexico Smoke Management Plan that provides detailed guidance to minimize smoke impacts. Prescribed fire smoke would be closely monitored real-time and evaluated with careful consideration on the impacts to public health. However, even with favorable atmospheric conditions, residences and other inhabited nearby areas being treated with prescribed fire can experience undesirable levels of smoke for periods lasting several hours.

As night falls, so does the smoke as air movement typically decreases with the loss of daytime heating. During cool overnight periods, smoke settles into low-lying areas closest to the burn perimeter and impacts are often greatest during nighttime and early morning hours especially for nearby valleys, canyons and other low-lying areas. Most communities are located in valleys and low-lying areas. Cañones Creek can funnel nighttime smoke from a prescribed fire in the upper watershed down-valley and into Cañones, Abiquiu and surrounding communities. Smoke is often heaviest and most impactful during the overnight and early morning hours. As daytime heating commences, air movement increases and smoke lifts and disperses more easily over a larger area. Typically, dense smoke from prescribed burns does not impact localized areas as long as would smoke from a wildfire. Smoke decreases each day after initial burning, but light smoke can last for several weeks after ignitions depending upon fuel loadings, fuel moistures and precipitation events.

The impact of smoke on local community members and visitors would depend on weather conditions when fires are active and an individual's sensitivity to smoke. The Forest Service would take measures to manage smoke impacts resulting from prescribed fire. Prior to implementing a prescribed fire, a prescribed fire plan would be written to follow the New Mexico Smoke Management Program. Prescribed fires would be carefully evaluated to consider smoke dispersal into nearby communities. As a result, the

effects on air quality from prescribed fire would be short term and localized near the prescribed fire area. The duration of the impact would coincide with the duration of prescribed burn activities.

Visibility

The reduction in wildfire risk and potential smoke emissions would likely result in a long-term benefit to visibility conditions because prescribed burning would produce less smoke emissions compared to no action wildfire emissions. Fewer acres within the project area would have the conditions needed to support stand-replacing, uncharacteristic wildfires; therefore, the likelihood of large, uncontrolled smoke emissions would be lower under the proposed action. If wildfires burned the treatment units within 2-5 years after treatments are completed, the number of acres burning with surface fire would increase by about 278-28 percent compared to the no action wildfire scenario that would sustain about 64 percent crown fire. If wildfires burned the treatment units within 6-10 years after treatments are completed, the number of acres burning with surface fire would increase approximately 188-287 percent compared to the no action wildfire scenario.

Prescribed fire events would be planned in such a way as to avoid or minimize impacts to visibility. Therefore, adverse impacts to Class I areas are unlikely to occur from prescribed fire activities proposed as part of the proposed action.

Cumulative Effects

Compared to annual New Mexico estimated emissions from prescribed burning the project area would emit approximately 36-54% of PM2.5, 37-56% of PM10 and 13-20% of NOx on an annual basis. The implementation of this project would add to emissions from other sources that overlap in space and time. Additive emissions would include those from transportation to and from worksites, equipment use (outside of equipment emissions analyzed above from thinning), minor road improvements, prescribed burns not associated with this project, and other applicable sources. Additive emissions could also arise or be offset from other projects implemented on the SFNF, such as those associated with the Rio Chama CFLRP, Northern NM Riparian Restoration effort, or work conducted on neighboring public or private lands.

3.6 Climate Change

Affected Environment

Climate change is anticipated to have lasting, large-scale impacts to a variety of ecological, social, and economic resources around the SFNF. Mean annual temperatures in the planning area have increased in the last several decades, mostly with increased nighttime temperatures. There has been a decrease in the amount of snow at low to mid-elevations, and an increase in year-to-year precipitation variability (wetter wet years and drier dry years). At higher elevations, overall snowfall, and spring snow-water equivalent (amount of water in snowpack) have remained steady in most southern areas, but snowmelt now occurs earlier in the year. Changes in temperature and in amounts and timing of precipitation have led to earlier peak stream flow rates in most streams, with higher spring flows and lower summer flows, and will have a major influence on fire across the western United States, especially in mid-elevation forests (USDA 2022b).

The most important determinant of fire severity is fuel condition, while two other important factors for determining fire regimes are vegetation type (or ERU) and weather or climate patterns. Fire history and dendrochronological studies provide ample evidence of past relationships between fire and climate. That evidence makes it clear that a changing climate will profoundly affect the frequency and severity of fires

and change vegetation structure and composition as a response to more severe or prolonged droughts. Warmer temperatures, more variable precipitation, and increased moisture deficit are likely to stress vegetation, and make high-elevation forests more vulnerable to fire, insects, and disease. Fires will likely be more frequent and widespread. Insects such as western spruce budworm and spruce beetle are likely to proliferate in stressed and weakened trees, and mortality is likely to increase because of these outbreaks. However, past spruce budworm outbreaks have been associated with periods of increased moisture, and warmer, more drought-prone conditions could reduce budworm activity and temper the severity of future outbreaks. Root rot is also likely to increase in stressed forests. Increased tree mortality due to extended or severe drought, will change fuel structure and dead fuel loads, further impacting fire frequency and severity. The increased burning of forests will also result in carbon release, changing western forests from carbon sinks to carbon sources, contributing to increased greenhouse gas emissions (USDA 2022b).

At the forest level, the effects of climate change on vegetation are magnified where vegetation structure and composition are outside the natural range of variation, especially in high-elevation forests that are moderately (e.g., MCW, MCD, PPF) to highly (e.g., ALP, SFF) vulnerable to climate change on a landscape scale. Vulnerability ratings are based off of each ERU's ability to resist non-normal ecological conditions and rank their degree of resilience to these disturbances, where ERUs ranked highly vulnerable have little resistance to non-normal disturbances and less ability to recover following these types of disturbance. Across the forest, 8 percent of all ecosystems are at very high vulnerability risk, 14 percent are at high vulnerability, 54 percent are at moderate vulnerability, and 24 percent are at low vulnerability (USDA 2015b). The ERUs with the highest vulnerability to climate change at the plan unit scale include ALP, PJG, and PJS. On more localized scales, a very high to high vulnerability risk could be expected in the northwest zone (Cuba) in PJG, PJS, and SFF; southwest zone (Coyote, Jemez Springs) in JUG, PJG, PJO, PPF, and SFF; northeast zone (Pecos and Las Vegas) in SFF; southeast zone (Glorietta Mesa, Anton Chico) in CPGB, JUG, PJG, PJO, PPF, and SFF; and central zone (Los Alamos, Caja del Rio) in CPGB, MCD, PJG, PJS, PPF, and SFF (USDA 2015b) (USDA 2022b).

Outside of the impacts that changes in climate could have on vegetation, such as structural and composition changes, type shifts across elevational gradients, increased mortality or predisposition to secondary disturbances like disease or insects, and increased competition pressure from growing invasive species populations, changes in ERUs would affect wildlife, recreation opportunities, and socio-economic factors. For instance, five at-risk species in the forest rely on CPGB or on PJS and PJG, all of which are at very high vulnerability to climate change at various scales. Recreation opportunities could suffer from the loss of SFF areas (such as the forested areas surrounding the Santa Fe Ski Basin), as increased tree mortality would make hiking or riding on popular trails exceedingly dangerous. In wilderness areas, trail maintenance would become increasingly difficult with additional tree mortality. Socio-economic impacts of climate change-affected vegetation in the forest may include reduced availability of forest products needed for heat (fuelwood) or sustenance (piñon nuts), medicinal uses, and cultural traditions or practices. Scenery may also be negatively impacted, resulting in fewer (non-local) visitors to the Santa Fe, bringing less revenue into the area and reducing the need for some existing seasonal or permanent positions (USDA 2022b).

A large proportion of ERUs are well outside of the natural range of variation and are highly departed from desired conditions. Uncharacteristically dense vegetation has a lower resilience to the effects of climate change, fire, insects, and pathogens. Moreover, plant compositions that have shifted toward dominance of less drought- and fire-tolerant species also have decreased resilience to the effects of climate change. One of the best ways that land managers can align forest conditions to adapt with a changing climate is by reintroducing fire into fire-adapted ecosystems. Implementing managed fire and other management techniques in highly departed areas now is paramount to shape sustainable and resilient ecosystems for

the future in the face of a changing climate (USDA 2022b). There are also several other actions that can help support ecosystems and their resources to build resilience towards the effects of climate change. Thus, a group of climate scientists concerned with how forest management practices can enhance carbon sequestration and address climate change adaptation have developed a Forest Carbon Management Menu that outlines 7 broad adaptation strategies and highlights associated approaches for land managers to incorporate during project development (Ontl et al. 2020).

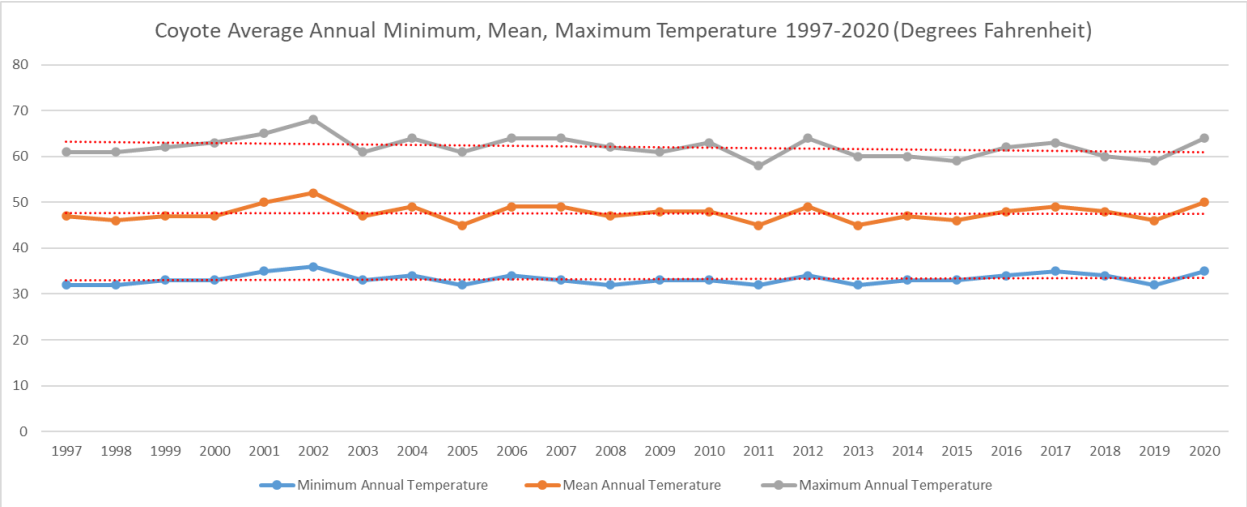
Climate data gathered in the Jemez Mountains region started in the early 1900's at weather stations that are mostly located at elevations that range from about 6,300-8,200 feet above sea level (ASL). Average annual temperature and precipitation data from the four stations are summarized in Table 20 and the data from these and many other long-term stations are used in modeling climate change shown below (WRCC, 2020). (USDA 2022b).

Table 20. Average annual data from four long term weather stations in the Jemez Mountains vicinity.

Weather Station	Period of Record	Elevation ASL (feet)	Average Max. Temperature (F)	Average Min. Temperature (F)	Average Total Precipitation (inches)	Average Total Snowfall (inches)
ABIQUIU DAM, NEW MEXICO (290041)	06/01/1957 to 06/08/2016	6,380	64.8	37.3	9.82	10.0
JEMEZ SPRINGS, NEW MEXICO (294369)	05/01/1910 to 05/31/2016	6,260	66.4	37.0	16.96	28.9
LOS ALAMOS, NEW MEXICO (295084)	01/01/1902 to 06/08/2016	7,360	60.1	36.1	18.28	53.2
WOLF CANYON, NEW MEXICO (299820)	05/01/1912 to 06/08/2016	8,220	56.7	24.5	22.69	120.2

From 1997-2020, the Coyote RAWS shows an overall decrease in annual maximum temperatures, steady annual mean temperatures, and an increase in annual minimum temperature (NWCG, 2020).

Figure 8 Coyote RAWS average annual minimum, mean and maximum Temperature 1997-2020 (degrees Fahrenheit).



The emission of greenhouse gases (GHGs) by human activities and natural processes contribute to the warming of the Earth's climate. Warming could have significant ecological, economic, and social impacts at regional and global scales (IPCC, 2007), some of which have already begun to actualize and are projected to compound in the future under different climate scenarios (IPCC, 2021). Spring melting is occurring earlier in the year; the Colorado River, Rio Grande, and several other southwestern rivers have hydrographs that peak earlier, suggesting that the spring temperatures in these regions are warmer than in the past (EPA, 2016). Several researchers have specifically studied Santa Fe NF watersheds for impacts related to climate change. Fritze et al. (2011) showed that snowmelt is occurring 5 to 20 days earlier in the Jemez Mountains with higher streamflow in March and April, but less from May-June (based on 60 years data from 1948-2008). The Santa Fe and Gallinas municipal watersheds are dependent on these upland snow sources (USDA 2022b).

The U.S. Climate Resilience Toolkit shows[12] historic and projected Jemez Mountains Coniferous Forest temperatures and precipitation from 1950-2100. The climate projections are based on lower and higher greenhouse gas emissions scenarios and show significant increases in maximum and minimum temperatures and slight decreases in precipitation (See FF-AQ-CC specialist report Figures 9-14). The charts show an overall decrease in precipitation and increase in dry days per year; significant increases in maximum and minimum temperatures; and significant decreases in days per year with maximum and minimum temperatures below 32 degrees Fahrenheit (USCRT, 2020).

Greenhouse Gases

New Mexico emitted 21,387,147 tons of carbon dioxide and 9,057 tons of methane in 2020 from all sources, an increase over 2014 emissions for both gasses (Table 21) (EPA, 2020b and 2020c). This information will be compared to estimated project emissions below, with 2014 data used as a comparison for prescribed fire and 2020 for wildfire emissions due to the Covid-19 pandemic likely altering the number of prescribed fires implemented across NM in 2020.

Table 21. National Emissions Inventory of annual Greenhouse Gas Emissions; local, state and national emissions (tons) as reported for the years 2014 and 2020.

Source	GHG CO2		GHG CH4	
	2014	2020	2014	2020
Rio Arriba County – All Sources	546,573	313, 290	928	84
Sandoval County – All Sources	1,152,924	1,186,107	302	94
New Mexico – All Sources	18,632,809	21,387,147	6,658	9,057
National – All Sources	2,257,756,571	2,277,523,166	1,108,327	1,513,679
Rio Arriba County – Prescribed Fires	87,653	2,062	360	7
Rio Arriba County – Wildfires	116,782	12,466	534	47
Rio Arriba County – Agricultural Field Burning	U/A	U/A	U/A	U/A

[12] Based on global climate models developed for the United Nations Intergovernmental Panel on Climate Change, Climate Explorer's (Toolkit) graphs and maps show projected conditions for two possible futures: one in which humans reduce and stabilize global emissions of heat-trapping gases (labeled Lower emissions), and one in which we continue increasing emissions through the 21st century (labeled Higher emissions). Decision makers can compare climate projections based on these two plausible futures, and plan according to their tolerance for risk and the timeframe of their decisions.

Sandoval County – Prescribed Fires	15,614	65	67	0.2
Sandoval County – Wildfires	49,674	6,035	171	21
Sandoval County – Agricultural Field Burning	U/A	U/A	U/A	U/A
New Mexico – Prescribed Fires	463,827	131,487	1,887	475
New Mexico – Wildfires	781,826	1,842,999	3,221	7,232
New Mexico – Agricultural Field Burning	U/A	U/A	U/A	U/A
National – Prescribed Fires	108,914,013	109,560,235	423,651	394,100
National – Wildfires	110,380,596	221,225,765	508,106	963,276
National – Agricultural Field Burning	U/A	U/A	U/A	U/A

Climate Change Vulnerability Assessment

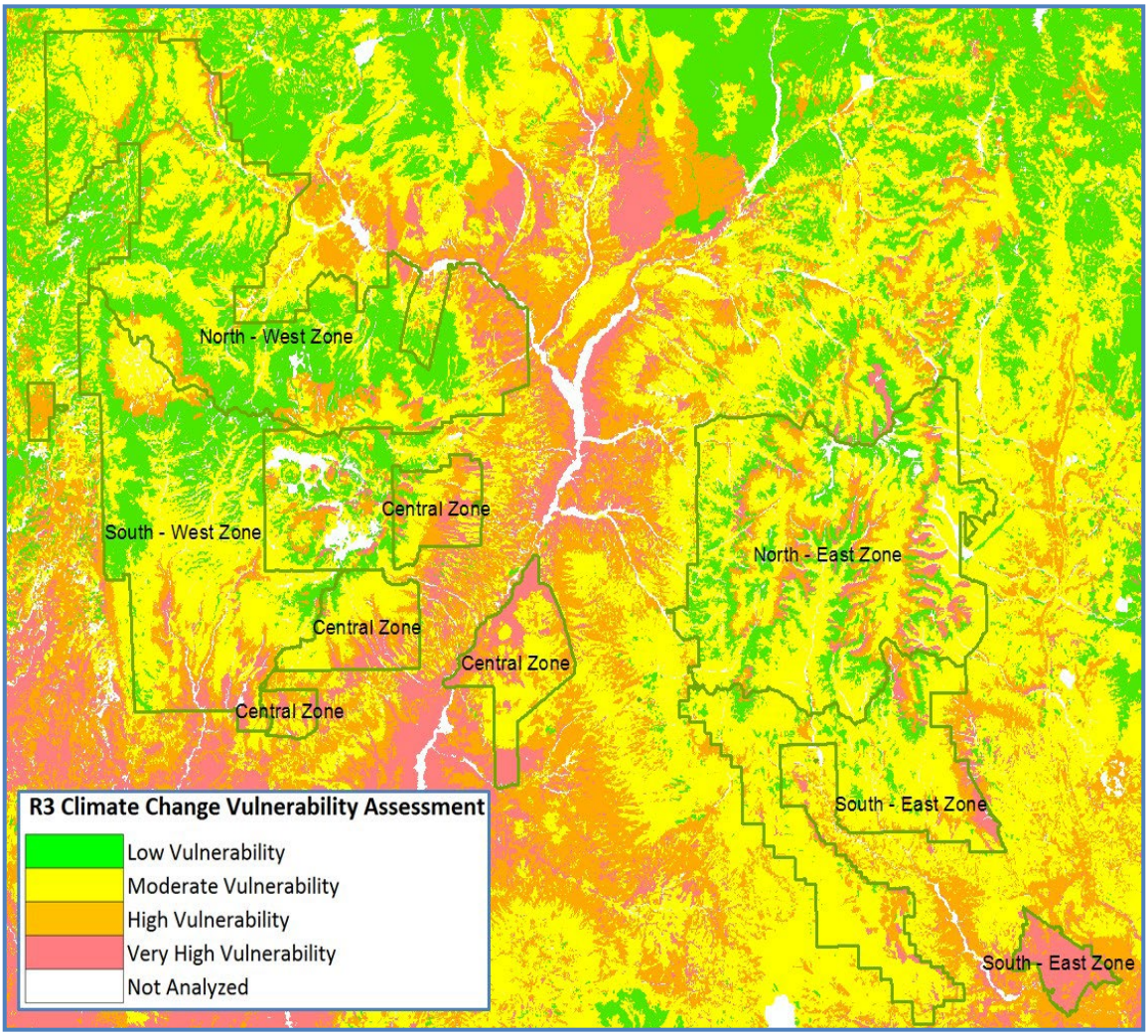
The Climate Change Vulnerability Assessment project (CCVA) was developed as an ecosystem-based evaluation of the potential vulnerability of Southwest ecosystems to the projected climate of late 21st century. The CCVA results infer vulnerability based on the projected climate departure from the historic climate envelope for a given ERU and location. In broad terms it may be helpful to think of future climate simply as a potential stressor of significant change (i.e., on structure, composition, function), with the vulnerability rating on par with risk or probability of stress – either low, moderate, high, or very high. In more specific terms, vulnerability can be considered the relative probability of type conversion. Two key components of the CCVA are the ability of ecosystems to resist climate change effects and maintain resilient ecosystem functions:

Resistance – The ability of an ecosystem to endure disturbance and maintain structure, composition, and function that are characteristic of the system. Resistance may be reduced as departure from current vegetation condition class increases, especially for some ecosystems (e.g., BP, MPO, MEW, PPE, MCD, PPF, PJG).

Resilience – The ability of an ecosystem, following disturbance, to regain structure, composition, and function that are characteristic of the system on a time span consistent with its successional patterns, Resiliency may be reduced as departure from current vegetation condition class increases especially for some ecosystems (e.g., BP, MPO, MEW, PPE, MCD, PPF, PJG).

According to the assessment all the watersheds within the project area have a composite vulnerability score of low to high vulnerability with low to moderate vulnerability covering the majority of the area (Figure 9) **Error! Reference source not found.**(USDA 2015b).

Figure 9 Patterns of Vulnerability to Climate Change on the Santa Fe National Forest and surrounding lands of northern New Mexico.



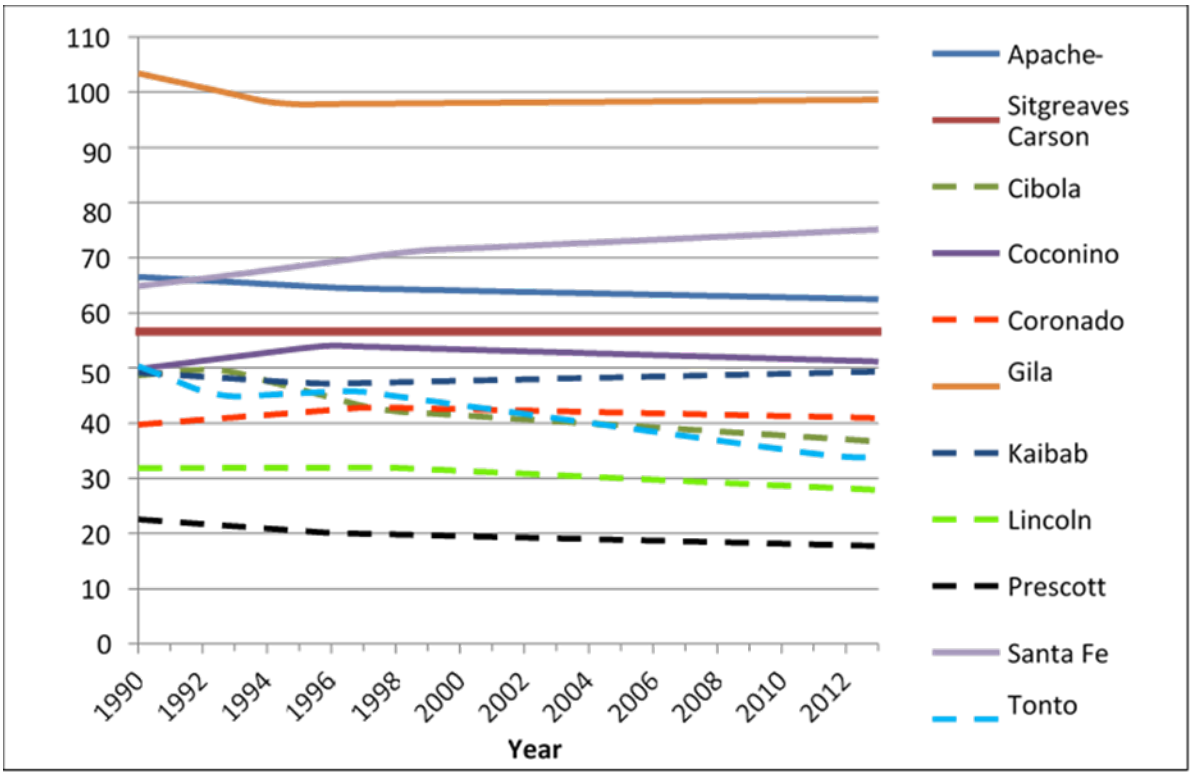
Carbon Storage

Forests play an important role in carbon cycling, which is the direct removal of CO2 from the atmosphere, storage through biologic processes, such as forest growth, and carbon release through the death and decay of biological materials Carbon storage by forests mitigates greenhouse gas emissions by offsetting losses through removal and storage of atmospheric carbon. Over at least the past several decades, temperate forests have provided a valuable ecosystem service by acting as a net sink of atmospheric carbon dioxide, partly offsetting anthropogenic emissions. Carbon dioxide uptake by forests in the conterminous United States offset approximately 16 percent of our national total carbon dioxide emissions in 2011. Forests and other ecosystems generally act as carbon sinks because, through photosynthesis, growing plants remove CO2 from the atmosphere and store it. Keeping forests as forests is one of the most cost-effective carbon storage measures. Restoration—bringing badly disturbed forests and grasslands back to producing a full range of environmental services—is another (USDA 2022b).

Carbon stocks are estimated by linear interpolation between Forest Inventory and Analysis survey years for the seven ecosystem carbon pools – above-ground live tree, below-ground live tree, understory, standing dead trees, down dead wood, forest floor, and soil organic carbon. Total forest ecosystem carbon

stored in the Southwestern Region decreased between 1990 and 2013, with 584 teragrams (Tg[13]) in 1990 and 551 Tg in 2013. Figure 10 displays these trends for each of the national forests between the years 1990 and 2013, where the Gila National Forest stored the largest amount of carbon in the region, approximately 103 Tg in 1990 and 99 Tg in 2013. During this period, the Santa Fe, Carson, and Kaibab national forests generally increased in ecosystem carbon stocks, while the Apache-Sitgreaves, Coconino, Tonto, Cibola, Coronado, Lincoln, and Prescott national forests generally decreased (USDA 2015a). Roughly 34.5% of the carbon stocks on the SFNF are stored in above-ground, live woody vegetation (> 1 inch diameter), with the remaining 65.5% of carbon stored in soil, organic matter on the forest floor, roots, snags, coarse woody debris, and small understory vegetation (Black et al., 2022). A quantitative assessment of forest carbon stocks and the factors that influence carbon trends (management activities, disturbances, and environmental factors) for the SFNF is available in the project record (Black et al.,2022).

Figure 10 Total forest ecosystem carbon (Tg) for the national forests in the Southwestern Region from 1990 to 2013.



The Santa Fe NF can be stratified into 11 major ecosystem types referred to as Ecological Response Units or ERUs. Each ERU contributes differently to biomass carbon stocks based on its spatial extent, vegetation community composition and structure, and ecosystem dynamics. Relative contributions to carbon stocks are lowest in grassland and shrubland ERUs, with increasing contributions by woodland and forest ERUs, respectively. Table 22 shows reference condition, current condition, and projected biomass carbon stocks for major ERUs of the entire SFNF (USDA 2016). This information will be compared to estimated project carbon emissions and storage below.

[13] 1 teragram (Tg) = 1,102,311 tons.

Table 22. Santa Fe National Forest biomass carbon stock per ERU in reference condition, current conditions, and projected +100 years (tons).

ERU	Acres	Reference Condition (tons)	Current Condition (tons)	Projected +100 years (tons)	Projected +100 years (% change from current)
MSG Montane Subalpine Grassland	17,707	25,622	57,079	70,476	23.5%
CPGB Colorado Plateau – Great Basin Grassland	41,639	123,173	Data Unavailable	Data Unavailable	Data Unavailable
SAGE Sagebrush Shrubland	37,457	184,597	224,343	262,950	17.2%
PJS Piñon Juniper Sagebrush	30,449	368,605	268,348	443,589	65.3%
PJG Piñon Juniper Grassland	43,356	615,908	532,127	941,636	77.0%
JUG Juniper Grassland	97,470	1,418,465	1,330,627	1,828,469	37.4%
PJO Piñon Juniper Woodland	231,508	5,077,819	4,031,786	4,620,260	14.6%
PPF Ponderosa Pine Forest	403,915	12,073,018	17,103,934	16,396,685	-4.1%
MCD Mixed Conifer – Frequent Fire	429,967	25,217,432	29,800,962	27,264,090	-8.5%
MCWE Mixed Conifer – With Aspen (w/ Elk) (Wet Mixed Conifer)	40,174	3,524,277	3,175,945	2,674,948	-15.8%
SFFE Spruce Fir Forest (w/ Elk)	250,481	24,000,294	21,718,522	22,439,765	3.3%
Total	**1,624,123**	**45,104,640**	**78,243,672**	**76,942,868**	**-1.7%**

Environmental Effects

No Action Alternative

Smoke and Greenhouse Gas Emissions and Carbon Storage

Under the No Action alternative, the project area would remain at risk of sustaining damaging, widespread wildfires and remain increasingly vulnerable to the impacts of climate change. Compared to 2020 annual estimated New Mexico wildfire emissions, if the entire project area was burned in a wildfire, criteria pollutant emissions would be 247 percent of PM2.5, 247 percent of PM10, 127 percent of NOx, while greenhouse gas emissions would be 167 percent of CO2 and 260 percent of CH4. The social cost of emissions associated with the no-action alternative is nearly double (1.9x) the cost of the proposed action. Additionally, wildfire emissions would release sequestered surface and ground carbon, and carbon stocks would be reduced by approximately 959,390 tons or about 1.23 percent of current forest wide sequestered carbon (Tables 23-24).

Table 23. Wildfire Fuel Loading, Surface, and Ground Carbon Storage

Ecological Response Unit	Acres	Pre Burn Fuel Load (tons/ac)	Pre Burn Fuel Load (total tons)	Pre Burn Carbon (tons/ac)	Pre Burn Carbon (total tons)	Post Burn Fuel Load (tons/ac)	Post Burn Fuel Load (total tons)	Post Burn Carbon (tons/ac)	Post Burn Carbon (total tons)
Gambel Oak Shrubland	197	14.570	2,870.290	7.010	1,380.970	4.060	799.820	2.030	399.910
Herbaceous (wetland)	2,299	2.340	5,379.660	1.170	2,689.830	0.000	0.000	0.000	0.000
Juniper Grass	5,204	2.160	11,240.640	1.080	5,620.320	0.420	2,185.680	0.210	1,092.840
Mixed Conifer – frequent fire	38,130	33.240	1,267,441.200	15.670	597,497.100	12.190	464,804.700	6.100	232,593.000
Montane / Subalpine Grassland	3,440	2.340	8,049.600	1.170	4,024.800	0.000	0.000	0.000	0.000
Narrowleaf Cottonwood / Shrub (RMAP)	633	12.750	8,070.750	5.920	3,747.360	3.000	1,899.000	1.500	949.500
Piñon Juniper Grass	35	6.570	229.950	3.250	113.750	4.970	173.950	2.490	87.150
Piñon Juniper Sagebrush	5,061	18.750	94,893.750	8.670	43,878.870	5.450	27,582.450	2.730	13,816.530
Mixed Conifer with Aspen (Wet Mixed Conifer)	8,463	37.470	317,108.610	17.130	144,971.190	6.710	56,786.730	3.350	28,351.050
Piñon Juniper Woodland	10,837	18.370	199,075.690	8.670	93,956.790	5.450	59,061.650	2.730	29,585.010
Ponderosa Pine / Willow	106	2.560	271.360	1.220	129.320	0.720	76.320	0.360	38.160
Ponderosa Pine Forest	31,303	17.810	557,506.430	8.080	252,928.240	4.560	142,741.680	2.280	71,370.840
Rio Grande Cottonwood / Shrub	116	12.750	1,479.000	5.920	686.720	3.000	348.000	1.500	174.000
Sagebrush Shrubland	1,053	3.620	3,811.860	1.810	1,905.930	0.360	379.080	0.180	189.540
Spruce-Fir Forest	14,106	39.130	551,967.780	18.040	254,472.240	9.930	140,072.580	4.960	69,965.760
Willow - Thinleaf Alder (RMAP)	630	2.560	1.220	1.220	768.600	0.720	453.600	0.360	226.800
Total	**121,613**		**3,029,396.6**		**1,408,003.4**		**896,911.6**		**448,613.3**

Table 24 Wildfire Smoke and Green House Gas Emissions

Ecological Response Unit	Acres	CP PM2.5 Emissions (tons/acre)	CP PM2.5 Emissions (total tons)	CP PM10 Emissions (tons/acre)	CP PM10 Emissions (total tons)	CP NOx Emissions (tons/acre)	CP NOx Emissions (total tons)	GHG CO2 Emissions (tons/acre)	GHG CO2 Emissions (total tons)	GHG CH4 Emissions (tons/acre)	GHG CH4 Emissions (total tons)
Gambel Oak Shrubland	197	0.069	13.593	0.080	15.760	0.027	5.319	17.559	3,459.025	0.035	6.895
Herbaceous (wetland)	2,299	0.006	13.794	0.007	16.093	0.008	17.243	4.162	9,567.289	0.002	4.598
Juniper Grass	5,204	0.005	26.020	0.006	31.224	0.006	31.224	3.100	16,132.400	0.002	10.408
Mixed Conifer – frequent fire	38,130	0.350	13,345.500	0.410	15,633.300	0.020	762.600	29.340	1,118,734.200	0.210	8,007.300
Montane / Subalpine Grassland	3,440	0.006	20.640	0.007	24.080	0.008	27.520	4.162	14,317.280	0.002	6.880
Narrowleaf Cottonwood / Shrub (RMAP)	633	0.080	50.640	0.090	56.970	0.020	12.660	15.920	10,077.360	0.040	25.320
Piñon Juniper Grass	35	0.022	0.753	0.025	0.875	0.003	0.088	23.868	835.380	0.013	0.438
Piñon Juniper Sagebrush	5,061	0.144	726.254	0.170	857.840	0.024	121.464	19.966	101,047.926	0.082	412.472
Mixed Conifer with Aspen (Wet Mixed Conifer)	8,463	0.580	4,908.540	0.680	5,754.840	0.020	169.260	41.100	347,829.300	0.350	2,962.050
Piñon Juniper Woodland	10,837	0.144	1,560.528	0.170	1,842.290	0.024	260.088	19.966	216,371.542	0.082	888.634
Ponderosa Pine / Willow	106	0.014	1.484	0.017	1.749	0.005	0.477	3.019	320.014	0.008	0.795
Ponderosa Pine Forest	31,303	0.140	4,382.420	0.170	5,321.510	0.030	939.090	20.530	642,650.590	0.080	2,504.240
Rio Grande Cottonwood / Shrub	116	0.006	0.696	0.090	10.440	0.020	2.320	15.920	1,846.720	0.040	4.640
Sagebrush Shrubland	1,053	0.009	8.951	0.010	10.530	0.011	11.057	5.805	6,112.139	0.003	2.633
Spruce-Fir Forest	14,106	0.470	6,629.820	0.556	7,835.883	0.030	423.180	41.108	579,869.448	0.280	3,949.680
Willow - Thinleaf Alder (RMAP)	630	0.014	8.820	0.017	10.710	0.005	3.150	3.019	1,901.970	0.008	5.040
Total	**121,613**		**31,689.6**		**37,413.4**		**2,783.6**		**3,069,170.6**		**18,787.0**

Proposed Action Alternative

Greenhouse Gases

The effects analysis for greenhouse gas emissions is the global atmosphere given the mix of atmospheric gases can have no bounds. The timeframe for the analysis is 10-15 years because all project activities should be completed within this timeframe. The climate impact of the EVLRP would be relative to the greenhouse gas emissions the project emits into the atmosphere through its implementation. Because local greenhouse gas emissions mix readily into the global pool of greenhouse gases, it is difficult and highly uncertain to assess the indirect effects of emissions from single or multiple projects of this size on global climate. However, it is possible to estimate emissions from implementing prescribed burning and thinning activities, which we have elucidated in greater detail within the FF-AQ-CC specialist report (on file in the project record). Below we have summarized the findings of that analysis.

