



Biological Assessment
for the



Santa Fe Mountains Landscape Resiliency Project

**Espanola & Pecos-Las Vegas Ranger Districts
Santa Fe National Forest**

Forest Service Southwestern Region
United States Department of Agriculture
Santa Fe & San Miguel Counties, New Mexico

2021.07.14

Consultation Code: 02ENNM00-2020-SLI-1177



Cover Photo- Project area along Highway 475 (to ski basin) showing conifers and aspen.

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Summary of findings:

The project **may affect but is not likely to adversely affect** Mexican spotted owl.

The project **may affect but is not likely to adversely affect** Mexican spotted owl critical habitat.

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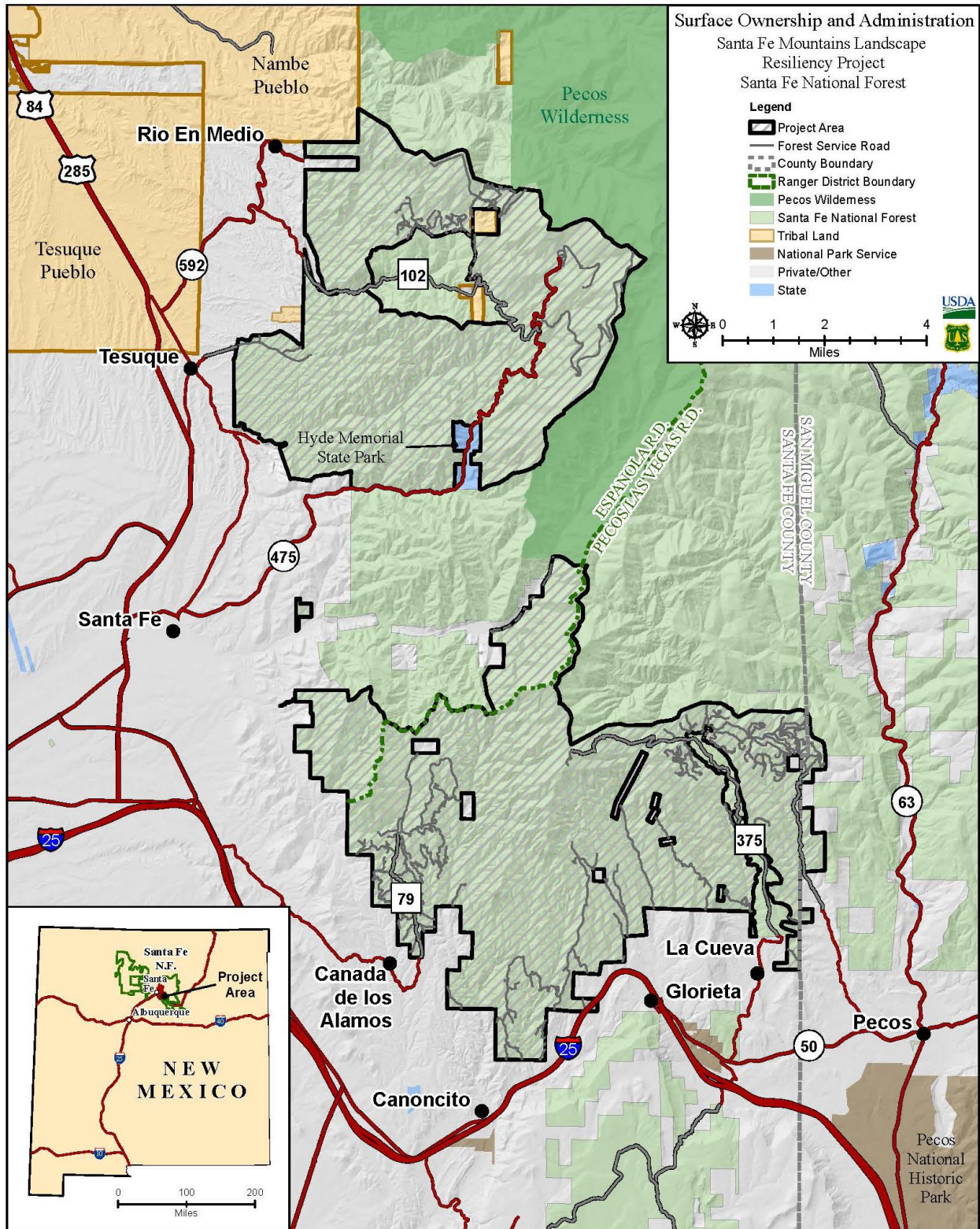
1. Introduction to the project and this document

The Santa Fe Mountains Landscape Resiliency Project (hereafter referred to as SFM project or the project) is a vegetation management project proposed by the U.S. Forest Service. The project area covers approximately 50,566 acres of the Española and Pecos-Las Vegas Ranger Districts (see project map in Figure 1). The purpose of the project is to improve ecosystem resilience of a priority landscape to future disturbances including wildfire, climate change, and insect outbreaks. To meet this purpose, the U.S. Forest Service proposes mechanical and manual vegetation thinning treatments, prescribed fire, and riparian restoration on National Forest System lands within the project area. The project also includes closure of up to 1.5 miles of National Forest System roads. Initial forest management treatments would be conducted over 10 to 15 years after a decision and would be followed by maintenance burning as needed.

In accordance with the Endangered Species Act (ESA) Section 7 and Forest Service Manual 2671.4, the Santa Fe National Forest (SFNF) is required to consult with the U.S. Fish and Wildlife Service (USFWS) when proposed actions may affect threatened, endangered or proposed species. This Biological Assessment describes the species considered in this analysis, the current and desired conditions for the project area, the proposed actions, and the expected effects of project implementation on species and critical habitat protected by the Endangered Species Act. The information and analysis in this document focus on the project conditions, proposed actions and resources most relevant for meeting the requirements for interagency cooperation and consultation rather than describing all aspects of the project. For more information about specific project components, the SFM project's Draft Environmental Assessment (EA) and other documents and supporting materials are available upon request from the Santa Fe National Forest or at <https://www.fs.usda.gov/project/?project=55088>.

The proposed action also includes a project-level amendment to the Santa Fe National Forest Land and Resource Management Plan. The plan amendment would include replacing outdated forest plan language related to management of Mexican spotted owl habitat with management guidance in the 2012 recovery plan (USFWS 2012). Therefore, the analysis in this Biological Assessment assumes that the management direction from the project-level amendment would be followed during project implementation.

The analysis and findings of this BA are based on the best data and scientific information available at the time of preparation. If new information reveals effects that could likely impact ESA-listed species or their habitats in a manner or to an extent not considered in this evaluation, or if a new species is listed or habitat is identified that may be affected by the action, this BA would be revised or amended and additional consultation would occur prior to project implementation.



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Figure 1. Santa Fe Mountains Landscape Resiliency Project Vicinity Map.

Project Location-

The project area is located on the Espanola and Pecos-Las Vegas Ranger Districts of the Santa Fe National Forest in Santa Fe and San Miguel Counties in northeastern New Mexico. (See Figure 1 - Map). The project is within elevations approximately between 6,900 and 12,400 feet (2,100 – 3,780 meters).

The legal descriptions of the project area is:

- Township (T) 16 North (N), Range (R) 10 East (E), Sections 1-4, 10-15, 23-25
- T 16 N, R 11 E, Sections 1–21, 24-25, 29-31
- T 16 N, R 12 E, Sections 6-7, 18-19
- T 17 N, R 10 E, Sections 1–5, 20–21, 24-29, 32-36
- T 17 N, R 11 E, Sections 6-8, 17-20, 25-27, 29-36
- T 17 N, R 12 E, Sections 30-31
- T 18 N, R 10 E, Sections 1–4, 9–13, 15-16, 19-36
- T 18 N, R 11 E, Sections 5-10, 16-21, 28-32
- T 19 S, R 10 E, Section 34

2. Species considered

The species listed in Table 1 were identified by the USFWS Information, Planning and Consultation (IPaC) website for information regarding federally threatened, endangered and proposed species potentially occurring within or near the project area. The USFWS IPaC website assigned consultation code: 02ENNM00-2020-SLI-1177 to this project. Based on this list, I used USFS Geographic Information System data to review observations of species and boundaries of Critical Habitat and other habitat designations (e.g., Mexican spotted owl Protected Activity Centers), as well vegetation types and measures of habitat quality to determine if the species are potentially present in the project area.

Table 1. Federally listed species considered for this analysis

Scientific Name	Common Name	ESA Status	Species Present	Critical Habitat Present	Potential Suitable Habitat Present
<i>Strix occidentalis lucida</i>	Mexican spotted owl	Threatened	Yes	Yes	Yes
<i>Zapus hudsonius luteus</i>	New Mexico meadow jumping mouse	Endangered	No known occurrences	No	No
<i>Empidonax traillii extimus</i>	Southwestern willow flycatcher	Endangered	No known occurrences	No	No
<i>Coccyzus americanus</i>	Western yellow-billed cuckoo	Threatened	No known occurrences	No	No

The IPaC system identifies species for each project with a broad-scale filter, generally based on the county with which the project occurs. In large counties such as these, a species may be listed by the IPaC system, however the precise location record may be in a distant part of the county with the proper habitats. For this project, the New Mexico meadow jumping mouse, southwestern willow flycatcher and western yellow-billed cuckoo were listed by the IPaC because their habitats occur within the counties in which this project proposes activities. However, there are no known records of these three species from the project area and suitable habitats also do not exist in the project area; therefore, this analysis does not consider them further.

The Mexican spotted owl (MSO) is the only federally proposed, threatened, or endangered species known to occur in the project area. Additionally, there is designated critical habitat for the Mexican spotted owl in the project area. Ponderosa pine, mixed conifer and riparian habitat are dominant vegetation types within and adjacent to the project area; therefore, potential nest/roost habitat as well as dispersal and foraging habitat exists for the Mexican spotted owl. Recovery nest/roost habitat was identified as part of the project-level plan amendment to align MSO management with the 2012 Recovery Plan; the methods for this designation are in a supplemental document on the project website (link above) and the effects of the proposed action on recovery nest/roost habitat are below. Mexican spotted owl Protected Activity Centers (PACs) have been delineated in the project area, and surveys are ongoing for activity in existing PACs as well as potential new nest/roost sites.

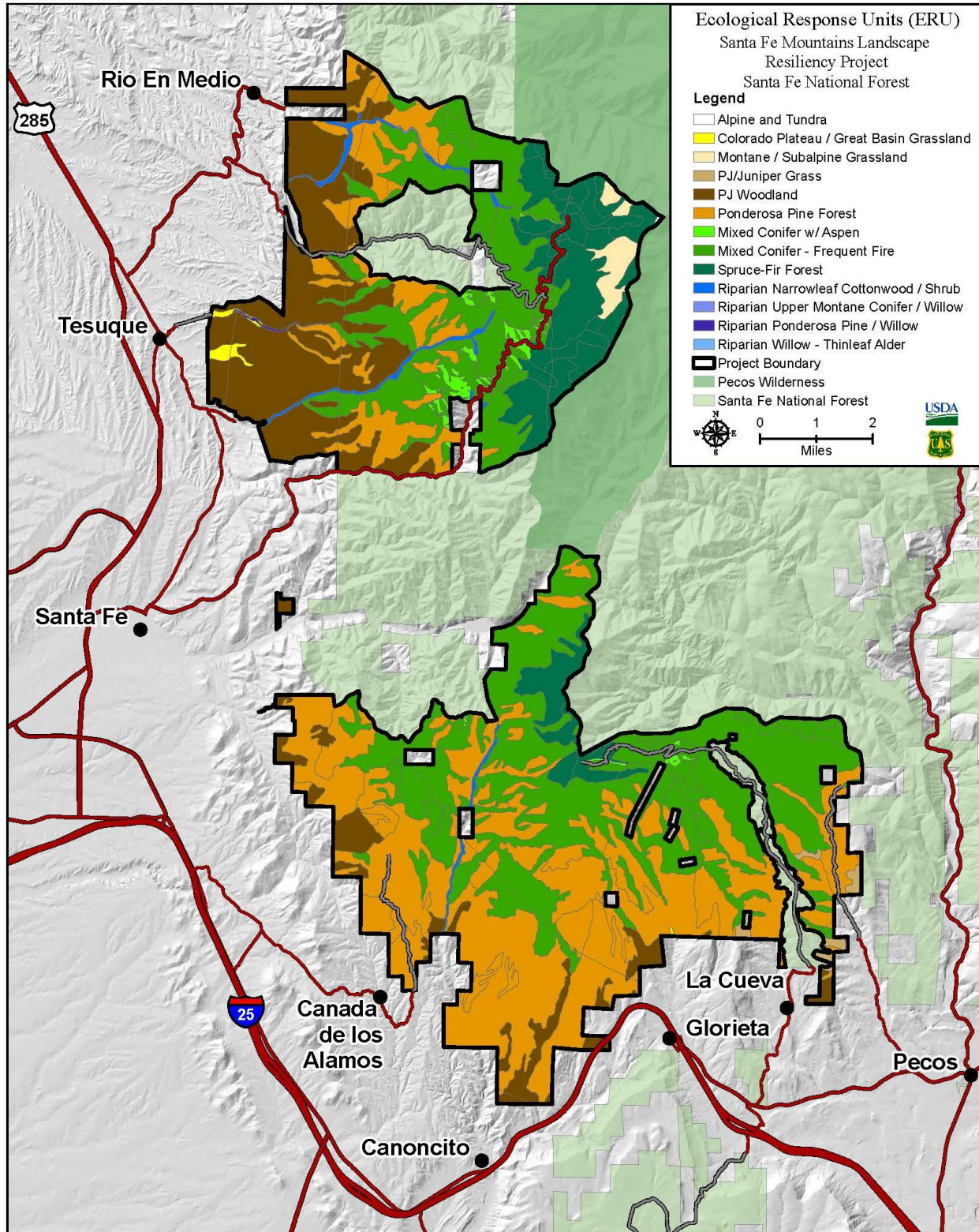
Many locations within the project area already have two years of protocol survey, while other areas have had one of the two years of protocol survey, and additional areas remain that will need both years of survey. Implementation of proposed activities would follow the completion of surveys to assure that appropriate protection measures would be followed to avoid adverse effects to MSO if they are present.

3. Description of the project

The sections below describe the existing and desired conditions for the project area, specific desired conditions related to Mexican spotted owl and the activities proposed in the Project.

3.1. Existing and desired vegetation conditions

The project area is located on the Espanola and Pecos-Las Vegas Ranger Districts of the Santa Fe National Forest in Santa Fe and San Miguel Counties in northeastern New Mexico. The project area spans elevations from 6,900 to 12,400 feet (2,100 – 3,780 meters) and is dominated by forest stands including ponderosa pine, mixed conifer, spruce-fir and pinyon-juniper. The major vegetation types, referred to as Ecological Response Units (ERUs), are shown in Figure 2 and listed in Table 2. Additional information on ERUs in the Santa Fe National Forest, including descriptions forestwide current conditions, may be found in the assessment recently completed as part of the forest plan revision process (available at https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd506133.pdf).



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Figure 2. Ecological Response Units in the Project area

Table 2. Ecological Response Units in the Project Area

Ecological Response Unit	Area within the SFM project (acres)	Area within the Santa Fe National Forest (acres)
Mixed Conifer–Frequent Fire Forest	17,858	429,967
Ponderosa Pine Forest	17,396	403,915
Piñon-Juniper Woodland, Pinon-Juniper Grassland, and Juniper Grasslands	8,670	274,864
Spruce-Fir	5,022	250,481
Riparian: primarily Narrowleaf Cottonwood/ Shrub	524	45,993
Montane/Subalpine Grassland	491	17,707
Mixed Conifer with Aspen	456	40,174
Colorado Plateau/Great Basin Grassland	139	41,639
Other (Alpine and Tundra)	10	5,015
Totals	50,566	1,509,755

Many stands in the project area are characterized by high density of smaller trees (i.e., <12 inches in diameter at breast height [dbh]), resulting from past harvest of larger trees and decades of fire suppression. The historical absence of low-intensity fire has also promoted higher density of shade-tolerant species and accumulation of surface and ladder fuels in the project area. These conditions increase the risk for uncharacteristically severe wildfire which could drastically alter vegetation communities. High vegetation density also increases the risk of insect and disease outbreaks that can lead to widespread tree mortality, particularly when accompanied by drought conditions. The vegetation in the project area also includes some stands with larger, older trees as well as uneven-aged stands with a more open canopy. Riparian vegetation along streams in the project area includes willows, alders, cottonwoods, sedges, rushes, grasses and forbs.

The project area is mountainous and access is limited to many areas. Over 20,000 acres within the project area are inoperable for mechanical vegetation treatment due to steep slopes (40+% slopes), and over 5,000 acres of that is considered completely inoperable by mechanical or hand tools (60+% slopes; see Table 3).

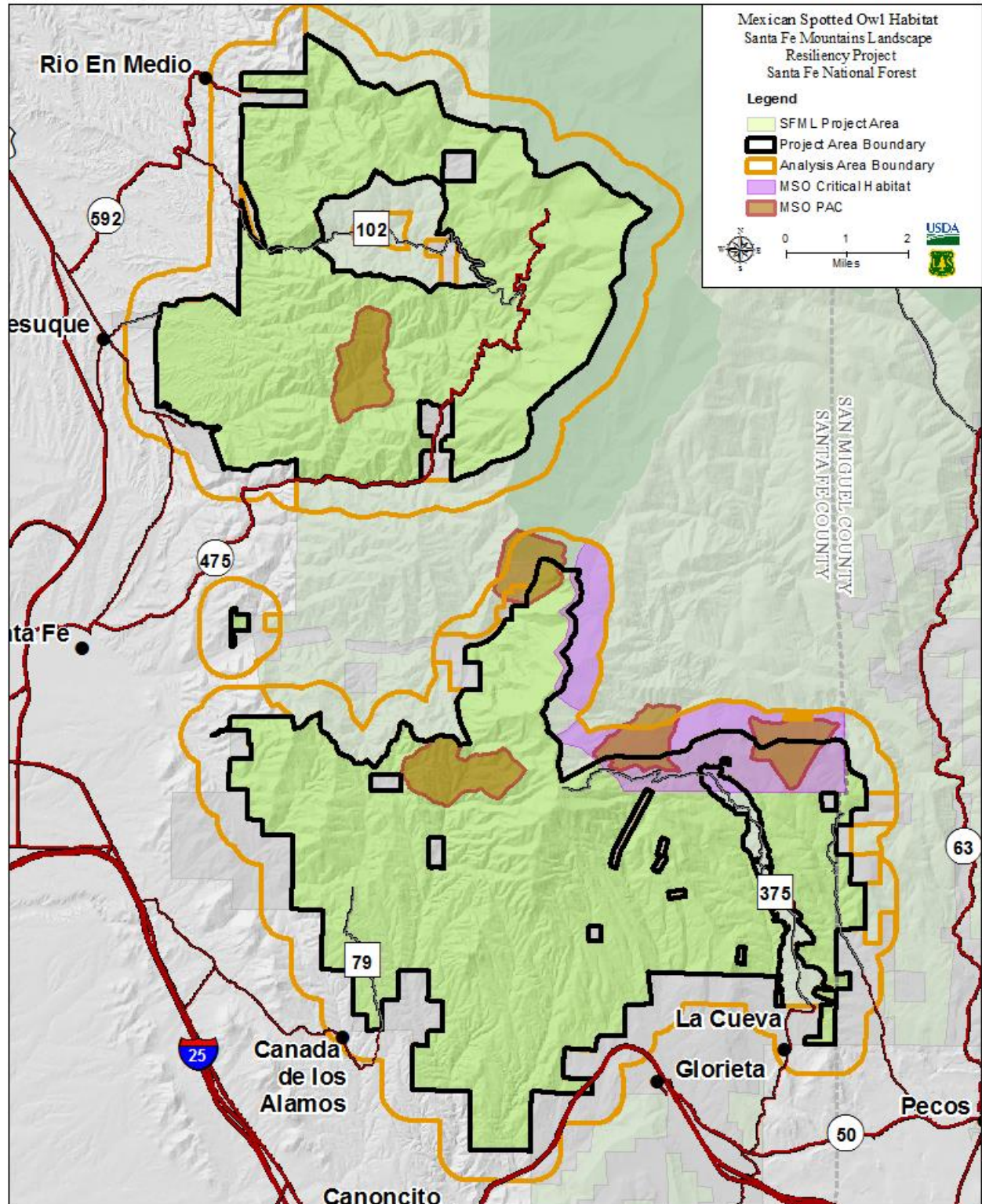
Table 3. Slope of lands within the project area.

Slope	Acres	Percent (%) of Project Area
0-20 %	7,813	15.5
20-40 %	20,810	41.2
40-60 %	16,249	32.1
60+ %	5,694	11.3
Total	50,566	100

The desired condition for the project area is a resilient forest ecosystem with a mosaic of site-appropriate vegetation types consisting of a diversity of vegetation species, sizes, age classes, densities. In general, in the ponderosa pine and mixed conifer ERUs, the desired conditions would have lower overall tree density than the current conditions, with a higher proportion of large trees. The desired conditions include vegetation heterogeneity due to fire and other disturbances, but the reduced and patchier fuel conditions would lower the risk of catastrophic wildfire (USDA 2020). Achieving the desired conditions outlined above for the ERUs would also improve 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 the MSO. Restoring forest structure with multiple age classes and retaining snags would also provide a diversity of habitat types for multiple species including goshawks and Merriam's turkey.

3.2. Existing and desired conditions for Mexican spotted owl

The Mexican spotted owl is the only federally listed species known to occur within and immediately adjacent to the project area. The Santa Fe National Forest is in the Southern Rocky Mountains Ecological Management Unit (SRM-NM-5B), a 80,858-acre unit. There are currently 63 MSO Protected Activity Centers (PACs) that have been identified in the Forest. Within the project area, there are five PACs (at least partially) as well as 1,956 acres of critical habitat (Fig. 3 and Table 4).



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Figure 3. Map of project and analysis area showing MSO PACs and critical habitat

Table 4. Mexican spotted owl PACs in the project area

PAC Name & ID	Total PAC Acres	PAC Acres in Project Area	% of PAC in Project Area	Last Known Occupancy	General Location	Comments
Apache (ID TBD)	891	891	100	2019 (Discovered)	Upper Apache Canyon	PAC completely in project area. PAC is larger than usual due to available habitat arrangement.
Dalton (03100510)	635	318	50	2019	Dalton Canyon	Partially in Project Area, completely in Analysis Area.
La Cueva (03100516)	623	124	20	2019	East of Glorieta Baldy	Partially in Project Area, partially in Analysis Area.
McClure (03100566)	656	151	33	2015	Near McClure Reservoir	Partially in Project Area, partially in Analysis Area
Tesuque (03100567)	795	795	100	2019	Along Big Tesuque Creek	PAC is larger than usual due to available habitat arrangement.