Compared to estimated annual New Mexico greenhouse gas emissions from prescribed burning (Table 21) the project area would emit up to approximately 24-46% of CO2 and 39-59% of CH4 on an annual basis over the lifetime of the project. Concurrently, the EVLRP would also help to reduce the effects of anthropogenic climate change at the local scale by improving the health and vigor of residual trees, which will work more efficiently to convert (sunlight plus) CO2 into O2 and energy via photosynthesis.

Monetized Impacts from GHGs

The "social cost of carbon," "social cost of nitrous oxide," and "social cost of methane" – together, the "social cost of greenhouse gases" (SC-GHG) are estimates of the monetized damages (e.g., resource and production losses, health/safety effects, infrastructure losses, and other damages due to temperature increase, sea-level rise, and other climate changes) associated with incremental increases in GHG emissions in a given year. For Federal agencies, the best currently available estimates of the SC-GHG are the interim estimates of the social cost of carbon dioxide (SC-CO2), methane (SC-CH4), and nitrous oxide (SC-N2O) developed by the Interagency Working Group (IWG) on the SC-GHG. The IWG estimates in the 2021 Technical Support Document are referenced by CEQ's 2023 GHG Guidance. The FF-AQ-CC specialist report gives a more detailed account of how the SC-GHG for the EVLRP were estimated and provides a description of the range of estimates based on different damage scenarios. Below, we report the average value, by 3 discount rates, for comparison between the 10-year total for the proposed action and the no-action alternative, with a single year cost (2014) of emissions for Rio Arriba and Sandoval Counties, where this project would occur (Table 25). Fifteen-year rates and a low probability, high damage scenario are also available in the specialist report.

Table 25 Social Cost (SC)-GHGs Summary Table

Social Cost of GHG (2020$)	Average Value, 5% discount rate	Average Value, 3% discount rate	Average Value, 2.5% discount rate
Total – No action alternative (10-yr total)	$69,171,000	$225,913,000	$331,057,000
Total – Proposed Action (10-yr project total)	$36,035,000	$117,163,000	$171,407,000
2014 Combined Annual Emissions: Rio Arriba and Sandoval Counties (single year)	$125,023,000	$405,122,000	$598,647,000

Carbon Storage

The effects analysis area for carbon includes forested lands within the EVLRP footprint because this is where thinning and prescribed burning treatments are proposed and where carbon stocks may be affected. The Forest Service recognizes the vital role that our nation's forests and grasslands play in carbon cycling, which includes the direct removal of CO2 from the atmosphere through photosynthesis (carbon sequestration) and storage and release of carbon through biologic processes, such as forest growth, death, and decay. Carbon sequestration by forests is one way to mitigate greenhouse gas emissions by offsetting losses through removal and storage of carbon into long-term pools (USDA 2015a). Over at least the past several decades, temperate forests have provided a valuable ecosystem service by acting as a net sink of atmospheric carbon dioxide, partly offsetting anthropogenic emissions (Millar and Stephenson 2015). Carbon dioxide uptake by forests in the conterminous United States offset approximately sixteen percent of national total CO2 emissions in 2011 (EPA 2013). Forests and other ecosystems generally act as carbon sinks because, through photosynthesis, growing plants remove CO2 from the atmosphere and store it (USDA 2015a). Currently most states in the United States are carbon sinks, though in more recent years, states in the western US, including New Mexico are becoming carbon sources (Domke et al. 2020).

Keeping forests as forests is one of the most cost-effective carbon storage measures. Restoration of ecosystem resistance and resilience—bringing disturbed forests and grasslands that are outside natural ranges of variability back to producing a full range of environmental services—is another (USDA 2015b). Restoration increases resistance and resilience to damaging forms of disturbance such as drought stress and wildfire effects that are considered outside the natural range of variability. The proposed action would increase ecosystem resistance and resilience that could result in carbon storage beyond the 10-15-year project duration. When forests remain forested, aboveground biomass is the largest contributor to carbon uptake followed by belowground biomass (Domke et al. 2020). Even though practices such as thinning and prescribed fire may release carbon in the short term, they focus growth and storage for the future on trees that are at lower risk and/or are more resilient to disturbance.

Previous research in southwestern ponderosa pine forest has demonstrated that a restored condition that is maintained by regular surface fire can store more carbon than a fire-suppressed condition when the effects of unplanned wildfire are incorporated (Hurteau 2017). Appropriate forest management and protection can substitute lighter, strategically placed, and more recoverable emissions for disturbance emissions that would be more severe, extensive, and less reversible (USDA 2015b). Because live trees continually sequester carbon and are a more stable carbon sink than dead biomass left on the site, treating stands is preferred for long-term mitigation of atmospheric carbon levels (Vegh et al., 2013). Additionally, reducing tree density through thinning has been shown to reduce drought stress and increase growth and carbon storage relative to a fire-suppressed condition during dry periods (Hurteau 2017). The restoration of desired forest structure and the maintenance of that structure with regular surface fire helped sustain the forest carbon sink, even under an increasingly hotter climate (Hurteau 2017).

The current suite of issues facing forest managers is likely to be compounded by ongoing climate change. In forests of the southwestern United States, increasingly large wildfires and drought already carry ecological and socioeconomic costs, costs that have the potential to rise with the changing climate. While managing forests for an uncertain climate future requires a diversity of approaches, the results of a study by Hurteau (2017) suggest that restoring forest structure and surface fire to southwestern ponderosa pine provides an opportunity to maintain system structure and function, even under the projected warmer, drier future, which is likely to have increased fire frequency.

In a recent 2019 study about how thinning and prescribed burning treatment scenarios influence wildfire behavior and carbon dynamics in the Santa Fe watershed, D. J. Krofcheck found:

Forests provide a range of services to society, including carbon storage, which helps regulate the climate. Wildfires impact a forest's contribution to climate regulation by releasing carbon to the atmosphere through combustion and by killing trees, which reduces the amount of carbon removed from the atmosphere. In forests that historically experienced frequent-fire, fire-exclusion has increased tree density and the amount of biomass available to burn. These changes have increased the risk of stand-replacing wildfires, and ongoing climate change is making forests more flammable. Management to reduce stand-replacing fire risk typically involves thinning small trees and prescribed burning, both of which reduce the amount of carbon stored in the forest. We sought to determine how management would influence wildfire behavior and carbon dynamics for two different scenarios under projected climate for a municipal watershed in the Jemez Mountains of New Mexico. The prioritized scenario-placed thinning and burning treatments based on stakeholder and manager input. The optimized scenario-placed thinning treatments based on the chance of stand-replacing wildfires and applied prescribed burning to all frequent-fire forest types in the watershed. Both scenarios reduced the occurrence of stand-replacing fire. However, the optimized scenario stored more carbon because 54% less of the watershed was thinned. This reduced carbon losses from management and halved the time it took the watershed carbon storage to surpass that of the no-management scenario. Informing management based on risk helps build adaptive capacity to changing climate and maintains the climate regulation benefits of forests (Krofcheck et al., 2019).

According to satellite imagery and Forest Inventory and Analysis (FIA) data, timber harvest (includes thinning) has been a minor disturbance type on the Santa Fe NF from 1990 to 2011, affecting less than 1 percent of the forested area over this timeframe (Birdsey *et al.,* 2019). Carbon losses from the forest ecosystem associated with harvest/thinning have been relatively small compared to the total amount of carbon stored in the forest, with losses from 1990 to 2011 equivalent to about 0.09 percent of non-soil carbon stocks (Birdsey *et al.,* 2019).

Compared to the minor impact of thinning/harvest, fire has been the dominant disturbance type on the Santa Fe NF from 1990 to 2011, typically affecting less than 0.5% of total forested area annually (Birdsey *et al.,* 2019; Black *et al.,* 2022). During this period, about 4.6 percent of the forested area experienced some level of fires including prescribed fires and wildfires, though it is noted that this estimate omits the Las Conchas fire impact from late 2011 (Birdsey *et al.,* 2019; Black *et al.,* 2022). Additionally, many prescribed fires that burned primarily along the forest floor were likely undetected by the satellite imagery because they did not cause a change in canopy cover, suggesting that prescribed fires are having a limited impact on carbon storage as compared to wildfire. Still, carbon losses from the forest ecosystem associated with fires have been relatively small compared to the total amount of carbon stored in the forest, with losses from 1990 to 2011 equivalent to about 1.5 percent of non-soil carbon stocks (Black *et al.,* 2022).

For the EVLRP, stored carbon would be reduced due to biomass removal and prescribed burning (greenhouse gas release or emissions) post treatment. New or accelerated forest stand growth, especially

growth among middle-aged trees, would partially offset the removed or released carbon through heightened carbon sequestration. In addition, the post treatment forest stands would be more resilient and able to resist adverse wildfire effects which would allow for more steady carbon storage over time (Wiedinmyer and Hurteau 2010). Calculations show that post prescribed burning, surface and ground carbon storage would be reduced by 478,791 tons, while thinning plus pile burning could remove an additional 124,338 tons. Compared to reported SFNF carbon stocks (Table 23 above) implementing the proposed action could reduce surface and ground forest carbon by 0.78%.

Cumulative Effects

Compared to estimated annual New Mexico greenhouse gas emissions from prescribed burning the project would emit up to approximately 24-46% of CO2 and 39-59% of CH4 on an annual basis. The social cost of implementing the project over 10 years is roughly 29% of the cost of a single year of total GHG emissions for the two New Mexico counties in which the project occurs.

Emissions generated from the implementation of the EVLRP would be additive to other GHG emissions released through various sources (e.g., forest management, transportation, industrial) across the state on public and private lands, including other projects occurring on the SFNF like those associated with the Rio Chama CFLR and Northern NM Riparian Restoration efforts. However, implementing this project also cumulatively enhances the reduction of uncharacteristic fire risk across the broader landscape, and may help to avoid or lessen wildfire emissions and smoke impacts should a fire occur. Emissions generated from this project may also be partially offset through restoration and forest regeneration efforts occurring elsewhere on the Santa Fe NF and on neighboring lands.

After prescribed burning is completed, calculations show that about 478,791 tons of surface and ground carbon would be removed from the project area. Thinning and pile burning would remove up to an additional 124,338 tons. Compared to reported SFNF carbon stocks the implementation of the proposed action is estimated to reduce forest carbon by up to 0.78%. Other similar fuels reduction and resiliency treatments on the Forest will also reduce current carbon stores on the Forest by some margin, though cumulatively these treatments should not shift the Forest from being a carbon sink to a source, as increased occurrences of severe wildfire would. Furthermore, restoring these frequent-fire forests to a desired stand density and structure within the project area combines with other similar efforts across the SFNF and surrounding lands to increase landscape resistance and resilience to wildfire, insect and disease outbreaks, and to the effects of climate change by a much greater margin than any single treatment implemented alone.

3.7 Cultural Resources

Affected Environment

Cultural resources represent the tangible and intangible evidence of human behavior and past human occupation. Cultural resources are also referred to as archaeological sites or Historic Properties. Cultural resources may consist of precontact or historic archaeological sites, historic-age buildings and structures, traditional use areas, and cultural places that are important to a group's traditional beliefs, religion, or cultural practices. These resources are non-renewable and depending on the nature of the resource can be particularly sensitive to management practices, such as the proposed landscape restoration treatments.

The area for consideration of impacts of Proposed Actions to cultural resources is the entire 121,648-acre EVLRP area. The Area of Potential Effects (APE) for the purposes of National Historic Preservation Act (NHPA) compliance is also the entire 121,648-acre project area. This encompasses all National Forest System lands within the project boundary on which ground-disturbing project activities may occur and includes silvicultural treatments (precommercial and commercial thinning), prescribed fire and associated activities, and road work activities (maintenance/improvements, closure, decommissioning, and opening temporary roads). The cultural resources analysis for this project shows that a total of 287 previous cultural resources projects and a total of 724 previously documented Historic Properties are within the APE (Hamlin and Comstock 2023).

National Historic Preservation Act (NHPA) Compliance

The USDA Forest Service Southwestern Region (Region 3) has a programmatic agreement (PA) with the Advisory Council on Historic Preservation (ACHP) and State Historic Preservation Officers (SHPOs) that stipulates the Forest Service's responsibilities for complying with the National Historic Preservation Act (NHPA) (USDA-FS 2023). Region 3 has developed a standard consultation protocol for large-scale fuels reduction, vegetation treatment, and habitat improvement projects via Appendix J of the PA. Region 3 has also developed a standard consultation protocol for routine road maintenance, road closure, and road decommissioning projects via Appendix E of the PA. Road work not covered by Appendix E shall follow standard compliance protocols established via the overarching PA. By following these protocols, the ACHP and the SHPOs have agreed that the Forest Service will satisfy legal requirements for the identification, evaluation, and treatment of historic properties. The SFNF will comply with the protocols in lieu of standard Section 106 NHPA consultation (36 CFR 800).

Per the NHPA regulations, an effect to Historic Properties is defined as, "alterations to the characteristics of an historic property qualifying it for inclusion in or eligibility to the National Register" (36 CFR 800.16(i)). Proposed activities may affect historic properties adversely, beneficially, or neutrally. An adverse effect to Historic Properties "is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register of Historic Places in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register of Historic Places. Adverse effects may include reasonably foreseeable effects that may occur later in time, be farther removed in distance or be cumulative" (36 CFR 800.5(1)). Types of adverse effects cited in the regulations include:

- Physical destruction of or damage to all or part of the property.
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with

the Secretary of the Interior's Standards for the Treatment of Historic Properties and applicable guidelines.
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance.
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features.
- In general, impacts to Historic Properties, especially archeological sites, can be defined as anything that results in the removal of, displacement of, or damage to artifacts, features, and/or stratigraphic deposits of cultural material.

The initial compliance document for this project is the Encino Vista Landscape Restoration Project: Phase I Cultural Resources and Inventory Assessment (Hamlin and Comstock 2023b). This report details the culture history of the project area and summarizes existing data for previous cultural resource projects and sites within the APE. The data were derived from a data snapshot obtained in October 2020. Primary sources of information for the records search were the USDA Forest Service's Natural Resource Manager (NRM) Heritage Database, hardcopy reports and site files at the SFNF Headquarters, and the New Mexico Historic Preservation Division's New Mexico Cultural Resources Information System (NMCRIS) online database. Tribal consultation thus far for the EVLRP has involved correspondence to 22 federally-recognized tribes and will continue during project implementation. With the submission of the Phase I Assessment, the SFNF expects to receive SHPO concurrence on a finding of No Adverse Effect to Historic Properties provided adherence to the stipulated design features during project implementation (Appendix C). Project implementation will require additional phases of cultural resources inventory and compliance documentation per the Region 3 PA.

Analysis Summary

Previous Cultural Resources Projects

The EVLRP Phase 1 Cultural Resources and Inventory Assessment (Hamlin and Comstock 2023) shows that a total of 287 previous cultural resources projects have been completed in the APE. Project purposes include survey (inventory), records searches and literature reviews, site monitoring and inspection, planning, research, excavation, and interpretation. The majority of previous projects center on legal compliance and reporting conducted on the SFNF.

Previous projects analysis involved categorizing projects by purpose (survey or non-survey) and survey validity (valid, invalid, review required) based on current professional standards. Survey validity criteria comprised survey age, survey technique and transect width, and whether the survey was completed by professional archaeologists. The majority of previous survey in the APE does not meet current professional standards.

The most recent and relevant ethnographic assessment that includes the EVLRP area was completed in 2016 (Hanson et al. 2016). An ethnography is the systematic study and description of people and cultures. Data is gathered through interviews, observations, and documents analysis. The authors detail traditional communities and uses of the Jemez Mountains. These groups include federally recognized tribes and rural historic communities that have historically occupied and used the Jemez Mountains.

Cultural Resources

The EVLRP Phase 1 Cultural Resources and Inventory Assessment (Hamlin and Comstock 2023) shows that a total of 724 previously documented Historic Properties (sites) are within the Area of Potential Effects (APE). Human use and occupation began in the area over 10,000 years ago. Sites were analyzed by age, type, National Register of Historic Places (NRHP) eligibility, and fire sensitivity. Within the

EVLRP footprint, there are two management areas and one designated area relevant to cultural resources per the SFNF Land Management Plan.

Site age analysis identified 608 (84 percent) are Precontact, 59 (8 percent) Historic, 45 (6 percent) Multicomponent, and 7 (1 percent) Unknown. There are also five (1 percent) sites that were determined to be noncultural on their latest revisit. Therefore, most sites in the project area date to prior to Spanish arrival in the area (approximately A.D. 1540 and earlier).

Sites were categorized into eight general types: Precontact artifact scatter, Precontact structure, Historic general, Multicomponent, Other, Rockshelter, Non-Cultural, Petroglyph. Of the 724 sites previously recorded in the project area, Precontact artifact scatters account for 60.1% of the site total (n=435), and Precontact structural sites account for 19.8 percent (n=143).

Site NRHP eligibility ranges across the sites. Federal requirements and previous consultation provide standard mitigation protocols for cultural resources that are Listed, Eligible, Unevaluated/Undetermined to the NRHP or that are found to be significant to tribes or other traditional communities who depend upon the project area for their lifeways. Of the 724 total previously recorded sites in the project area, Unevaluated or Undetermined sites total 342, or 47.2% of the site count. Sites determined Eligible to the NRHP total 313, or 43.2% of the total site count. Sites determined Not Eligible to the NRHP total 51, or 7.0% of the total site count. Twenty-one numbered sites (2.9%) are part of a NRHP-listed Historic Property, Tsi-P'in Owingeh Pueblo (AR-03-10-01-00001/LA 301). In sum, 673 (93.0%) previously documented Historic Properties may potentially require protection within the EVLRP footprint.

Data from each site were analyzed to determine a site's fire sensitivity and a project implementation treatment recommendation. It should be noted that in many cases, these data are outdated and incomplete. An accurate assessment of site fire sensitivity will require a ground-truthing exercise to verify fuel loads, fire-sensitive features, and pre-burn treatment needs at individual sites. Approximately 32.2% (n=233) of the previously recorded archaeological sites in the EVLRP are considered fire-sensitive, according to the Region 3 PA, Appendix J, Section III (USDA-FS 2023). Known fire-sensitive site types in the Southwest Region include:

- *Historic sites with standing, or downed wooden structure or other flammable features or artifacts*
- *Rock art sites (depending on rock art type, exposure, fuel type, and fuel loading)*
- *Cliff dwellings*
- *Prehistoric sites with flammable architecture elements and other flammable features or artifacts*
- *Prehistoric sites with exposed building stone or sot or porous materials such as volcanic tuff*
- *Culturally modified trees, including aspen art and peeled /scarred trees*
- *Certain traditional cultural properties (based on consultation with tribes)*

Designated and Management Areas

Within the EVLRP footprint, there are two management areas and one designated area relevant to cultural resources per the SFNF Land Management Plan (Figure 1). The designated area is the Old Spanish National Historic Trail (NHT) (USDA-FS 2022a:189-192). The Old Spanish NHT extends 2,700 miles through New Mexico, Colorado, Utah, Nevada, and Arizona, and ends in California. The trail served as a route for immigrants and trade goods moving west to California in the mid-1800s. The trail has several routes, and the Armijo Route spans the project in the north, generally along State Highway 96. The Old Spanish NHT is documented as a SFNF Historic Property (AR-03-10-01-01917/LA 200221).

The first management area is a Cultural Interpretive Management Area, Tsi-P'in Owingeh Pueblo (USDA-FS 2022a:205-208). This is a publicly interpreted archaeological site documented as a SFNF Historic Property (AR-03-10-01-00001/LA 301). The site is listed on the National Register of Historic

Places and the New Mexico State Register. The site is a large Ancestral Tewa pueblo and consists of the architectural remains of a large multi-room pueblo and associated features. It was inhabited by the ancestors of the modern-day Tewa pueblo communities that live throughout the Española Valley to the east of the EVLRP area. The pueblo was built around A.D. 1275 and depopulated before A.D. 1450. Tsi-P'in Owingeh Pueblo is in the northeastern section of the project.

The second management area is an Eligible Wild and Scenic River, Cañones Creek (USDA-FS 2022a: 217-219). This 9.98-mile river segment meets the basic criteria for inclusion in the National Wild and Scenic Rivers System. The outstanding remarkable values (ORVs) of Cañones Creek are recreation, scenery, prehistory, botanical, and fish. The prehistory ORV directly corresponds to the occupation of Tsi-P'in Owingeh Pueblo. The pueblo is located on a prominent mesa above Cañones Creek.

Environmental Effects

No Action Alternative

Under the no action alternative, activities, including silvicultural treatments, prescribed burning, and road activities, would not be implemented within the APE. Without implementation of the proposed actions, design criteria proposed to ensure no adverse effects would also not be implemented. The condition of cultural resources would be expected to continue along existing trends and there would be no adverse effects to historic properties resulting from this alternative.

Proposed Action Alternative

The Proposed Action Alternative has the potential to cause adverse direct or indirect effects to Historic Properties in the project's APE. The nature and scope of the proposed project activities are such that effects to Historic Properties within the project's APE can be reasonably predicted. Adverse effects can be caused by silvicultural treatments (precommercial and commercial thinning), prescribed fire and associated activities, and road work activities (maintenance, improvements, reconstruction, opening temporary roads, road closure or decommissioning).

To avoid adverse direct or indirect effects to Historic Properties within the project's APE, design features will be applied during project implementation. Design features will be employed in a site-specific manner to ensure adequate protection based on site types, locations, and adjacent project activities. Most design features are Standard Protection Measures outlined in the Region 3 PA Appendix J, Section II and Appendix E, Section III (USDA-FS 2023). Additional design features for road work not covered via Appendix E have been added for the purposes of this project. All design features may be reviewed in Appendix C.

Cumulative Effects

The cumulative effects on cultural resources should consider all ground surface-altering actions that have occurred or are likely to occur within the APE. Previous and current Forest Service management activities, public resource procurement and recreational use, and natural processes have impacted cultural resources. However, these impacts are substantially diminished through the use of design features (Appendix C).

Past, present, or reasonably foreseeable future projects within or adjacent to the analysis area may affect cultural resources. These projects include routine road and trail maintenance, aquatic habitat restoration, road and trail decommissioning, invasive species removal, and additional vegetation thinning and prescribed fire projects. Projects on SFNF lands would comply with the Region 3 PA (USDA, FS 2023) and impacts to cultural resources would either be avoided or mitigated through this process.

Increasing the scale of restoration treatments would provide long-term protection for the entire landscape and all of the cultural resources within it from disturbances such as high-intensity wildfire. Cumulatively, the projects within and adjacent to the project area would improve long-term protection of cultural resources. Therefore, the potential cumulative effects on cultural resources are not considered to be adverse.

Summary

The analysis area contains 724 previously documented historic properties: 313 archaeological sites determined Eligible to the NRHP; 342 sites considered Unevaluated or Undetermined; and 51 sites determined Not Eligible. Twenty-one numbered sites (2.9%) are part of a Listed historic property, Tsi-P'in Owingeh Pueblo (AR-03-10-01-00001/LA 301). Although the proposed project comprises the types of activities that have the potential to affect historic properties directly or indirectly, the effects will be avoided through project design and cultural resources-specific design features (Appendix C).

In summary, all listed, eligible, and unevaluated/undetermined Historic Properties will be flagged and avoided by mechanical thinning treatments and road work activities. Hand-thinning and prescribed burning may occur within site boundaries provided the design features in Appendix C are followed. Sites with combustible material will be protected during prescribed fire. A sample of listed, eligible, and unevaluated/undetermined sites will be monitored after the proposed treatments to assess whether the sites were adequately avoided and the extent to which the treatments had indirect effects (i.e., damage from increased erosion) on the sites. No project activities shall occur within the boundary of the Tsi-P'in Owingeh Pueblo Cultural Interpretive Management Area. Treatments on and around known traditional cultural use areas should be developed and implemented through ongoing consultation with tribes and traditional rural communities throughout the life of this project.

Provided these measures are implemented, the project will result in no direct or indirect adverse effects to historic properties. This project meets the policies and standards set forth in the National Historic Preservation Act of 1966, as amended (54 U.S.C. 300101) and its regulations (36 CFR 800) and the USDA Forest Service Region 3 Programmatic Agreement (USDA 202

3.8 Wildlife, Fish, and Rare Plants

Affected Environment

At-Risk Species – Threatened and Endangered including Species of Conservation Concern

At-risk species identified for the Santa Fe LMP revision include federally classified endangered, threatened, proposed, and candidate species, as described under the Endangered Species Act (1973), and species of conservation concern (SCC) (USDA 2022b). SCC are species, other than federally recognized species, which are known or expected to occur on the Santa Fe NF and for which the Regional Forester has determined that the best available scientific information indicates substantial concern about the species' capability to persist over the long term. For SCC, habitat management and compatible multiple uses will be accomplished in a way that ensures species' persistence on the Santa Fe NF, in accordance with the 2012 Planning Rule (36 CFR § 219.9(b)). The expectation is that if a project is consistent with 2022 LMP direction and plan components that population viability for SCC should be maintained. This process replaces previous Forest Service Manual 2670 Direction for Regional Forester Sensitive Species and Management Indicator Species analyses, which no longer apply. (36 CFR 219.9(b)).

The project area includes a total of twenty-six at-risk species. Two of the species are federally listed under the Endangered Species Act; the Threatened MSO and the Endangered JMS. Remaining at-risk species include twenty-four SCC. The SCC species include three fish, one invertebrate, six birds, five mammals and eight plants. Refer to Appendix A to review the SCC species list and the SCC LMP Consistency Report for this project.

Based on the Information for Planning and Consultation (iPAC) official species list (Project code: 2023-0119811), there is potential for effects to two species listed under the ESA. Therefore, this analysis will focus on effects to MSO and the JMS. There is no designated critical habitat within the project area for either species. Effects to Federally listed species are addressed in more detail in the Biological Assessment (BA), which is in preparation.

Threatened and Endangered Species

Mexican spotted owl - The MSO, listed in 1993 as threatened under the ESA, normally occupies old-growth forest in mixed conifer, rocky canyons, deciduous riparian, or a combination of these habitats that will support a home range of 1,400 to 4,500 acres (USFWS 2012). Habitat also typically has a structured canopy, a perennial water source, and a rodent-dominated prey base of adequate size. MSO home ranges include protected activity centers (PACs) that represent concentrated use areas for nesting, roosting, and foraging. Proximal areas to roosting must provide extensive foraging opportunities with dietary preferences relying on small mammals such as mice, woodrats, and voles. Adult birds are faithful to their nesting sites and return year after year to breed in the same location. There is no critical habitat for this species designated within the project area.

The project area contains a total of 32,489 acres of RCNR habitat which includes five known PACs. The project area contains 22,269 acres of RFH which includes canyon rim edges and adjacent areas that are composed of mixed conifer forest. Many other forest types in the project area are considered "other woodland types" within the revised recovery plan and do not contain specific management recommendations.

Jemez mountain salamander - The JMS was listed in 2013 as endangered under the ESA, is endemic only to the Santa Fe NF within the vicinity of the rim of the Valles caldera. The physical or biological habitat features required for this species include but are not limited to the availability of aboveground cover objects including downed logs, rocks, and uncompacted soil (USFWS 2013). Threats include habitat loss from severe wildfire or other activities that alter hydrology and disease including chytrid fungus. This species is usually present in its habitat year-round and spends much of its life underground. However, it may be found at the surface during the rainy season (approximately July through October), when conditions are suitable for surface activity. There is no designated critical habitat for the Jemez Mountain salamander in the EVLRP area.

The project area contains a total of 20,082 acres of suitable habitat for the JMS.

Methods – Threatened and Endangered Species Analysis

For this analysis, MSO habitat was based upon two main data sources. The first is based on a habitat model called the "geophysical layer" which represents areas of steep topographic relief (Johnson 2003). The model is based upon digital elevation model data and hundreds of MSO nest and roost locations from New Mexico. Grid codes 4-7 were utilized to narrow down recovery canyon nest roost habitat (RCNR) and determine which codes represent recovery foraging habitat. Grid codes 5-7 constitute RCNR. Those grid codes were cross referenced with over 20 recent MSO nesting sites in the Jemez mountains that all occur within grid codes 5-7. Therefore, this accurately represents RCNR habitat within the analysis area. Grid code 4 and below has been determined to represent recovery foraging habitat where it intersects the mixed conifer ERU. The second was the SFNF s "draft Nest/Roost Layer" (Luetzelschwab 2021). This dynamic draft NR layer is quite useful for depicting areas of the Santa Fe which contain well-structured forests which are within steep areas and contain mixed conifer habitat. It was appropriate to use two different data sources for the MSO because the species is known to use both Forested nest roost habitat and canyon habitat on the Forest. If one were to only use a single layer, true nesting and roosting habitat for the MSO may be underestimated.

For this analysis, JMS habitat was based upon an unpublished draft model which is being developed by the JMS Species Status Assessment core team. The core team is comprised of individuals and taxa experts from academia, U.S. Fish and Wildlife Service, U.S. Forest Service who are working toward the development of a recovery plan. This model categorizes habitat for the JMS based on forest vegetation type and condition that would be best suited for JMS activities. The draft documents are within the project record and may be made available by freedom of information act request. The terminology used within the draft SSA model for JMS habitat includes five categories: Favorable, Moderately Favorable, Least Favorable, Non- Habitat and Not Analyzed. For the purposes of this assessment, suitable habitat for the salamander was depicted and calculated by combining Favorable, Moderately Favorable and Least Favorable in to one "suitable habitat" category. This is due to the lack of available science to support the use of only one of these categories for analysis and that the effects to all categories would be similar and difficult to separate.

Migratory Birds

The affected environment for migratory birds is the entire project area for the EVLRP. The project area contains multiple ERUs including Piñon-Juniper woodlands, Piñon-Juniper grasslands, ponderosa pine, mixed conifer –frequent fire, mixed conifer with aspen and spruce fir.

Direction for management and protection of migratory birds and their habitats within the continental United States exists in several forms.

1. The Migratory Bird Treaty Act (MBTA) enacted in 1918 established Federal prohibition, unless permitted by regulations, to pursue, hunt, take, capture, kill any migratory bird, any part, nest, or egg of any such bird.
2. Executive Order (EO) 13186, signed January 10, 2001, directed Federal agencies to avoid or minimize adverse impacts (to the extent practical) on migratory bird resources when conducting agency actions (among many items within the "Federal Agency Responsibilities" section of the EO).
3. Pursuant to the EO, land management agencies were directed to develop Memorandum of Understanding (MOU) to strengthen and promote migratory bird conservation and collaboration with the U.S. Fish and Wildlife Service. The original 2008 MOU is still in effect and multiple extensions have occurred since 2022.
4. Bald and Golden Eagle Protection Act (1940 as amended) protects eagles from actions of anyone (or entity) which would "take" eagles to the point of causing nest failure or reduce productivity (unless you or your entity have obtained a permit issued by the Secretary of the Interior).

Environmental Consequences

For the purposes of this analysis, the phrase "short term" refers to effects or impacts which are realized over period of no more than 2 years. "Long term" describes effects or impacts which generally occur for 10 years or longer.

No Action Alternative

Under the no action alternative, none of the proposed treatments will be completed. There will be no reduction in stand density or threat of habitat loss through wildfire. Current ecosystem trends will continue and stand density and fuel loading will continue to increase while habitat quality decreases for many species.

Threatened and Endangered Species

Under the no action alternative, there would be no direct or indirect effects to any threatened or endangered species. Current ecological trends would continue and there would be no long-term improvement of habitat quality or reduction of wildfire risk for MSO or JMS.

Species of Conservation Concern

Under the no action alternative, no project activities would occur and there would be no requirement for this project to demonstrate 2022 SFNF LMP consistency with SCC.

Migratory Birds, Important bird areas, overwintering areas and Bald and Golden Eagles

Under the no action alternative, there would be no direct or indirect effects to migratory birds or bald and golden eagles. Current ecological trends would continue and there would be no long-term improvement of habitat quality or reduction of wildfire risk.

Proposed Action Alternative

Assumptions

The following effects section is based upon these assumptions:

- Restoration activities would be implemented in a phased approach over a 15 –20 -year period and distributed across the project area in space and time.