Additionally, as part of a project-level forest plan amendment to align the SFM project with the 2012 MSO Recovery Plan, 3,879 acres are designated for management as recovery nest/roost habitat in the project area (Fig. 4). The methods used to for this process are described in a document titled "Mexican Spotted Owl Nest/Roost Habitat Identification Process" that is available on the project website (<https://www.fs.usda.gov/project/?project=55088>) or upon request. Initial assessment of the recovery nest/roost habitat indicated that few areas currently meet the desired conditions for forest structure described in the 2012 Recovery Plan (USFWS 2012, p. 275-278). Specifically, recent LiDAR measurements of canopy cover showed that both the basal area and canopy cover of larger trees (i.e., 12-18 inch and 18+ inch dbh) in mixed conifer stands is substantially lower than the desired forest structure for recovery nest/roost habitat. However, almost all the designated recovery nest/roost habitat is in areas that a geophysical habitat model (Johnson 2003) suggested would have a high probability of current or potential future MSO nest/roost habitat.

The 2012 Recovery Plan includes descriptions of desired conditions and related management guidelines for MSO habitat, including PACs/core areas, forested recovery habitat and critical habitat:

Desired Conditions for Protected Activity Centers:

The following minimum parameters have been established within nest cores in established protected activity centers:

1. Stands should have a minimum basal area of 145 square feet per acre and a minimum density of 15 trees per acre in the greater than 18-inch DBH size class;
2. Maintain a minimum of 60 percent canopy cover in mixed conifer vegetation;
3. Trees in the 12- to 18-inch DBH size class should comprise at least 30 percent of stand basal area. Trees in the greater than 18-inch DBH size class should comprise at least 30 percent of stand basal area; and
4. Retain dead and down woody material and snags per current recovery plan guidelines.

The following minimum parameters have been established outside of nest cores for nest/roost habitat in established protected activity centers (PACs):

1. Strive for tree species diversity, especially with a mixture of hardwoods and shade-tolerant species, to be improved and maintained
2. Strive for diverse composition of vigorous native herbaceous and shrub species to be improved and maintained
3. Emphasize the retention of large hardwoods
4. Maintain a minimum of 60 percent canopy cover in mixed conifer forest. Pure ponderosa pine stands would be managed to appropriate canopy cover requirements. Canopy cover would be managed within stands.
5. Trees greater than 16 inches DBH would contribute at least 50 percent of the stand basal area
6. Opening sizes would vary between 0.1 and 2.5 acres. Openings within a forest are different than natural meadows. Small canopy gaps within forested patches provide for prey habitat diversity. Openings should be small in nest/roost core areas, may be larger in rest of protected activity center. Two to five tree clumps will be retained in openings. The shape of the openings should fall along natural features and look as natural as possible.
7. Create a diversity of patch sizes with minimum patch size of 2.5 acres with larger patches near activity center; mix of sizes towards periphery. Forest type may dictate patch size (i.e., mixed conifer forests have larger and fewer patches than pine-oak forest). Strive for between-patch heterogeneity.
8. Strive for horizontal and vertical habitat heterogeneity within patches, including tree species composition.
9. Trees greater than 18 inches DBH should not be removed unless there are compelling safety reasons to do so or if it can be demonstrated that removal of these trees would benefit owl habitat. This should be done judiciously and only when truly necessary to meet specific resource objectives.
10. Retain dead and downed woody material and snags per current recovery plan guidelines.

Desired Conditions for Recovery Nest/Roost Habitat:

The following minimum parameters have been established to promote the retention or development of suitable recovery nest/roost habitat (outside of established protected activity centers):

1. Identify forested stands that currently meet or exceed owl nest/roost conditions or where such conditions can be reasonably obtained in time.
2. No stands currently meeting nest/roost conditions would be treated in such a way as to lower that stand below those conditions unless a surplus of these stands exists at a larger landscape level.
3. Strive for tree species diversity, especially with a mixture of hardwoods and shade-tolerant species, to be improved and maintained.
4. Strive for diverse composition of vigorous native herbaceous and shrub species to be improved and maintained.
5. Emphasize the retention of large hardwoods.
6. Strive for a diversity of patch sizes with minimum contiguous patch size of 1.0 to 2.5 acres. Forest type may dictate patch size (i.e., mixed conifer forests have larger and fewer patches than pine-oak forest). Strive for between-patch heterogeneity.
7. Strive for horizontal and vertical habitat heterogeneity within patches, including tree species composition.
8. Opening sizes would vary between 0.1 to 0.5 acres. Openings within a forest are different than natural meadows. Small canopy gaps within forested patches provide for prey habitat diversity. Openings should be small in nest/roost patches, may be larger in rest of protected activity center. A tree clump would be retained in larger openings. The shape of the openings should fall along natural features and look as natural as possible.
9. Maintain a minimum of 60 percent canopy cover in mixed conifer forest.
10. Maintain a minimum basal area of 120ft²/ac
11. Maintain a minimum of 30% BA of trees 12-18 inch DBH
12. Maintain a minimum of 30% BA of trees with >18 inch DBH
13. Maintain a minimum of tree density of 30 large trees (>12 inch DBH) per hectare
14. Trees greater than 18 inches DBH should not be removed unless there are compelling safety reasons to do so or if it can be demonstrated that removal of those areas would enhance owl habitat. This should be done judiciously and only when truly necessary to meet specific resource objectives.
15. Retain 10 to 15 tons per acre of downed logs at 12 inches midpoint at least 8 feet long unless this conflicts with forest restoration and/or owl habitat.
16. Retain dead and down woody material and snags per current recovery plan guidelines.

Desired Conditions for Forested Recovery Habitat (Non-Nest/Roost):

The following minimum parameters are recommended to promote the retention or development of forested recovery habitat that is suitable for foraging, dispersal, and wintering (outside of established protected activity centers):

1. Strive for spatial heterogeneity by incorporating natural variation, such as irregular tree spacing and various stand/patch/group/clump sizes.
2. Emphasize the retention of large hardwoods.
3. Retain most trees greater than 18 inches DBH when possible and strive to retain (do not cut) all trees greater than 24 inches DBH, unless overriding management situations require their removal to protect human safety and/or property (e.g., the removal of hazard trees along roads, in campgrounds, and along power lines).
4. Retain the five largest snags per acre with an emphasis of greater than 18 inches DBH unless overriding management situations require their removal to protect human safety and/or property (e.g., the removal of hazard trees along roads, in campgrounds, and along power lines).
5. Retain 10 to 15 tons per acre of downed logs at 12 inches midpoint at least 8 feet long unless this conflicts with forest restoration and/or owl habitat.
6. Retain dead and down woody material and snags per current recovery plan guidelines.

Mexican Spotted Owl Critical Habitat:

The U.S. Fish and Wildlife Service (2005) identified primary constituent elements in the August 2004 designation of Mexican spotted owl critical habitat. Primary constituent elements are those physical and biological features necessary to ensure conservation of the species. Critical habitat includes only protected and restricted habitats as defined in the original recovery plan (U.S. Fish and Wildlife Service 1995). The primary constituent elements of critical habitat include habitat features recognized as being associated with Mexican spotted owl occupancy. The following parameters, designed to promote an uneven-aged forest structure and provide for adequate prey species, would also be followed within designated critical habitat (U.S. Fish and Wildlife Service 2012):

1. A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees. Trees greater than 12 inches DBH would comprise 30 to 45 percent of a stand;
2. Maintain a “shaded canopy” with a minimum of minimum of 40 percent canopy cover;
3. Maintain snags greater than 12 inches DBH;
4. Maintain high volumes of fallen trees and other woody debris;
5. Maintain a wide range of tree and plant species, including hardwoods; and
6. Maintain adequate levels of residual plant cover to maintain fruits, seeds, and allow plant regeneration.

3.3. Proposed action

The description of the proposed action below is taken verbatim from the project EA (only figure and table numbers have been changed).

In response to the purpose and need, the Forest Service proposes to conduct restoration activities on approximately 50,566 acres in the Santa Fe Mountains over the next 10 to 15 years to meet initial project objectives, with additional prescribed fire maintenance treatments beyond 20 years. Restoration activities would occur in multiple ecological response units, including mixed conifer-frequent fire forest, ponderosa pine forest, pinyon-juniper woodlands and grasslands, and riparian areas. Restoration activities would focus on vegetation thinning and prescribed fire treatments to improve forest resiliency by reducing stand density, stand continuity, and stand homogeneity (sameness of forest structure and species composition), and increase heterogeneity (diverse forest structure and species composition) at a landscape scale, mid-scale, and fine scale.

The proposed action is designed to provide a wide range of restoration methods that could be used to achieve desired conditions at the fine scale, mid-scale, and landscape scale. Each restoration method has a related set of tools that may be used on any given location depending on the characteristics of the specific treatment site, such as vegetation type, topography, presence of federally listed species, etc. This approach provides flexibility and is known as conditions-based management. Condition-based management is defined by the Forest Service as a system of management practices based on implementation of specific design elements from a broader proposed action, where the design elements vary according to a range of on-the-ground conditions in order to meet intended outcomes. For the Project, those intended outcomes are the desired conditions presented in EA Section 1.3.

Condition-based management stems from the recognition that the environment is dynamic, changing as ecosystems respond to changing natural and human-caused events. The Forest Service would apply the most appropriate tool or combination of tools to achieve desired results. Before carrying out treatments, project leaders would look at the specific area to be treated and select the appropriate treatment tool(s) using an interdisciplinary resource review process. The tools that may be considered as well as the circumstances under which they may be applied are described in detail in the following sections. Error! Reference source not found. provides a general overview of the restoration methods and associated tools that could be used to implement the proposed project. The sections below provide greater detail about the proposed restoration methods and tools.

Table 5. Summary of Restoration Methods and Associated Activities that Comprise the Proposed Action

Restoration Method/Associated Activities	Tools to be Used for Implementation	Acres or Miles Proposed for Treatment
Vegetation Thinning using Thin from Below	Hand thinning Manual harvesting using chainsaws Mechanical methods such as mastication	18,000 acres
Use of Prescribed Fire	Broadcast burning Pile burning Jackpot burning	38,000 acres
Riparian Restoration	Conifer and non-native species removal Indirect use of prescribed fire Herbicide application Native tree planting Fencing	680 acres 17 miles of stream
Road Closure	Closure of 1.5 mile along Forest Service Road 79W	1.5 mile

Conditions-Based Management Approach for Proposed Vegetation Thinning and Prescribed Burn Treatments

The Proposed Action does not define specific treatment units, but rather general areas throughout the project area where treatments are most likely to occur and the suite of tools that would be used. A central component of the purpose and need for this project is the safe re-introduction of fire as an ecological process to frequent-fire adapted systems. It is imperative that prescribed fire be implemented in a manner that is safe for firefighters while protecting valued resources.

Vegetation thinning (both manual and mechanical) treatments and prescribed burning are two methods that would be implemented to meet the purpose and need. The decision-making process and framework that Forest Service practitioners utilize to choose where, when, and to what extent these tools are utilized and implemented follows a generalized and logical pattern. The Forest Service does not have complete information regarding the conditions found on every acre of the project footprint, however sufficient information exists to make informed decisions about the types of treatments that work best in certain conditions, as well as make informed estimates so that the effects of those treatments can be disclosed in this document.

In order to implement the Proposed Action, the Forest Service would follow the steps outlined below to evaluate on-the-ground conditions that would inform the appropriate forest treatments and prescriptions to be applied in specific locations within the project area to move towards desired conditions described in EA Chapter 1:

- 1. Identify treatment area boundary and conduct field reconnaissance and inventory.** The type of reconnaissance and inventory protocol required depends on the forest characteristics within the treatment area (e.g., homogeneity of stand conditions) and the availability of existing data (e.g., common stand exams).
- 2. Coordinate with resource specialists and applicable partnering agencies to determine the appropriate design features and mitigation measures necessary to implement proposed treatment(s).** Prior to treatment implementation the U.S. Forest Service will coordinate with

resources specialists (i.e., wildlife biologist, hydrologist, archaeologist, recreation specialist) to determine any applicable design features to be implemented.

3. **Consider any previous forest restoration treatments or disturbed areas that could be used to build a prescribe fire burn boundary and identify safe anchor points that would facilitate the implementation of prescribed fire.** This is an iterative and adaptive process that builds from continuing treatments as the project progresses. For example, once a ‘first-entry’ prescribed burn is completed in a given area, the outcome of the treatment is considered for the next burn block.
4. **Define prescribed fire unit boundary using topography, vegetation/fuel condition, and proximity to previously treated or disturbed areas that provide safe anchor points.** Prescribed fire units would typically be defined by ridgelines, spur ridges, valley/canyon bottoms, existing roads and natural barriers. Hand or machine firelines would also be used on ridgelines, spur ridges, valley/canyon bottoms to create a prescribed fire perimeter.
5. **As necessary, vegetation thinning would be required to prepare a prescribed fire unit boundary necessary for safe and effective implementation.** The amount of thinning required for prescribed fire unit preparation depends primarily upon vegetation conditions and topography. In general, the approach is to do the least amount of thinning necessary to ensure safety and meet resource objectives.
6. **As necessary, delineate thinning units within the burn block to facilitate the reintroduction of fire and move the landscape closer to desired conditions.** Treatment might include thinning and hand piling, followed by a piling burning treatment prior to implementing a broadcast burn on the larger block. Error! Reference source not found. below provides a guide for the vegetation characteristics that would be evaluated by the U.S. Forest Service to determine if vegetation thinning is needed prior to safely introducing prescribed fire on the landscape.

Table 6. Vegetation characteristics suitable for consideration of vegetation thinning treatments by ecological response unit

Ecological Unit(s)	Response	Basal Area (BA; square feet/acre)	Trees per Acre (TPA)	Quadratic Diameter (QMD; inches)	Mean Crowning Index (CI; miles/hour)	Torching Index (TI; miles/hour)
Mixed Conifer–Frequent Fire		≥60	≥500	<6.0"	<25	<20
Ponderosa Pine		≥60	≥500	<6.0"	<25	<20
Piñon-Juniper Pinon-Juniper and Juniper Grasslands	Woodland, Grassland,	≥100	≥600	<7.0"	<15	<30

To move the forest stands within the project area towards the desired condition of uneven-aged stand structure, as described in EA Chapter 1; thin from below treatments would be applied, followed by prescribed fire treatments. All treatment areas may be entered multiple times to meet the desired conditions. Prescribed fire would be the primary tool used to reduce tree densities and undesirable tree regeneration and promote grasses and forbs. An example of the conditions-based management approach described above may include the following scenario: within a prescribed burn block, stand reconnaissance and inventory show that several stands are overly dense and have a high probability of tree crowning and/or torching. Implementation of prescribed fire from the perimeter of the burn block may be acceptable to the U.S. Forest Service practitioner(s) to ensure safety and protection of adjacent resources, however the extent of potential mid- and high- severity fire is considered unacceptable. In this instance, the U.S. Forest Service could opt

to treat stands interior to the burn block as a means to manipulate fuel conditions to reduce risk of tree crowning and/or torching.

Error! Reference source not found. and **Error! Reference source not found.**6 illustrate potential vegetation thinning and prescribed fire treatment units that could be delineated for the project area. It's important to note that proposed conditions-based treatments would not be limited to individual polygons as displayed in these figures. Rather, they represent the U.S. Forest Service's best estimate of existing conditions that warrant vegetation thinning or prescribed fire treatments or both. The actual location of forest treatments would occur where deemed appropriate at the time of implementation and would follow the conditions-based management approach described in this chapter of the EA.



Santa Fe Mountains Landscape Resiliency Project - Northern Extent

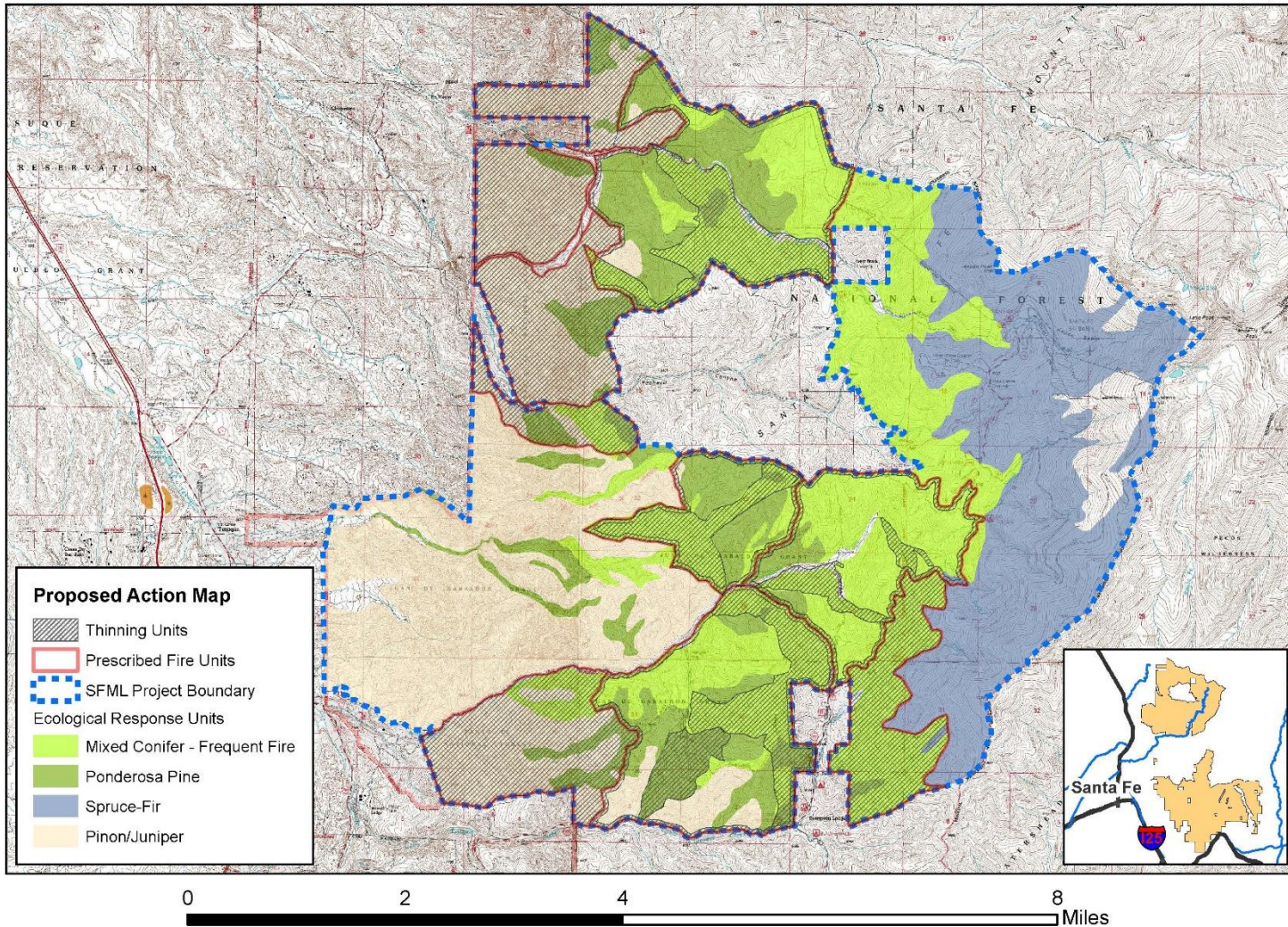


Figure 5. Potential vegetation thinning and prescribed fire treatment units for the northern portion of the project area



Santa Fe Mountains Landscape Resiliency Project - Southern Extent

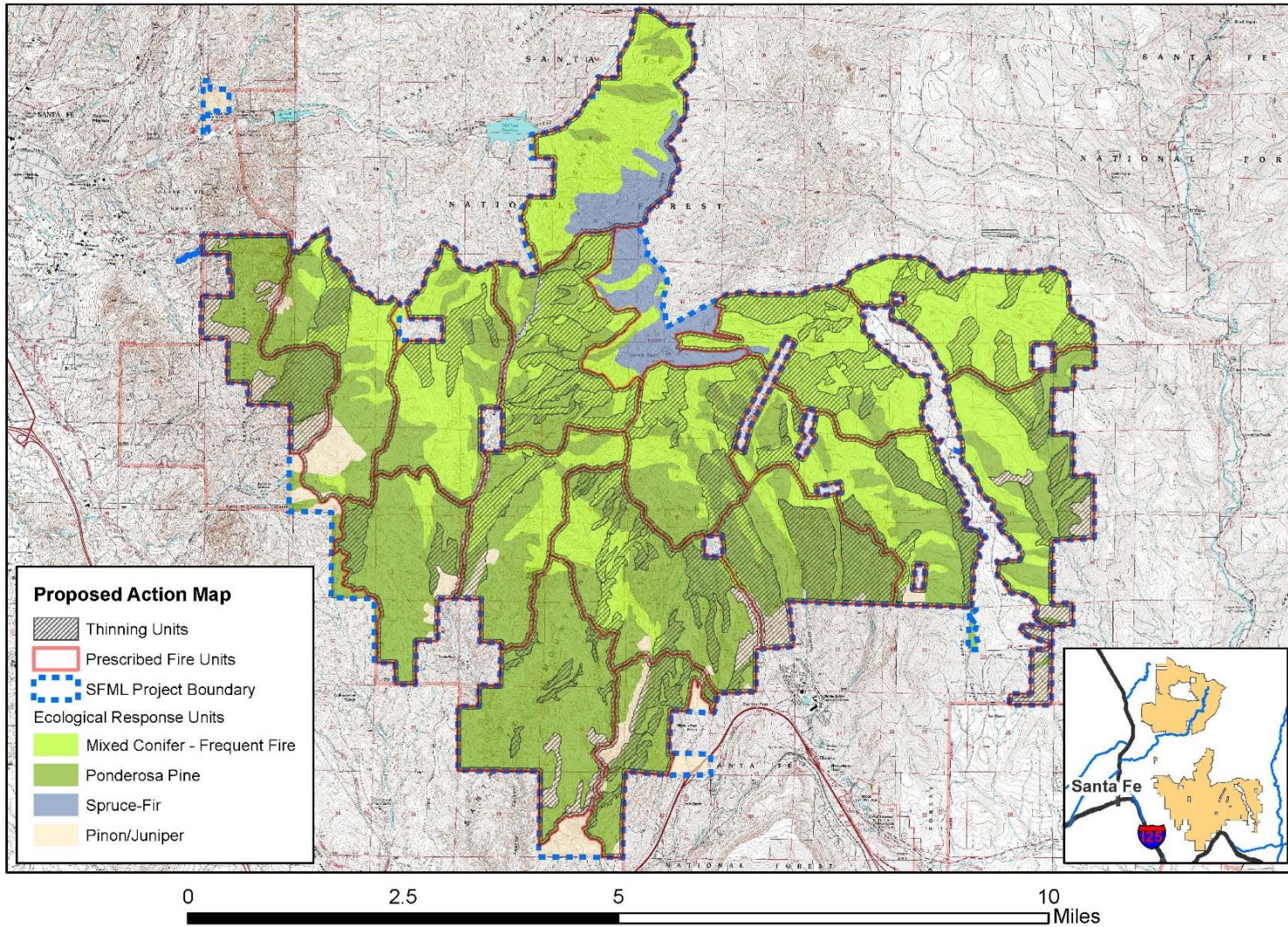


Figure 6. Potential vegetation thinning and prescribed fire treatment units for the southern portion of the project area

Acreage amounts would not exceed the proposed action acreages presented in **Table 4** above. All actions would be conducted in accordance with Forest Plan requirements, and all applicable laws, regulations, and policies. Thinned material would be made available for fuelwood collection where feasible and in line with other resource objectives. No mechanical equipment would be used on slopes greater than 40 percent. No new roads or temporary roads would be constructed.