- Implementation of proposed vegetation treatments would occur on up to 2000 acres for PCT vegetation thinning and up to 8,000 acres for prescribed fire, annually.
- Spatial arrangement and timing of proposed activities within MSO recovery habitat will be designed to meet MSO-specific desired conditions based on present habitat type as outlined in the MSO Recovery Plan.
- Individual vegetation thinning treatment units would vary according to the size and arrangement of appropriate stands on the landscape. In general, leave areas will be identified in an interdisciplinary manner.
- Prescribed fire treatment units would average 500 to 1,000 acres in size, and burning would be done primarily in the fall and outside of breeding bird season. Fire intensity would be patchy within the burn unit boundaries, including some unburned refugia. Spring burning could occur but is likely to be less frequent due to environmental parameters necessary for spring burning.
- All Project Design Features (PDFs) (design features, mitigation measures, and best management practices), including species specific measures (detailed in Appendix C), would be implemented as applicable to treatment area conditions, MSO recovery habitat and JMS suitable habitat parameters.
- Pre-treatment surveys and habitat identification would be conducted according to the MSO Recovery Plan and U.S. Forest Service Region 3 MSO Habitat Management Strategy. The process includes habitat assessment, development of a pre-implementation compliance review checklist, and Habitat Checklist for Planning projects that involve prescribed fire and Forest thinning within MSO recovery habitat (Appendix B).
- Habitat models utilized for this analysis are the best available science on the species habitat.

Threatened and Endangered Species

The following section briefly describes impacts to threatened and endangered species from the proposed action and discusses the effect determination from the draft biological assessment (BA). The final BA will not be available until the Final EA is released. As the Forest works through the section 7 consultation process, additional conservation measures or PDCs may be needed as we work with the species leads for MSO and JMS.

Effects Determination - Mexican spotted owl – (NLAA) May affect, not likely to adversely affect.

Table 26 MSO habitat in proposed acres.

MSO Geophysical Model *	TOTAL Acres of MSO RCNR /RFH Habitat within planning area	Proposed Action Component			
		Commercial Thinning	PCT – Masticatio n	PCT Rx Pile Only	Broadcast Rx Fire
Recovery Canyon Nest/Roost (RCNR) Total Acres	32,489	1,734	1,625	4,771	20,482
% potentially impacted RCNR acres / total available acres	--	5%	5%	15%	63%
Recovery Foraging Habitat (RFH)	22,269	1333	903	2,999	12,533
% potentially impacted RCNR acres / total available acres	--	6%	5%	15%	56%
* Review methods section for a breakdown of how this model was used for this analysis. Percent impacted acres are rounded to nearest whole percent.					

The effect determination is based upon the application of best management practices, project design features, 2022 SFNF LMP components and quality of location information for this species. Recent survey data allows the Forest to avoid direct effects to MSO while meeting the purpose and need of this project. No commercial thinning is proposed in PACS. There are 2,613 acres of PAC acres included within the total RCNR habitat acres above. Although PACs are independent of Recovery habitat within the revised recovery plan, the acres were not removed at this time but will be removed for the BA and final EA. Table 26 shows the acres of RCNR and RFH and the percent of each recovery habitat type affected by the proposed action when compared to total available in the project area.

General Effects to MSO and Recovery Habitat

As consistent with the revised recovery plan for the MSO and the Southwestern Region MSO Habitat Management Strategy and 2022 SFNF LMP, forest stand structural conditions are to be sampled (common stand exams) prior to treatments. If sampled stands are meeting recovery plan recommendation for Southern Rocky Mountains EMU forested recovery habitat, the Forest will work toward treating stands to maintain recommended basal area, percent diameter class and species composition. Stands that currently meet RCNR recommendations would not be degraded below or may not be treated at all.

Direct effects to MSO from commercial thinning activities and mechanized PCT will not occur. This is because MSO surveys would be conducted in RCNR prior to implementation or direct coordination with the wildlife biologists may result in the action being allowed due to habitat quality evaluations, topography,

distance to known nesting and roosting areas (sound will not travel into canyon PACs/ into RCNR) or other means. Mastication would occur adjacent to roads and not within known protected activity centers. Indirect effects to RCNR and RFH would include loss of some downed wood components, slight decrease in canopy cover through small diameter tree mastication, increased light penetration to the forest floor and temporary impacts to prey base. See Table 6 for a breakdown of the desired conditions within proposed commercial treatment areas.

Hand thinning and pile burning may have discountable direct effects to the MSO (noise disturbance). These noise disturbance impacts would be unlikely to disrupt MSO breeding behavior. This is because MSO surveys would be or have been conducted in RCNR prior to implementation and direct coordination with the wildlife biologists may result in the action being allowed due to habitat quality evaluations, topography, distance to known nesting or roosting areas or other means. Indirect effects to MSO RCNR and RFH would have mostly negligible effects in terms of canopy loss. This is due to the project design which focuses on cutting trees less than 9 inches dbh and below within treated areas. Trees in that size class rarely reduce the canopy of dominant and co-dominant trees because ladder fuels are located on the forest floor and are comprised of smaller diameter trees and brush.

The application of prescribed fire could occur at any time of year but is much more likely during the fall months. In general, direct effects to MSO could include harassment causing flushing response through use of vehicles, helicopters or drones for aerial ignition operations. Indirect effects may include smoke accumulation, habitat alteration (mosaic burning conditions), short term impacts to prey base and consumption of downed wood and snags. Furthermore, reducing ladder fuels would provide beneficial effects in terms of increasing the chance for proper fire management during broadcast burning or wildfire management. Other indirect effects include smoke accumulation within canyons which may force MSOs to temporarily relocate from overwintering areas.

Reforestation would have *no effect* on the MSO. This is because those activities would occur within the Spruce-Fir ERU and outside of RCNR or RFH. This vegetation type is not considered recovery habitat within the revised recovery plan for the MSO and known as another woodland type.

Multiple PDFs have been incorporated into the proposed action. Appendix C includes PDFs that have been designed to help reduce the overall impact of the proposed action on the MSO. Examples of PDFs include those which impose seasonal restrictions for some activities, limit the diameter of trees which can be cut within PACs, avoidance of downed wood accumulations, describe desired prescribed fire intensities and more. In addition, the MSO NEPA (Habitat) Checklist and MSO Step by Step Habitat Treatment and Implementation Guide for the project are attached as Appendix B.

Overall, the implementation of the proposed action will focus on meeting desired ecological conditions within the project area, improving wildlife habitat and create more resilient forests which can resist catastrophic wildfire. Although MSOs and recovery habitat could be impacted over the short term, the long-term benefits of implementing the proposed action outweigh the short-term impacts for this species.

Jemez mountain salamander – (LAA) May affect, likely to adversely affect

Table 27 JMS habitat in proposed acres.

SSA Draft Model	TOTAL Acres of SSA Draft Model Category	Proposed Action Component			
		Commercial Thinning	Mechanical PCT (mastication)	PCT - Rx Pile Only	Broadcast
Grand Total of Acres* of Suitable JMS habitat	**20,082**	940	0	1,541	10,405
% of total acres impacted by the proposed action	--	5%	-	8%	52%
*See methods section for an explanation regarding how suitable habitat acres were developed.					

Commercial thinning (and associated road maintenance work) would impact up to 940 acres of suitable JMS habitat. Direct effects to JMS include harassment, potential injury or mortality. These effects may occur through use of vehicles and ground skidding equipment (GSE) accessing commercial timber units to conduct thinning operations and skidding logs to landings. Indirect effects to suitable habitat include decrease in canopy cover, inadvertent destruction of habitat features (downed wood) by GSE, increases in solar radiation, long term reduction in habitat quality and habitat fragmentation (compaction).

Mastication equipment will not be permitted in JMS habitat; therefore, this component of the proposed action will have No Effect on the JMS or their habitat. Instead, roadsides that are being targeted for roadside fuel breaks are included in the next proposed action component PCT and pile burning which are to occur by hand.

Up to 1,541 acres of suitable JMS habitat would be impacted by PCT and pile burning (8%). This proposed action component is overlapping much of the prescribed fire broadcast areas discussed in the next component section however, we articulate here that impacts from this action would include hand thinning impacts to treated areas but would not experience GSE compaction impacts. Direct effects to JMS may include harassment from Forest crews while hand thinning small diameter fuels along roads or steep hillsides over 40% slope. The impact of Forest crews on the JMS would be in the form of stepping through habitat, possibly harassing an individual underneath a cover object when piling small diameter fuels into piles. In general, crews would thin any time of the year but usually avoid working in wet weather. Hand piles would be comprised of limbs, boles, and branches less than 9 inches dbh and would not exceed 6 feet in diameter or 6 feet in height (conical or paraboloid shape). Other direct effects to JMS may include injury or mortality from subsequently burning piles.

Up to 10,405 acres of suitable JMS habitat would be affected by broadcast prescribed fire (52% of total suitable habitat within the analysis area). Broadcast prescribed fire would be applied to the landscape when environmental conditions would allow the best chance for low severity fire impacts. The application of prescribed fire could occur at any time of year. Fall and winter burning would likely result in less direct effects to JMS assuming that our current understanding of JMS biology is accurate. During dry and frozen conditions, it is assumed that JMS are underground where the conditions allow for proper respiration and other life history functions. Spring burning could have potentially more direct impacts to JMS if they are surface active. Direct effects to JMS from broadcast fire may include harassment, injury, or mortality. Indirect effects from prescribed fire may include consumption and loss of some downed woody material, loss of canopy cover (herbaceous vegetation, grass and ladder fuels), recruitment of snags and downed wood. Lighting caused fires in the Jemez mountains historically occurred during pre-monsoon conditions

and may reflect a more natural fire pattern with unknown consequences or benefits to the JMS. A recent study in the Jemez Mountains found repeated, low-severity fire was a key historical ecological process in JMS habitat and an important component of ecosystem restoration, resilience, and likely species recovery (Margolis and Malevich 2016). The assumption that JMS evolved with low-severity fire provides the context for this effects analysis. The proposed action would have long-term indirect impacts to the JMS and its habitat by reducing hazardous fuels and influencing forest composition and structure toward desired conditions.

Reforestation work would have no effect on the JMS or its suitable habitat. This is because areas proposed for reforestation are well outside the suspected range of the species and outside of modeled habitat.

Overall, restoration activities would reduce the risk for stand replacing, high-intensity wildfire that would have greater long-term adverse effects to JMS and habitat loss than the proposed action. PDFs are incorporated into the proposed action to reduce the potential for adverse effects to JMS. A few examples include ensuring the team plans prescribed fires under the optimal conditions to achieve low fire severity fire, offer protection of the species during suitable environmental conditions and focus ground skidding equipment work in the winter months when the JMS is presumed to be underground, and avoiding creating piles on top of existing macro features (rock piles, large downed wood accumulations) and more. Please review Appendix C for a full list of the PDFs.

Migratory Bird Analysis – Species of Concern, Important Bird Areas, Overwintering and Bald and Golden Eagles

New Mexico Avian Conservation Partners considers eight risk factors in identifying conservation priority species: Global Abundance, New Mexico Breeding Abundance, Global Breeding Distribution, New Mexico Breeding Distribution, Threats to Breeding in New Mexico, Importance of New Mexico to Breeding, Global Winter Distribution, and Threats on Wintering Grounds. A list of species at the highest risk are classified as “highest priority” for conservation action. This section addresses general effects to migratory birds, and effects to highest priority species for the main habitat types found in the planning area.

There have not been specific USFS policies provided to direct migratory bird analyses in the NEPA process. However, the Southwestern Regional Office (R3 USFS) advice on migratory bird analysis is as follows.

1. Analyze effects to Species of Concern which are developed by the local (State) Partners in Flight office with an emphasis on “high priority species”.
2. Analyze effects of project action on Important Bird Areas (IBA’s) and
3. Analyze effects of project actions to important overwintering areas on USFS lands.

Species of Concern (SOC) which have been identified by the State of New Mexico Partners in Flight (PIF) and were considered for this analysis are described in Table 28. This table was utilized to guide the effects analysis. The National Information Resource System (NRIS) and eBird data were utilized to evaluate species occurrence within the project area and potential impacts.

Table 28 Species of Concern (SOC) which have been identified by the State of New Mexico Partners in Flight

SPECIES ACCOUNTS Santa Fe National Forest high priority migratory bird species of concern. We assume the following migratory bird species of concern may occur in the project area because their habitats also are within the project area.				
Species	**Nest Substrate[b]**	**Nest type[b]**	**Usual nest height range[b] (feet)**	**Nesting Period[c]**
Mixed Conifer Forest: Douglas fir, white fir, ponderosa pine, often some aspen and Gambel's oak.				
Owl, Flammulated[a]	snag	cavity	no information	May to Jul
Owl, Mexican Spotted[a]	conifer, cliff	cavity, platform, scrape	80	May to Sep
Ponderosa pine forest: primarily pure ponderosa pine forest				
Owl, Flammulated[a]	snag	cavity	no information	May to Jul
Owl, Mexican Spotted[a]	conifer, cliff	cavity, platform, scrape	80	May to Sep
Warbler, Grace's[a]	conifer	cup	20 to 60	May to Aug
Warbler, Virginia's[a]	ground	cup	0	Apr to Aug
Woodpecker, Lewis's[a]	deciduous tree, snag	cavity	5 to 100	May to Aug
Piñon – Juniper woodland				
Jay, Pinyon	conifer	cup	3 to 26	Apr to Aug
Titmouse, Juniper	deciduous tree, snag	cavity	3 to 10	Apr to Jul
Thrasher, Bendire's	shrub	cup	2 to 4	Mar to Aug
[a] Species occur in other habitat categories too [b] Source: Ehrlich and others 1988 [c] Source: Corman and Wise-Gervais 1995				

The implementation of the proposed action would locally impact up to eight migratory bird species or SOCs (Table 28). These impacts would occur through the life of the project and over the long term as future maintenance burning will be necessary to meet the desired conditions. Effects to habitat from the implementation of the proposed action may include temporary- to - long term loss of canopy cover from thinning dense ladder fuels, commercial thinning and prescribed burning. Consumption of downed wood and loss of snags through prescribed fire is also likely to occur. Migratory birds are generally able to fly away from disturbances as they occur and will find adjacent functioning habitat when displaced. The exception to this is during nesting season. Nesting birds are more susceptible to disturbance impacts as they (eggs, nestlings) cannot flee disturbances.

Prescribed fire would generally occur during periods of suitable environmental conditions for burning (the fall, winter and early spring months) and outside of the breeding bird season. Fall burns would not impact any nesting migratory bird breeding activities. Under this alternative, spring burning could occur provided the appropriate environmental conditions exist. In addition to effects discussed above, spring burning could potentially cause loss of nestlings, fledglings or eggs. Potential loss of individuals may only be applicable to migratory birds that nest within substrates which could be affected by prescribed fire and thinning activities (ground, snag and shrub nesters). These include Virginia's warbler and Lewis's woodpecker (ponderosa pine ERU). This is due to Virginia's warbler being a ground nester and Lewis's woodpecker nesting in decayed snags both of which, could be impacted by prescribed fire. As with any treatment, some individual migratory birds or habitats may experience more impacts than others at the

stand level. As forest conditions change through management activities or lack of management activities (fire suppression, no active thinning management), the changes benefit some species and do not benefit others. Other migratory birds in the planning area that are of high concern include Juniper titmouse, Pinyon Jay, and Bendire's thrasher occupying mostly the Piñon – Juniper ERU. There are no broadcast prescribed fires proposed within this ERU rather, proposed actions within the ERU are strictly for WUI objectives and any prescribed burning would occur for slash management only. Therefore, the ERU would experience minimal thinning and burning work and only near WUI areas where the purpose and need are well defined. Project design features are in place to protect threatened and endangered species, and these will also benefit migratory birds. These include Wild –3 through 5, Wild – 7 through 9, and Wild 12, 18 and 20 and 22. A measure specifically calls out for the retention of mast producing trees within the Piñon-Juniper ERU.

Reforestation work would only impact the Lewis's woodpecker through incidental hazard tree felling to facilitate implementation. Only hazard trees which pose a significant safety hazard to Forest workers may be felled.

Under this alternative, treatments would not occur simultaneously in space or time. Specific treatment areas are selected based upon specialist criteria, PDFs BMPs and threatened and endangered species habitat parameters. All of which results in non- contiguous blocks of treatment areas along roads and strategic locations and varying forest structural conditions across the landscape. Treatments would not occur at a high frequency and would take place for the life of the project (10-15 years or longer). This means that migratory birds would experience effects over a long period and not simultaneously. Many treatments will include leave groups or areas which will not be treated. Those leave groups can serve as habitat for some birds but may be too small to continue to function for some migratory birds.

Although the implementation of the proposed action will not result in a measurable impact to bird populations within the analysis area, effects are likely. Indirect impacts from the proposed vegetation and fuels treatments will be minimal and highly localized, occur in different space and time but expected effects vary by species. The proposed action does not include purposeful or intentional take of migratory birds. This project will not affect migratory birds at the population level but may result in an unintentional take of individuals during proposed activities.

Important Bird Areas and Overwintering Areas

The project area does not contain any identified Important Bird Areas (IBA). However, the project is adjacent to the Valles Caldera National Preserve, which is an IBA. The implementation of the proposed action would not impact any IBAs directly. Indirectly, smoke from prescribed fire could cause short term impacts but they are expected to have no measurable effect on IBAs or birds that utilize them. Additionally, overwintering areas in New Mexico consist primarily of large wetlands or other water sources. Important overwintering areas recognized on the Forest include the Pecos River, and Rio Chama and Rio Grande corridors, all of which are outside of the analysis area. Therefore, no further analysis of impacts to overwintering areas is included in this analysis.

Bald and Golden Eagles

Both bald and golden eagles have been documented within the project area. Bald eagle nesting has not been documented on the SFNF and there are no large waterbodies with sufficient foraging habitat on the Forest or within the project area. Therefore, no impacts are expected to the species. Golden eagles are known to nest on the SFNF within rocky, canyon and cliff habitat. There are no known nest sites in the

project area. However, on the eastern edge of the project area where there are steep canyons bisected by mesas, it is possible that golden eagles may occur. As discussed in the MSO section, use of helicopters and drones for aerial prescribed fire ignition is likely to occur within the project area. The possibility exists for temporary impacts to individual golden eagles and habitat, however Wild 20 and 21 PDFs provide the ability to monitor for potential impacts to raptors during prescribed fire activities and/or seasonally restrict an activity (Appendix C, Part 1). Since golden eagle suitable nesting habitat occurs concurrently with MSO PACs and RCNR, measures to protect the MSO should decrease impacts benefit the golden eagle and therefore, would prevent impacts.

Cumulative Effects – At Risk, Threatened and Endangered Species and Migratory Birds

The cumulative effects analysis boundary for Wildlife, fish and rare plants includes all land within the project area and pertains to all terrestrial and aquatic resources within section 3.8 of this document.

Cumulative effects can increase over time. Future Federal, private and State actions similar to the proposed action could occur within the project analysis area. The project area has multiple term grazing permits which will occur simultaneous to implementation of the proposed action. Grazing can exacerbate erosion, affect herbaceous and grass species and impact the success of prescribed burning operations. Forest thinning and prescribed burning, if undertaken on Forest Service lands, would be designed to mitigate potential wildfire and, when possible, benefit wildlife and fisheries habitat. Thinning and prescribed burning on non-Forest Service land would largely occur in areas that typically support habitat (e.g., Piñon-Juniper in lower elevations) for fewer at –risk species or on relatively smaller areas of land.

When combined with ongoing or reasonably foreseeable actions on federal and private lands, additional cumulative effects are anticipated from implementation of the proposed action. The proposed action would follow 2022 SFNF LMP requirements, implement PDFs that protect and improve species habitats, and cause beneficial effects to habitat through future forest restoration treatments. Review Table 41 for a list of projects that have been developed to display those actions which have been identified which contribute to cumulative effects.

3.9 Range Resources

Affected Environment

Livestock grazing is important to the local economy and is directly tied to the history and strongly rooted culture that has shaped the present-day area. There are several small predominantly Hispanic villages near the project area. The residents retain their traditional values and depend on the use of natural resources, including livestock grazing and the use of forest products. Raising livestock contributes to a sense of identity, prestige within the community, pride of lifestyle, and a feeling of self-sufficiency. These create a strong sense of community (Raish and McSweeny 2003; 2012).

Livestock grazing contributes to the livelihood of permittees and the economy of local communities and counties. For most permittees, livestock grazing is generally not a commercial venture. Most of the permittees have other jobs and do not make their sole living from livestock production, although for some, a substantial portion of their income is derived from livestock. The permittees typically own small ranches, and federal grazing permits are integral to their overall operations.

The EVLRP area contains all or part of 11 grazing allotments: Coyote, Gallina River, Jarosa, La Jara, Mesa Alta, Mesa Del Medio, Mesa Poleo, Palomas, Penas Negras, San Pedro & Youngsville. (Figure 11). There are many rangeland infrastructure components like fence lines, water developments and other management components within the EVLRP area.

Adaptive management is used to adjust current resource conditions with livestock numbers. The number of authorized livestock, season of use, and levels of livestock use can vary from year to year based on resource conditions. It is important to note that the current standard as formalized in the Forest Service Handbook may be different from that used in older allotment decisions.

Figure 11 Grazing Allotments within the project area.

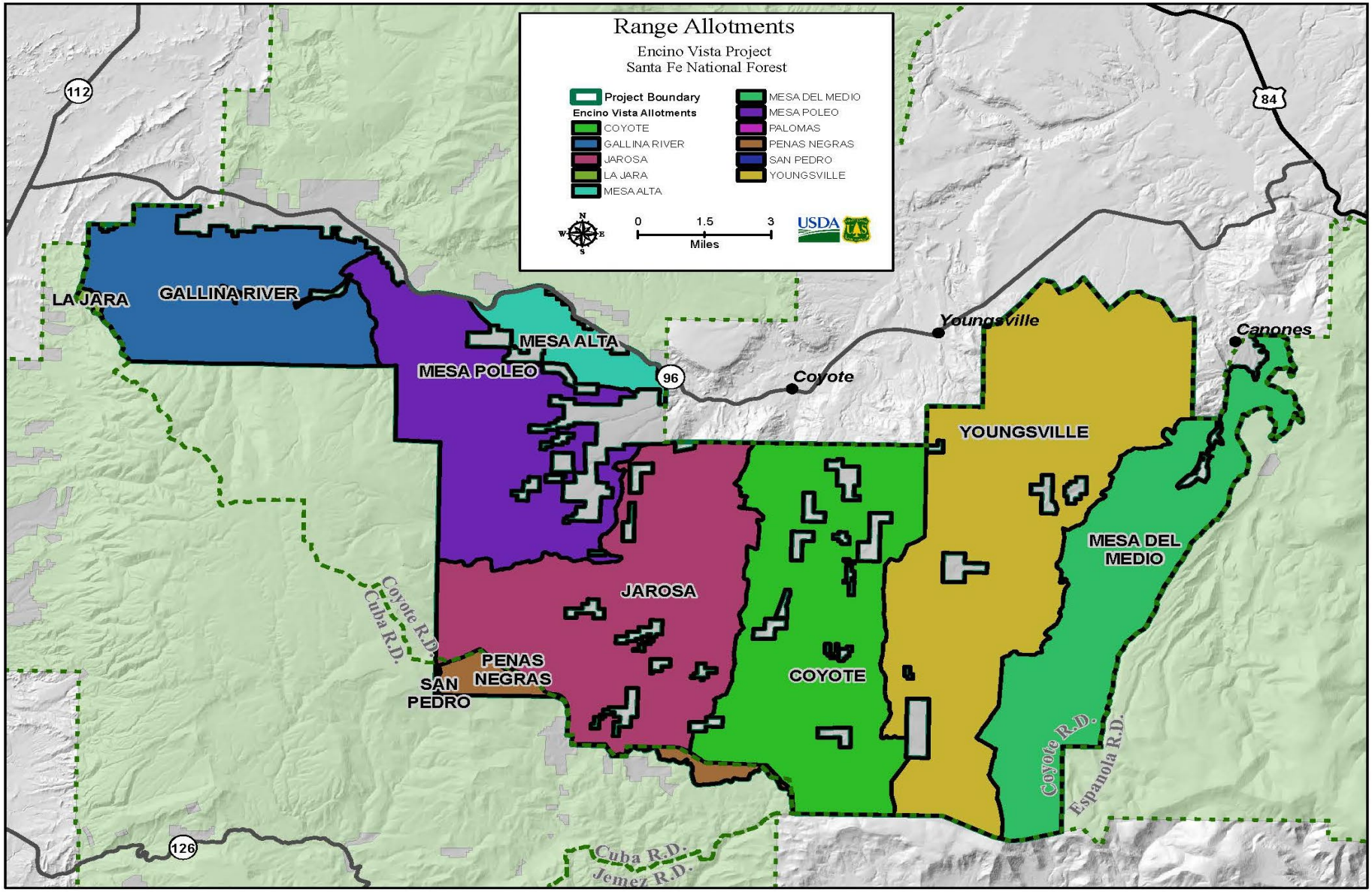


Table 29. Grazing Allotments within the project area.

Allotment Name	Allotment Status	Total Acreage of Allotment	Acres of Allotment in Project Area	Percent of Allotment Acres in Project Area	Number of Permits	Number of Permitted Livestock	AUMs
Coyote	Active	19,929	19,905	99.87	14	335	2444
Gallina River	Active	22,404	13,387	59.75	7	211	1501
Jarosa	Active	22,176	20,881	94.16	11	412	2878
La Jara	Active	14,988	145	0.96	2	38	225
Mesa Alta	Active	36,155	3,103	8.58	8	200	1744
Mesa Del Medio	Active	16,724	16,709	99.91	9	148	1044
Mesa Poleo	Active	22,297	15,180	68.08	11	208	1626
Palomas	Active	5,297	2.7	0.05	2	109	724
Penas Negras	Active	15,901	1,922	12.08	6	303	1864
San Pedro	Active	20,994	34	0.16	3	440	2119
Youngsville	Active	30,294	30,266	99.91	17	769	5665
Total		**227,159**	**121,535**		**90**	**3,173**	**21,834**

Environmental Effects

No Action Alternative

Under the no action alternative, permitted livestock numbers would stay the same. However, annually authorized numbers will continue to vary annually, as it should with adaptive management, in accordance with the grazing resource condition. Under the no action alternative, forest ecosystem conditions would continue to decline, stand structure would continue to grow denser, herbaceous understory will decline or disappear, and overall forest resiliency will continue to decline throughout the project area. The overgrown forests would continue to adversely impact rangeland health. As shade-tolerant species become dominant and alter the understory species composition of the forest, the grasses, forb, and shrub matrix of the forest would change and eventually herbaceous production will become negligible. Rangeland capability is the potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity, and the ability of grazing livestock to move freely within an allotment, in the EVLRP area is declining because of tree encroachment and would continue to do so. Under the no action alternative, herbaceous vegetation density and diversity would continue to decline. In the long-term, rangeland capability and forage production would also continue to decline leading to an overall negative impact on the range resources.

Proposed Action Alternative

Implementing the proposed action would have both adverse and beneficial short-term impacts to rangeland resources. Impacts from each restoration method are discussed below. Overall, the allotments would see minimal short-term impacts and some positive long-term impacts from the proposed action on livestock forage. Additionally, there may be some positive long-term impact for range fences with decreased impacts and damage from fallen trees in overgrown stands and less sediment delivery to dirt tanks and cattle guards post treatment.

Use of Prescribed Fire

The use of prescribed fire would result in adverse short-term effects (1-5 years) on vegetation, livestock grazing, allotment management, and individual permittees. In some instances, small sections of a prescribed burn units or burn piles may burn too hot, thereby scorching the root crown and killing plants entirely. Creating areas of bare ground could lead to an introduction or propagation of nonnative invasive species (Zouhar and others 2008). After a prescribed fire is completed, there would be a cessation of grazing (in affected pastures) for 1-2 years. This rest period is needed to let the soil stabilize and for grasses and forbs to reestablish themselves and grow. Perennial grasses which lose their leaves in the first growing season after a fire (e.g., through grazing) produce less forage and do not grow as well. They are also more likely to die. (Jirik and Bunting 1994; Bunting et al 1998). During the rest period, permittees may be required to temporarily reduce their authorized livestock numbers, shorten the season of use, or do a combination of both to allow herbaceous vegetation to recover and regenerate.

Forest staff will ensure permittees will be minimally affected economically. Livestock management changes cause cost to permittees by requiring permittees move livestock, or lease pastures, and/or purchase replacement livestock for their herds. With extensive coordination between permittees, rangeland, and fire/fuels staff prior to a treatment the Forest staff will reduce the potential adverse economic effects to permittees. In addition, allowing permittees to use understocked allotments elsewhere and use of an altered pasture rotation, the Forest staff will reduce or eliminate adverse economic and logistical impacts to their operations.

The short-term impacts on grazing and permittees discussed above would be reduced for maintenance or re-entry burning when compared with first entry burning. During a maintenance burn, livestock can be moved around an allotment to take advantage of improved forage while another part of the allotment is undergoing a maintenance burn. Reentry burns would also burn with less intensity because the amount of fuel would be greatly reduced during the initial burn. This would allow for more rapid herbaceous plant recovery, and increased production. Prescribed fire could potentially have greater effects on an allotment if there is a drought in the year before the burn. The drought would slow reestablishment of native herbaceous vegetation. In this scenario, resting the affected pastures for at least one year, reductions of authorized livestock numbers, season of use, or a combination of both could compound the negative effects on grazing, allotment management, and the permittees. In the long-term, an increase in range capability and improved range conditions after using prescribed fire is expected. This means that more of the allotment can be used by grazing animals under proper management without long-term damage to the soil resource or plant communities. Under current conditions, livestock cannot access some areas because of the dense forest. Other areas have limited amounts of forage because there are too many trees. Prescribed fire would thin the forest and remove fuels. This would allow livestock to use areas that were inaccessible before burning as well as increase herbaceous forage.

Prescribed fire would increase the amount of herbaceous vegetation within the ponderosa pine and dry mixed conifer forest types. There would also be an increase in species diversity, abundance, and distribution of herbaceous vegetation (Covington et al. 1997; Webster and Halpern 2010). Similar effects

on herbaceous vegetation are likely to occur in other forest types, including aspen (USDA 1989) and Piñon-Juniper (Covington et al. 1991). Over the long term, the increase in forage production from the proposed prescribed fire treatments would improve allotment conditions and allow for a more flexible grazing management scheme because livestock distribution would improve and livestock utilization rates in any one specific area would decrease, meaning the concentration of grazing livestock would disperse to other areas with available forage. Range capability is also expected to increase. These benefits would allow for a more sustainable range program through drought years, and for low-intensity, naturally occurring surface fires to occur on the landscape, further sustaining forage production, and species diversity which in turn increases site resiliency.

Vegetation Thinning Treatments

Mechanical treatments and stand improvement thinning would have some minor short-term impacts (1-5 years) on livestock grazing, grazing management, and the permittees. These include the loss of available forage or use of pastures and damage to range infrastructure (fences, water tank, or cattleguards).

Mechanical treatments have been implemented in the general area in the past with few impacts on livestock grazing, allotment management, and permittees. For this project, damage to range infrastructure would be avoided to the extent possible. If there is damage to infrastructure from treatments, it will be restored before the project is completed. This will reduce impacts on livestock grazing before and during these treatments. Even so, it may be necessary in some instances to limit or delay grazing in areas where mechanical thinning treatments are actively occurring. Manual thinning has a minimal if any effect on livestock grazing resources due to low disturbance in areas that are being treated.

Over the long-term, reducing tree density with vegetation thinning treatments would increase the diversity and abundance of understory plants- grasses, forbs and shrubs. Removing trees opens up the canopy and allows more sunlight and precipitation to reach the forest floor and reduces competition between plants for soil moisture and nutrients. These conditions improve growing conditions for understory plants in dry forest types including Piñon-Juniper (Bates et al. 2000; Brockway et al., 2002), ponderosa pine (Covington et al. 1997; Griffis et al. 2001), and mixed conifer (Collins et al. 2007). The combination of vegetation thinning treatments followed by prescribed fire often has an additive effect- the increase in understory vegetation is greater after the two treatments than either one by itself (Griffis et al. 2001; Laughlin et al. 2008).

Long-term beneficial effects on rangeland resources could result from debris left over from vegetation thinning treatments in certain Ecological Response Units (ERUs), which could enhance soil productivity and resilience to invasive nonnative species. The remaining slash debris contains significant amounts of carbon and nitrogen which regenerates the soil fertility leading to more plant processes and ultimately plant diversity. The debris also acts as a natural mulch which increases soil water availability. Both processes coupled together work to suppress the introduction of nonnative species and enhance native vegetation communities (Kirkland 2012). Suppressing nonnative species and increasing soil productivity from debris would create long-term beneficial impacts to rangeland resources, including more forage availability for livestock.

The Piñon-Juniper vegetation types would also have an increase in range capability and forage production. Vegetation thinning treatments would be done at different intensities- more trees would be removed in some areas than in others- to achieve specific management objectives. Because of this, the increase in herbaceous vegetation would vary across the treated areas. It may also take longer to occur in areas that are treated less intensely (fewer trees are removed).

Mechanical treatments and manual thinning, with or without prescribed fire, would also reduce fuel loads and lower the potential for an uncharacteristically severe wildfire that could cause significant damage to rangeland resources.

The long-term effects of mechanical and manual treatments outweigh the short-term effects. It is expected that over a 10-year period, the increase in forage production from these treatments would improve allotment conditions and livestock distribution, decrease utilization rates and allow for a more flexible grazing management scheme. These benefits would allow for a sustainable range program through drought years, and for low-intensity ground fires to occur on the landscape.

Cumulative Effects

The area considered for the cumulative effects analysis is the active allotments within the project area because this is where cumulative impacts would be evident within allotments. The cumulative effects analysis considered past, present, and reasonably foreseeable future non-project activities and their effects, in combination with the proposed action.

The proposed action is not predicted to result in any long-term adverse impacts on forage or current livestock grazing permit holders. Furthermore, it will result in positive long-term impacts by potentially increasing forage and decreasing fence and other infrastructure maintenance.

The past uses in the cumulative effects analysis area have had a direct effect on range capability, as described in Affected Environment and Environmental Consequences sections. Past uses mostly comprise vegetation management projects that improve forage conditions for livestock benefit, however some recreation and urban interface projects have minimally changed livestock movement and management over the years. Historic proliferation of mining and ranching roads, the establishment of federal, state, county, and private lands, and community development have all contributed to the current range conditions in the cumulative effects analysis area.

Ongoing and planned activities such as the Habitat Improvements for Terrestrial Species, Vegetation Treatments throughout the SFNF, and Non-native Invasive Species Management Projects proposed in the SFNF LMP are similar in nature to the proposed action, but much smaller in scale.