For a variety of factors, including but not limited to, smoke impacts, costs of treatment, impacts to the affected environment, capital resources, and human resources, the U.S. Forest Service estimates that no more than 750 acres per year would be treated with manual or mechanical vegetation thinning and no more than 4,000 acres per year would be treated by the use of prescribed fire. However, if factors such as funding, technology and weather allow for moving ahead at a greater pace without exceeding the impacts described in this document, the intention is to implement this project as soon as it can be completed.

Vegetation Thinning Treatments

Manual and mechanical vegetation thinning treatment methods would include but are not limited to the following: the use of chainsaws to cut trees and distribute slash, masticators to thin trees and manipulate slash material, excavators for machine piling of slash and fire-line construction. Other specialized equipment may be used to treat the fuels to meet resource objectives. No mechanical equipment would be used on slopes greater than 40%. Lop and scatter or piling of thinned material would occur depending upon site conditions. Forest products would not be generated as a part of this project with the exception of fuelwood where conditions allow and do not conflict with resource objectives.

Error! Reference source not found. displays the maximum acres proposed for vegetation thinning treatment for each ERU. The text following the table provides a brief description of the proposed silvicultural prescriptions to be applied in the project area. The silvicultural prescriptions would be further refined through site-specific assessments prior to implementation.

Table 7. Ecological Response Units Proposed for Vegetation Thinning Treatments

Ecological Response Unit(s)	Total acres within SFM Footprint	Total acre thin from below to a target BA (16" DBH/12" DRC limit)
Mixed Conifer–Frequent Fire	17,875	7,500
Ponderosa Pine	17,347	6,500
Piñon-Juniper Woodland, Pinon-Juniper Grassland, and Juniper Grasslands	8,660	4,000
Spruce-Fir	5,022	-
Montane/Subalpine Grassland	491	-
Mixed Conifer with Aspen	456	-
Narrowleaf Cottonwood/Shrub	503	-
Colorado Plateau/Great Basin Grassland	139	-
Other	63	-
Total	50,556	18,000

Thin from below would be used to improve tree growth, tree vigor, and create stand structure that would meet uneven-aged desired conditions by removing unhealthy, intermediate, and suppressed trees and providing more growing space for the residual trees. The primary purpose is to reduce fuel continuity and

modifying fuel arrangement. Uneven-aged structure would be emphasized by implementing treatments to create openings, break stand continuity, and allow for regeneration of site-appropriate vegetation. Understory and mid-story trees would be left in place, where needed, to achieve uneven-aged forest structure. Conifers within grasslands and meadows would be cut to allow for open conditions that promote grasses and forbs.

No trees with diameters greater than 16-inches diameter at breast height (DBH) or 12-inches diameter at root collar (DRC) for juniper species (*Juniperus spp.*) and pinon pine (*Pinus edulis*) would be cut under this alternative. This approach is focused solely on fuels reduction; acknowledging that some stands may be better suited for other silvicultural approaches to more quickly move conditions to the desired future condition. In the case of this project however, the ability of the U.S. Forest Service to cut and/or utilize material greater than the specified diameter limit is not practical. Therefore, the U.S. Forest Service opts to impose a diameter limit of 16-inches DBH outside of MSO protected activity centers in order to clarify to the public the maximum upper limit of a thin from below treatment. It is important to note that the conditions-based approach described above would be followed to determine the tree diameter limit to be applied to a specific treatment unit. Not all treatment units would require that a 16-inch DBH or 12-inch DRC limit to meet treatment objectives. In all likelihood, site-specific treatments and prescriptions may utilize a smaller tree diameter limit.

VEGETATION THINNING TREATMENTS WITHIN MEXICAN SPOTTED OWL RECOVERY HABITAT AND PROTECTED ACTIVITY CENTERS

Vegetation thinning within or adjacent to Mexican spotted owl protected activity centers would be avoided to the greatest extent practicable. However, through the conditions-based management approach described above, the U.S. Forest Service may evaluate forest stand conditions within or adjacent to Mexican spotted owl protected activity centers that require vegetation thinning treatment in order to safely and effectively re-introduce prescribed fire in a treatment unit. In those cases, the same general thin from below to a target basal area silvicultural strategy would be followed within or adjacent to Mexican spotted owl protected activity centers. Within Mexican spotted owl protected activity centers (outside of nest cores), vegetation thinning treatments would be limited to the removal of trees less than or equal to 9 inches DBH to address ladder fuel concerns within a protected activity center. A target basal area (BA) of 150 square foot per acre or higher would be included in the silvicultural prescription.

EA Section 2.3.12 provides additional information regarding design features to be implemented for the project relative to Mexican spotted owl.

Implementation of treatments within Mexican spotted owl protected activity centers would occur using a phased approach. Treatments would initially be implemented in five protected activity centers following an implementation schedule as approved by the U.S. Fish and Wildlife Service. Pre- and post-treatment monitoring would occur so the impacts of treatments can be understood before proceeding with treatments in additional protected activity centers.

Use of Prescribed Fire

There are two classes of wildland fire: planned (i.e., prescribed fire) and unplanned (wildfire). Prescribed fire (also called controlled or prescribed burning) refers to deliberately burning wildland fuels in either their natural or a modified state and under specified environmental conditions, which allows the fire to be confined to a predetermined area and produces the fire line intensity and rate of spread required to attain planned resource management objectives (Helms 1998).

Broadcast, maintenance, jackpot and pile burning are all types of prescribed fire activity proposed for the project. Natural and existing features such as rocky slopes and travel routes may be used as prescribed fire

containment lines. There is the potential need to construct fire lines via hand tools or mechanized equipment in order to confine fires to predetermined areas. **Error! Reference source not found.** summarizes the proposed prescribed fire treatment acreages within the project area by Ecological Response Unit.

Table 8. Proposed Prescribed Fire Treatments (in acres) by Ecological Response Unit

Ecological Response Unit(s)	Total acres within SFM Footprint	Acres proposed for use of prescribed fire
Mixed Conifer–Frequent Fire	17,875	17,000
Ponderosa Pine	17,347	17,000
Piñon-Juniper Woodland, Pinon-Juniper Grassland, and Juniper Grasslands	8,660	4,000
Spruce-Fir	5,022	-
Montane/Subalpine Grassland	491	-
Mixed Conifer with Aspen	456	-
Narrowleaf Cottonwood/Shrub	503	-
Colorado Plateau/Great Basin Grassland	139	-
Other	63	-
Total	50,556	38,000

Prescribed fire could be used as a stand-alone restoration treatment or could be used after other vegetation thinning treatments, for example, to remove slash after initial manual and/or mechanical treatments are completed. It could also be used to emulate the role of “natural” fire. Resource protection measures would be applied as appropriate to limit the impacts of prescribed fire on human health and safety, natural resources, and other factors.

Prescribed fires are ignited either by hand or by aerial ignition using aircraft carrying specialized equipment to ignite surface fuels. 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 of the burn. Prescribed fires are typically planned during or immediately following monsoon season, during winter, or at 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 would be limited to air quality and weather conditions, allowing for safe execution of ignition operations with qualified fire personnel from multiple jurisdictions. Prescribed burning would be staggered across treatment units and planned over several burning periods to limit smoke impacts on a given area as much as feasible and as the availability of qualified personnel and funding allows. In order to reduce the potential for soil movement and erosion, no mechanical equipment associated with prescribed fire use would occur on slopes greater than 40 percent.

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, approved by the agency administrator, and include criteria for the conditions under which the fire would be conducted to meet management objectives.

There are many potential goals that can be achieved by using prescribed fire. Examples include but are not limited to:

- Reduce surface and ladder fuels that contribute to increased risk of uncharacteristically severe unplanned wildfire.
- Reduce risk and help to safely protect local communities from unplanned wildfire.
- Help protect natural resources such as timber and wildlife critical habitat.
- Promote native species and reduce encroachment of invasive species.
- Enhance landscape resiliency and recovery from an unplanned wildfire.
- Improve firefighter ability to safely and effectively respond to and suppress unplanned wildfire.
- Initial prescribed fire treatment would be followed by maintenance burns approximately every 5 – 10 years.

USE OF PRESCRIBED FIRE IN MEXICAN SPOTTED OWL RECOVERY HABITAT AND PROTECTED ACTIVITY CENTERS

Prescribed fire would be used in Mexican spotted owl protected activity centers, both within and outside of core areas, outside of the Mexican spotted owl breeding season. Prescribed burns may be allowed within Mexican spotted owl protected activity centers during the breeding season if the protected activity center is unoccupied or the owls are not nesting that year, as inferred from results of surveys conducted according to the Mexican spotted owl protocol. Prescribed fire with Mexican spotted owl protected activity centers and recovery nest/roost habitat would be conducted at low intensity with low-severity effects. Dead and down woody material and snags would be retained following the current Mexican spotted owl recovery plan (U.S. Fish and Wildlife Service 2012).

Riparian Restoration Treatments

Riparian restoration treatments within an estimated 100-foot buffer of established waterways are proposed along approximately 4.5 miles and 370 acres of Arroyo Hondo (Error! Reference source not found.) and approximately 12.5 miles and 310 acres of Tesuque Creek (**Figure 8**) to improve watershed conditions. In areas where riparian vegetation is in poor condition, or is being encroached with conifers, vegetation thinning, prescribed burning, native species plantings, and possible herbicide applications would occur. The following restoration activities would be implemented within the active floodplain:

- Conifers 12-inches DBH or less would be cut and removed to allow riparian vegetation to thrive and expand.
- Tree boles greater than 3-inches DBH would be left in the floodplain.
- Non-native species such as Siberian elm, Russian olive, salt cedar, and Tree of Heaven would be treated (e.g., cut and sprayed with herbicide following the Invasive Plant Control Record of Decision [ROD; U.S. Forest Service 2018]).
- Alder and willow would be cut to stimulate growth, as conditions allow.
- Remaining slash would be lopped and scattered (or piled and burned if fuel loads are high and the terrain allows).
- Native species such as willow, cottonwood, alder, grasses and forbs would be planted if natural regeneration is determined to be insufficient following conifer and non-native species removal.

The following restoration activities would be implemented outside of the active floodplain, but within the 100-foot buffer around riparian areas:

- Where deciduous trees exist, all conifers 12-inches DBH or less would be cut and removed to allow riparian vegetation to thrive and expand.
- Where deciduous trees do not exist, all conifers 5-inches DBH or less would be cut and removed.
- Alder and willow would be cut to stimulate growth, as conditions allow.
- Remaining slash would be lopped and scattered or piled and burned.
- Non-native species such as Siberian elm, Russian olive, salt cedar, and Tree of Heaven would be treated (e.g., cut and sprayed with herbicide following the Invasive Plant Control ROD [U.S. Forest Service 2018]).
- Native species such as willow, cottonwood, alder, grasses and forbs would be planted if natural regeneration is determined to be insufficient following conifer and non-native species removal.

Both within and outside of active floodplains, prescribed fire would be indirectly introduced by allowing low intensity prescribed fire to back down into the riparian areas from upland areas. This indirect use of prescribed fire would reduce understory fuels and promote riparian vegetation growth.

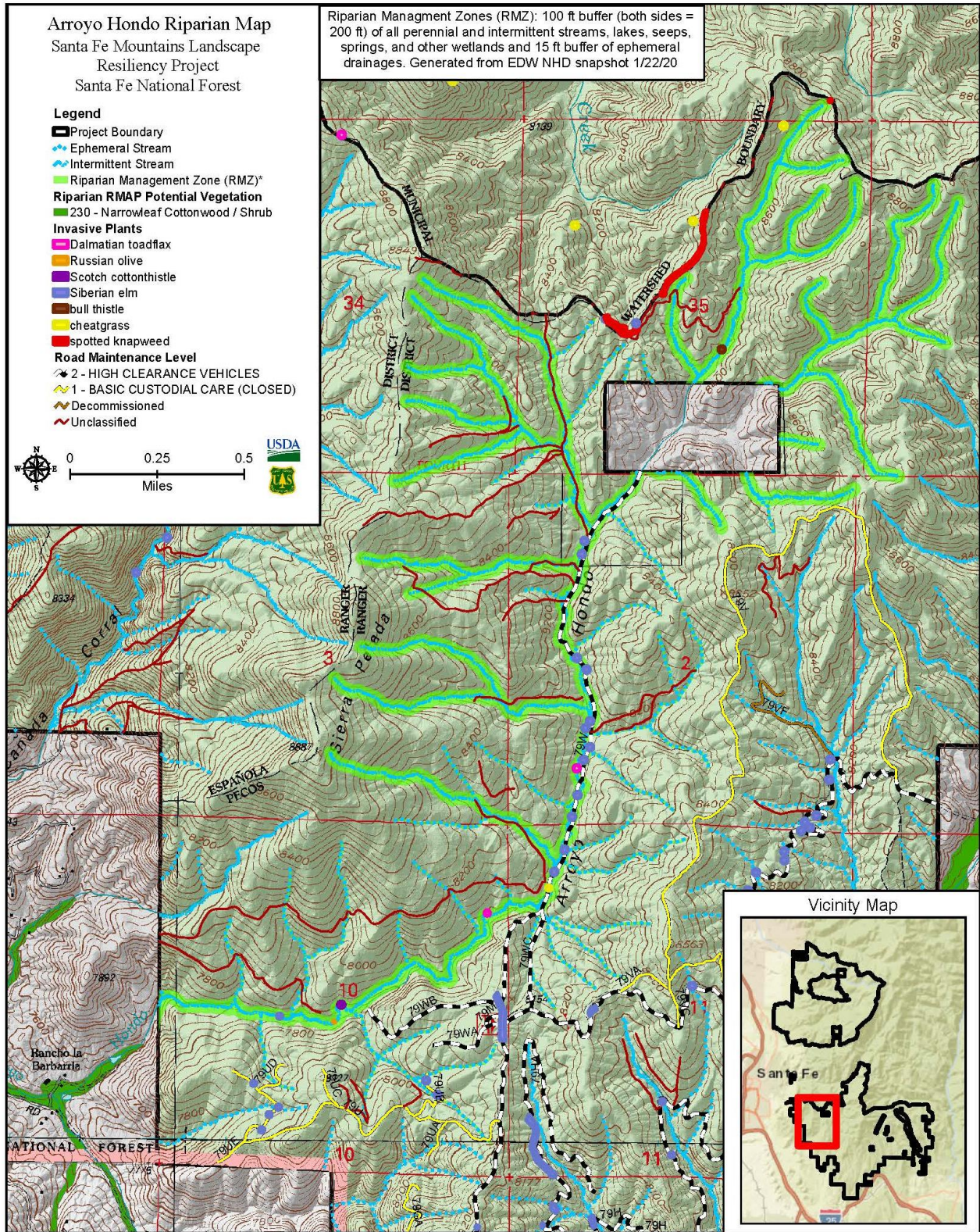
If deemed necessary for successful riparian restoration, herbicides would be applied to non-native species within riparian areas in a manner that is consistent with the Santa Fe National Forest Invasive Plant Control Project ROD (U.S. Forest Service 2018). Per the Invasive Plant Control Project ROD, which is herein incorporated by reference, methods determined and documented to have low risk to fish or other aquatic species would be followed for herbicide applications within riparian areas. Examples include a non-herbicide method (for example, mowing) that avoids erosion/sediment production or herbicides registered by the Environmental Protection Agency for aquatic habitats; for example, chlorsulfuron, glyphosate formulations such as Rodeo (which does not use the surfactant polyethoxylated tallowamine), imazapic, and imazapyr. Also adhere to design features to protect to riparian, water, and aquatic resources (U.S. Forest Service 2018; 27).

Fencing may be installed if needed to protect restored areas if it is determined that riparian vegetation regeneration is being hampered by browsing and grazing.

Riparian restoration treatments outside the Arroyo Hondo and Tesuque Creek areas shown in **Figure 7 and 8** would follow the conditions-based management approach described in EA section 2.2.2.1.

Road Closure

Approximately 1.5 miles of Forest Road 79W would be gated and closed for public motorized access, although private landowners would maintain access (Error! Reference source not found.). This proposed road closure would help to reduce resource impacts.



The data used to create this map is intended for broad-scale planning purposes. The Forest Service provides no warranty regarding its accuracy or use for other purposes.
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Figure 7. Proposed Riparian Restoration Area along Arroyo Hondo