All ecosystems are impacted through time by many different forces, and the components of the system are continually reacting to those disturbances. Some disturbances become an integral part of the system. These types of disturbances stabilize the system and become a part of management of the system should the historic natural source or frequency of that disturbance be altered by human activities or encroachment (USDA 2006). The existing condition data is based upon USFS spatial data which utilizes Ecological Response Units (ERU), tree size class, canopy cover, and number of vegetation stories. This data represents potential natural vegetation under natural disturbance events. Desired conditions are based upon the ERU descriptions which utilizes reference conditions for seral states, coarse wood and snags, and fire regimes. This data was used to develop the conditions needed for desired conditions in the SFNF Land Management Plan.

The cumulative effects of this project to herbaceous vegetation and the range resource should be to increase the vegetative cover, species diversity, and plant production or forage. This would be similar to the other fuels treatments. At an allotment scale this effect will not be significant. This project has the potential to increase invasive species amount and distribution, but given the project design features, this potential effect should be minimal.

3.10 Recreation and Scenery

Affected Environment

The EVLRP area is within a recreation area on the forest that is mostly an undiscovered gem in the Northern New Mexico landscape and does not receive the visitor pressure of other areas on the Forest. However, there are excellent developed and dispersed recreation used widely by the surrounding communities and is an important and treasured part of the life and culture of the area.

Key features include:

- Resumidero, Coyote Canyon, and Rio Puerco campgrounds which are all non-fee site as of the 2021 season.
- Tea Kettle Rock and Tsi'Pin that are outstanding cultural/interpretive sites
- Three National Trails: the Continental Divide National Scenic Trail, the Old Spanish National Historic Trail, and the Cañones National Recreation Trail.
- Cañones Creek which is listed as eligible as a wild and scenic river.

The full spectrum of recreational opportunities is listed below in Table 30.

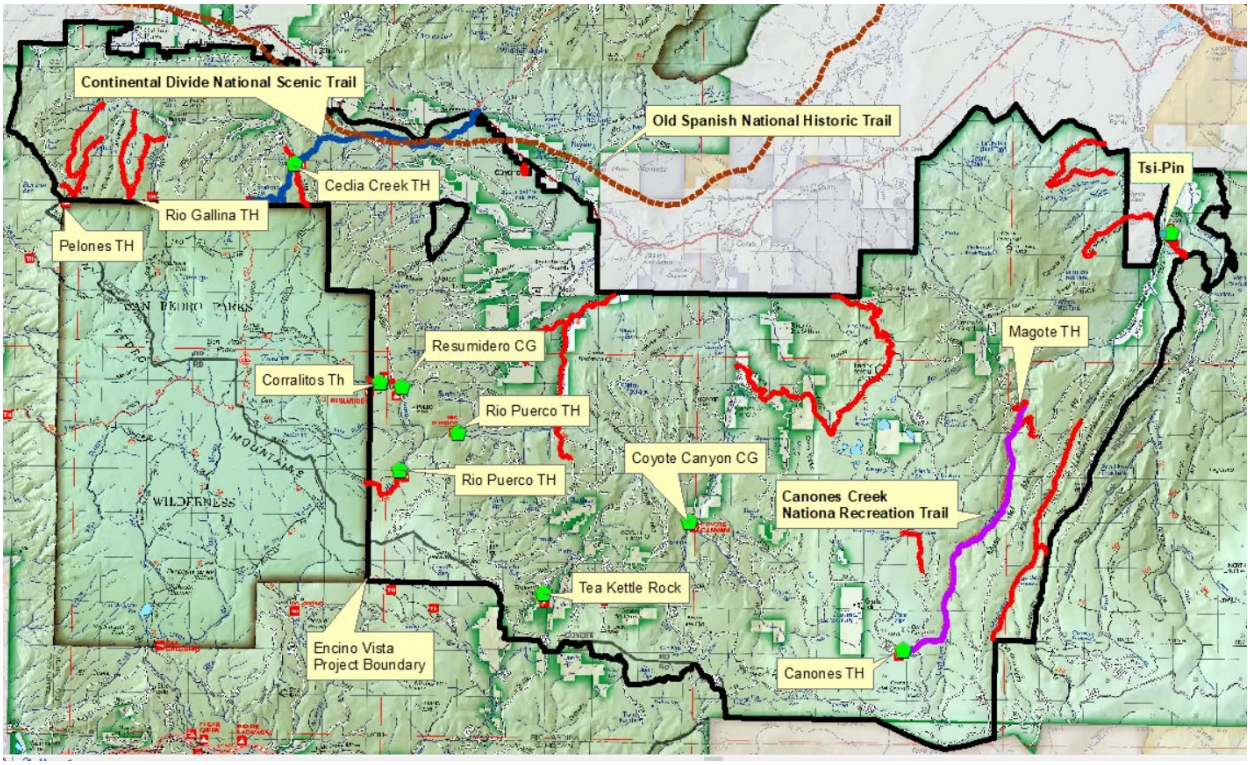
Recreation Facilities and Opportunities

Table 30. Recreation sites within and directly adjacent to the project area.

Site Type	Within the Project Area	Outside and nearby the Project Area	Total Rec Sites on Coyote District
Campgrounds	3	1	4
Group Campgrounds	1	0	1
Boating Sites	0	3	3
Interpretive Site	2	0	2
Trailheads	9	1	10
Trails	23 trails 62 miles	81 Miles	143 Miles
Miles of Road open in Travel Management	360 Miles	213 Miles	573 Miles

Source: Santa Fe NF Natural Resources Manager Database and Forest geospatial data, 2017.

Figure 12 Key Recreation features found in the EVLRP footprint.



The most popular recreation activities within the project area include camping, hunting, motorized travel, including dirt bikes and ATVs, hiking, horseback riding, and increased mountain bike travel. In the winter, there is limited snow mobile travel and some cross-country ski potential in select areas, depending on snowpack and temperatures. The Project Area is not a destination for winter recreation.

Table 31. Developed Recreation Facilities in the Encino Vista Project Area

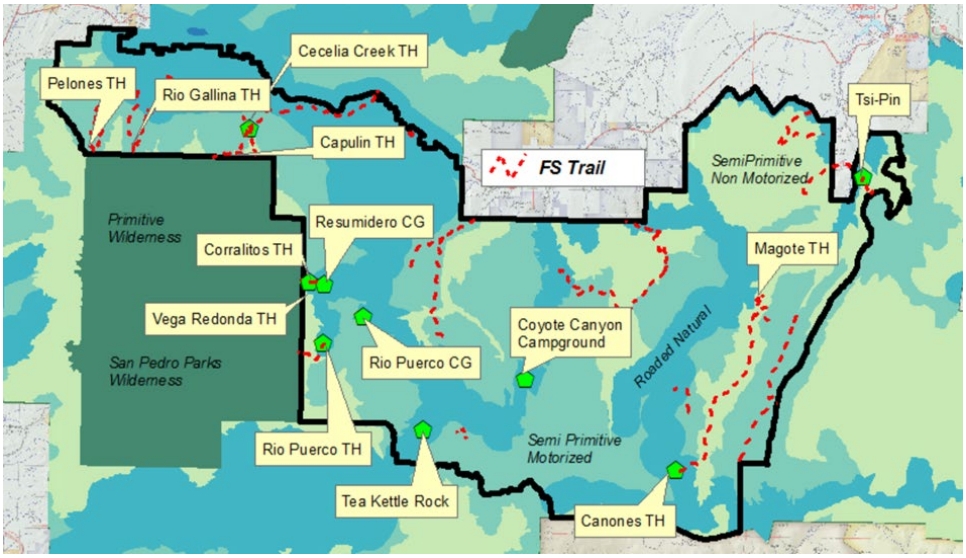
Location Name	Type of Recreation Opportunities Provided	Estimated number of users accommodated	Recreation Setting
Resumidero	Campground	50	Roaded Natural
Rio Puerco	Campground and Trailhead	10	Roaded Natural
Coyote Canyon	Campground and Trailhead	10	Roaded Natural
Tsi'Pin	Campground and Trailhead	Permit Only - 8	Semi Primitive Non-Motorized

Recreation Opportunity Spectrum within the Project Area

Recreation visitors in the project area are primarily from the Rio Arriba and Sandoval Counties, with a collective population over 188,000 according to the 2021 census statistics, but there are many other visitors from other Northern New Mexico counties, and also national and international visitors. The project area is within one of the more lightly used areas on the SFNF.

Figure 13 shows a map of the Recreation Opportunity Spectrum (USDA, 2019d) within the project area. Roughly 40 percent falls into the Semi-Primitive Motorized setting, 37 percent within the Roaded Natural setting, and 23 percent in the Semi Primitive Non-Motorized Setting. There are no areas within the Primitive, Semi Rural or Rural Categories.

Figure 13 Recreation Opportunity Spectrum within the Project Area.



Semi Primitive Non-Motorized. Semi Primitive Motorized Roaded Natural

There are 5 categories within the Recreation Opportunity Spectrum. From most primitive, that would describe wilderness areas, to most developed, which could describe a downhill ski resort. These categories are Primitive, Semi Primitive Non-Motorized, Semi Primitive Motorized, Roaded Natural and Urban. There are no Primitive or Urban categories within the proposed action. A detailed description of the categories and legend follow:

Primitive – A setting that is not roaded and retains a primitive character. Applies to most Wilderness areas. There are no Primitive settings in the Project Area.

Semi Primitive Non-Motorized – A setting that has an area of primitive roads* or trails that are not open to motorized use; is generally at least 2,500 acres in size; and is between 1/2 and 3 miles from all roads, railroads, or trails with motorized use. Access is via nonmotorized trails or nonmotorized primitive roads or cross-country. Low contact frequency with other visitors. High probability of solitude; natural-appearing environment.

Note:* "Primitive roads" are not constructed or maintained and are not generally suitable for highway type vehicles.

29,724 acres - This incorporates 23 percent of the Project Area and includes Tsi'Pin interpretive site.

Semi Primitive Motorized – A setting that has an area that allows motorized use, is generally at least 2,500 acres in size, and is at least 1/2 mile from a "better than" primitive road. Access is via motorized trails or primitive roads or cross country, where terrain and regulations permit. Low to moderate contact frequency with other visitors. Environment may have moderately dominant alterations, but these do not dominate views from trails or primitive roads in the area.

52,196 acres - - Semi Primitive Motorized accounts for 40 percent of the Project area and includes most of the Forest Service System trails and many of the roads open in Travel Management.

Roaded Natural – A setting in an area that is within 1/2 mile of a "better than" primitive road. Access is primarily via conventional motorized use on roads. Contact frequency with other users may be low to moderate on trails and moderate to high on roads. Environment is natural appearing as viewed from visually sensitive roads and trails.
48,326 acres - -This incorporates 37 percent of the project area and includes all of the Campgrounds and many of the trailheads.

Rural – Predominantly a culturally modified setting where the natural environment has been substantially modified, i.e., structures are readily apparent, pastoral or agricultural or intensively managed wildland landscapes predominate as viewed from visually sensitive roads and trails. Access is primarily via conventional motorized use on roads. Contact frequency with other users may be moderate to high in developed sites and moderate away from developed sites.

Trails

The Coyote District has a treasure of beautiful and lightly used trails, of which the project area encompasses 23 trails and 62 miles. Within this count, there are the three special categories of National Designated trails.. These are:

1. National Recreation Trails – Administratively designated with local management criteria.
2. National Scenic Trails – Congressionally designated with special management criteria.
3. National Historic Trails – Congressionally designated with special management criteria.

The project area includes a trail from each of these categories.

1. Cañones Creek National Recreation Trail – A beautiful 7.2 mile trail up the Cañones river drainage from the Magote trailhead on the north end to the Cañones trailhead on the south end.
2. Continental Divide National Scenic Trail – The Continental Divide trail is a 3200-mile trail from Canada to Mexico following the actual Continental Divide within a 50-mile corridor. The EVLRP area contains 7.6 miles out of about 42 miles that pass through the SFNF.
3. The Old Spanish National Historic Trail – This historic trail has several branches and forks, but it was an overland pack train trade route in the early to mid-1800s from Santa Fe, New Mexico to Los Angeles, California incorporating sections of Colorado, Utah, and Nevada along the way. The trail is not interpreted or even visible on the ground within the project area but is currently a general route recorded digitally that sometimes follows existing roads, but often there is no defined trail or road on the ground. Currently most recreation users would not even be aware of its existence. Even so, protection of the corridor is important with much the same criteria as for the Continental Divide National Scenic Trail. Approximately 7 miles pass through the northern boundary of the Project area, with the CDNST and Spanish trails in much the same corridor.

Cañones Creek Eligible Wild and Scenic River

During the recent SFNF LMP and FEIS it was determined that the Cañones Creek is eligible as a Wild and Scenic River. Eligible wild and scenic rivers meet the basic criteria for inclusion in the National Wild and Scenic Rivers System (USDA, 2022). They are free-flowing and possess at least one outstandingly remarkable value (ORV). Wild and Scenic rivers can be further subclassified as Wild, Scenic, Recreation or any combination of the three based on the condition and development level in and around the river at

the time it was deemed eligible (ADD Reference). Cañones Creek met the criteria for classification as a Wild river, which holds the highest level of scenic integrity. However, it will be referenced as eligible for the National Wild and Scenic Rivers System. This area meets five of the ORVs.

1. Recreation – Cañones National Recreation Trail is located along the banks of this river. Ther is outstanding opportunity for solitude, scenery and wildlife viewing.
2. Scenery - values related to the enclosed canyon with mesas defining the rims.
3. Botanical - Presence of little leaf buttercup, previously a NM sensitive plant species recently removed from the sensitive species list.– One occurrence was documented in 2021 at Mogote TH intersection of the trail with the river. Still a nectar producing riparian species that will be avoided by avoiding disturbance in non-forested riparian areas that would not need treatment.
4. Fish: Genetically pure Rio Grande Cutthroat Trout occupy the Creek.
5. Prehistory – Nearby prehistoric site that is a large-scale room, "Tsi'Pin."

The section of Cañones Creek that is eligible as a wild and scenic river extends from the southern headwaters in Cañones Canyon to the intersection of Chihuahueños Creek to the north, about 8 miles.

Scenery

The project area is rich in outstanding scenery. Research shows there is a high degree of public agreement regarding scenic preferences, and people tend to value most highly the more visually attractive and natural-appearing landscape.

The Santa Fe NF uses the Forest Service Scenery Management System to determine the importance of scenery and to identify scenic resources as they relate to people. Scenic integrity measures the degree to which the scenic character attributes are intact. Scenic integrity objectives are defined by degrees or levels of alteration from the existing scenic character and the intent is to achieve the highest scenic integrity possible and move toward the desired conditions. As with all desired conditions, projects implemented under the 2022 SFNF LMP are designed to maintain or move toward desired conditions.

The forest is divided into 4 levels of desired scenic integrity: very high, high, moderate, and low. These levels set objectives for the amount of variation from the existing scenic character that is permissible within the scenic integrity level.

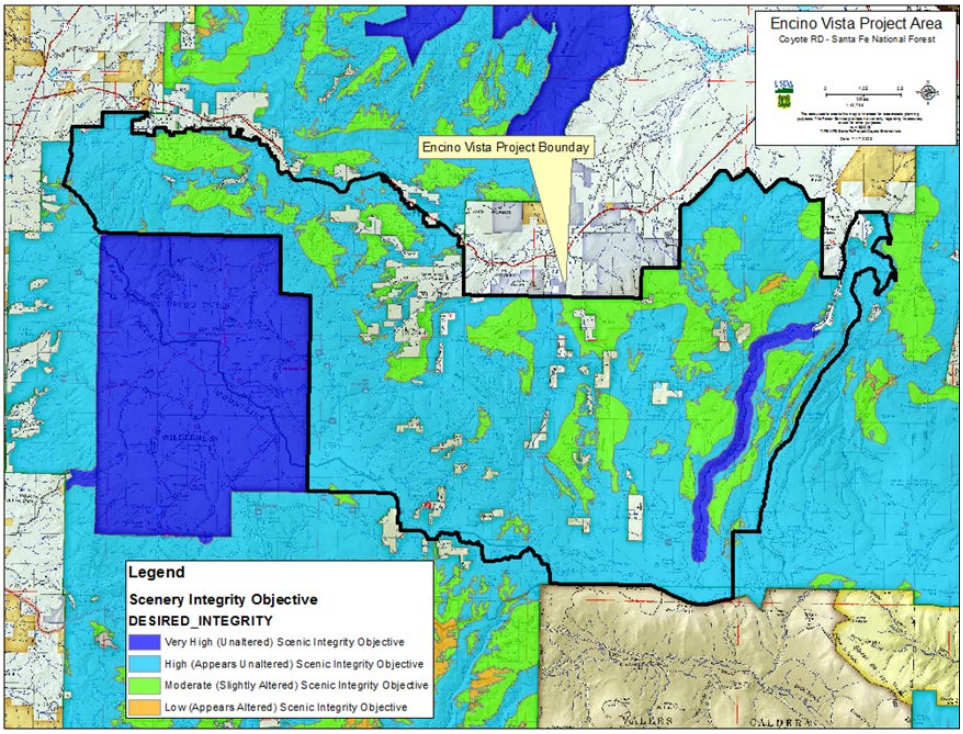
Table 32 shows how levels of the Scenic Integrity Objectives (SIO) are defined. Within the Project Area; 75 percent is within High Scenic integrity, which includes the Continental Divide National Scenic Trail and the Old Spanish National Historic trail, 22 percent is in Moderate Scenery, and 2.5 percent within Very High Scenic Integrity. The corridor of the Cañones Creek Eligible Wild and Scenic River is 2.5 percent, meeting the very high SIO.

Table 32 Scenery Management System scenery integrity objectives and how they relate to public perceptions

Scenic Integrity Objectives	Public Perceptions of Scenery
Very High	Unaltered, scenic character is intact, naturally evolving
High	Appears unaltered; alterations to scenic character may be present but are not evident; naturally appearing.

Moderate	Slightly altered; alterations are subordinate to scenic character being viewed (scenic character is dominant, not the alteration) relatively naturally appearing.
Low	Moderately altered; alterations begin to dominate the valued scenic character being viewed.

Figure 14 Scenery Management System, scenic integrity objectives map



Environmental Effects

The analysis to determine potential impacts to recreation is based on existing management and data from SFNF and Coyote Ranger District. Spatial/geographic information system data were also used in this analysis and include recreation settings and designated recreation sites. The changes (based on the proposed project as described in the EA) to the resource condition indicators provide the basis for assessing impacts.

The affected environment, as described above, for recreational opportunities and scenery was used to analyze potential impacts for both alternatives. Impacts will be described in terms of short or long term separately as they specifically relate to recreation and scenery.

For recreation, short term impacts are those that occur during implementation of the project and may linger for a few days to a few weeks after the project. Long term impacts are those that will last more than a month following implementation of the project.

For scenery, short term impacts are those that occur during implementation of the project due to equipment and activities taking place such as thinning and burning. Long term impacts could last a season or more, before vegetation grows back and stabilizes. The analysis area is the same as for cumulative

impacts shown on Figure 15. These are areas that are reasonably accessible to people living or visiting the Abiquiu/Coyote area. This takes in Coyote Ranger District and parts of the Cuba and Española Ranger Districts. The analysis area includes trails and recreation sites accessed from Highway 112, 84, 96 and Forest Road 151. These areas include nearby recreation sites, trails, and roads that could be used as alternative recreation sites during implementation.

The following indicators are used to assess the potential for impacts to recreation/scenery/wild and scenic river resources:

- Recreation settings – Assess changes in the recreation settings (e.g., undeveloped or rural settings) within the analysis area as a result of the proposed project. Specifically, assess whether the settings that support existing off-highway vehicle, hiking, camping, target shooting, or hunting opportunities, as well as settings that provide for remoteness, quiet or solitude, would change (increase or decrease).

- Recreation opportunities/activities – Assess whether a change in (loss or creation of) recreational activities or access to (including special use activities) would result with development of the proposed project. Specifically, assess whether the change would increase or decrease the qualities of the hunting or other off trail experience.

- Desired recreation experiences – Assess the potential for diminishment or loss of developed recreational values and quality (e.g., off-highway vehicle, hiking, camping, target shooting) and undeveloped recreational values and quality in the project area.

- Scenery integrity objectives – For scenery the Desired Integrity Objectives should be maintained or improved long term. The proposed action could result in short term degradation of some scenery objectives, especially in the High and Very High Categories, but with the ultimate purpose of better protecting and improving those long-term desired integrity objectives.

- Table 33 provides a breakdown of these indicators and the measures used in the predicting and characterizing the analysis.

Table 33. Resource indicators and measures for assessing effects.

Resource Element	Resource Indicator	Measure (Quantify if possible)
Recreation Setting	Changes to the existing recreation settings	Qualitative assessment of restoration within Recreation Opportunity Spectrum classes
Recreation Opportunities	Changes (loss of or creation of) to the current available recreation opportunities and activities	Qualitative assessment of restoration method's impact to recreation opportunity
Desired Recreation Experiences	Changes (diminishment or improvement) to existing recreation values and quality	Qualitative assessment of restoration method's impact to recreation desired experiences
Scenery	Changes (diminishment or improvement) to the scenery integrity objectives	Qualitative assessment of any potential change in the scenery integrity from short- and long-term effects of the proposed action, as well as potential to meet or exceed those scenery objectives.

No Action Alternative

Under the No Action Alternative, there would not be potential short-term closures to trail use due to prescribed burns and thinning operations. There would not be short term smoke in the area due to prescribed burns, and no closure of road or additional roads added. Recreation use would continue as it currently is.

Under the No Action Alternative, there could be a long-term increase in fuels buildup resulting in potential catastrophic fires which could affect most of the trails and scenic quality in the area. Scenery integrity objectives may deteriorate as fuels build up and more trees die due to the density of trees within a climate change regime. If a catastrophic fire occurred, trails would have to be re-built over time when conditions had stabilized, and restoration was safe. Scenery objective criteria as described in Chapter 1 would change or not be met for a long period of time, if ever. Many areas would no longer have the climate patterns to eventually return to the former vegetative types. Falling trees would increase user risk and make maintenance more difficult.

If catastrophic fire were to occur, trails would need reconstruction multiple times due to flooding. Relocation for some trails would be required and other trails may not be practical to rebuild. The trail character, scenery, shading, and "feel" of the trail would be changed long term. Trails may become much more dangerous on windy days. Thorny plant species that increase after fires, like New Mexico Locust, may make the trails more difficult to use.

Impacts to the existing recreation setting, scenery objectives, opportunity, and existing recreation experiences would progress as seen in similar landscapes where large acres of trees are dying due to drought and insects and fuels build up over time. The likelihood of catastrophic fire from natural and man-made causes increases over time. Should this occur, there would be major impacts to the recreation setting, opportunity, scenery objectives, and existing recreation experiences.

Currently, the Forest Service has limited resources to maintain existing recreation opportunities (e.g., clearing down trees from trails and roads) or to mitigate threats such as the impacts to recreation facilities such as campgrounds, trailheads, roads, and parking areas that could result from a wildfire, windthrow, or other disturbance. Hazardous tree analysis and removal would continue at established campgrounds and recreational facilities each year regardless of whether or not the proposed action was implemented. Current trail maintenance is limited to removing existing vegetation threats as time and resources are available and depending on the risk to health and human safety, as opposed to maximizing resources by treating larger areas to restore forest resiliency, as described in the proposed action. Piecemeal treatments that only address immediate hazards would not reduce the risk for large catastrophic wildfires, and often do not address recreation site hazards such as dead and dying trees that block safe passage on forest roads and trails. The threat of uncharacteristically severe wildfire, windthrow, or other disturbance would continue to increase with ongoing, non-landscape-scale vegetation management activities under the No Action Alternative. Furthermore, continuing to only remove site-specific vegetation as time and resources permit will perpetuate current unhealthy forest conditions and could even increase the rate of forest health decline.

Research and recent wildfires in New Mexico have demonstrated the negative effects from severe wildfire can have on recreation (such as the Cerro Grande and Las Conchas fires, where fire impacts included closing developed campgrounds and trails to public use and created safety hazards to dispersed recreation opportunities such as camping). Scenery objectives in these areas was drastically and permanently changed. Most users perceive this as a negative change, especially with flooding and erosion that follows a major fire. If the EVLRP analysis area or portions thereof were closed due to wildfire, recreation users would be required to seek alternative locations to pursue the same activity. This could lead to

overcrowding in nearby areas of the SFNF, resulting in potential resource damage and undesirable recreational experiences.

With the no action alternative there is likely to be an effect on recreation experiences due to more dead and dying trees falling across the trail, increased risk of injury from falling trees, and the degradation of scenery due to increasing acreage of dead trees.

Barring a severe wildfire, windthrow, or other disturbances, there would be no loss or creation of new recreation opportunities. Recreation opportunities and activities would continue as they do today, but the desired conditions associated with the varied environment and scenery objectives as outlined in the 2022 SFNF LMP and in Chapter 1 would be less likely to move towards those desired conditions.

Proposed Action Alternative

The project area is used extensively for recreation. The proposed action has the potential to benefit recreation in both a positive and negative aspect. The positive aspect would be to lessen the risk of catastrophic fires that could remove the quality and availability of recreational opportunities both long and short term. The negative impacts are identified as short term displacement of recreationists and intrusion of noise, smoke and short term visual aspects of vegetative treatments, especially prescribed burns. .

The impacts to recreation from the implementation activities could affect each type of recreation in slightly different ways:

Trails – The proposed action activities may restrict the use of favorite trails for the short term, mostly from controlled burns. Mechanical vegetation thinning would not directly affect trails unless the trail itself was used for access by motorized vehicles. For treatments near the Continental Divide Trail, The Old Spanish Trail Corridor, or the Cañones National Recreation Trail, any treatments need to protect the visual quality of the trail with extra care following the mitigations and the goals, standards and management practices as described in the 2022 SFNF LMP. These mitigations are listed in Appendix C which protect the scenic corridor of these trails and reduce the impacts to the recreation experience.

Where trails are used as access for treatments, they will require reclamation to restore the trail to a sustainable single track. Long term, the visual changes due to mechanical thinning, prescribed fires, riparian vegetation, and closed roads would not be noticeable to the majority of recreation users. There are few vantage points from trails and facilities where these treatment areas can be seen in an overview aspect.

Any prescribed fire affecting the Continental Divide Trail would require notification of the CDNST Coalition, who can in turn notify through hikers of potential delays or detours. If a portion of the Continental Divide Trail is closed for more than a few hours, alternate routes must be provided and submitted ahead of time.

Within the project area, there are 62.5 miles of Forest Service System trails. The number of trail miles outside the project area, yet nearby and accessible from the project area are 214.5 miles. This would provide numerous alternatives if any project area trails were closed to recreational trail use for any period of time during implementation. There are also many options for alternative trails especially during prescribed burns when users may desire to be further away from smoke and fire activities.

Therefore, with so many alternative trails for recreation, any short-term impacts by restricting trail access for a few days is not considered an impact that degrades recreation opportunities for most users.

Campgrounds - Potential impacts to campground users would be short-term during treatment implementation activities (from noise, human presence). The thinned trees and piles in other treatment areas like Black Canyon in the Española area, were not noticed by most campers, or at least no one commented on them. No long-term impacts to campground use or experience would be expected due to the design feature that requires a visual buffer such that mechanical vegetation treatments would not be visible from the campground. Periods of smoke and noise could affect quality of experience.

Camping primarily occurs along designated roads and trails. Campsites, both developed and dispersed, could be temporarily closed or restricted for public safety, including prescribed burning, heavy equipment use, slash piles, and even hand vegetation thinning. Campers in dispersed sites while work is underway would experience indirect noise and visual effects similar to those already described.

However, the restoration activities would be conducted in a manner that would not close entire sites for public use at any one time. (e.g., treatment areas would be worked sequentially so as to allow recreation use to continue in that area to the extent possible). Upon restoration, the recreation setting would likely improve (e.g., become safer, more scenic, and more sustainable for future recreationists), resulting in a long-term, beneficial impact.

The proposed action activities may restrict availability, access, and aesthetics of the camping during prescribed burns. Periods of smoke and noise could affect quality of experience.

Dispersed Camping – The proposed action activities may restrict availability, access, and aesthetics of travel and camping during prescribed burns. Periods of smoke and noise could affect quality of experience.

Recreation Special Uses – Outfitter Guide trips to areas planned for prescribed burns may need to be changed on occasion or rescheduled, but this would be more the exception rather than common place. Smoke and noise may affect quality of experience. Outfitter Guides other than fall hunting are uncommon in the project area.

There is the potential that outfitters and guides may need to adjust their trip locations and/or days to avoid restricted areas, smoke, and/or congestion and noise associated with these operations. Advanced notice of these activities could be given to minimize the inconvenience to guides and their clients.

Scenery – Scenery impacts include mostly short-term effects from burning. These effects include smoke reducing visibility as well as the actual blackened and burned area, even if it is low intensity. Design mitigations to protect the viewshed of trails and the Cañones Creek corridor during implementation would protect the scenery from mechanical effects of implementation. In the long term, scenery objectives would have a good chance of maintaining or exceeding the designated standards following implementation.

Mitigation measures were developed to provide screening of piles and mechanical treatments such that they are not visible from the trails, trailheads, or recreation facilities. This would protect the viewshed and scenery integrity objectives of these sites. Even more stringent design features for the scenic, historic, and recreational trails, as well as the Cañones Creek eligible Wild and Scenic River will also protect the scenic integrity objectives such that they continue to move toward or exceed these established categories. Prescribed burns would create smoke and blackened ground in the short term, but long term the potential to meet and exceed the scenic integrity objectives would be improved.

Eligible Wild and Scenic River – Cañones Creek is eligible as a Wild and Scenic River with a specific category of Wild River. The wild classification is the highest standard to protect the visual quality and the free-flowing nature of the creek. Wild rivers are within a Very High Scenic Integrity Corridor. Any

treatments that could affect the river must be done with great care, realizing that no treatment could result in severe burns where the wild and free flowing character of this creek could be dramatically and forever changed or altered and possibly disqualified as a wild free flowing river. This is often the result of catastrophic fires in the southwest and specifically in northern New Mexico. Any treatment within the watershed of this creek should follow the design features for very high scenic integrity, protect all outstanding remarkable values, and the design features for National Recreation Trails.

Implementation of the Proposed Action

During implementation of the proposed action, there could be short-term, minor to moderate impacts to site-specific recreation sites. Noise from restoration activities and the intrusion of workers, equipment, vehicles, or debris and cleared areas could temporarily and adversely impact the experience of recreationists in developed as well as dispersed settings (particularly those settings classified under the recreation opportunity spectrum as semi-primitive motorized and semi-primitive non-motorized, where such activities would be more evident and invasive to the recreating public). These recreation activities include driving for pleasure on approved routes and hiking/biking/horseback riding on trails. These indirect effects would be temporary and localized. The effects would be transient as the recreationist moves past the work area (or vice versa). Certain areas could be closed for a few days causing a recreationist to use an alternate recreation area.

Maintaining vegetation clearances or establishing new forest health practices around recreation infrastructure may result in changes to the recreation setting that people have grown accustomed to, but these changes would be intended to benefit the recreation setting in the long-term. It would likely be perceived as an improved aesthetic change by most.

Table 34 Summary Table of Causal effects

Rec type Action	Trails	Dispersed Camping	Campgrounds and picnic areas	Recreation Special Uses *
Mechanical Vegetation Treatment	Mitigated with design features for no effect. If trail used for access, will be repaired.	Potential restriction to some areas short term. Potential area changes to regular users.	Potential area changes to regular users	Potential for short term restriction to some areas.
Prescribed Fire	Short term use restrictions. Smoke and noise. Fireline user trails could occur	Smoke and noise potential. Potential restriction to some areas short term. Potential area changes – less fuelwood.	Potential area changes such as less fuelwood.	Short term smoke and noise Short term use restriction to some areas.
Roads up to 280 miles of road improved	Improved access to Trails.	Improved access to campgrounds.	Improved access to dispersed recreation	Improved travel access to some areas.
Up to 8 miles of user created or roads closed in the Travel will be decommissioned and reclaimed.	These roads used as non-motorized recreation would not be available.	No effect – Decommissioned road would continue to not be available as motorized access to Campgrounds.	No effect – Decommissioned road would continue to not be available as motorized access to dispersed recreation.	No effect – Decommissioned road would continue to not be available as motorized access to special use sites.

Vegetation treatments

Manual and mechanical vegetation treatments, particularly those that involve heavy equipment or machinery, have the potential to adversely impact recreation opportunities and experiences; these impacts would be site specific and short term. Recreation PDFs, specifically Rec1-7, described in Appendix C (Part 1), should limit the use of equipment on trails and focus activities during non-peak seasons, when recreation use is anticipated to be at its lowest. Design features will be incorporated to minimize any indirect effects such as cut stumps adjacent to trails that might cause tripping hazards for hikers and bike tire punctures for bikers. Also, there would be a one-year time limit and minimal distance of 150 feet for any vegetation piles placed near trails or campgrounds. Changes around a campground or dispersed camping area could create potential for less available firewood. Yearly hazard tree mitigation may offset this for developed campgrounds since these trees that are felled are often cut up and used as fuel wood.

Prescribed Fire

When prescribed fires occur in the vicinity of trails, these trails will not be open for use during the fire burning period which could be from a day to a week at most. Trail users would be displaced to other trails for a period of time. Recreation users, even in adjacent areas, could experience periods of increased smoke and lessened visibility, but given the broad area of the analysis area, there would almost certainly be somewhere in the vicinity where the trails would not be affected. The same is true for other recreation activities such as camping in campgrounds or dispersed camping, and motorized driving. Following a prescribed burn there may be sections of burn visible from trails, dispersed camp areas and forest roads. These burn areas would mostly be short term impacts unless the burn was very severe in a particular area. Depending on the time of year, the black areas would green up and the burn would not be immediately noticeable. The proposed action goal is to prevent the large area severe burns where there would be a stand replacing fire resulting in long term impacts.

Restoration

Restoration activities conducted in areas that are not near developed sites or adjacent to routes or trails (i.e., in semi-primitive non-motorized areas) under the proposed action would have beneficial effects on the recreation setting. A healthier forest (i.e., mixed conifer, ponderosa pine, and Piñon-Juniper forests with natural plant and animal demographics, maximum structural and spatial heterogeneity of vegetation, maximum productivity and biodiversity, and intact ecosystem processes and functions) would be more open in character than the current landscape and would offer more dispersed recreation opportunities like hunting, hiking, and wildlife viewing.

Road Activities

There would be up to 281 miles of existing road that would be improved for access and to lessen runoff and effects to the watershed. This could improve access to some recreation sites. Up to 8 miles of temporary roads to facilitate commercial thinning treatments could occur with the potential to utilize user created or closed roads. These could be used as temporary access for implementation and would be decommissioned or reclaimed such that they would no longer be suitable surfaces for non-motorized travel.

Summary

Recreation settings – Recreation settings are not expected to change in a way that is striking and dramatic to the average user long term. There could be short term interruptions to the recreation sites and corridors such as debris, smoke, noise, workers, and even burn areas near the trail corridors. Long term, users might notice a slightly more open forest in and around the recreation trail corridors and facilities such as campgrounds, dispersed camping and picnic areas. The proposed action is expected to help preserve these recreation site surroundings and corridors from the potential of catastrophic fire where the recreation settings would be severely impacted.

Recreation opportunities/activities – Short term recreation activities might be temporarily restricted or degraded in quality in some areas for short periods of time due to prescribed burns, smoke, noise, fencing, or vegetative removal. Long term, the recreation opportunities would not be impacted. Hunting is not expected to be noticeably impacted by the proposed action other than temporary closing of some areas during implementation, and migration of animals to other areas in the short term. The more open habitats created by the proposed action might even draw more deer and elk to these areas. The proposed action should lessen the chance for catastrophic fire around these recreation sites and trails. Should a catastrophic fire occur, there would be great impact to recreation opportunities and activities. Trails

would disappear and need to be reconstructed in a severely burned environment where most topsoil could be lost.

Desired recreation experiences – Short term, desired recreation experiences would be impacted only through short term closures of select trails and dispersed camping within a prescribed burn. There are no plans to close campgrounds and picnic areas due to the proposed action. Long term, the desired recreation experiences would not be impacted by the proposed action other than lessening the chance of catastrophic fire in the future which would impact desired recreation experiences.

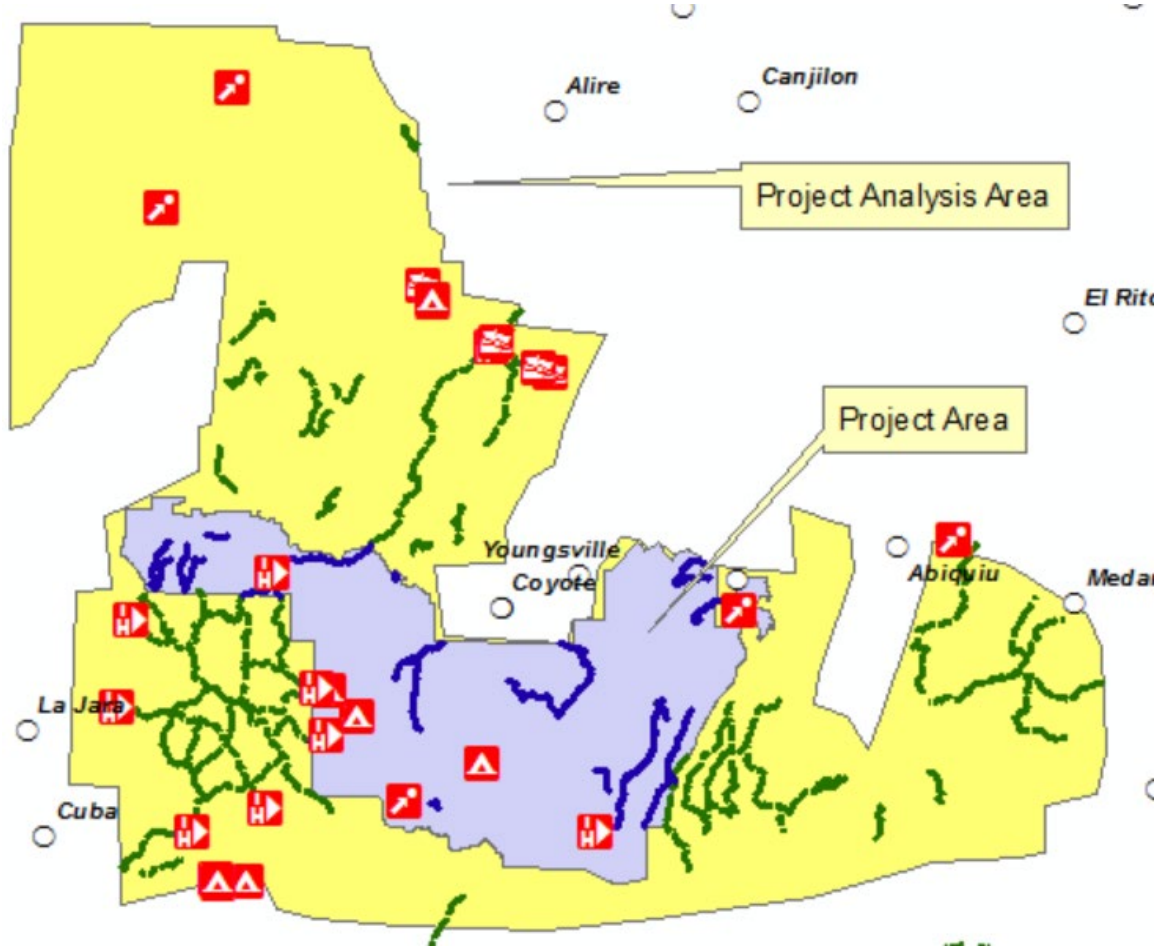
Scenery impacts – Short term impacts may occur to the scenery integrity objectives, especially the high and very high categories, mostly due to prescribed fire. However, in the long term, the scenery integrity objectives should meet or exceed the current designations. The Design Features should protect the scenery integrity objectives for other vegetative and mechanical treatments even in the short term. Treatment along the Cañones Creek proposed wild river must not affect the five outstanding remarkable values: the Rio Grande Cutthroat Trout, the Little Leaf Buttercup, Tsi'Pin cultural site, the Cañones National Recreation trail, or the long-term scenic quality of the Cañones Creek Corridor.

Cumulative Effects

Analysis Area

The spatial boundaries for analyzing the cumulative effects for recreation and scenery resources are the Northern portion of the Jemez mountains, Rio Chama Canyon area and surrounding USFS lands. This includes all of Coyote Ranger district, and portions of the Espanola and Cuba Ranger Districts (figure 15). This area is a reasonable region in which recreation settings, existing recreation opportunities, scenery, and activities, and desired recreation experiences, when assessed in combination with other cumulative actions. That could be impacted if the proposed project were implemented.

Figure 15 Cumulative effects analysis area for Recreation and Scenery



The temporal boundaries for analyzing the cumulative effects is 15 years because restoration methods are anticipated to have taken effect in that time period.

The past uses in the cumulative effects analysis area have had a direct effect on the recreation settings, as described in Affected Environment and Environmental Consequences sections. Historic proliferation of mining and ranching roads, the establishment of federal, state, county, and private lands, and community development have all shaped the recreation opportunities, settings, and desired experiences in the cumulative effects analysis area.

Nonnative, invasive plant management, watershed protection, fuels reduction, restoration, and habitat improvement activities all have the potential, when considered with the proposed action, to cumulatively impact the recreation setting. Ongoing activities such as smaller controlled burns and managed wildfires continue in the project area. The cumulative impact of all these actions to the recreation setting would be minor, and short term.

As described above under direct and indirect impacts from the Proposed Action, any adverse impacts to recreation settings would be most apparent during and immediately after project treatments. Users can be expected to pursue similar or other opportunities outside the project treatment areas as needed, but mostly within the cumulative effects analysis area. They can also be expected to return to the areas over time inside the project area once restoration activities are successfully completed. Over time, the cumulative

impacts to recreation setting would be beneficial, and the recreation setting would be protected and enhanced.

Implementation activities of the proposed action and other reasonably foreseeable actions may detract from the recreational opportunities. For example, areas affected by controlled burns/fires would likely render the setting less desirable for recreation activities, thus affecting the recreation experience. These would be individually minor, but collectively moderate, particularly in areas where the proposed action and other reasonably foreseeable projects overlap and are not spread out over large areas. However, with the proposed action being staggered over long periods of time and the actions not all conducted concurrently, the cumulative effects on recreation opportunities and experiences would be substantially decreased (i.e., recreational opportunities would continue in areas not being actively restored). Therefore, recreational opportunities would not be lost permanently (i.e., restoration activities may only take a few days) and no recreational opportunities would be completely precluded, even during implementation of the proposed action at any time since all recreation opportunities identified within the cumulative effects analysis area are able to be pursued in adjacent and similar areas.

Off-highway vehicle riding may have more opportunities available as a result of the proposed action and other reasonably foreseeable projects, particularly projects that create improved access roads (both temporary and permanent), such as for fuels reduction and forest restoration projects. These projects often encourage increased off-highway vehicle use through “curiosity,” and users may use the access roads of the proposed action and other reasonably foreseeable projects’ access roads to view the activities and/or sites (subject to the Travel Management Plan and existing New Mexico off-highway vehicle laws and regulations).

The desired recreation experiences of the project area would not change when considered in the context of the other actions, since the Forest Service would ensure those projects would also be conducted in a manner that minimizes impacts to recreation experiences and in compliance with the 2022 SFNF LMP.

The scenery disruption from the proposed action is not expected to degrade the scenic integrity objectives long term in isolation or cumulatively with other actions from the past, present or reasonably foreseeable future. In fact the proposed action is expected to move the scenery objectives more towards the desired conditions.

In summary, the cumulative impacts to recreation would be the incremental increase in people, projects and activities within a very high use recreation area. Impacts by the project would be minimized with design features, timing, and the abundance of alternative areas where people can participate in their recreational activity of choice. It should be noted that although the project would increase a ‘presence of activities’ in the area during implementation, the desired result would be an environment that would be more sustainable over time and would allow recreation activities to continue, and even grow. Without the project, there could be increased risk of catastrophic fire that would change, limit, and even eliminate much of the recreation activities that are currently enjoyed.

3.11 Watershed and Soils

Affected Environment

Soil

The soil resource analysis is primarily based on data provided by the Terrestrial Ecosystem Survey of the SFNF (TES) (USDA 1993). Existing soil conditions can be interpreted by comparing soil loss rates and

examining harvest limitations and erosion hazard ratings described in the SFNF TES manuscript (USDA Forest Service 1993). The Forest Service Southwest Region 3 FSH 2509.18 - Soil Management Handbook identifies measures to assess soil quality standards through the soil condition evaluation protocol (USDA Forest Service 1999). The primary soil functions evaluated are soil stability, soil hydrology, and nutrient cycling (USDA 1999). These functions are interrelated. Ecological map units are assigned a soil condition category (satisfactory, unsatisfactory or unsuitable) which is an indication of the status of soil functions (see USDA 1999 and 2013 for definitions of these soil conditions). See Figure 17 which depicts existing soil conditions in the EVLRP area.

The project area contains highly erosive hillslopes occurring across Mixed Conifer-Frequent Fire, PJ Woodland and Ponderosa Pine ERU's. Soils within approximately 15,699 acres (12 percent of the project area) are rated "unsatisfactory" due to excessive soil loss rates (erosion) and inadequate ground cover. Table 35 describes soil condition and severe erosion hazard acres across the project area.

Table 35 Soil Condition and Severe Erosion Hazard Acres by Watershed within the EVLRP Area

HUC 12 Watershed	Watershed Acres in Project Area	% of Watershed in Project Area	Soil Condition (Acres)							
			Satisfactory	% of project watershed acres	Un-satisfactory	% of project watershed acres	Unsuited	% of project watershed acres	Severe Erosion Hazard Rating (Acres)	% of project watershed acres
Cañones Creek	26,958	75%	20,380	76%	6,193	23%	371	1%	17,150	64%
Cañones Creek-Abiquiu Reservoir	3,147	9%	2,178	69%	165	5%	802	25%	1,061	34%
Coyote Creek	27,275	95%	23,315	85%	3,248	12%	714	3%	20,127	74%
Headwaters Rio Cebolla	2,848	13%	2,848	100%	0	0%	0	0%	1,772	62%
Headwaters Rio Puerco de Chama	23,019	65%	21,402	93%	1,461	6%	158	1%	9,679	42%
Outlet Rio Puerco de Chama	12,107	33%	10,185	84%	1,550	13%	370	3%	7,137	59%
Poleo Creek	17,617	60%	16,487	94%	1,133	6%	0	0%	3,920	22%
Polvadera Creek	1,238	6%	1,105	89%	130	10%	0	0%	22	2%
Rio Capulin	6,186	30%	5,813	94%	372	6%	3	0%	2,943	48%
Rito Peñas Negras	1,433	13%	1,433	100%	0	0%	0	0%	1,146	80%
Upper Rio Gallina	8,142	44%	6,256	77%	1,447	18%	433	5%	3,240	40%
Total	**129,970**		**111402**	**86%**	**15699**	**12%**	**2851**	**2%**	**68197**	**52%**

Watersheds and Hydrology

The project area contains eleven subwatersheds (HUC 12 watersheds). The majority of the project area (73 percent) is within four watersheds: Cañones Creek, Coyote Creek, Headwaters Rio Puerco and Poleo Creek. The U.S. Forest Service classifies the condition of subwatersheds into one of three condition classes based on the quality of aquatic and terrestrial habitat: Functioning Properly, Functioning at Risk, or Impaired.

None of the project area watersheds are Functioning Properly; the majority are Functioning at Risk meaning they exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Three watersheds (Cañones Creek, Rito Peñas Negras, and Headwaters Rio Cebolla) are impaired, meaning they exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Eight of the eleven watersheds have streams impaired by temperature, nutrients, sedimentation/siltation, and turbidity pollutants.

Several project area streams are impaired by temperature pollution (Cañones Creek, Rio Puerco de Chama, Rito Peñas Negras (NMED, 2022). TMDLs have been written for Polvadera Creek[1], Rio Puerco de Chama, and Rito Peñas Negras). For the Rio Puerco de Chama, the standard should be achieved when shade is increased to 28% (representing a 20% reduction in solar energy from the existing condition); the upper Rito Peñas Negras would achieve the standard when shade is increased to 27% (an approximate 4% increase from existing).

Table 36 describes the existing condition of project area watersheds, water quality, and road density, as well as their overlap with the project area.

[1] Although this stream is not currently 303d listed as impaired for any pollutants, a TMDL was written for the lower Chama when Polvadera creek was listed for temperature (2004).

Table 36. Project Area Watershed Condition, Road Density and Water Quality Impairments

Watershed	Watershed Acres in Project Area	% of Watershed in Project Area	Road Density mi/mi^2	Listed as Impaired or Impaired with TMDL[14] (not meeting des. beneficial uses) NMED, 20182022	Watershed Condition Classification
Cañones Creek	26961	75%	3.2	Chihuahueños Creek-**sediments,** aluminum; lower Cañones- **temperature;** E. coli, TMDLs for **turbidity**, fecal coliform, aluminum	Impaired Function
Cañones Creek-Abiquiu Reservoir	3147	9%	3.2	**Temperature**, E. coli; TMDLs for aluminum, **turbidity**, and fecal coliform	Functioning At Risk
Coyote Creek	27278	95%	4.0	**Sedimentation/siltation**	Functioning At Risk
Headwaters Rio Cebolla	2848	13%	2.8	**nutrients, turbidity**, aluminum; TMDL for **sedimentation/siltation**	Impaired Function
Headwaters Rio Puerco de Chama	23022	65%	3.6	Not impaired by any pollutants	Functioning At Risk
Outlet Rio Puerco de Chama	12109	33%	1.1	**Temperature, nutrients**, E. coli; TMDLs for **temperature** and E. coli	Functioning At Risk
Poleo Creek	17620	60%	2.5	**Sedimentation/siltation**, TMDL **turbidity**	Functioning At Risk
Polvadera Creek	1239	6%	2.5	Not impaired by any pollutants; TMDL for **temperature**	Functioning At Risk
Rio Capulin	6188	30%	3.2	E. coli; TMDL for E. coli	Functioning At Risk
Rito Peñas Negras	1433	13%	5.6	**Temperature, Turbidity, Sedimentation/Siltation, Nutrients**; TMDLs for **sedimentation/siltation, nutrients, total organic carbon, and temperature**	Impaired Function
Upper Rio Gallina	8144	44%	3.1	Not impaired by any pollutants	Functioning At Risk

[14] TMDL- Total Maximum Daily Load; A TMDL is the calculation of the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet and continue to meet water quality standards for that particular pollutant. A TMDL determines a pollutant reduction target and allocates load reductions necessary to the source(s) of the pollutant. Section 303(d) of the Clean Water Act authorizes EPA to assist states, territories and authorized tribes in listing impaired waters and developing Total Maximum Daily Loads (TMDLs) for these waterbodies. TMDLs for non-point sources are achieved through the effective implementation of best management practices. See: NMED, 2011; NMED, 2002; NMED, 2004; NMED, 2009; NMED,2022.

Figure 16 Project area hydrology

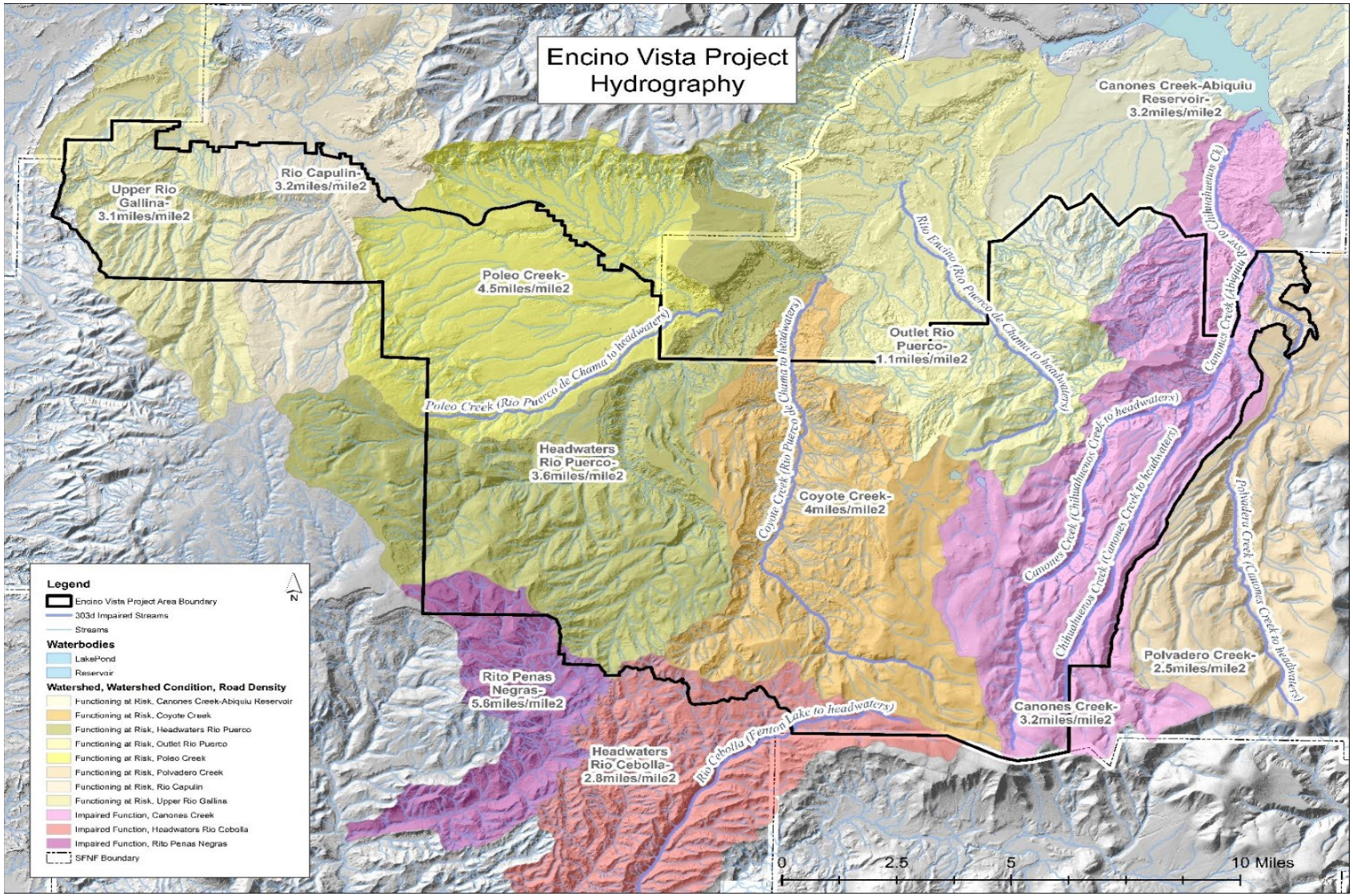
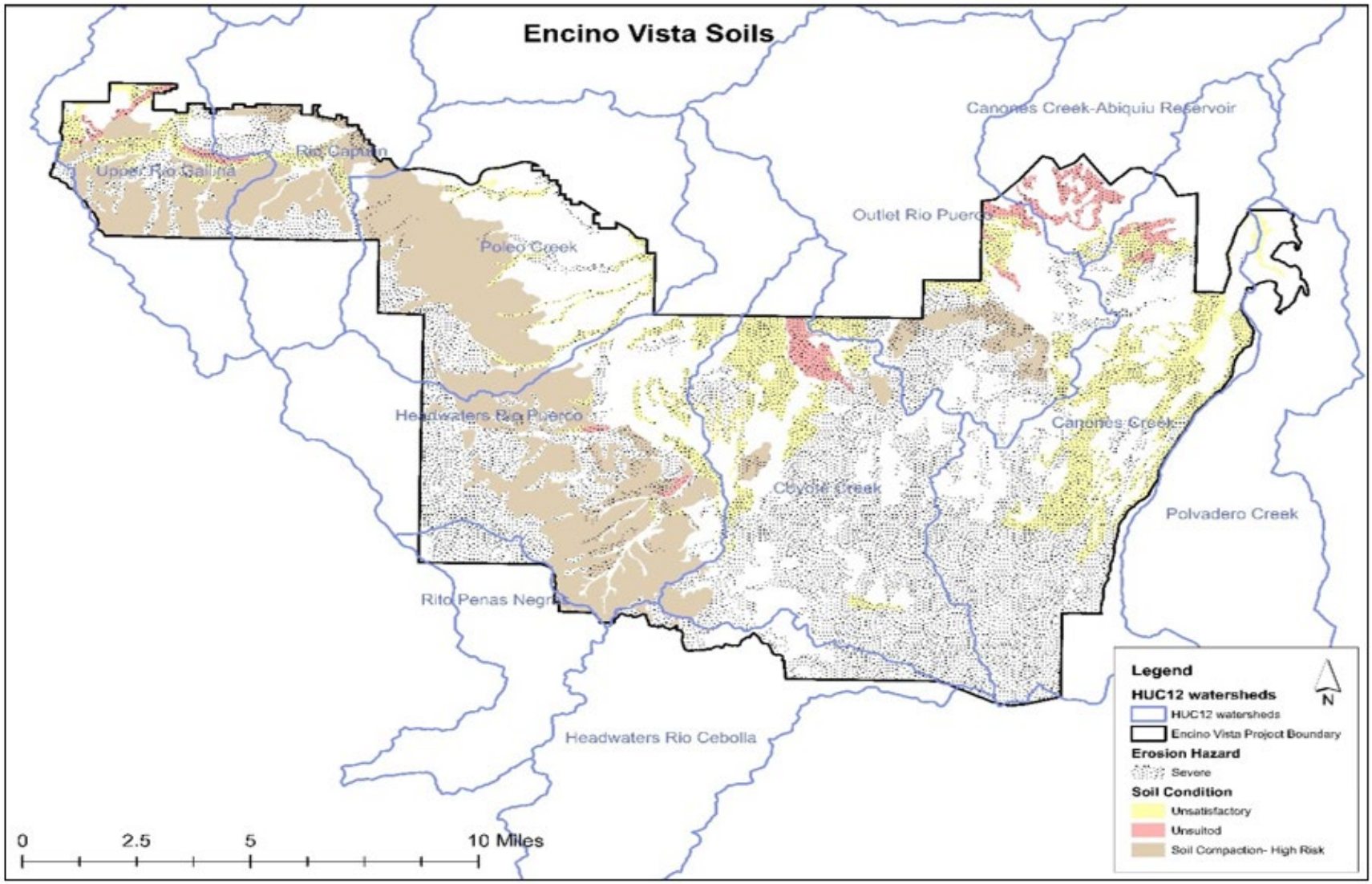


Figure 17 Project area Soil Condition



Environmental Effects

Issues Addressed

Issues pertaining to Watershed resources [water (water quality, flow regime), soil (productivity) and watersheds (resiliency)] that have been identified for detailed analysis are described below. “An issue is a statement of cause and effect linking environmental effects to actions” (FSH 1909.15).

Issue 1: Project activities could adversely affect WATERSHED RESILIENCY by decreasing a watershed’s ability to absorb and hold precipitation, to later release it during dry periods.

Issue 2: Project activities (mechanical treatments and prescribed burning) could adversely affect SOIL CONDITION and EROSION (through compaction and/or increased loss of soil).

Issue 3: Project activities could adversely affect MYCORRHIZAE FUNGI in the soil by adversely affecting soil properties.

Issue 4: Project activities could degrade WATER QUALITY through physical and chemical processes that add pollutants to water.

Issue 5: Project activities could affect ROAD CONDITION AND DENSITY ultimately affecting WATER QUALITY.

Issue 6: Project activities could cause increased PEAK STREAM FLOWS, which may flood private property and infrastructure downstream.

Methodology

Erosion, Sedimentation, Peak Flows

These analyses focused on water quality and changes to flow regime. The Forest Service Watershed Erosion Prediction Project (FS WEPP) model[1] interfaces (Elliot, 2005; Elliot et al., 2000) were used to analyze erosion and sedimentation rates (tons/acre/year) around the project area. The Forest Service Peak Flow Calculator[2] was used to estimate peak flows for catchment outlets using Curve Number technology. WEPP climate and runoff outputs were used as Peak Flow model inputs. Results include peak discharge given various soil burn severities, including unburned. The Fuel Management Erosion (FuME) interface was used to predict soil erosion and sedimentation associated with proposed fuel management activities including prescribed fire and roads. The model compares these outputs with erosion and sedimentation from wildfire.

Roads

The GRAIP-Lite model[3] (Nelson et al., 2019) was used to analyze all NFSRs within the project area. GRAIP-Lite is a geospatially based analysis tool that predicts and routes sediment from roads through the hydrologic network. The model is based on empirically measured road erosion rates, road slope (from a digital elevation model), roads layers, road surface data, vegetation data, and traffic estimates (based on maintenance level assumptions). It is a useful tool for assessing which road segments are most erosive and which are delivering the most sediment to streams. Together with the Motor Vehicle Use Map, the GRAIP-Lite analysis results were used to identify roads which likely need treatment, prioritize those roads, and quantify the impacts of the roads on water resources.

[1] FS WEPP interfaces (including WEPP Cloud and FuME) were developed by the USFS Rocky Mountain Research Station. More information about the WEPP model and the FS interfaces can be found here: https://forest.moscowfsl.wsu.edu/fswepp
[2] The FS Peak Flow Calculator can be found here: https://forest.moscowfsl.wsu.edu/fswepp/ermit/peakflow/
[3] GRAIP = Geomorphic Roads Analysis and Inventory Package. More information about the GRAIP-Lite model can be found here: https://www.fs.usda.gov/research/rmrs/projects/graiplite

Spatial and Temporal Boundaries

The spatial context for this analysis is bounded by the 12-digit hydrologic unit code watersheds which overlap the project area. Short-term effects are those which occur and disappear within five years. Long-term effects are those which persist beyond 5 years. The cumulative effects analysis timeframe is based on documented effects to soil productivity by mechanical harvesting which can persist for as long as 50 years (Greacen and Sands, 1980).

No Action Alternative

The No Action Alternative would not result in any adverse *direct* effects to watershed resources; no soil disturbance would occur, nor new soil compaction, and old disturbance in the project area would continue to recover at natural rates. Mycorrhizal fungi would not be disturbed by mechanical equipment or prescribed fire and would continue to function. Most soils in satisfactory condition (aside from those with deficient ground cover) would likely maintain this status. This alternative would however result in numerous adverse *indirect* effects to watershed resources.

Because this alternative would not restore forest structure, groundcover would be expected to remain deficient (and decline) beneath areas of dense canopy. Vegetative ground cover protects soil from erosion and filters sediment and nutrients from overland flow. Without widespread groundcover, soils are more prone to erosion and waterbodies are more likely to receive sediment and nutrient pollution, adversely affecting aquatic habitat and recreation (e.g., algal blooms in Abiquiu reservoir closed the area to swimming etc. in 2019; recreationists were discouraged from water contact by another bloom in 2020).

The existing Forest structure risks the likelihood of a high intensity wildfire, which would threaten water quality, soil productivity, and flooding (Rhoades et al., 2019; Neary et al., 2003). Adverse effects could include the loss of organics and a reduction of water infiltration (Wells et al. 1979), increased soil erosion from loss of cover, changes in soil productivity (Megahan 1990), loss of soil microbial populations (Hungerford 1991; Neary et al. 2005) and nutrient losses (DeBano 1991; Amaranthus et al. 1989), as well as potential losses of soil organisms including mycorrhizal fungi (DeBano 2000; Dove and Hart 2017). Because 52% of the project area has severely erosive soil, these adverse effects are likely to occur throughout much of the project area. Modelling (WEPP) showed a 6-fold increase in hillslope erosion and stream channel sedimentation above existing levels, given a wildfire.

Water quality is adversely affected by high intensity wildfire through physical and chemical processes, as well as the use of man-made chemicals (e.g., petroleum fuels and retardant). When soil and vegetation are burned, nutrients, metals, and other contaminants are released; together with eroded sediment, these pollutants are moved to waterbodies during spring snowmelt and precipitation events that generate overland flow (Stednick, 2010; Spencer et al., 2003). As stream shading vegetation is burned, stream temperatures are also likely to increase. Because numerous waterbodies within the project area are currently listed as impaired for sediment, nutrients, and temperature (NMED,2022), this alternative risks additional water quality degradation and loss of aquatic habitat, should a wildfire occur.

High intensity wildfire also threatens the ability of a watershed to absorb precipitation. Without ground cover and riparian vegetation, overland flow is rapidly transmitted down hillslopes and stream channels (Neary et al., 2003). The FS Peak Flow calculator was used to analyze the potential increase in stream flow; Coyote Creek watershed, with an outlet approximately 3.5 miles upstream of the village of Coyote, was selected as an example basin. Currently, given a modest 5 year recurrence interval storm (meaning there is a 20% chance a storm of this size will occur in any year), Coyote Creek discharges about 232 cfs. If a severe wildfire were to occur, discharge would be expected to increase by 37% (317 cfs); the increase by a 50-year recurrence interval storm would be 24% (545 cfs). Such an increase in flows could cause problems for acequias, culverts, roads and other infrastructure downstream. Adverse effects to human safety, infrastructure (e.g., acequias, villages, roads) and aquatic ecosystems (e.g., Polvadera Creek after the 2010 wildfire) may be risked.

Under this alternative, existing NFS roads and unclassified routes in the project area would continue to receive low traffic. This alternative, however, would not improve any project area roads. High road densities (some extremely high), poor road conditions, and unauthorized motorized traffic on closed roads would persist within project area watersheds. By ignoring these roads, erosion and sedimentation (7 lbs./mile/year, per watershed, on average), as well as disruption to the hydrologic network and adverse effects to aquatic habitat would continue.

The No Action alternative would therefore maintain watersheds that are 1) less resilient to climate change (i.e., less able to hold and slowly release high quality water during dry periods) and 2) are not moving towards desired conditions ("properly functioning" as defined by USDA, 2011; and the SFNF LMP (2022).

Proposed Action Alternative

Soil

Twelve percent of project area soils are rated "unsatisfactory" due to excessive soil loss rates (erosion) and inadequate ground cover. Another 2 percent are currently rated "satisfactory", but have little ground cover, approaching less than tolerable levels. This condition is likely related to the dense forest canopy cover which has resulted in the loss of graminoid cover (as it is outcompeted for solar energy, soil nutrients, and water) as well as current and historical grazing. Two percent of project area soils are rated "unsuitable" because they are severely erosive, steep (40 to 80 percent slopes), *and* have low effective ground cover (10 to 25 percent).

The proposed action includes treatments (forest thinning and low intensity/severity prescribed fire) expected to increase groundcover; these activities are expected to have long-term *indirect* and beneficial effects on soil condition because groundcover (especially perennial grasses; Reynolds et al. 2013; Moore and Deiter 1992) reduces erosion, increases water infiltration, promotes healthy soil accumulation, and mycorrhizae fungi (Reynolds et al. 2013). Further, low intensity/severity prescribed fire is expected to improve nutrient cycling and soil moisture retention (DeLuca and Aplet 2008). These beneficial impacts are expected to last between 3 and 10 years.

Short term adverse and direct effects however are possible. Ground based harvesting treatments could increase the risk of soil compaction, rutting, puddling, and erosion, but in general, heavy equipment should result only in localized areas of soil disturbance (Jagow 1994, Fleishman 1996 and 2005). High levels of soil disturbance are not expected because numerous project design features and the effective implementation of BMPs (such as harvesting while soils are dry or frozen, avoiding slopes >40 percent with ground-based equipment, retaining groundcover, utilizing slash mats etc.) would minimize effects on

soil resources. Further, rapid freeze/thaw cycles, common within lower elevations of the project area, are expected to help expedite soil compaction recovery (less than 50 years; Greacon and Sands 1980; Webb et al. 1986); where it is not mechanically treated (e.g. ripping skid trails and landings). Research has shown that careful operation (with protections including those mentioned above) can recover unavoidable adverse effects by heavy equipment (specifically resulting from surface disturbance) within 4-10 years (Archer 2009, Croke 2001).