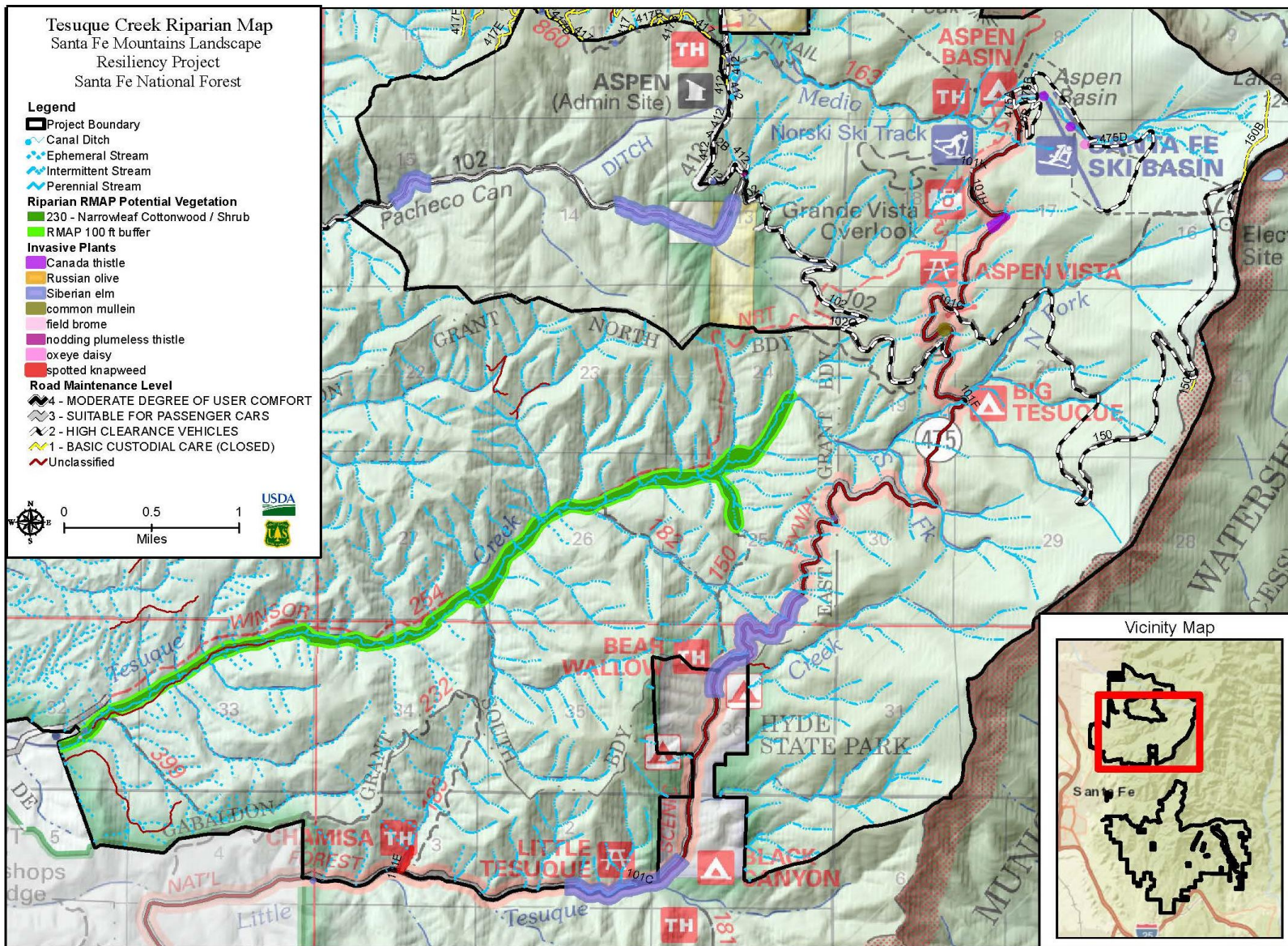


Figure 8. Proposed Riparian Restoration Area along Tesuque Creek

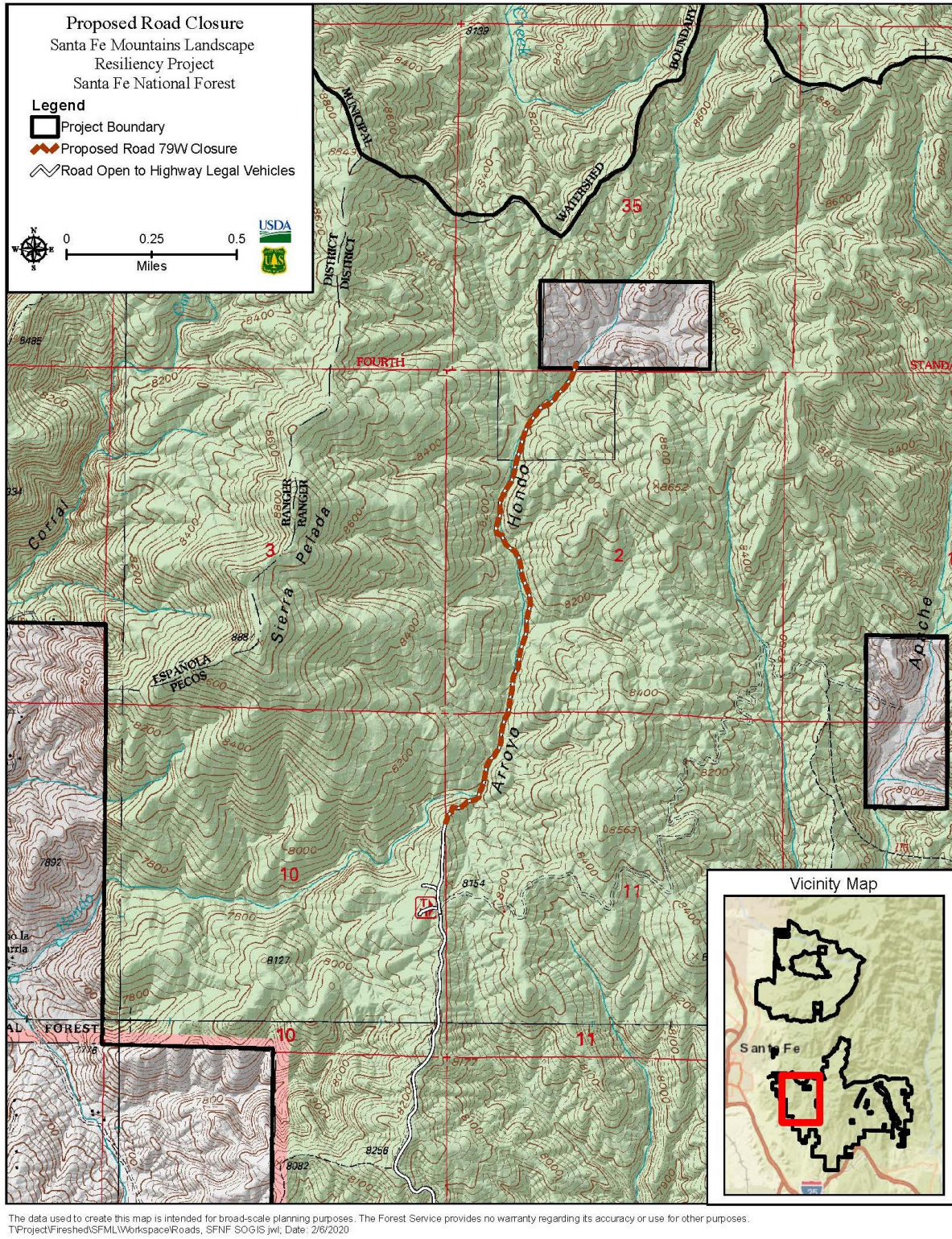


Figure 9. Proposed Road Closure on Forest Service Road 79W

Integrated Design Features

As part of the proposed action, Integrated Design Features (IDFs) have been developed to guide how the proposed action would be implemented. These IDFs are in addition to standards and guidelines from the Santa Fe National Forest Plan (Forest Plan), as amended, and Best Management Practices (BMPs). During implementation, all applicable guidelines and policies would be followed. See the Project EA and the Appendices at the end of this document for a list of IDF’s applicable to MSO.

Project Forest Plan Amendments

As part of the proposed action, a Forest Plan Amendment is needed in order to meet the project objectives and to ensure the project proposed actions are following the current MSO Recovery Plan (2012) and best available science/management recommendations, such as for goshawks. A detailed discussion of the Forest Plan Amendments can be found in the project record. The amendments broadly include the following-

- A. Adopt aspects of the current MSO recovery plan (the existing Forest Plan includes the outdated MSO Recovery Plan (1995)), such as treating vegetation related to MSO PACs.
- B. Clarifies activity restrictions during MSO breeding seasons
- C. Clarifies need for interspaces related to Goshawk habitat

4. Effects of the proposed action

The SFM project proposes to use a condition-based toolbox approach for implementation. This approach allows managers to determine which treatments are appropriate in each area based on the site-specific conditions. Because the exact location of treatments is not known at the time of project analysis and authorization, this BA focuses on potential effects of proposed activities on resources across the analysis area based on whether the actions are likely to occur. Activities have already been narrowed down to areas that would be potentially appropriate based on general information such as vegetation type at the scale of the ERU. Thinning and prescribed fire are proposed the mixed conifer, ponderosa pine and pinyon/juniper ERUs in the project, and only within a portion of those areas (Table 9).

Table 9. Area proposed for thinning and prescribed fire in the project ERUs.

Ecological Response Unit	Area of ERU within Project Area (acres)	Area proposed for thinning or mastication (acres percent of ERU)		Area proposed for prescribed fire (acres percent of ERU)	
Mixed Conifer	17,875	7,500	42%	17,000	95%
Ponderosa Pine	17,347	6,500	37%	17,000	98%
Piñon-Juniper	8,660	4,000	46%	4,000	46%

Additionally, it is unlikely that not every acre of the areas proposed for activities would be treated because a range of factors such as limited access, steeper slopes than expected, vegetation structure already at desired conditions or not suitable for the proposed thinning, protected heritage sites or limiting design features would make project implementation infeasible or undesirable. Therefore, the area affected is likely to be somewhat less than the total proposed acreage of thinning and prescribed fire, and the treated and untreated areas would contribute to landscape heterogeneity at multiple scales in the project area.

Determining the potential effects of the proposed action requires considering how the management actions would be implemented, the spatial and temporal relationship between activities and presence of MSO or MSO habitat and the impacts of the actions on MSO and MSO habitat based on the best available scientific information. Another important consideration is whether the actions and their effects are reasonably certain to occur and, if so, whether the expected effects constitute harm to the species. The ecology and habitat relationships of MSO are covered in the 2012 recovery plan and forest-level information was reviewed in the 2011 Forest Plan Biological Assessment; general information is not repeated here except when directly relevant to the project effects. The relationships between project activities and potential effects on MSO and MSO habitat are based on the best available scientific information, including the critical habitat designation, analysis and guidance in the recovery plan and other relevant scientific literature.

This analysis assumes that the project would be implemented with the design features listed in Appendices A, which act as a safeguard against adverse effects where activities are conducted. Although there are separate discussions for various MSO habitat designations (i.e., PACs, critical habitat, recovery habitat), most of the desired conditions, activities, design features and effects would be similar across the project. In some cases, such as mechanical thinning in PACs or activities in nest core areas, design features specific to those designated areas would alter or prevent project implementation. Prior to implementation, silvicultural prescriptions would be written by a USFS Certified Silviculturist. These prescriptions would be written to meet Regional standards for silvicultural prescriptions and would provide more detailed, site-specific direction for implementation to meet project objectives for MSO habitat improvement, fuels reduction and resource protection, as well as incorporating general and site-specific design features.

The proposed road closure is not located in any PACs and would have no effects on MSO or MSO habitat. To the limited extent that it could affect MSO at all, the road closure could potentially benefit owls by decreasing vehicle traffic in the forest. Therefore, it is not considered further.

4.1. Spatial and temporal scale of analysis

The analysis area consists of the geographic extent in which resources may be affected by the proposed action. This includes all areas that may be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CRF §402.02).

To analyze potential effects from this project, an action analysis area was defined for the as the project area plus a half-mile buffer (shown in Figures 3 and 4 above and Figure 10 below). A half-mile buffer corresponds with the survey protocol for Mexican spotted owl, so this analysis area would account for the possibility of activities indirectly affecting MSO that are present immediately adjacent to the project boundary. This analysis area is approximately 64,782 acres of Forest Service land.

Because of the large scale of the project and intentionally phased approach of implementation, the direct effects of the activities are considered over a 10 to 15-year period following the decision. Based on previous projects, the EA stated that implementation is expected to occur on up to 750 acres of thinning and 4,000 acres of burning annually, and those estimates are used in this analysis. Understanding the spatial arrangement and timing of proposed activities is an important component of conducting a realistic and rigorous effects analysis:

- The area of individual thinning units would vary according to the size and arrangement of appropriate stands on the landscape. In general, stands thinned in a year would be individually smaller than the total area thinned that year and discontinuous (e.g., multiple separate areas of

10s to 100s of acres each with leave areas within the treatment boundaries due to sensitive resources or steep slopes).

- Most prescribed fire units would be 100-300 acres and burning would be done primarily in the fall. Fire intensity would be patchy within the burn unit boundaries, including some unburned refugia.

These expectations for the spatial and temporal scales of implementation are based on project design features and experience implementing similar work on the Santa Fe National Forest.

4.2. Direct effects on Mexican spotted owls

The 2012 Recovery Plan identifies several activities proposed in the SFM project that could potentially result in harm to Mexican spotted owls. For example, noise disturbance (e.g., operation of heavy equipment), timber harvest, prescribed fire and road or trail maintenance all have the potential to change owl behavior or flush them from perches, daytime roosts or nests. These disturbances and changes in behavior could increase vulnerability to heat-related stress and predators, or even lead to nest abandonment (USFWS 2012, p. 55, 261). However, effects of these activities on MSO are highly context-dependent, primarily a function of whether they occur where owls are present and, if so, the duration, magnitude, specific location and timing of implementation.

Project activities include thinning and prescribed fire in PACs where surveys have recently found owls present. For both activities, the combination of operational suitability of site conditions and design criteria would substantially reduce the likelihood of adverse impact to owls:

- For both thinning and prescribed fire in PACs, the most important factor related to potential effects on MSO is timing. These activities would only be implemented in PACs during the non-breeding season or when a biologist confirms that the PAC is not occupied or that breeding is not occurring.
- Thinning would generally occur in stands that are not currently high-quality habitat for nesting and roosting due to high density of smaller trees not associated with high quality habitat. Most of the thinning would be done by hand, which produces less noise disturbance than when machinery is used for mastication, machine piling and fire line installation. Heavy machinery will be restricted to areas without steep slopes, which greatly reduces both the overall spatial extent of such treatments and the likelihood that mechanical thinning would occur in the highest quality stands within PACs. Therefore, even in PACs, owl presence is unlikely within the specific areas that are suitable for thinning. If owls are present in or near these areas, the disturbance would generally be temporary and relatively low intensity and is unlikely to result in harm.
- Prescribed fire will be applied when fuel and climatic conditions are expected to produce low to moderate fire intensity, with flames mostly limited to the ground level well below the canopy of larger trees where MSO prefer to roost. Most prescribed fire would be implemented in the fall when temperatures are cooler and relative humidity is higher, which reduces fire intensities and the probability of spotting, escape and undesirable fire effects. Burning in the fall also removes the risk of disturbing nesting MSO. If weather and fuel conditions are appropriate for spring burning, the potential risk of disturbing nesting MSO would be mitigated by survey requirements prior to treatments and associated project integrated design features. Fire operations may include the use of multiple vehicles, hand crews and aircraft across several hundred acres. The resulting noise and activity could disturb owls. However, vehicles and hand crews would usually be limited to areas accessible by road or less steep slopes, both of which are unlikely to be associated with nest and roost sites. Therefore, prescribed fire activities are unlikely to harm Mexican spotted owls.

A minimum of two years of inventory to USFWS protocol standards are required within the mixed-conifer vegetation potentially suitable for MSO nesting and roosting before project implementation. Surveys for additional nesting or roosting sites in the project area are ongoing and would be completed before implementation of activities in an area. If owls are found and a PAC is established, appropriate measures would be followed as described in the recovery plan and the IDFs, such as determining the PAC status (nesting, non-nesting or absence) for the year using USFWS standards and breeding season restrictions. Following these procedures would avoid adverse impacts of project activities on MSO even where they are not currently known to occur.

Riparian restoration is proposed to improve degraded streamside conditions within parts of two PACs (Apache and Tesuque). These activities would include removal of trees not considered to be components of high-quality riparian forest habitats, including native conifers as well as a variety of non-native invasive species. In general, owls would not be expected to be present in the riparian areas during the day, so it is unlikely that implementing the vegetation removal, planting and herbicide would disturb MSO. Additionally, any activities within PACs would follow Recovery Plan guidance to avoid disturbing MSO or damaging owl habitat.