Mechanical harvesting, especially in larger openings, has been shown to have some suppressive effects on mycorrhizae fungi, which live within the top four inches of soil (Anna, 2009) and are important for maintaining forest health. The proposed action includes group selection openings between 0.1 to 0.5 acres in size, which may result in a short-term decrease in mycorrhizae fungi in the soil. Because nutrient cycling, groundcover and root growth are expected to recover and increase following treatments, mycorrhizae populations are also expected to return rapidly (Philpott et al. 2018; Harvey et al. 1980; Reynolds et al. 2013; Johnson et al. 1991; Mann et al. 1988).

While some minor soil disturbance is expected by hand thinning (fuel reduction) activities, the extent and severity of the disturbance is not likely to result in erosion or decreased groundcover. Adverse impacts to soil, water, or mycorrhizae fungi are therefore not expected by this activity.

The impact of prescribed fire (includes both pile and broadcast burning) on watershed resources depends on the level of soil burn severity; higher soil burn severity is commonly coincident with areas of high vegetation burn intensity (dependent on soil moisture; Niehoff 2002; Busse et al. 2014). Generally, negative impacts to soil resources by prescribed fire activities would be small in area and short lived (i.e., 2 to 7 years) because burn prescriptions (e.g., favorable weather conditions and planned burn blocks) control fire intensity (and therefore soil burn severity) (Neary 2005).

In areas of higher soil burn severity (expected beneath pile burned areas), prescribed fire can directly and adversely affect soil nutrients by increasing available (transportable) nitrogen for a period of 1 to 2 years (Choromanska and DeLuca 2002) as well as phosphorus and potassium (DeBano 1981). The indirect effects of soil nutrient loss include reduced plant growth, increased susceptibility to pathogens such as root disease (Garrison and Moore 1998; Garrison-Johnston et al. 2003) and insect infestation (Garrison-Johnston et al. 2003 and 2004). Adverse effects by these activities would be minimized by burning piles only when soil moisture levels are high, as well as ensuring adequate spacing between piles so as to retain some unburned soil (see project design criteria). Natural processes (e.g., nitrogen fixing plants, charcoal properties, rock weathering, duff accumulation) are also expected to recover soil nutrients over time (Newland and DeLuca 2000; Jurgensen et. al. 1997; Certini 2005; Reynolds et al. 2013; DeLuca and Aplet 2008; Stark 1979; Morford 2011).

Mycorrhizae fungi have developed in the ecosystem in conjunction with low intensity, somewhat frequent fires (Anna 2009); higher intensity fire has been shown to reduce but not eliminate mycorrhizal productivity (Anna 2009; Dove and Hart 2017). Therefore, a small scale and short-term decrease in mycorrhizae within the soil is possible by prescribed fire activities, but no long-term adverse effects are expected.

Water Quality

Protecting water quality from the potential adverse effects of proposed activities is especially important for the EVLRP because many streams within the project area are currently not meeting state water quality standards for sedimentation/siltation, turbidity, temperature and nutrients (i.e., listed as impaired; NMED, 2022).

Chihuahenos Creek, Cañones Creek, Coyote Creek, Rio Cebolla, Poleo Creek, and Rito Peñas Negras are currently not meeting state water quality standards for sedimentation/siltation and/or turbidity (NMED, 2022). Analysis by the WEPP model indicates the proposed action may result in an average of 118 tons/year15 of sediment, per watershed, delivered to waterbodies across the project area (above the average background rate of 109 tons/year, per watershed). While the analysis results do indicate a potential increase in sedimentation by the proposed action, sedimentation by a large high intensity wildfire (602 tons/year, average per watershed, which includes the background rate) dwarfs the volume potentially generated by project activities. One could therefore conclude the proposed action would prevent an average of 408 tons of sediment per watershed, per year (for the next 15 years, during which the risk of high intensity wildfire is reduced). Further effective implementation of BMPs, project design criteria and the actual small and slow pace of implementing treatments would decrease the modelled short-term erosion and sedimentation predicted by the WEPP model. In the long-term, proposed activities are expected to reduce the background erosion rate, improving the existing condition as groundcover increases.

Proposed road treatments are expected to off-set any short-term sedimentation by proposed activities and further reduce erosion and sedimentation from existing levels (model analysis indicates every year, 23 tons of sediment are delivered to streams from project area roads). While increased traffic associated with the implementation of the proposed action is modelled to result in an additional 57 pounds of sediment per mile used, ultimately road related sediment would be reduced through road improvement (e.g., improved drainage, surfacing).

Several project area streams are also impaired by temperature pollution (Cañones Creek, Rio Puerco de Chama, and the Rito Peñas Negras; NMED, 2022). Stream temperature is most affected by solar radiation (Brown and Krygier, 1970) and therefore maintaining stream shade is an effective mitigation to potential effects. While thinning treatments are proposed near and within riparian areas, Best Management Practices and project design criteria would prevent significant reductions in stream shade from occurring. Monitoring and riparian planting activities would help to increase stream shade should an adverse effect occur. Under the Proposed Action, planting would occur on approximately 678 acres and would include Engelmann spruce, a high elevation species associated with riparian areas that is known to provide stream shading.

Several project area waterbodies are presently impaired by nutrient pollution (Rio Cebolla, Rio Puerco de Chama, Rito Peñas Negras; NMED, 2022). As discussed above, fire releases nutrients (and other contaminants) from plants and soil. Nutrients are an exceptional water quality concern because they can cause algal blooms and eutrophication (Gottfried and DeBano, 1990), such as at Abiquiu Reservoir in both August 2019 and 2020. The use of prescribed fire in project area watersheds which drain to Abiquiu Reservoir is proposed despite concern for reservoir algal blooms, because the potential water quality effects are significantly less, in terms of concentration (Stednick, 2010; Meixner and Wohlgemuth, 2004), and duration (Rhoades et al., 2019; Stephens et al., 2004) by prescribed fire than by high intensity wildfire; presumably because prescribed fire typically results in lower fire intensity (Certini, 2005). Low intensity prescribed fire also results in less soil erosion and sedimentation of nutrient laden soil (Robichaud, 2000). Further, preservation of the soil structure combined with an increase in nutrient availability (typical of low intensity prescribed fire) promotes the rapid establishment of vegetative ground cover (Certini, 2005), which helps to quickly filter and infiltrate water, reduce erosion, and

[15] FuME model results for erosion and sedimentation by thinning activities were likely inaccurate (suspiciously and consistently low); therefore the total average sedimentation volume is not inclusive of all activities. Model results are still however useful for comparing alternatives; volumes should not be taken as absolute quantities.

ameliorate the potential adverse effects to water quality. Water quality impacts by high intensity wildfire have been shown to last at least fourteen years (Rhoades et al., 2019); the reestablishment of ground cover is a significant control on this recovery time (Rhoades et al., 2011). Whereas adverse effects to water quality by moderate intensity prescribed fires have been shown to dissipate after only three months (Lake Tahoe basin, Stephens et al., 2004).

While the use of petroleum fuel in heavy equipment and fuel ignition poses some risk to water quality, the carefully planned use of these pollutants is more likely during project activities than during an emergency wildfire incident. Effectively implemented BMPs and project design criteria would help to ensure water quality is not adversely impacted by proposed activities (Appendix C).

Peak Flows

Activities which remove extensive areas of ground cover and vegetation within a basin can result in increased peak flows and flooding (direct and adverse effects). As an example, proxy for the entire project area, peak flows were modelled for a basin within the Coyote Creek watershed (approximately 3.5 miles above the village of Coyote). The effects of broadcast burning were specifically analyzed; mechanical thinning activities were not modelled because these activities are smaller in scale and are expected to have a minor effect on peak flows when compared with widespread prescribed fire.

Peak Flow model results show that if widespread (low severity) broadcast burning were implemented within the Coyote Creek watershed, peak flows could increase (over the existing condition) by 16%, given a 5 year recurrence interval storm (which has a 20% chance of occurring in any year). A 10% increase would be expected from a 50-year recurrence interval storm (2% chance of occurrence in any year). These modeled increases however assume the entire Coyote Basin watershed (18,048 acres) will be burned at once; smaller burn blocks (~5,000 acres max.; <1/3 the basin area) would be ignited (up to 5,000 acres per year). Burning smaller areas over time will help to ensure groundcover recovers before additional acres of groundcover within a watershed are affected; doing so should minimize the effects on peak flows (see specified design criteria and the strategy for avoiding cumulative watershed effects). Further, in comparison to the effects on peak flow by a high intensity wildfire (24% to 37% increase), the subtle increases in peak flows by the proposed action are favorable. The predicted increase in flows by the proposed action is not expected to cause problems for acequias, culverts, roads, and other infrastructure downstream. The recovery period to pre-disturbance peak flow levels depends on the intensity of disturbance, geologic, vegetative, and topographic factors; an area burned by low-intensity fire would be expected to return to pre-disturbance hydrologic conditions within several years, or as soon as adequate groundcover can slow and infiltrate precipitation (Neary et al., 2003).

Watershed Resiliency

Because the proposed action is expected to result in increased groundcover, decreased road related sediment, and decreased risk of high intensity wildfire, long-term benefits to watershed resiliency are expected. Resilient watersheds are 1) better able to hold and slowly release high quality water during dry periods induced by climate change, and 2) are moving towards desired conditions (“properly functioning” as defined by USDA, 2011; and the SFNF LMP (2022).

Cumulative Watershed Effects

A cumulative watershed effect (CWE) is a project-induced impact that, when added to the effects of other past (within the last 50 years), present, and reasonably foreseeable future actions within the same watershed, results in an incremental effect on watershed resources. The spatial context for this analysis is bound by the 12-digit hydrologic unit code watersheds which overlap the project area. Past disturbances include timber harvest, fuels treatments and wildfires. Presently ongoing activities include fuel-wood

gathering, grazing, riparian and aquatic restoration, dispersed and developed recreation, as well as roads and trails. Future activities include the Ojo Restoration Thinning and Prescribed Fire project, the American Park Collaborative Restoration Project, the Cerro Pelon Timber Stand and Wildlife Habitat Improvement Project, and actions implemented under the NNMRAWR project.

The risk of adverse cumulative watershed effects by the proposed action is proportional to the acreage treated by the EVLRP, the degree of historic watershed disturbance, acres grazed, and concurrently proposed future projects (Table 37). Watersheds at high risk are: Coyote Creek, Headwaters Rio Puerco de Chama, and Poleo Creek. Watersheds at moderate risk are: Cañones Creek, Rio Capulin, and the Upper Rio Gallina. Watersheds at low risk are: Cañones Creek-Abiquiu Reservoir, Headwater Rio Cebolla, Outlet Rio Puerco de Chama, Polvadera Creek, and Rito Penas Negras.

Adverse effects by cumulative watershed disturbances may include soil and water contamination by herbicides, E coli. and biological pathogens (e.g., giardia), nutrients, carbon and heavy metals; increased soil compaction, erosion and sedimentation; loss of soil productivity; increased peak flows and flooding. Cumulative adverse effects ultimately result in diminished ecosystem services (e.g., filtering water, storing water, and providing quality habitat) by wetlands, streams, and watersheds.

The potential for adverse cumulative effects is reduced by the NNMRAWR project, road treatments proposed by the EVLRP, the project's design features, and Best Management Practices which, through monitoring, would help to ensure adequate groundcover is present prior to creating further disturbance within the same watershed.

Table 37 Summary of cumulative effects within project area watersheds and their risk assessment

Watershed (HUC12)	Total Watershed Acres	Existing Condition WCF Rating and Water Quality Impairments	% Watershed treated by proposed Encino Vista treatments	Adverse CWE Factors	Beneficial CWE Factors	CWE Potential Risk
Cañones Creek	36,112	Poor 303d- Sediment	33%	Past timber activities- 108 acres Past wildfire- 814 acres Ongoing grazing- 30064 acres Road Density- 3.2 mi/mi^2	Increased herbaceous groundcover NNMRAWR Encino Vista Proposed Road Treatments	moderate
Cañones Creek-Abiquiu Reservoir	36,028	At Risk 303d- Temperature	0%	Ongoing grazing- 3145 acres Road Density- 3.2 mi/mi^2	NNMRAWR Encino Vista Proposed Road Treatments	low
Coyote Creek	28,851	At Risk 303d- Sedimentation/Siltation	55%	Past timber activities- 1245 acres Past wildfire- 88 acres Ongoing grazing- 24851 acres Road Density- 4 mi/mi^2	Increased herbaceous groundcover NNMRAWR Encino Vista Proposed Road Treatments	high
Headwaters Rio Cebolla	22,739	Poor 303d- Nutrients, turbidity	7%	Past timber activities- 459 acres Past wildfire- 56 acres Past prescribed fire- 2 acres Ongoing grazing- 20,772 acres Road Density- 2.8 mi/mi^2	Increased herbaceous groundcover Nutrient cycling NNMRAWR Encino Vista Proposed Road Treatments	low
Headwaters Rio Puerco de Chama	35,394	At Risk	40%	Past timber activities- 1798 acres Past wildfire- 6130 acres Ongoing grazing- 29328 acres Road Density- 3.6 mi/mi^2 Planned American Park timber activities- 22 acres	Increased herbaceous groundcover NNMRAWR Encino Vista Proposed Road Treatments	high
Outlet Rio Puerco de Chama	36,465	At Risk 303d- Temperature Nutrients	17%	Past timber activities- 541 acres Past wildfire- 745 acres Ongoing grazing- 16499 acres Road Density- 1.1 mi/mi^2	Increased herbaceous groundcover NNMRAWR Encino Vista Proposed Road Treatments	low
Poleo Creek	29,541	At Risk 303d- Sedimentation/siltation	44%	Past timber activities- 4282 acres Past wildfire- 38 acres Past prescribed fire- 411 acres Ongoing grazing- 24091 acres Road Density- 4.5 mi/mi^2 Planned Ojo timber activities- 3657 acres	Increased herbaceous groundcover Nutrient cycling NNMRAWR Encino Vista Proposed Road Treatments	high
Polvadera Creek	22,146	At Risk	0%	Past timber activities- 136 acres Past wildfire- 10250 acres Past prescribed fire- 2655 acres	Increased herbaceous groundcover Nutrient cycling	low

				Ongoing grazing- 21771 acres Road Density- 2.5 mi/mi^2 Planned Cerro Pelon timber activities- 76 acres	Ongoing Polvadera Creek Riparian and Aquatic Restoration Project NNMRAWR Encino Vista Proposed Road Treatments	
Rio Capulin	20,791	At Risk	26%	Past timber activities- 1938 acres Past prescribed fire- 1212 acres Ongoing grazing- 17506 acres Road Density – 3.2 mi/mi^2 Planned Ojo timber activities- 763 acres	Increased herbaceous groundcover Nutrient cycling NNMRAWR Encino Vista Proposed Road Treatments	moderate
Rito Peñas Negras	10,883	Poor 303- Temperature Turbidity Sedimentation/siltation Nutrients	<1%	Past timber activities- 82 acres Past wildfire- 101 acres Ongoing grazing- 10249 acres Road Density- 5.6 mi/mi^2 Planned American Park timber activities- 6291 acres	Increased herbaceous groundcover NNMRAWR Encino Vista Proposed Road Treatments	low
Upper Rio Gallina	18,419	At Risk	25%	Past timber activities- 1911 acres Past wildfire- 2571 acres Past prescribed fire- 187 acres Road Density- 3.1 mi/mi^2 Ongoing grazing- 13379 acres	Increased herbaceous groundcover Nutrient cycling NNMRAWR Encino Vista Proposed Road Treatments	moderate

Conclusion

In the long-term, the proposed action is expected to result in improved watershed condition (including soil and water resources); while some short-term adverse effects to watershed resources are possible, they are largely expected to be avoided or mitigated through the effective implementation of project design criteria, best management practices, and monitoring.

If no treatments are implemented (the No Action Alternative), watershed resources are at risk of increased erosion, decreased water infiltration/retention, and degraded water quality in the likely event of high intensity wildfire.

3.12 Inventoried Roadless Areas

Affected Environment

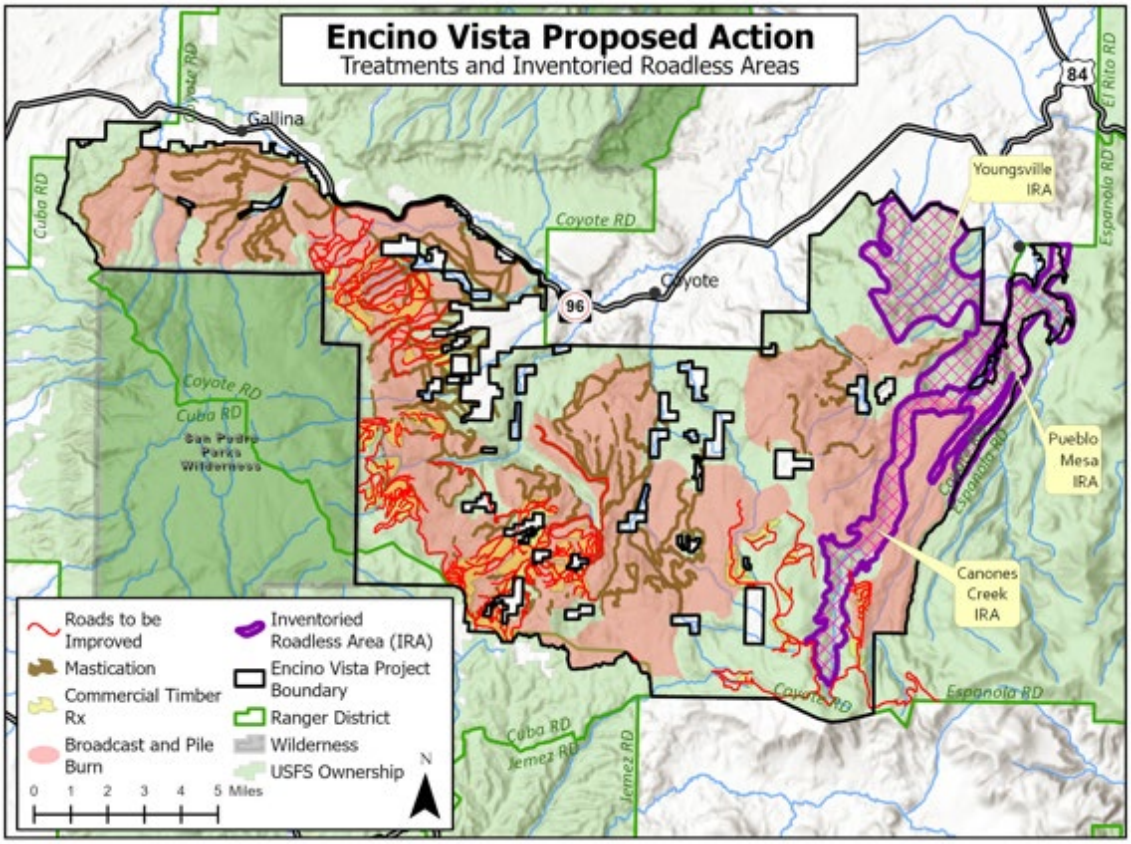
The project area includes Three designated Inventoried Roadless Areas (IRA); Cañones Creek, Youngsville and Puebla Mesa IRAs. This project is subject to the Chief's Review Process for Activities in Roadless Areas (issued on May 31, 2012). The purpose of the EVLRP project fits within that directive, and per its requirements the Regional Forester for the Southwestern Region reviews all activities that involve "the cutting, sale, or removal of generally small diameter timber when needed to maintain or restore 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." After review of the actions proposed, the Regional Forester may approve treatment activities in the IRAs upon determining that the project is consistent with the 2001 Roadless Area Rule (36 CFR Part 294) and that the proposed action is expected to protect and maintain IRA characteristics. The SFNF is awaiting the findings from this review.

The following information will be provided to the Regional Office regarding the use of the exception to the 2001 Roadless Rule; §294.13 (b)1 (ii)- Timber, (ecosystem). This exception states that the timber may be cut, sold, or removed in inventoried roadless areas if the responsible official determines that:

Exception Under 36 CFR 294.13(b)(1)(ii) (Ecosystem)

The cutting, sale, or removal of timber in these areas is expected to be infrequent. **AND** The cutting, sale, or removal of timber is needed to maintain or restore 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.

Figure 18 EVLRP Inventoried Roadless Areas with shown Proposed actions



Environmental Effects

Not all of the proposed action will be implemented within the IRAs. currently only fuels related treatments are expected. Proposed fuels treatments within IRAs are pre commercial thinning and prescribed burning. No mechanical fuels treatments or mastication are expected to occur within any IRA. Treatments will focus on primarily small diameter thinning and prescribed fire to reduce fuel loading, remove excess slash from silvicultural treatments, and reintroduce fire to frequent fire ERUs and reduce the risk of uncharacteristic wildfire. The Responsible official and the IDT have determined that within the IRAs all treatments would be limited to 750 acres per year or 7% of the proposed acres within the IRAs. At the project scale is 2% of the PCT or small diameter thinning and 1% of the prescribed fire treatments.

Table 38 displays the proposed fuels treatments within each IRA with an overall 22.6% of the IRAs proposed for treatment.

Table 38 IRA proposed treatment acres

NAME	Total Acres	Proposed acres	% Total IRA Acres
Cañones Creek IRA	3,936.7	2285.5	16.8%
Puebla Mesa	6,113.6	730.4	5.4%
Youngsville	2973.9	54.1	0.4%
TOTAL	13,024.1	3,069.9	22.6%

Table 39 Nine IRA characteristics with anticipated proposed action effect

IRA Characteristic	Proposed action
High quality or undisturbed soil, water, or air resources	Improve
Sources of public drinking water	Maintain
Diversity of plant and animal communities	Improve
Habitat for threatened, endangered, proposed, candidate, and sensitive species and species dependent on large undisturbed areas of land	Maintain
Primitive, semi-primitive nonmotorized and semi-primitive motorized classes of dispersed recreation	Maintain
Reference landscapes for research study or interpretation	Maintain
Natural appearing landscapes with high scenic quality	Maintain
Traditional cultural properties and sacred sites	Maintain
Other locally unique characteristics	Maintain

High quality or undisturbed soil, water, or air resources

There are no areas within or adjacent to the Inventoried roadless areas which have special air quality status or standards. There may be disruptions to air quality locally within and the surrounding area during and shortly after prescribed burn activities. All prescribed burn activities will coordinate and comply with New Mexico Air Quality Bureau to reduce the possible impacts to air quality. It is expected that the times of decreased air quality to be infrequent and of short duration with the implementation of project design features and BMPS. Impacts are expected to be minimal.

There will no commercial or mechanical treatments with the IRAs. treatments will be limited to hand cutting/ piling and prescribed fire. While some minor soil disturbance is expected by hand thinning (fuel reduction) activities, the extent and severity of the disturbance is not likely to result in erosion or

decreased groundcover. Adverse impacts to soil, water, or mycorrhizae fungi are therefore not expected by this activity.

The impact of prescribed fire (includes both pile and broadcast burning) on watershed resources depends on the level of soil burn severity; higher soil burn severity is commonly coincident with areas of high vegetation burn. Generally, negative impacts to soil resources by prescribed fire activities would be small in area and short lived (i.e., 2 to 7 years) because burn prescriptions (e.g., favorable weather conditions and planned burn blocks) control fire intensity (and therefore soil burn severity) (Neary 2005). All treatments are designed to reintroduce low- moderate intensity fire within frequent fire ERUs. It is expected impacts to be short term and adverse in small areas of the landscape. With the full implementation of PDFs and Design features developed for the project, potential impacts to IRAs would be decreased. PDFs can be found in Appendix C.

Sources of public drinking water

There are no public drinking water systems or designated municipal watersheds within the project area on NFS lands. There are number of wells and drinking water systems on private land adjacent to the project area. From the data we have, these water systems are groundwater wells that provide drinking water to the local communities north of the project area. There are a number of Mutual Domestic Water Consumers Associations (Capulin, Arroyo Del Agua, Coyote, Youngsville, and Cañones).

No water rights will be affected by the Proposed Action as project activities as the proposed directly to vegetation management and road maintenance. The PA (Chapter 1) is intended to protect and improve watershed resiliency.

Water quality and water quantity were addressed within the issues analyzed in Chapter 3.11 Of this document. All HUC 12 watersheds were fully analyzed in the Watershed Specialist Report and this Draft EA. With in the IRAs. Cañones Creek is the only HUC-12 watershed.

Protecting water quality from the potential adverse effects of proposed activities is especially important for the EVLRP because many streams within the project area are currently not meeting state water quality standards for sedimentation/siltation, turbidity, temperature and nutrients (i.e., listed as impaired; NMED, 2022).Chihuahenos Creek, Cañones Creek, Coyote Creek, Rio Cebolla, Poleo Creek, and Rito Peñas Negras are currently not meeting state water quality standards for sedimentation/siltation and/or turbidity (NMED, 2022). Water quantity was analyzed in Coyote Creek drainage as a proxy for the project area. the results show both the prescribed burning and wildfires increase peak flows. The no action alternative showed far more water runoff post uncharacteristic wildfire than the prescribed burning. Although, it was assumed the entire watershed was burnt at once (18,000 plus acres). Within the three IRAs the SFNF will be limited on treatments in order to meet the exception. Thus, water quantity or peak flows can be expected to increase but not as much as the rest of the project area or to a level that would be associated with negative impacts. The Cañones Creek and Puebla Mesa IRAs lay above the village of Cañones, NM, in which the Cañones Creek runs through. These portions of watersheds don’t directly supply water drinking systems, though does maintain ground recharge/ water levels for the villager's water wells. These drainage systems also supply local acequias used during the spring and summer months for agriculture. With commitment to using all necessary mitigations in Appendix C, the proposed action is expected to have some short-term impacts following initial treatments. However, the long-term effects outweigh the short term. By improving the overall watershed resiliency, function, water quality and quantity. Particularly when compared to other SFNF HUC 12 watersheds that have been impacted by

uncharacteristic wildfires and post fire impacts such as lose of total vegetation and severe flooding. The proposed action would maintain water rights and traditional uses for the village of Cañones, NM.

Diversity of plant and animal communities & Habitat for threatened, endangered, proposed, candidate, and sensitive species and species dependent on large undisturbed areas of land

Within the project area Ecological Response Units (ERUs) are described as the following.

1. Forested stands are overstocked, lack horizontal and vertical structure, and have altered species composition.

2. Forest structure is not comprised of the desired range of diameter classes and habitat components, such as openings or interspaces.

3. Tree species composition is departed from desired conditions in native mixed conifer vegetation types

ERUS which are found in the three IRAs are similar with the rest of the project area. As described above and in further detail in this document, PPF, MCD and MCW ERUs are departed from the 2022 SFNF LMP desired conditions. Treatments under the Proposed action will shift forest stands towards desired conditions. By thinning for stand structure and composition and prescribed fire as the initial reintroduction of fire into these landscapes. These actions collectively improve plant communities as compared to no action. Where the no action alternative, plant communities are likely to further depart from desired conditions and are at risk of uncharacteristic wildfires. In the past decade on the SFNF have devastated forests to full forest type conversion. As well as large high severity fires having damaging post fire effects on the landscape. Current forest conditions limit wildlife habitat diversity and quality. However, unnaturally dense forested stands and a closed canopy structure do offer habitat for some wildlife species such as MSO. These same areas offer poor habitat for many species that rely on healthy herbaceous understory for forage, calving or nesting areas such as migratory birds and native ungulates, among others. There is a need to maintain or enhance native understory vegetation and a diversity of habitat components for the wide variety of species that utilize this area. Existing acres of habitat for are disclosed in Section 3.8. The proposed action alternative is described as follows for the entire project area. Treatments would not occur simultaneously in space or time. Specific treatment areas are selected based upon specialist criteria, PDFs BMPs and threatened and endangered species habitat parameters. All of which results in non- contiguous blocks of treatment areas along roads and strategic locations and varying forest structural conditions across the landscape. Treatments would not occur at a high frequency and would take place for 20 years or longer. Many treatments will include leave groups or areas which are not treated. Those leave groups may serve as habitat for some animals but may be too small for others.

The EVLRP IDT has created several Project Design Features (PDF), which include specific features which inhibit the potential introduction or spread of invasive species, wildlife considerations, and treatments timing restrictions. with the implementation of these PDFs, it can be expected impacts from the proposed action would be minimal and short in duration. With the No Action alternative, current conditions would result in degraded habitat. Under the Proposed Action, overall conditions should improve and move ERUs toward desired conditions in the long term.

A full analysis was completed within the Draft EA (Chapter 3.8), Species of Conservation Concern Report and Biological Assessment. The project area includes a total of twenty-six at-risk species. Two of the species are federally listed under the endangered species act; the Threatened MSO and the Endangered JMS. Remaining at-risk species include twenty-four Species of Conservation Concern (SCC). The SCC species include three fish, one invertebrate, six birds, five mammals and eight plants. Refer to

Appendix B to review the SCC species list and the SCC LMP Consistency Report for this project. The Forest is working through the Formal Consultation for the section 7 process with USFWS species leads for MSO and JMS. Those findings will be fully incorporated in the EVLRP. Under the no action alternative, there would be no direct or indirect effects to any threatened or endangered species. Current ecological trends would continue and there would be no long-term improvement of habitat quality or reduction of wildfire risk for MSO or JMS. The proposed action of the EVLRP is designed that as an area is identified for treatments in which are identified as wildlife habitat for T&E species, the treatments would be designed to meet the desired conditions for that species.

MSO-Mexican spotted owl – May affect, not likely to adversely affect. Spatial arrangement and timing of proposed activities within MSO recovery habitat will be designed to meet MSO-specific desired conditions based on present habitat type as outlined in Appendix A and the MSO Recovery Plan. The project area contains a total of 32,489 acres of RCNR habitat which includes five known PACs. The project area contains 22,269 acres of RFH which includes canyon rim edges and adjacent areas that are composed of mixed conifer forest. Portions of these habitats are found in the IRAs. There may be direct effects from the proposed action in IRAs which include noise disturbance, and harassment during implementation. Though with PDF these impacts should aid in reducing the overall impacts.

JMS-Jemez Mountain Salamander – May affect, likely to adversely affect. The project area contains a total of 20,082 acres of suitable habitat for the JMS up to 1,541 acres of suitable JMS habitat would be impacted by PCT and pile burning (8%). Up to 10,405 acres of suitable JMS habitat would be affected by broadcast prescribed fire (52% of total suitable habitat within the analysis area). Much of this habitat is found with the IRAs. Due to the fact in which there is less known about this species habits and tendencies, the SFNF cannot determine proposed activities won't impact the JMS. Though there are PDFs and mitigations to reduce impacts to the greatest extent practicable. These PDFs are incorporated into the proposed action to reduce the potential for adverse effects to JMS. Some of these impacts may include harassment, injury or mortality. For both T&E species, but primarily JMS, the following assumption has been made. Natural or lighting caused fires in the Jemez mountains historically occurred during pre-monsoon conditions and may reflect a more natural fire pattern with unknown consequences or benefits to the JMS. A recent study in the Jemez Mountains found repeated, low-severity fire was a key historical ecological process in JMS habitat and an important component of ecosystem restoration, resilience, and likely species recovery (Margolis and Malevich 2016). The assumption that JMS evolved with low-severity fire provides the context for this effects analysis. The proposed action would have long-term indirect impacts to the JMS and its habitat by reducing hazardous fuels and influencing forest composition and structure toward desired conditions. Overall, the implementation of the proposed action will focus on meeting desired ecological conditions within the project area, improving wildlife habitat and creating more resilient forests which can resist catastrophic wildfire. Such wildfire events would have greater long-term adverse effects to these species and habitat loss than the proposed action.

Although MSOs and recovery habitat could be impacted over the short term, the long- term benefits of implementing the proposed action outweigh the short-term impacts for this species. These T&E species and their habitats are overall expected to remain stable with the proposed action. As well as with the no action is can be expected conditions would further depart from these species desired conditions or by characteristics wildfires.

Primitive, semi-primitive nonmotorized and semi-primitive motorized classes of dispersed recreation

Full analysis of this resource as it applies to the EVLRP project area may be found in the Recreation and Scenery Specialist Report and Chapter 3.10 of the Draft EA. That analysis was used to inform this document.

Particularly within the IRAs, Recreation opportunities are classified as Semi Primitive motorized and non-motorized (Figure 13). Some areas of the IRAs are truly roadless and other portions may contain roads open to the public and shown on the SFNF MVUM. There are a series of NFS trails within the IRAs. These include but not limited to the Cañones Creek National Recreation Trail, Magote, Piedra Lumbre, Canada Gonzales, and Cañoncito Seco trail. As well as the TSI P'in Owingeh Cultural Interpretive Management Area. As well as Cañones Creek eligible Wild and Scenic River. The proposed action has the potential to benefit recreation in both a positive and negative aspect. The positive aspect would be to lessen the risk of catastrophic fires that could remove the quality and availability of recreational opportunities both long and short term. The negative impacts are identified as short-term displacement of recreationists and intrusion of noise, smoke and short-term visual aspects of vegetative treatments, especially prescribed burns. Although when compared to the No action alternative, in any case an uncharacteristic wildfire occurs in these roadless areas, the negative impacts would be severe and long term. Decreasing the quality and availability of these recreational opportunities.

Reference landscapes for research study or interpretation

There are no Reference Landscapes for research study of interpretation on the SFNF. This characteristic of the IRAs classified as stable for that reason. There is expected to be no change in reference landscapes from the EVLRP. These 3 IRA landscapes are relatively in pristine natural condition. There landscapes are relatively remote by topography and have limited access to vast areas of the IRAs. With some access via NFSRs and majority via NFS trails. Though in the context of the EVLRP all three IRAs encompass approx. 10% of the project area. Given this small portion of the project area, and remote nature of the IRAs, it is expected that proposed treatments of small diameter thinning, pile burning and/ or broadcast burning is likely to be minimal.

Natural appearing landscapes with high scenic quality

The three IRAs have overall pristine scenery as appearing very high or high. The Table 40 below shows the acres and percent within each IRA and cumulatively. This shows within all three IRAs the 78% has high (appears unaltered) and 22% as very high (unaltered). The map below shows the Scenic Integrity Objectives (SIO) for the entire project area (Figure 14) . Which displays the only location Very High SIO is within the IRAs. Particularly the Cañones Creek EW&SR. The proposed actions within the IRAs are expected to maintain the scenic integrity as high or very high. But focusing on small diameter thinning within the IRAs, treatments focus on removing the minimum number of trees to safely and successfully reintroduce low – moderate intensity fire.

Table 40 IRA Scenic Integrity

NAME	SIO	ACRES	% TOTAL
Cañones Creek	High (Appears Unaltered)	1,285	10%
	Very High (Unaltered)	2,653	20%
	TOTAL	**3,938**	
Pueblo Mesa	High (Appears Unaltered)	2,957	23%
	Very High (Unaltered)	18	<1%
	TOTAL	**2,975**	
Youngsville	High (Appears Unaltered)	5,906	45%
	Very High (Unaltered)	210	2%
	TOTAL	**6,116**	
Grand Total		**13,029**	**100%**

Under the No Action Alternative, there would be no potential short term impacts due to prescribed burns and thinning operations. Long term there would be increased chance of continuing buildup of fuels resulting in potential catastrophic fires, which could affect most of the trails and scenic quality in the area. Scenery integrity objectives may deteriorate as fuels build up and more trees die due to the density of trees within a climate change regime. If a catastrophic fire occurred, trails would have to be re-built over time when conditions had stabilized and restoration was safe. Scenery objective criteria would change or not be met for a long period of time, if ever. Many areas would no longer have the climate patterns to eventually return to the former vegetative types. Falling trees would increase user risk and make maintenance more difficult. Scenery impacts include mostly short-term effects from burning. These effects include smoke reducing visibility as well as the actual blackened and burned area, even if it is low intensity. There are PDFs and mitigations to protect the viewshed of trails and the Cañones Creek corridor during implementation would protect the scenery from mechanical effects of implementation. In the long term, scenery objectives would have a good chance of maintaining or exceeding the designated standards following implementation. PDFs and mitigation measures were developed to provide screening of piles and mechanical treatments such that they are not visible from the trails, trailheads, or recreation facilities. This would protect the viewshed and scenery integrity objectives of these sites. Even more stringent design features for the scenic, historic, and recreational trails, as well as the Cañones Creek eligible Wild and Scenic River will also protect the scenic integrity objectives such that they continue to move toward or exceed these established categories. Prescribed burns would create smoke and blackened ground in the short term, but long term the potential to meet and exceed the scenic integrity objectives would be improved.

Traditional cultural properties and sacred sites

The three IRAs within the project area contain archaeological sites (historic properties) and may contain traditional cultural properties. Traditional cultural properties may apply to both traditional communities and Native American tribes. Complete (100 percent) cultural resources inventory of these areas has not been completed. The SFNF is aware the potential exists for high site densities within portions of the three IRAs. The SFNF will continue to ensure sites are identified, mitigated, and protected to reduce impacts to known cultural resources during the phased implementation of the project.

A local tribe has conveyed that Tsi-P'in Owingeh Pueblo and all associated sites area an important ancestral area. This site is specifically located in Pueblo Mesa IRA, and associated sites encompass a much larger area and may also occur within the Cañones Creek IRA. To ensure the greatest protection for Tsi-P'in Owingeh Pueblo during project implementation, the IDT and Responsible Official have determined no EVLRP project activities shall occur within the Tsi-P'in Owingeh Cultural interpretive Management Area. No additional areas of concern have been conveyed to the IDT or Responsible Official at this time.

Formal Government-to-Government consultation for EVLRP was initiated in November 2019. Since then, the SFNF has followed up with formal letters in September 2021 and February 2024 to share project details and status updates The SFNF has contacted a total of 22 Native American tribes for the purposes of this project. Additionally, The EVLRP and SFNF project activities are routinely discussed during Tribal and SFNF Memorandum of Understanding (MOU) meetings. This is ongoing Government-to-Government consultation which could lead to additional areas identified for protection under NHPA.

The initial assessment (Class I) of previous cultural resource projects and known Historic Properties within the project area has been completed by Forest Service Heritage Program staff. Previous valid inventory may occur within the three IRAs, and additional inventory within the three IRSs may be necessary during project implementation. Implementation of the proposed action within any IRA would follow Design Features and Best Management Practices as described in EA Appendix C and the Phase I report to ensure no adverse effects to known historic properties.

Under the no action alternative, activities, including silvicultural treatments, prescribed burning, and road activities, would not be implemented within the IRAs. Without implementation of the proposed actions, design criteria proposed to ensure no adverse effects would also not be implemented. The condition of cultural resources would be expected to continue along existing trends and there would be no adverse effects to historic properties resulting from this alternative. These traditional cultural properties and sacred sites would remain at risk of negative impacts from uncharacteristic wildfire and post-fire events.

In summary, all listed, eligible, and unevaluated/undetermined Historic Properties will be flagged and avoided by mechanical thinning treatments and road work activities. Hand-thinning and prescribed burning may occur within site boundaries provided the design features in Appendix C are followed. Sites with combustible material will be protected during prescribed fire. Listed, eligible, and unevaluated/undetermined sites will be monitored after the proposed treatments to assess whether the sites were adequately avoided and the extent to which the treatments had indirect effects (i.e., damage from increased erosion) on the sites. Treatments on and around known traditional cultural use areas should be developed and implemented through ongoing consultation with tribes and traditional rural communities throughout the life of this project.

Provided these measures are implemented, the project will result in no direct or indirect adverse effects to historic properties. This project meets the policies and standards set forth in the National Historic Preservation Act of 1966, as amended (54 U.S.C. 300101) and its regulations (36 CFR 800) and the USDA Forest Service Region 3 Programmatic Agreement (USDA 2023).

More detail of project level analysis was completed in the Cultural Resources Specialist Report and EVLRP EA.

Other locally unique characteristics

Within the Cañones Creek IRA there is a 9.98-mile corridor of that creek for which is identified as an Eligible Wild and Scenic River per the 2022 SFNF LMP. This EW&SR is analyzed under Recreation Chapter 3.10. This creek has five outstanding recreation values (ORV), which include recreation, scenery, prehistoric, botanical and fish. The proposed action is directly aimed at restoring forest health lower the risk of uncharacteristic wildfire, improve watershed health and enhance wildlife habitat. As this pertains to this unique area of the IRAs by improve watershed resiliency to drought, climate change, reintroducing fire in frequent fire ERUs and overall reduce the risk of uncharacteristic wildfires.

Any treatments within the IRAs and this EW&SR would follow specific design features and best management practices (BMPs) to Scenery and Wild & Scenic Rivers found in Appendix C. Implementation using all necessary DF and BMPs the proposed action is likely to have short term adverse and long-term beneficial effects of this resource. Short term adverse impacts may include a disruption of recreational uses in the immediate area, through possible trail closures during forest management activities. there may be possible erosion events, specifically during summer monsoons, that may occur to the Cañones creek. This possible impact is expected to short in nature following a treatment lasting one or two growing seasons. It is not expected to inhibit the free-flowing nature of the creek.

It is also locally unique to the project area are the Continental Divide Trail, The Old Spanish Trail Corridor, and the Cañones National Recreation Trail. The fact, that is occurs on this landscape makes this entire project area unique. With in the IRAs specifically, the Cañones Creek National Recreation Trail solely is not unique, as there are many national recreation trails on USFS lands.

Though to project all the trails and trail system, (particularly the three mentioned above) any treatments need to protect the visual quality of the trail with extra care following the mitigations and the goals, standards and management practices as described in the 2022 SFNF LMP. These mitigations are listed in Appendix C. With consideration and implementation, these mitigations will protect the scenic corridor of these trails and reduce the impacts to the recreation resource. Users may experience some short-term impacts, during implementation, though the no action alternative the trail conditions could continue as they currently are. Although an uncharacteristic wildfire could potentially devastate these locally unique features of the IRAs. Leaving long term adverse impacts.

Conclusion

At this time, it is yet to be determined if the approval to use the exception to the 2001 Roadless Rule; §294.13 (b)1 (ii)- Timber, (ecosystem). Although, based on the above resource analysis and hard look at the nine roadless characteristics. The proposed action is likely to be infrequent because the proposed treatments solely with the IRA make up 22% of their total area. As well as only 4% of the total project area. Further the annual limits of the proposed treatments of 750 acres per year or 7% of the proposed acres within the IRAs. At the project scale is 2% of the PCT or small diameter thinning and 1% of the prescribed fire treatments. This is due to the fact the vast majority of proposed treatments in the EVLRP are outside of the IRAs. It should be noted that all treatments will not occur at the same time, or place. Treatments will occur over the course of 10-15 years for the entire project area. Treatments solely occurring in the IRA are relatively small and would occur over a long period of time.

In addition, the proposed action is likely to improve ecosystems not only within the IRAs but at the entire project level. The proposed action will shift the forest structure and composition closer to desired conditions per the 2022 SFNF LMP. As well in TEPC species habitat ensuring those habitats are enhanced or maintained. These treatments will create a healthier, more resilient landscape which in turn will ensure

these ecosystems, habitats and landscapes ability to withstand disturbances. These disturbances include climate change, uncharacteristic wildfires, and insect and disease outbreaks.

With implementation of the PDFs, mitigation measures and BMPs (Appendix C) the proposed action is expected to have some possible short term adverse impacts to recreation, scenery, and possible soil or water resources. When compared to the no action alternative, in an event of uncharacteristic wildfire, these adverse effects could be long term and catastrophic to IRAs and adjacent landscapes. The long term benefits of the proposed action out weight the short term impacts, by maintaining these roadless areas.

3.13 Socioeconomics and Environmental Justice

Affected Environment

A more comprehensive discussion of socioeconomics environmental justice can be found in the Specialist Report in the project record, only those aspects that are likely to be impacted by this project are discussed here.

Socioeconomics

The socioeconomic analysis focuses on Rio Arriba County, New Mexico, a Micropolitan Statistical Area . according to the U.S. Census Bureau This mean that it has "at least one urbanized area of 10,000 to 50,000 people, plus adjacent territory that has a high degree of social and economic integration with the core as measure by commuting ties" (USDC 2021). The communities of Cañones, Youngsville, Coyote, and Gallina are the primary population centers that may be affected as all are near the project's northern boundary and can be considered to be within the wildland-urban interface (WUI). Abiquiu may also be considered, as the watershed it relies on is within the project boundary (see above in Watersheds, under Comparison of Existing Conditions and Desired Conditions).

Population and economic characteristics of Rio Arriba County relevant to the EVLRP are summarized in the bullets below relying on source data in the USDC (2021):

- Rio Arriba County population has remained fairly steady at around 40,000 people since 2010.
- The age of that population has skewed older with a net increase of percent of the population over the age of 65 while all younger age brackets saw a decrease in population
- The racial profile of the population is majority white (41%), "some other race" (potentially indicating Hispanic or Latino) at 27%, and American Indian at 16% of the population.
- The majority (71%) of the population is Hispanic or Latino ethnicity, significantly higher than other areas of rural (39%) or urban (52%) New Mexico and much higher than the U.S. as a whole (18%).
- In 2021, median household income in Rio Arriba County was $46,994, though this figure may be reflecting Covid Pandemic-related direct income payments to citizens, forbearance of certain bills, and other economic variables that do not reflect persistent economic conditions. This is lower than the median household income in New Mexico and the United States as a whole. A little over 22% of people in Rio Arriba County live in poverty with 12% living in deep poverty (defined as less than half of the federal poverty level).
- Service-related industries and government comprise about 80 percent of total employment. Non-service industries (e.g., farming, mining, construction, agricultural services, etc.) comprise about 19% of total employment. The non-service industry includes a forest economy with about a dozen local commercial wood product purchasers within the market area. Products generated as a result of restoration and thinning treatments on the National Forest include rough cut timber, finished timber, vigas, latillas, firewood, and biomass for wood pellets.

Traditional Communities and Uses

The term "traditional community" refers to a federally recognized tribe or a land-based rural community that has a long-standing history in and around lands managed by the Forest Service. There are numerous small unincorporated communities within the boundaries of the Santa Fe NF, as well as several adjacent federally recognized tribes and small incorporated towns and villages. These communities are geographically and historically rooted to a particular landscape.

The Santa Fe NF manages the natural resources and landscapes that sustain these traditional communities, their cultures, and their traditions. Local heritage, cultural, traditions, and values have been handed down over generations and predate control of the Forest by the United States. Long-standing use of the forest and its natural resources are fundamental to the interconnected economic, social, and cultural vitality of many inhabitants in northern New Mexico, including federally recognized tribes, Spanish and Mexican land-grant-mercedes and acequias[16]. Traditional uses of the forest include, but are not limited to:

- fuelwood gathering for home heating or for selling.
- use of wood products for building materials or ceremonial use.
- collection of soils and rocks for building materials and other purposes.
- hunting or fishing for subsistence or ceremonial uses.
- gathering edible or medicinal plants.
- grazing cattle; use of common waters (e.g., acequias or irrigation ditches) for drinking, irrigating crops, and watering livestock.
- religious and ceremonial use of lands and waters.
- recreational uses such as weddings, family reunions, and dispersed camping.

All land within the project area is ancestral land to several Native American tribes and communities. The project area is adjacent to the Santa Clara Pueblo. In 2011, the Las Conchas Fire burned over 150,000 acres and consumed most forested acres on the Santa Clara Reservation. As such, the forestlands within the EVLRP have become even more essential to Santa Clara, and more generally all Native people, for the collection of forest products for personal and ceremonial uses. The tribes that are closest geographically to the project area are the Santa Clara Pueblo, Jicarilla Apache Nation, and the Ohkay Owingeh-Tribe. The Pueblos of San Ildefonso and Pojoaque are also close to the project area.

The project area overlaps or is directly adjacent to three Land Grants – Mercedes: the San Joaquin– Rio de Chama Grant, the Juan Bautista Land Grant, and the Piedra Lumbre Land Grant. These Land Grants were awarded by the King of Spain to families who settled in this region before the land was later acquired by the United States government. These traditional use communities are also political subdivisions recognized by the State of New Mexico that are actively involved in managing and preserving adjacent NFS lands for traditional and cultural uses such as grazing, water for agriculture and consumption, stone and clay, wood, game, fish, medicinal plants, and fuelwood, other forest products.

[16] An acequia is an historical community ditch in New Mexico that carries snow runoff, spring flows, or river water to irrigate fields and is administered by a governing board.

Environmental Justice

In 1994, President Clinton issued Executive Order 12898. This order directs Federal agencies to consider the human health and environmental conditions in minority and low-income communities. The purpose of Executive Order 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations (Executive Office of the President 1994). The goal of environmental justice is for Federal agency decision-makers to meaningfully involve minority (typically 50% or more) and low-income populations in decision-making processes, and to identify impacts that are disproportionately high and adverse with respect to these populations and identify alternatives that would avoid or mitigate those impacts.

In 2021, President Biden issued Executive Order 13985 titled Advancing Racial Equity and Support for Underserved Communities. Section 8, *Engagement with Members of Underserved Communities,* requires federal agencies to consult with members of communities that have been historically underrepresented in the Federal Government and underserved by, or subject to discrimination in, Federal policies and programs. Traditional communities including federally recognized Tribes and Spanish Land Grants pr-date the establishment of the United States government. The language barrier created by the transition from Spanish and Native languages to English resulted in difficulty by traditional communities to assimilate to the new government. Consequently, these communities have experienced a degree of historical underservice by the federal government. This executive order seeks to remedy past failures and promote more engagement by the Forest Service with these communities. The Forest Service recognizes their vital and time-honored connections to the project area's natural resources.

Rio Arriba County as a whole exhibits relatively high rates of poverty as well as large percentages of the population identifying themselves as Hispanic or Latino, American Indian, or "some other race" and so are appropriately considered under environmental justice.

Examples of environmental justice issues in Rio Arriba County that are relevant to this project include:

- About 6 percent of households lack a vehicle, which could make fire evacuation difficult.
- Low-income households are less likely to have property insurance to help recover from any property damage done by a wildfire.
- Populated areas in Rio Arriba County have a greater wildfire risk to homes[17] than 69% of counties in the State. Low-income households are less likely to be able to implement pro-active wildfire mitigation measures to reduce their risk.
- Traditional communities often rely on forest products and uses for subsistence as well as income and may also require access to spiritual or cultural sites within the Forest.
- About 18% of households use fuelwood to heat their homes, often relying on wood sources within the Forest.

[17] Risk to Homes: integrates wildfire likelihood (the probability of wildfire occurring) and wildfire intensity (the energy released by a wildfire) with expected consequences to homes if a fire occurs. (USDA 2020)

Environmental Effects

No Action Alternative

As the No Action Alternative does not reduce the risk of uncharacteristic wildfire, it also has the potential to have negative socioeconomic effects related to wildfire impacts if implemented. Although all communities, wealthy and poor, suffer direct economic consequences when there are large wildfires, normal commercial activity can be disrupted. Many of communities near the project may have high degrees of poverty and people with lower incomes; even a temporary loss of work can overwhelm low-income individuals and families. These individuals may also have a more difficult time evacuating in the event of a wildfire or rebuilding afterwards. Continued wildfire risk thus may have a disproportionate impact on low-income or minority communities and would not be abated by the No Action Alternative.

Without the landscape-scale treatments, traditional uses in the project area would continue to be at risk of experiencing uncharacteristically severe wildfire. Uncharacteristically severe wildfire could cause loss of important historic information and sacred sites and could impact tribal ceremonial practices.

Because the No Action Alternative does not actively address road issues or existing watershed impacts, the potential benefits of those activities would not be realized. Thus watershed resources would continue to be at risk of increased erosion, decreased water infiltration/retention, and degraded water quality which could negatively impact traditional communities, including Environmental Justice Communities who rely on these watersheds to sustain both their domestic and agricultural water supplies.

Access to the project area would not be temporarily impeded under the No Action alternative. Roads in the project area would not undergo maintenance associated with the project, however, and in the case of public access roads this could result in continued deferred maintenance as road maintenance priorities are focused on other regions of the forest.

Proposed Action Alternative

Two elements of the proposed action have the most direct impact on socioeconomics due to direct federal spending on contracts: silvicultural treatments and road work. There are also direct economic benefits related to the value of forest products. Indirectly, silvicultural treatments and road work may also have local economic benefits in the form of fuel purchase as well as food and lodging for workers even where contractors are from outside the AOI.

Indirectly there are impacts (both positive and negative) to the quality of life in local communities, that may also affect local economies as well as traditional and Environmental Justice communities and issues. Short-term, restoration actions may disrupt traditional lifeways in specific locations while restoration treatments are being implemented and smoke from prescribed fire activities, dust and noise from equipment, and similar short-term localized impacts may be expected. Long-term, the Proposed Action would provide socioeconomic support to the rural and local communities surrounding the project area by improving ecosystem health over the long-term, and it would reduce the risk for uncharacteristic wildfires that could disrupt commercial and subsistence activity, adversely impact community health and well-being, and adversely impact traditional communities and their use of forest resources.

Socioeconomics

The proposed action includes about 7200 acres of commercial harvest over the life of the project, which would produce timber products such as saw logs that are important to mills within the project area and nearby. The harvesting, hauling, and processing would all have direct economic benefits to the local economy, especially where the purchasers are local businesses or where non-local purchasers hire locally

for this project. In some timber sales there may also be a fuelwood component that also has economic benefits for the local communities in providing a low or no cost source of fuelwood and supporting the continuation of traditional lifeways.

The proposed action also includes almost 27,000 acres of pre-commercial thinning, which would be conducted mostly by contractors paid to remove specific wood materials that are typically not suitable for mill products. While not of the same commercial value as saw timber, these small products in the form of biomass, fuelwood, posts and poles do yield economic value. These products are typically sold through personal use or commercial wood product contracts, which support small-scale owner/operator businesses and are also important to meeting the needs of local communities. There are at least four small wood products companies in communities within the AOI, as well as several more in communities that, while outside the immediate AOI, are still within communities in or near the SFNF. These companies employ local community members.

Prescribed fire is proposed on almost 75,000 acres. The preparation work needed prior to broadcast burning is generally contracted and hiring local contractors would provide direct economic benefits to the local communities.

The Proposed Action would also reduce the risk of uncharacteristic wildfires, which would better protect the area resources and the communities that they serve over the long-term. Populated areas in Rio Arriba County have, on average, a greater wildfire risk to homes than 69 percent of counties in the State; and a greater wildfire likelihood than 66 percent of counties in the State. Implementation of the Proposed Action would improve the protection of homes and infrastructure resources located along the Forest boundary (i.e., those within the WUI) that are at risk from damage by wildfires.

The proposed action includes the 280 miles of road maintenance, including 155 miles identified as priority. At least some portion of that road work is likely to be contracted. To the extent that local contractors in the AOI are awarded the road contracts, those federal dollars could make a substantial contribution to the local economy. If those contracts are awarded to non-local contractors there would still be some minor benefits to the local economy to the extent that local residents are hired for temporary employment (e.g. flaggers) and for local fuel purchases and potentially lodging and meals for non-local workers on the road improvement contract.

Traditional Communities and Uses

Access to treated areas of forest for traditional uses could be limited during treatment implementation. Consulting with the tribal governments and coordinating with local or traditional communities before project implementation would help to identify sacred sites and traditional use areas to further avoid or mitigate any possible effects.

However, under the Proposed Action, fuelwood from the project area would be available to local communities and opportunities to grow the Forest's fuelwood program. This would have short and long-term benefits for the local communities that need fuelwood for traditional wood heating or other traditional uses.

The Proposed Action aims to improve up to 500 miles of road in the project area, including public access roads. Improving the safety and efficiency of these roads will improve access for communities around the project area.

The Proposed Action would also improve watershed conditions and quality within the project area which would directly benefit the communities of Coyote, Youngsville, Cañones and Abiquiu, which all use

ground and surface water that is provided by watersheds within the project boundaries. Improved watershed conditions could also benefit the acequias that are in and around the project area, as improved watershed conditions could increase water quantity and quality in the acequia systems.

Environmental Justice

Meaningful participation of minority and low-income populations was provided throughout project planning. Under the Proposed Action, Tribal Consultation has occurred during the project design phase with sixteen Pueblos and Tribal Nations consulted. Additionally, two public meetings were held for this project. The mailing list included land grants, Rio Arriba County, soil and water conservation districts, and livestock associations, all of whom typically represent minority, land-based communities to some extent. Many community members on the mailing list are members of an acequia association, as well. In response to community input during the outreach described above, the project was increased in size to cover multiple communities with the goal of being able to improve watershed conditions, reduce wildfire hazard, and improve access to forest products for a greater number of people. Road maintenance and improvement objectives were also added to the project based on public input.

The primary risks for disproportionate adverse impacts to local minority or low-income communities with regards to this project is in the form of exposure risk from prescribed fire (e.g., health risks from smoke inhalation, safety due to proximity to prescribed burns) and the potential for temporary disruption of access to needed forest resources during project implementation.

Under the Proposed Action, use of prescribed fire and other vegetation treatments is expected to reduce the risk of uncharacteristic wildfire impacts. Thus, while there may be temporary increase in smoke and particulate matter in the air during prescribed fire implementation, this health risk is expected to be lesser and shorter-term than the risk to health, safety, and quality of life that would result in the event of an uncharacteristic fire. Cooperation with local authorities to alert at-risk individuals of ongoing burning will help to mitigate the immediate health risks of smoke inhalation to vulnerable individuals or communities.

Additionally, to move toward or meet desired conditions, site-specific silvicultural prescriptions would be developed based on ground conditions. This is not expected to create a long-term adverse impact on local communities' ability to access forest products or resources needed for traditional, cultural, or subsistence use. It is expected that access to forest resources disrupted by project implementation can be temporarily shifted to other nearby areas of the forest.

In the long-term, proposed activities are expected to improve the existing condition of community watersheds in the project area and reduce or prevent adverse impacts from roads and uncharacteristic wildfire. Overall, the Proposed Action is not expected to create disproportionate adverse impacts to local minority or low-income communities. Ongoing cooperation and communication with local communities during implementation will help to mitigate risk and any temporary impacts from treatments.

Cumulative Effects

The EVLRP is one of many landscape-scale projects that has been or will be implemented on the SFNF in the preceding and proceeding decade. These large-scale projects aim to move the forest toward desired conditions that re-align the ecosystem with historic fire regimes and consequently reduce the risk of uncharacteristic, catastrophic fires.

In addition to reducing fire risk across the landscape, the cumulative effect of large-scale vegetation projects across the Forest is to improve ecosystem conditions such that the forest can continue to provide traditional use products over the long-term. This has the effect of supporting traditional communities and their cultural values with regards to forest products and uses.

3.14 Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

The EVLRP is one of many projects located inside of the Rio Chama Collaborative Forestry Landscape Restoration Project (CFLRP) boundary. For that reason, projects occurring in the past, present and reasonably foreseeable future within proximity to EVLRP and, within the Rio Chama CFLRP boundary, would be expected to have possible cumulative effects.

Further analyze of possible cumulative effects resulting from the EVLRP are addressed in each resource analysis in Chapter 3 of this document. Figure 19 shows projects that are within the Rio Chama CFLRP and Table 41 provides additional project details.

Figure 19 EVLRP cumulative effects map

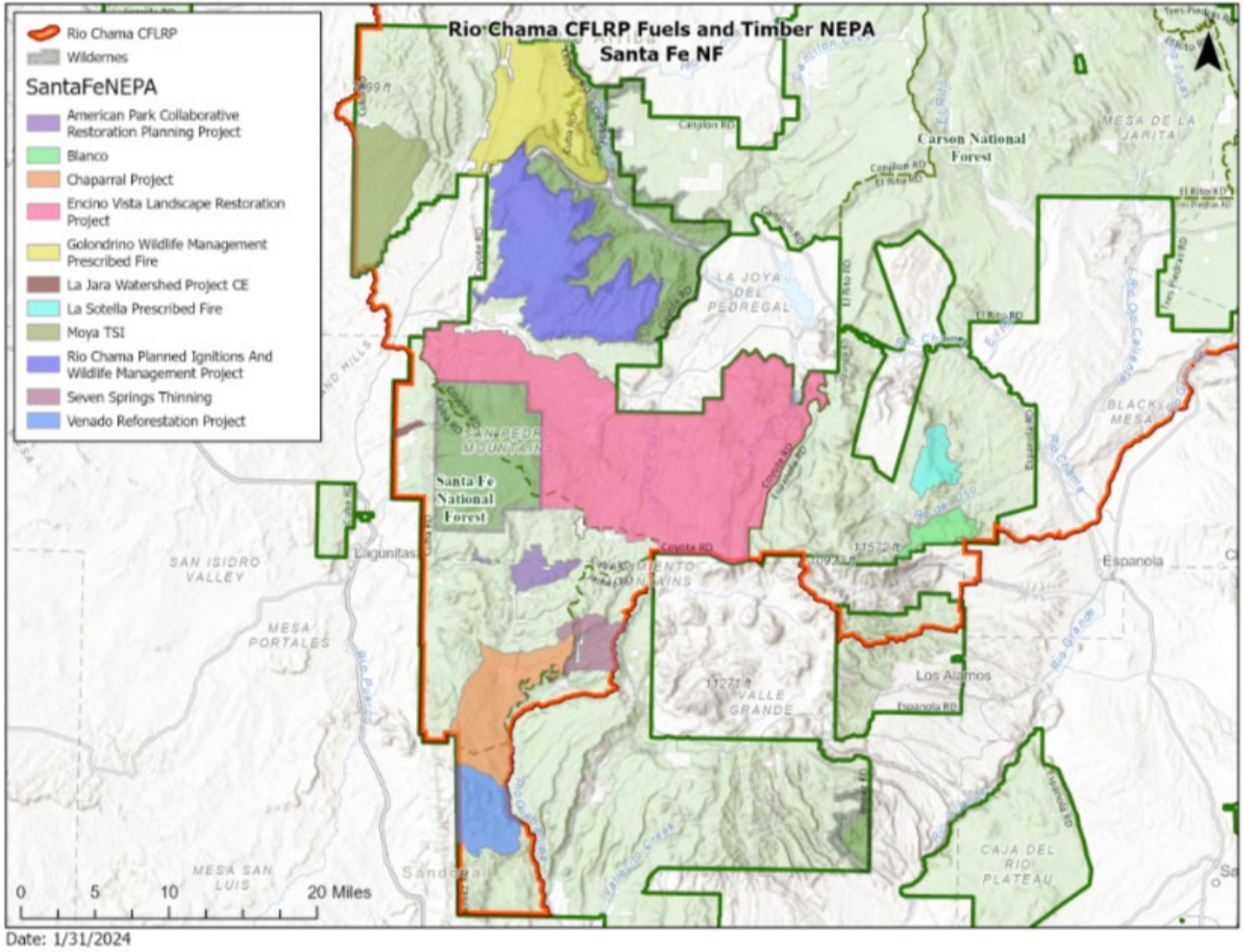


Table 41 EVLRP Cumulative Effect project descriptions

Action	Summary of Action
American Park Collaborative Forestry Restoration Planning Project	Silvicultural treatments and prescribed fire are needed to restore forest structure of ponderosa pine and dry mixed conifer stands so they are more resilient to attacks by forest pests and diseases and less susceptible to destructive wildfires. The project area contains several values at risk; Clear Creek Campground, Rio de Las Vacas Campground, and the wildland urban interface (WUI) around Rito Café and Wetherill Estates. Decision signed 2021
Blanco Project	This project is older, originally signed in 1995, possible cumulative impacts are unlikely. This project was a thinning and prescribed fire related project.
Chaparral Project	Utilize Prescribed fire and thinning over 22,000 acres in order to reduce density of small diameter trees, consume fuel accumulations and create opening and diversity. The focus of this project was to reduce potential of crown fire moving continuously across the landscape, threatening the Chaparral Girl Scout Camp and other values at risk. Decision Signed 1999
Golondrino Wildlife Management Prescribed Fire	Project's aim will improve wildlife habitat for particularly for mule deer and Rocky Mountain elk by utilizing low to moderate fire. There is a need to increase the quantity and quality of the browse and forage species while maintaining the diverse forest conditions. Decision signed in 2010, subsequent supplemental decision in 2014
La Jara Watershed Project	Project implementation includes mechanical thinning, hand thinning and prescribed fire. The action is needed to improve the health and vigor of the stands in the area. The purpose of the project is to improve forest structure and composition while reducing the risk of high intensity wildfire near the village of La Jara, NM and their municipal drinking water watershed. Decision signed in 2012
La Sotella Prescribed Fire	This project purpose and need is to move the Oso-Vallecitos watershed into a more sustainable and effective habitat conditions. Primarily in the PJ ERUs to stimulate understory, grasses and forbs for wildlife browse using low- moderate intensity prescribed fire and small diameter thinning. Decision signed in 2006.
Moya Big Game Habitat Improvement Project	The purpose and need of this project are to improve big game winter range habitat while reducing the potential for uncharacteristic wildfire. Decision signed
Rio Chama Planned ignitions and Wildlife Management Project	This project purpose and need is to increase the quantity and quality of browse and forage for Mule Deer, Rocky Mountain Elk, Merriam Turkey and other wildlife. As well as, planned and use of unplanned ignitions to reduce the potential for crown fire while maintaining a forest landscape with diverse ecological conditions. Decision Signed in 2010
Seven Springs Thinning Project	This project utilizes hand thinning and prescribed fire to restore the mixed conifer forests of 7,700 acres surrounding the Seven Springs Fish Hatchery. Treatments will help reduce the risk of uncharacteristic wildfires and better protect the community and hatchery. Decision signed 2021.

Northern New Mexico Riparian, Aquatic and Wetland Restoration Project	There is a need to continue restoring the key ecological processes and functions for self-sustaining riparian, wetland, and aquatic ecosystems. The purpose of this project is to maintain or enhance watershed and range health by restoring riparian, wetland, and associated upland and aquatic habitats; promoting species recovery and diversity; and allowing for grazing and sustainable human uses, such as hunting, fishing, and recreation, as required by the Land and Resource Management Plans for the Carson, Cibola and Santa Fe National Forests and the Kiowa National Grassland. Decision signed in 2021
Mesa Venado Project	This project is a reasonably foreseeable action. Which may include fuels related work (Ie. Small diameter thinning and prescribed burning).
Cordovas Restoration Thinning and Prescribed Fire project	This Project does not show on Figure 19, within the EVLRP footprint. The project will implement restoration thinning that focuses on VSS class 3 and 4 that overstocked to release residual trees to grow larger in to VSS 5 and 6 classes. Commercial and Noncommercial thinning is allowed, with prescribed fire to maintain forest structure and fuel conditions after initial treatments. Decision made in 2014
Ojo Restoration Thinning and Prescribed Fire Project	Project does not show on Figure 19, within the EVLRP footprint. Restoration treatments are planned to restore forest structure of Ponderosa Pine ERU so they are more resilient to insect and disease, as well as less susceptible to destructive wildfires. Decision signed in 2020
Valles Caldera/ SFNF boundary Fence Replacement	This Project is in initial discussions between the two agencies and is reasonably foreseeable. At this time, it is not anticipated to have cumulative impacts to EVLRP.

Chapter 4: Consultation and Coordination

4.1 Agencies and Non-Governmental Organizations

The Forest Service consulted the following individuals, Federal, State, tribal, and local agencies during the development of this EA.

4.1.1 Federal and State Officials and Agencies

New Mexico State Historic Preservation Office (NM SHPO)
State of New Mexico Department of Game and Fish
State of New Mexico Environment Department
US Department of the Interior, Fish and Wildlife Service
Rio Arriba County
New Mexico State Forestry
NRCS
USFWS
US Geological Survey

4.1.2 Non-governmental Organizations

Two public meetings were held for this project during earlier stages and 2 public meetings are scheduled to be held after the release of the draft EA for public comment. The mailing list included land grants, Rio Arriba County, soil and water conservation districts, and livestock associations, and the general public. The project area overlaps or is directly adjacent to three Land Grants – Mercedes: the San Joaquin– Rio de Chama Grant, the Juan Bautista Land Grant, and the Piedra Lumbre Land Grant. Many community members on the mailing list are members of an acequia association, as well.

4.2 Native American Tribes

Pueblo de Cochiti
The Hopi Tribe
Pueblo of Jemez
Jicarilla Apache Nation
Pueblo of Nambe
The Navajo Nation
Ohkay Owingeh Tribe
Pueblo of Picuris
Pueblo of Pojoaque
Pueblo of San Felipe
Pueblo of San Ildefonso
Pueblo of Sandia
Pueblo of Santa Ana
Pueblo of Santa Clara
Pueblo of Santa Domingo
Southern Ute Tribe
Ute Mountain Ute Tribe
Pueblo of Taos
Pueblo of Tesuque
Pueblo of Zia
Pueblo of Zuni

4.3 Relevant Laws, Regulations, and Policy

A partial list of Federal laws and EOs pertaining to Project-specific planning and environmental analysis on federal lands follows. Additional applicable Federal laws and EOs are mentioned in the appropriate resource sections.

Archaeological Resources Protection Act of 1979

The purpose of the Archaeological Resources Protection Act (ARPA) is to protect irreplaceable archaeological resources on federal and Native American lands.

This statute (16 U.S. Code [U.S.C.] 470aa-470mm; Public Law 96-95 and amendments to it) was enacted "...to secure, for the present and future benefit of the American people, the protection of archaeological resources and sites which are on public lands and Native American lands, and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals (Sec. 2(4)(b))."

The reasons behind enactment include recognition that archaeological resources are an irreplaceable part of America's heritage and that they were endangered increasingly because of the escalating commercial value of a small portion of the contents of archeological sites.

The primary impetus behind ARPA was the need to provide more effective law enforcement to protect public archeological sites. Two improvements over the Antiquities Act, which was the statute designed to provide this protection prior to ARPA's enactment, were more detailed descriptions of the prohibited activities and larger financial and incarceration penalties for convicted violators. Section 6 of the statute describes the range of prohibited actions including damage or defacement in addition to unpermitted excavation or removal. Also prohibited are selling, purchasing, and other trafficking activities whether within the United States or internationally. Section 6(c) prohibits interstate or international sale, purchase, or transport of any archeological resource excavated or removed in violation of a state or local law, ordinance, or regulation.

American Indian Religious Freedom Act

The American Indian Religious Freedom Act, Public Law No. 95-341, 92 Stat. 469 (August 11, 1978) (commonly abbreviated as AIRFA), is a United States federal law and a joint resolution of Congress that was passed in 1978. The AIRFA was enacted to protect and preserve the traditional religious rights and cultural practices of Native Americans, Eskimos, Aleuts, and native Hawaiians.

Clean Air Act, as amended in 1990

The purposes of the Clean Air Act are, "…to protect and enhance the quality of the nation's air resources so as to promote the public health and welfare and the productive capacity of its population; to initiate and accelerate a national research and development program to achieve the prevention and control of air pollution; to provide technical and financial assistance to State and local governments in connection with the development and execution of their air pollution prevention and control programs; and to encourage and assist the development and operation of regional air pollution prevention and control programs."

Clean Water Act, as amended in 1977 and 1982

The primary objective of the CWA is to restore and maintain the integrity of the nation's waters. This objective translates into two fundamental national goals: (1) eliminate the discharge of pollutants into the nation's waters, and (2) achieve water quality levels that are fishable and swimmable. The CWA establishes a no degradation policy for all proposed federal projects.

The CWA is addressed through PDFs and mitigation measures (addressed in Section 3.11 and Appendix C). For more information, see the Watershed Resources Specialist Report in the Project record.

Endangered Species Act (ESA) of 1973, as amended

The purpose of the ESA is to, "…provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth in subsection (a) of this section." The ESA also states, "It is further declared to be the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act." The ESA is addressed in Sections 3.3.8, Wildlife, Fish and Rare Plants.

Executive Order (EO) 11990—Protection of Wetlands

EO 11990 provides direction to federal agencies to protect the nation's wetlands when undertaking all activities. The order is addressed through PDFs (Appendix C).

Executive Orders (EOs) Pertaining to Tribal Consultation

A requirement for regular and meaningful consultation between federal and tribal government officials on federal policies that have tribal implications was established under EO 12175.

EO 12785 was enacted to reduce unfunded mandates upon state, local, and tribal governments; to streamline the application process and increase the availability of waivers to state, local, and tribal governments; and to establish regular and meaningful consultation and collaboration with state, local, and tribal governments on federal matters that significantly or uniquely affect their communities.

EO 13007 was enacted in order to (1) accommodate access to and ceremonial use of Native American sacred sites by Native American religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies shall maintain the confidentiality of sacred sites.

Executive Order (EO) 12898—Environmental Justice

Under EO 12898, each federal agency is directed to achieve environmental justice (EJ) as part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The President also signed a memorandum emphasizing the need to consider these types of effects during NEPA analysis. On March 24, 1995, the USDA completed an implementation strategy for EO 12898. Where Forest Service proposals have the potential to adversely affect minority or low-income populations disproportionately, effects must be considered and disclosed (and mitigated to the degree possible) through NEPA analysis and documentation. EO 12898, as well as update direction, is addressed in Section 3. 3.13, Socioeconomics and Environmental Justice.

Executive Order (EO) 13112—Invasive Species

EO 13112 requires federal agencies whose actions may affect the status of invasive species to identify such actions, prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species, provide for restoration of native species and habitat conditions, and promote public education on invasive species. Additionally, federal agencies are directed to not carry out actions that they believe are likely to cause or promote the introduction or spread of invasive species.

Activities proposed under the Proposed Action are not anticipated to substantially cause or promote the introduction or spread of invasive species. Information on noxious weeds can be found in Section 3.3.2, Forest Health, Section 3.3.6 Climate Change and 3.3.9, Range and addressed in Appendix C.

Executive Order (EO) 13186—Responsibilities of Federal Agencies to Protect Migratory Birds

Under EO 13186, federal agencies are required to evaluate the effects of federal actions and agency plans on migratory birds with an emphasis on species of concern. No interagency determinations are to be made for migratory birds, as with federally listed species. This information is reviewed with the United States Department of the Interior (USDI) Fish and Wildlife Service (FWS); no mechanism is in place for the FWS to consult on Project effects. Migratory birds and the existing FWS MOU are addressed in Section 3,3,8, Wildlife, Fish and Rare Plants section.

Federal Noxious Weed Act of 1974

The Federal Noxious Weed Act provides for the control and management of nonindigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health. Noxious weed treatment would be conducted according to federal and state law if implemented in conjunction with this Project (Appendix C).

Migratory Bird Treaty Act of 1918

The proposed agency activities should not degrade habitat for migratory birds that are known to occur in the Project area. Habitat for migratory species will be surveyed prior to project implementation wherever possible to ensure that appropriate measures have been taken to protect nest sites and other source habitat. Migratory birds are addressed in Sections 1.3.7 and 3.3.8, Wildlife, Fish and Rare Plants and PDFs to protect and reduce impacts to migratory birds are included in Appendix C.

National Environmental Policy Act (NEPA) of 1969, as amended

The purposes of the NEPA are, “To declare a national policy which will encourage productive and enjoyable harmony between man and his environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality” (42 U.S.C. Sec. 4321). The law further states “...it is the continuing policy of the federal government, in cooperation with State and local governments, and other concerned public and private organizations, to use 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” (42 U.S.C. Sec. 4331(a)). The format and content requirements of environmental analysis and documentation were established under NEPA.

National Forest Roads and Trails Act of October 13, 1964, as amended

(16 United States Code [U.S.C.] 532-538)

The National Forest Roads and Trails Act authorizes road and trail systems for national forests. It also authorizes granting of easements across NFS lands, construction, and financing of maximum economy roads (Forest Service Manual [FSM] 7705), and imposition of requirements on road users for maintaining and reconstructing roads, including cooperative deposits for that work.

National Historic Preservation Act (NHPA) of 1966, as amended

The National Historic Preservation Act (NHPA) of 1966 changed the way in which the federal government regarded its role in historic preservation. The NHPA authorized the Secretary of Interior to expand and maintain a NRHA composed of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture. This act requires federal agencies to consult with the SHPO and Native American tribes when nonrenewable cultural resources, such as archaeological sites and historic structures, may be affected by a federal action. Section 106 of NHPA requires federal agencies to review the effects proposed projects may have on cultural resources in the Project area.

The New Mexico SHPO has been consulted concerning proposed activities in the Project area. Section 3. 3.7, Cultural Resources, discusses NM SHPO consultation, and Section 1.1.6 discusses Native American tribal consultation.

National Trails System Act of 1968, as amended

The National Trails System Act was created for establishing trails in both urban and rural settings for people of all ages, interests, skills, and physical abilities. The act promotes the enjoyment and appreciation of trails while encouraging greater public access. Most of the recreation within the project occurs on SFNF System Trails. National trails and recreational use within the project area are addressed in Sections 1.3.8 and 3.3.10.

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Chapter 6: Glossary

Adaptive management: an implementation tool that goes beyond the "predict-mitigate-implement" model and incorporates an "implement-monitor-adapt" strategy that provides flexibility to account for inaccurate initial assumptions, to adapt to changes in environmental conditions or to respond to subsequent monitoring information that indicates that desired conditions are not being met.

Age class: a distinct aggregation (grouping) of trees originating from a single natural event or regeneration activity commonly consisting of trees of similar age.

Aspect: the direction in which a slope faces.

Basal area: the area of a cross-section of a tree, including bark, at breast height (4.5 feet above ground level). Basal area of a forest stand is the sum of the basal areas of all individual trees in the stand, usually given as square feet per acre or square meters per hectare. It is a measurement of how much of a site is occupied by trees.

Biodiversity: the variety, distribution, and abundance of living organisms in an ecosystem. Maintaining biodiversity is believed to promote stability, sustainability, and resilience of ecosystems.

Biomass: the wood product obtained (usually) from in-the-forest chipping of all or some portion of trees including limbs, tops, and unmerchantable stems, usually for energy production.

Broadcast burn: a type of prescribed fire where the burn is intentionally lit so that the fire will spread across the surface of the landscape, sometimes under residual trees, to meet resource objectives.

Browse: woody vegetation that animals use for food.

Brush: usually refers to shrubs and similar low-growing vegetation.

Buffer: an area of specified width where certain activities may not occur. Buffers are usually defined around special sensitive resources such as rare plants or archaeological sites, or along each side of a stream, or near other features to be protected from human disturbance.

Burn severity: a qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts.

Canopy: the more or less continuous cover of leaves and branches in a forest, usually formed by the crowns of the dominant and co-dominant trees.

Canopy base height: the vertical distance from the lowest live branch or whorl on a tree to the ground.

Canopy cover or closure (%): Canopy closure and canopy cover are two slightly different measures of the forest canopy that determine the amount of light able to penetrate to the forest floor. Canopy cover is the percentage of a given ground area that is covered by the vertical projection of the crowns of trees. Canopy or crown closure is an integrated measure from multiple angles of the canopy over a segment of the sky (hemisphere) above a single point on the ground. Both estimate the amount that tree canopies interlock and cover the ground surface with shade.

Closed: indicates canopy cover greater than 30%.

Open: indicates canopy cover ranging from 10% to 30%.

CCF: abbreviation signifying 100 cubic feet of wood volume.

Characteristic landscape: description of the aesthetic, social, and biophysical attributes that give a place its identity.

Class I areas (Air Quality): geographic areas designed by the Clean Air Act subject to the most stringent restrictions on allowable increment of air quality deterioration. Class I areas include U.S. Forest Service wildernesses and nation memorial parks over 5,000 acres, National Parks exceeding 6,000 acres, international parks, as well as other designated lands.

Closed road: a road placed in storage between intermittent uses. A closed road is closed to all vehicular traffic but may be available and suitable for nonmotorized uses. A closed road may be opened again for use at some time in the future.

Clump: a tight cluster of two to five trees of similar age and size originating from a common rooting zone that typically lean away from each other when mature. A clump is relatively isolated from other clumps or trees within a group of trees. A stand-alone clump of trees can function as a tree group.

Co-dominant tree: a tree with its crown in the upper level of the canopy of surrounding trees and receiving direct sunlight from above and comparatively little sunlight from the sides.

Community: an assemblage of plant or animal species, dependent on each other, and constituting an organized system or population.

Competition: the process in which organisms with similar requirements contend for resources—light, water, nutrients, and space—that are in limited supply.

Conifer: any tree that produces seeds in cones, with no fruit structure around the seed. Leaves are usually needles, scales, or narrow and linear in shape, and evergreen.

Cover (wildlife): the protective element within an animal's habitat, which provides concealment from predators (hiding cover) and shelter from the weather (thermal cover). Cover takes many forms, including patches of dense brush, tall grasses, the forest canopy, or other landscape features.

Cover type: refers to a forest or woodland type, such as ponderosa pine, pine-oak, or mixed-conifer.

Critical habitat: refers to specific geographic areas that are essential for the conservation of a federally listed threatened or endangered species and that may require special management and protection.

Crown: the portion of an individual tree above the main stem, consisting of live branches and foliage.

Crown cover: the ground area covered by the crown of a tree as delimited by the vertical projection of its outermost perimeter.

Crown fire (crowning): a fire that burns and moves through the uppermost branches (crowns) of trees and spreads from crown to crown. Fire burning in the crowns of trees is an indicator of a high-intensity wildfire.

Crowning index: the minimum wind speed (an index of rate of spread) required to maintain crown fire activity.

Design feature: an action(s) designed to guide implementation of on-the-ground activities to achieve desired conditions while minimizing adverse effects. Design features guide proper application of forestry operations, designed primarily to prevent soil erosion and water pollution, and to protect certain wildlife habitat values in riparian and wetland areas.

Desired condition: a portrayal of the land and resource conditions that are expected to result if goals and objectives are fully achieved. These conditions may currently exist or may be achieved sometime in the future. Desired conditions may be based on ecological or social objectives, or both. Desired ecological conditions are typically based upon the concepts of ecosystem structural and functional sustainability, resilience, and adaptive capability.

Diameter at breast height (dbh): a standard measure of tree diameter measured approximately 1.5 meters (4.5 feet) above the ground.

Diameter at Root Collar (DRC): the diameter measured at the root collar or at the natural ground line, whichever is higher, outside the bark. Measure tree stems only, not branches. A stem generally grows in an upright position and contributes to the main structural support of a tree crown.

Disturbance: any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment, such as a wildfire, windstorm, insect or disease attack, or flooding.

Drainage structure maintenance: installing and/or maintaining drainage features (e.g., rolling dips, grade dips, lead out ditches, culvert inlet and outlet cleaning, hardening of natural crossings).

Dripline: the area directly located under the outer circumference of the tree branches.

Drought: a period of relatively long duration with substantially below-normal precipitation, usually occurring over a large area.

Duff: the layer of decomposing organic materials lying below the litter layer of the freshly fallen twigs, needles, and leaves, and above the mineral soil.

Ecological management unit (EMU): Mexican spotted owl management areas that are geographical subdivisions of the owl's range to organize recovery efforts based on natural variability in owl habitat, human influences, international boundaries, and the logistics of implementing the Mexican spotted owl Recovery Plan.

Ecological restoration: the process of assisting the recovery of resilience and adaptive capacity of ecosystems that have been degraded, damaged, or destroyed. Restoration focuses on establishing the composition, structure, pattern, and ecological processes necessary to make terrestrial and aquatic ecosystems sustainable, resilient, and healthy under current and future.

Ecosystem: a complex of interacting organisms (plants, animals, fungi, bacteria, etc.) together with its environment, considered as a unit.

Encroachment: expansion of coniferous forests into meadows or aspen stands due to fire exclusion, grazing, climate change, or other disturbance or management practice that disrupts natural succession processes.

Endangered: a species in danger of extinction throughout all or a significant portion of its range.

Erosion: the wearing away of the land surface by rain or irrigation water, wind, ice, or other natural or anthropogenic agents that abrade, detach, and remove geologic parent material or soil from one point on the earth's surface and deposit it elsewhere.

Even-aged stand: a stand of trees composed of a single age class in which the range of tree ages is usually about 20% of rotation age.

Extreme fire behavior: extreme implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.

Felling: the cutting of standing trees.

Fine fuels: fast-drying fuels usually less than 0.25 inch in diameter and having a time lag of 1 hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Fire-adapted ecosystem: an associated group of plant and animals that have made long-term genetic changes in response to the presence of fire in their environment.

Fire behavior: the manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire frequency: a general term referring to the recurrence of fire in a given area over time.

Fire intensity: a term related to the heat energy released during a fire.

Fireline: a linear fire barrier that is scraped or dug to mineral soil that is used to stop or control the spread of fires.

Fire Management Plan: a plan that identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. A Fire Management Plan defines a program to manage wildland fires (wildfire and prescribed fire). The plan is supplemented by operational plans, including but not limited to preparedness plans, preplanned dispatch plans, prescribed fire burn plans, and prevention plans. Fire Management Plans ensure that wildland fire management goals and components are coordinated.

Fire prevention: activities such as public education, community outreach, law enforcement, engineering, and reduction of fuel hazards that are intended to reduce the incidence of unwanted human-caused wildfires and the risks they pose to life, property, or resources.

Fire regime: long-term pattern of fire behavior across a given landscape and vegetation community. Fire regimes are classified in terms of frequency (average number of years between fires) and severity (amount of replacement of the overstory vegetation).

Fire resources: all personnel and equipment available or potentially available for assignment to incidents.

Fire return interval: the number of years between two successive fires in a designated area.

Fire severity: a term related to the environmental impacts caused by a fire.

Fire suppression: all work and activities connected with control and fire-extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Flame length: the height of flames from a wildfire or prescribed fire, above the ground surface.

Forage: woody or non-woody vegetation such as grasses, forbs, and shrubs that are eaten by wildlife and/or livestock.

Forb: a plant with a soft rather than woody stem that is not a grass.

Foreground: a zone or distance ranging from 0- 0.5 miles in referring to visibility, scenic class, or scenic integrity objectives. Immediate foreground is 0- 300 ft.

Forest health: the perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function, vigor, presence of unusual levels of insects or disease, and resilience to disturbance. Note perception and interpretation of forest health are influenced by individual and cultural viewpoints, land management objectives, spatial and temporal scales, the relative health of the stands that comprise the forest, and the appearance of the forest at a point in time.

Free thinning: the removal of trees to control stand spacing and favor desired trees, using a combination of thinning criteria without regard to crown position.

Fuel: combustible living and dead material including vegetation such as trees, shrubs, grasses, snags, downed logs, tree needles, and other leaf litter that feeds a fire.

Fuelbreak: a natural or human-made change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled.

Fuel loading: the amount of fuel present expressed quantitatively in terms of weight of fuel per unit area. This may be available fuel (consumable fuel) or total fuel and is usually dry weight.

Fuel management: act or practice of controlling flammability and reducing resistance to control of wildland fuels through mechanical, chemical, biological, or manual means, or by fire, in support of land management objectives.

Fuel model: a description of fuels within an area that helps managers describe or simulate how a fire might behave, given other factors that can influence fire behavior (weather and topography).

Fuel treatment: manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control (e.g., lopping, chipping, crushing, piling and burning).

Gap: small opening created in a forest canopy, generally from windthrow. Gaps may result from loss of a single tree, or from a larger group of down trees. Gap formation is an important aspect of change and regeneration in many forests.

GIS (geographic information system): computer program(s) used to store, organize, and display geographic information spatially, such as roads, streams, soil types, or any other feature that can be mapped on the ground.

Ground cover: all herbaceous plants and low-growing shrubs in a forest or open area.

Group: a cluster of two or more trees with interlocking or nearly interlocking crown at maturity, surrounded by an opening. The size of tree groups is variable and depends on the forest community and sited conditions. Trees within groups are not uniformly spaced and trees may be tightly clumped.

Habitat: the environment in which a plant or animal lives.

Habitat diversity: the variety of wildlife habitat features and types in a specific area.

Habitat type: a system of site classification using the floristic composition of plant communities (understory species as well as trees) as an integrated indicator of those environmental factors that affect species reproduction, growth, competition and, therefore, community development.

Hand thinning: the use of hand tools such as chainsaws, brush cutters, loppers, and other methods that do not require the use of heavy machinery, vehicles, or similar equipment.

Harvest: cutting and gathering a tree crop for utilization. In a forest harvest, trees are felled and moved to a central location (landing) for final transport by trucks.

Hazard: any real or potential condition that can cause injury, illness, or death of personnel, or damage to or loss of equipment or property.

Heavy fuels: fuels of large diameter such as snags, logs, and large limbwood, which ignite and are consumed more slowly than flash fuels. Also called coarse fuels.

Herbaceous vegetation: non-woody plants, for example, grasses, forbs, wildflowers, and ferns.

Home range: the area an animal uses to satisfy its normal requirements for food, water, and cover.

Hydrologic unit code: a sequence of letters or numbers that identifies a hydrological feature such as a lake, river reach, or watershed. Hierarchical classification system that identifies a particular hydrologic drainage basin.

Hydrophobic: resistance to wetting exhibited by some soils, also called water repellency.
The phenomenon may occur naturally or may be fire-induced. It may be determined by water drop penetration time, equilibrium liquid-contact angles, solid-air surface tension indices, or the characterization of dynamic wetting angles during infiltration. **Intermittent waterbody:** a stream in which the flow of water on the surface is discontinuous, or that alternates between zones of surface and subsurface flow.

Interspaces: the open space between tree groups intended to be managed for grass-forb-shrub vegetation during the long term. Interspaces may include scattered single trees.

Invasive plants or noxious weeds: plants that possess one or more of the following attributes: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier of serious insect or disease, and may or may not have been part of a native plant community.

Jackpot burn: a modified form of broadcast burning where the target fuels are in concentrated pockets but not piled.

Jurisdiction: the range or sphere of authority. Public agencies have jurisdiction at an incident related to their legal responsibilities and authority for incident mitigation. Jurisdictional authority at an incident can be political/geographical (e.g., city, county, state or federal boundary lines), or functional (e.g., police department, health department, etc.).

Ladder fuels: vegetation fuels that provide vertical continuity, thereby allowing fire to carry from surface fuels into the crowns of trees with relative ease. They help initiate and assure crowning.

Landing: a central location where logs are gathered for transport to the mill.

Litter: the uppermost layer of organic debris on a forest floor, composed mainly of fresh or slightly decomposed leaves, bark, twigs, flowers, fruits, and other vegetable matter.

Log: section of the main stem of a harvested tree.

Mastication: reducing forest vegetation in the stand by grinding, shredding, or chopping woody material. Typically done with a masticator, shredder, or chipper machine.

Mature tree: a tree that has attained most of its potential height growth.

Mechanical treatment: cutting and removing trees using chainsaws, feller-bunchers, and skidders.

Mitigation measure: an activity or limitation placed upon a project activity to avoid or minimize adverse effects.

Model: a simplified or generalized representation of reality; a description, analogy, picture, or hypothesis to help visualize something that cannot be directly observed.

Monitoring: physical and biological evaluation of project activities to determine how well objectives are being met and if the effects of the activities are within those projected during the analysis.

Monoculture: the cultivation or growth of a single crop or organism, especially on agricultural or forest land.

Montane: referring to the climate, ecosystems, or species found in mountains.

Mosaic: the spatial arrangement of habitat where there is stand heterogeneity, measured at many spatial scales from the patch, the stand, and the vegetative community.

Nonnative invasive species: plant or animal species that are not native to a particular place and are causing disruption of the natural process of that place, displacing native plant and animal species, and degrading natural communities, among other disruptions.

Nutrient cycling: the circulation of chemicals necessary for life, from the environment (mostly from soil and water) through organisms and back to the environment.

Old growth: a late stage of forest succession beyond the age of biological maturity, or stands that contain old-growth characteristics including numerous large trees, large snags, and logs on the ground.

Openings: spatial breaks between groups or patches of trees containing grass, forb, shrub, and/or tree seedlings, but that are largely devoid of big trees.

Organic matter: that fraction of the soil that includes plant and animal residues at various stages of decomposition, cells and tissues of soil organisms, and substances synthesized by the soil population.

Overstocked: a condition in which trees are so closely spaced that they are competing for required resources, resulting in less than full growth potential for individual trees.

Overstory: the trees in a forest of more than one story that form the upper canopy layer.

Particulate matter: the microscopic particles that are part of smoke.

Perennial waterbody: a stream that flows throughout most (greater than 50%) of the year.

Pile burning: activity fuels, once piled by machine or by hand, are burned in place.

PM2.5: particulate matter of mass median aerodynamic diameter (MMAD) less than or equal to 2.5 micrometers.

PM10: particulate matter of MMAD less than or equal to 10 micrometers.

Pole: a tree of a size between a sapling and a mature tree.

Pre-commercial thinning: the removal of trees not for immediate financial return but to reduce stocking to concentrate growth on the more desirable trees.

Prescribed fire: a fire ignited by management actions under specified environmental conditions and following appropriate precautionary measures to achieve specific objectives. Prescribed fires are typically conducted in the spring or fall when temperatures are cool, humidity is high, and fire behavior is moderate. Prescribed fires are monitored by firefighters to ensure they remain within the area designated for burning.

Prescription: a schedule of activities for a stand or forest property which, when carried out, should produce the outcome desired by the landowner.

Protected activity center (PAC): an area that is a minimum of 600 acres surrounding known owl nest/roost sites. Protected activity centers are intended to sustain and enhance areas that are presently, recently, or historically occupied by breeding Mexican spotted owls.

Quadratic Mean Diameter: the measure of average tree diameter conventionally used in forestry, rather than the arithmetic mean diameter.

Rate of spread: the relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually it is expressed in chains or acres per hour for a specific period in the fire's history.

Recreation opportunity spectrum: a classification system that describes different outdoor recreation settings across the forests using seven standard classes that range from primitive, undeveloped settings to urban, highly developed settings. Attributes typically considered in describing the settings are size, scenic quality, type, and degree of access, remoteness, level of development, social encounters, and the amount of on-site management.

Regeneration: the replacement or renewal of a forest stand by natural or artificial means. Also, the term “regeneration” may refer to the young tree crop itself.

Residence time: the time, in seconds, required for the flaming front of a fire to pass a stationary point at the surface of the fuel. The total length of time that the flaming front of the fire occupies one point.

Residual stand: trees remaining uncut following any cutting operation.

Resistance – The ability of an ecosystem to endure disturbance and maintain structure, composition, and function that are characteristic of the system. Resistance may be reduced as departure from current vegetation condition class increases, especially for some ecosystems (e.g., BP, MPO, MEW, PPE, MCD, PPF, PJG).

Resiliency: the capacity of a (plant) community or ecosystem to maintain or regain normal function and development following a disturbance.

Restoration: the process of returning ecosystems or habitats to desired structure and species composition.

Riparian: the land and vegetation bordering flowing or standing water, identified by distinctive saturated soil characteristics and vegetation that require water (streams, lakes, ponds).

Risk: 1) the chance of fire starting as determined by the presence and activity of causative agents; 2) a chance of suffering harm or loss; 3) a causative agent; 4) in the National Fire Protection Association Standards, a number related to the potential of firebrands to which a given area will be exposed during the rating day.

Road blading: reshaping the roadway template to drain as designed, removing ruts and wash boards to provide a smooth-running surface

Road Clearing: removal of roadside vegetation for vehicle passage and to improve sight distance;

Road decommissioning: activities that result in the stabilization and restoration of unneeded roads to a more natural state.

Sapling: a tree that is no longer a seedling but not yet a pole, usually at least 4.5 feet tall and 1.0 to 4.9 inches in diameter.

Sawtimber: trees, or logs cut from trees, with suitable diameter and stem quality for conversion to lumber.

Sedimentation: the filling-in of stream channels or waterbodies with soil particles, usually as a result of erosion on adjacent land.

Seedling: a young tree, usually less than 3 feet high and less than 1 inch in diameter.

Sensitive species: plant and animal species identified by a regional forester for which population viability is a concern as evidenced by significant current or predicted downward trends in population or habitat capability that would reduce a species' distribution.

Sensitive viewpoint: campground, picnic areas, trailheads, trails, or developed areas.

Seral: a temporal and intermediate stage in the process of succession. The different stages of succession are often referred to as seral stages or states. Developmental stages are as follows:

> **early seral:** Communities that occur early in the successional path and generally have less complex structural developmental than other successional communities. Seedling and sapling size classes are an example of early seral forests.
>
> **mid-seral:** Communities that occur in the middle of the successional path. For forests, this usually corresponds to the pole or medium sawtimber growth stages.

late seral: Communities that occur in the later stage of the successional path with mature, generally larger individuals, such as mature forests.

Severity: the quality or state of distress inflicted by a force. The degree of environmental change caused by a disturbance (e.g., fire).

Shade-intolerant species: species that require sunlight to establish and grow.

Shade-tolerant species: species that grow well in shady conditions.

Silviculture: the art, science, and practice of establishing, tending, and reproducing forest stands.

Site: the combination of biotic, climatic, topographic, and soil conditions of an area.

Skidder: specialized logging equipment used to slide logs from stump to landing. Skidders are typically rubber tired or track mounted. Some are modified tractors equipped with either cable and winch, or a hydraulic grapple.

Skidding: moving trees from the felling site to a landing, using tractors or other logging equipment.

Skyline yarding: a thinning method that uses a system of cables to drag logs or whole trees from the cutting unit to a roadside landing.

Slash: branches, treetops, bark, and other woody material left on the ground as a byproduct of thinning (activity-produced slash).

Slope percent: the ratio between the amount of vertical rise of a slope and horizontal distance as expressed as a percent. For example, 100 feet of rise to 100 feet of horizontal distance equals 100 percent.

Snag: a standing dead or dying tree that has lost most of its branches.

Soil productivity: the capacity of a soil to produce a specific plant or sequence of plants under a specific system of management.

Soil stability: the potential of soil-covered slopes to withstand and undergo movement.

Spot borrow and surfacing: placing aggregate and/or other materials necessary to re-establish road templates, armor roadway shoulders, construct drainage dips, harden soft spots where rutting, erosion, or pumping are evident;

Stand: a group of trees sufficiently uniform in species composition, structure, and spatial arrangement to be distinguished from surrounding groups of trees.

Stand density: a quantitative measure of how completely a stand of trees occupies a site, usually expressed in terms of number of trees, or tree basal area per acre or per hectare.

Stand density index: a relative measure of competition in a forest stand based on number of trees per unit area and average tree size.

Stand structure: the presence, size, and physical arrangement of vegetation in a stand. Vertical structure refers to the variety of plant heights from the canopy to the forest floor. Horizontal structure refers to distribution of trees and other plants across the land surface.

State and transition model: nonequilibrium ecological model to describe vegetation dynamics of rangeland sites as adopted by the Natural Resources Conservation Service. Models recognize multiple steady states of vegetation and emphasize disturbance processes.

Structural stage: a stage of development of a vegetation community that is classified on the dominant processes of growth, development, competition, and mortality.

Succession: the ecological process of sequential replacement by plant communities on a given site as a result of reproduction and competition.

Suppressed trees: trees with crowns below the general level of the canopy and receiving no direct sunlight. Suppressed trees are characterized by low growth rate and low vigor due to competition with overtopping trees.

Suppression: a wildfire response strategy to "put the fire out" as efficiently and effectively as possible, while providing for firefighter and public safety. Also known as "perimeter containment" and "control." The goal of this strategy is to minimize acres burned.

Surface fire: a fire that burns over the forest floor, consuming litter, killing aboveground parts of herbaceous plants and shrubs, and typically scorching the bases and crowns of trees.

Surface fuel: fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low-stature living plants.

Sustainability: for this environmental impact statement, the capacity of an ecosystem for long-term maintenance of ecological processes and functions, biological diversity, and productivity.

System road: roads under the jurisdiction of the U.S. Forest Service and necessary for protection, administration, and use of the National Forests.

Thin from below: a method of thinning that involves cutting the smallest trees in the stand up to a specified diameter limit. Also called "low thinning."

Thinning: removing some trees in a forest stand to provide growing space for other trees, and/or to remove dead or dying trees to reduce pest problems.

Threatened: a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Torching: fires igniting and flaring up from the bottom to the top of a tree or group of trees.

Torching index: the open (6.1-m) windspeed at which crown fire activity can initiate for the specified fire environment**.**

Treatment: any silvicultural practice or procedure.

Uncharacteristic Fire: fires that burn large areas with excessive severity, such as the Los Conchas or Cerro Grande fires. 'High-severity wildlife' may be used interchangeably.

Understory: trees and other vegetation that grow beneath the overstory of a forest stand. Understory vegetation usually consists of grasses, forbs, and herbs; shrubs, bushes, and brush; and small immature trees (saplings).

Uneven-aged stand: a group of trees of a variety of ages and sizes and often of different species.

Upland: areas away from coastlines and the floodplains of streams, creeks, rivers, and other bodies of water.

Upland function: the ability of the uplands to allow for the retention of precipitation and maintain and improve soil condition.

Values at risk: property, structures, physical improvements, natural and cultural resources, community infrastructure, and economic, environmental, and social values.

Validation: assessing/confirming the current site conditions, selecting the appropriate management activities based on the analyzed criteria, and confirming the potential effects from those activities are accounted for in the environmental analysis decision.

Vegetation Structural Stages: a method for describing the growth stages of a stand of living trees. VSS are based on tree size (diameter) and total canopy cover. The system is used to group forest cover types into categories of similar growth conditions. There are six classes:

- VSS 1: grass/forb/shrub
- VSS 2: less than 5 inches diameter (seedling-sapling)
- VSS 3: 5 to 12 inches diameter (young forest)
- VSS 4: 12 to 18 inches diameter (mid-aged forest)
- VSS 5: 18 to 24 inches diameter (mature forest)
- VSS 6: greater than 24 inches diameter (old trees)

Wildland fire: a general term describing any non-structure fire that occurs in vegetation or natural fuels. Includes prescribed fire and wildfire.

Wildlife habitat: the arrangement of food, water, cover, and space required to meet the biological needs of an animal. Different wildlife species have different habitat requirements.

Water bar: a ditch or hump constructed diagonally across trails or roads to reduce soil erosion by diverting surface water runoff into adjacent ditches or vegetation.

Watershed: the total land area from which water drains into a particular stream or river.

Water yield: the amount of water "produced" by the watershed, i.e., the difference between precipitation and evapotranspiration.

Wildland-urban interface: the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetation fuels.

Woodland: a forest with low tree densities, often defined as less than 20% to 30% crown cover when trees are mature.

Woody debris: the dead and downed material on the forest floor consisting of fallen tree trunks and branches.