4.3. Effects on Mexican spotted owl PACs

Improving MSO habitat and reducing the risk of catastrophic wildfire are the primary objectives of the SFM project, and both are recommended management actions for MSO conservation and recovery. However, it is possible that implementing forest thinning and prescribed fire could alter habitat conditions in ways that could indirectly affect Mexican spotted owls, including within PACs. Positive effects would be indicated by post-treatment conditions that better approximate desired conditions for forest structure or wildfire risk (described in section 3.2), whereas negative effects would be indicated by deviation from the desired forest structure conditions described. In some cases, there may be short-term habitat disruption to promote longer-term benefits, such as reducing canopy cover in stands with a high density of smaller trees to generate structural diversity and increase growth of remaining trees. The effects of such activities depend on their current and future use by MSO, the magnitude and duration of habitat disruption and the landscape context of the activities. The focus of this analysis is to evaluate the likelihood of project activities adversely affecting Mexican spotted owl habitat conditions in these areas.

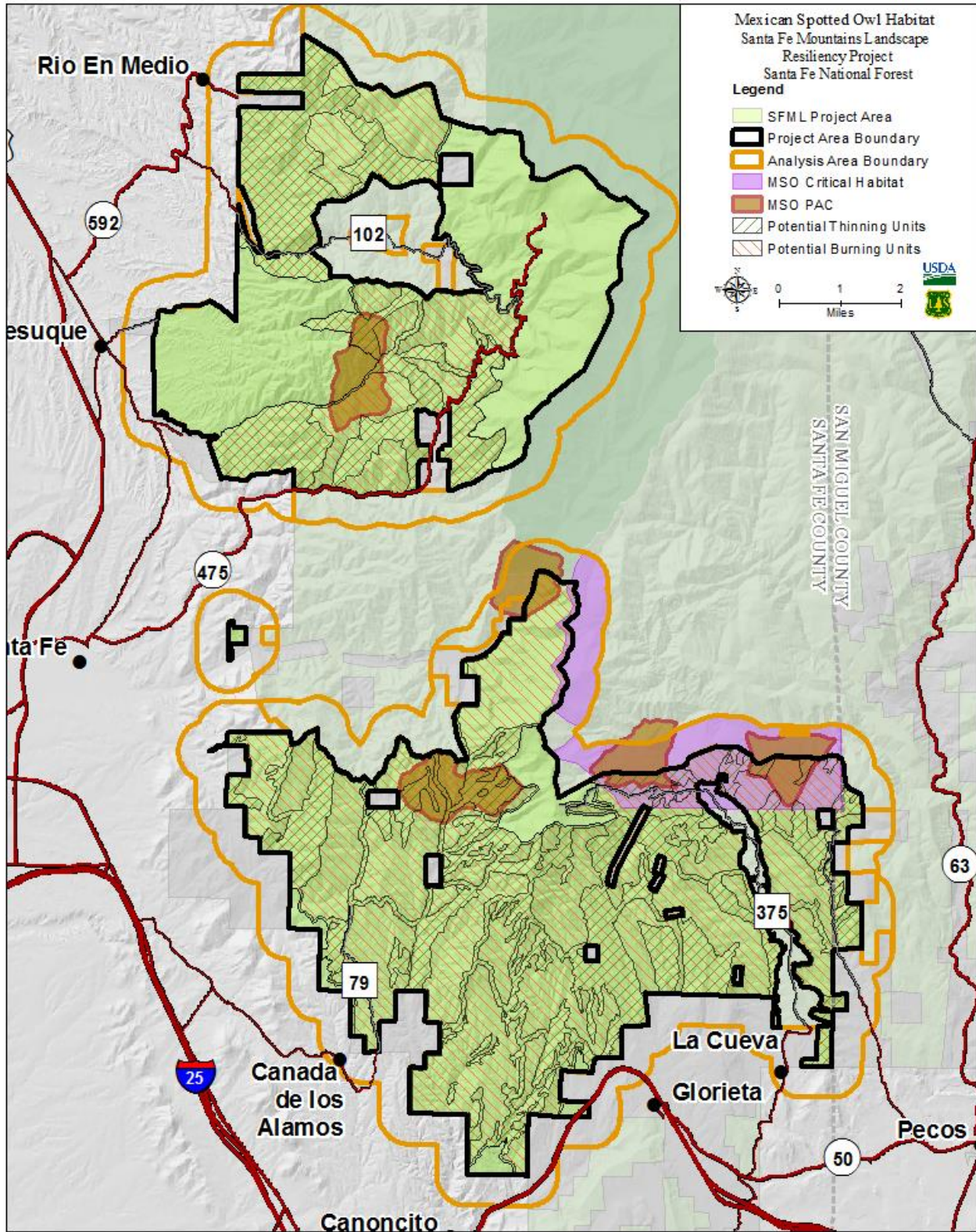
Despite MSO presence nearby, which would generally indicate presence of high-quality habitat, many areas with PACs do not meet the desired conditions for forest composition, vegetation structure and habitat components described in section 3.2 above (which are from Appendix C of the 2012 Recovery Plan). Therefore, four of the five PACs have areas proposed for thinning and all five have areas proposed for prescribed fire (Fig. 10). However, the potential negative effects of these activities on MSO are mitigated by the limited spatial scale of activities within PACs, the timeline of project implementation, the types of stands that would be suitable for thinning, and the many design features that would avoid or minimize adverse effects on MSO habitat.

The three PACs on the border of the project have less than half of their area proposed for activities of any kind, and most of that is prescribed fire. The two PACs located entirely within the project area both are proposed for thinning and prescribed fire, but approximately 1/3 of the Tesuque PAC does not have any proposed activities and the activities proposed in the Apache PAC would be implemented over several years and almost certainly would not cover the entire area due to the many factors mentioned elsewhere (i.e., already at desired conditions, access limitations, steep slopes, etc.) and described below.

As described previously, 11% of the project area has slopes greater than 60%, which are unsuitable for mechanical or hand thinning. An additional 32% of the project area is on slopes between 40 and 60%, where mechanical thinning would not occur, limiting impacts to removal of smaller trees without heavy equipment (e.g., crews with chainsaws). Large areas of MSO habitat, including in PACs, occur on these steeper slopes and would either be left in their current condition, would be selectively thinned to remove trees <12 inch dbh (<9 inch dbh in PACs), or would be treated through low to moderate intensity prescribed fire. This spatial variation in activities would create a mosaic habitat conditions in PACs and throughout the project area and leave large area of potentially suitable habitat as it currently exists.

If potential treatment areas in PACs are on operable slopes (i.e., <40% for mechanical thinning and <60% for hand thinning), the decision to implement thinning would be based on existing vegetation conditions. Under the conditions-based management approach of this project, the specific current conditions of PACs are not known beyond the general conditions of similar vegetations types across the project area, as described in this document, the silviculture report and the EA. Specific current conditions would be assessed prior to the implementation of a treatment unit that includes a PAC, at which point it would be determined if the PAC should be treated, and if so, to what extent (as described in the IDFs Appendix) in order to maintain the habitat characteristics.

In stands where the existing condition meets the desired habitat, the criteria described in the 2012 Recovery Plan Appendix C Tables 2 and 3, the area would either not be thinned or would be thinned only in a way that would not move the area below the habitat criteria. In stands where the existing condition does not meet the desired conditions, thinning would reduce the density of small trees. In some cases, the canopy cover may be reduced by thinning smaller trees (<12 inch dbh) if the criteria for basal area of the larger size classes is not met (30% or more of total basal area from 12-18 inch and 18+ inch dbh trees). The purpose of such thinning would be to create a more complex forest structure, reduce dominance by smaller size classes and promote diameter and height growth of remaining trees by reducing competition. MSO habitat use is associated with a high canopy cover of large trees, so reducing cover of smaller trees would generally not be considered an adverse effect to habitat quality and availability.



The data used to create this map is intended for broad-scale planning purposes. The Forest Service provides no warranty regarding its accuracy or use for other purposes.
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Figure 10. Map of project showing proposed thinning and prescribed fire in relation to MSO PACs and critical habitat

Many areas in PACs would be thinned and burned or only burned. Prescribed fire is a natural process in the major vegetation types in this project, and the effects of fire generally promote desired composition and structure as well as reducing fuel that may increase the risk of catastrophic wildfire. In this project, including in PACs, prescribed fire would be implemented to produce a mosaic of burned and unburned areas, with mostly areas burned with low and moderate intensity in the fall. Lower and moderate intensity fire reduces litter and understory density while maintaining the overstory vegetation, thus retaining the ERU type and function. The acres that would be burning-only would have less change in tree densities than the thinned areas, with most fire-induced mortality in trees <6 inch dbh. Burning increases crown-to base-heights on residual trees because lower limbs are often killed, which reduces the risk of torching and crown fires during wildfires.

The thinned and burned areas combined with burn only areas would create a matrix of overlapping treatment areas of decreased fuel hazard. An overlapping fuel treatment pattern is effective and efficient in disrupting fire spread across landscapes and can mitigate extreme fire behavior and effects within burned areas and even outside treatment areas. Additionally, this would leave a diversity of habitats post-treatment that would provide cover and forage for both MSO and their prey, in addition to other wildlife species.

4.4. Effects on Mexican spotted owl critical habitat

The project area includes 1,956 acres of designated critical habitat (Fig. 10 above), most of which is proposed for thinning, prescribed fire or a combination of the two activities. Management activities were developed to improve overall ecological conditions in the project area, including in the designated critical habitat. The analysis below considers the potential effects of project activities on the Primary Constituent Elements (PCEs) that indicate desired conditions for forest structure and prey abundance in critical habitat. Although this analysis is focused on PCEs for critical habitat, the effects described here on a range of resources relevant for MSO are also expected across the project area.

PCE: A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 percent to 45 percent of which are large trees with a dbh of 12 inches or more.

Effect: This project would retain a diversity of tree species (i.e., conifers and hardwoods associated with owl habitat) and would not reduce the range of tree sizes needed to create the diverse forest and multi-layered forest canopy Mexican spotted owls use. The intent of the project is to promote forest composition and structure within the range of variation typical for each ERU. Tree removal would occur through prescribed fire and forest thinning but would leave a representation of the trees existing prior to treatments. The project is designed to remove trees in the classes that are currently over-represented, such as the small and medium size ranges. However, thinning would maintain a range of tree species and sizes needed to maintain this PCE in PACs and recovery habitat across project and analysis area. Recovery Plan guidelines would be implemented, such as retaining large trees, providing appropriate canopy cover levels, and managing for a diverse range of tree species (such as oak in pine-oak forests and several conifer species in mixed conifer forest). In summary, the proposed action would not compromise the function and recovery role of this PCE.

PCE: A shade canopy created by the tree branches covering 40 percent or more of the ground.

Effect: Thinning and burning treatments can both reduce tree shade canopy. However, project implementation would follow Recovery Plan guidance on retaining canopy cover, particularly of large trees. Some small reductions in existing canopy cover may result from thinning smaller-diameter trees and minor mortality from prescribed fire, but the diameter limit on harvest will assure retention of the larger trees. In some cases, such as very dense mixed conifer stands composed of trees <12 inches dbh, there may be more substantial disruptions in canopy cover, but with the longer term objective of promoting growth of remaining trees and generating a multi-layered canopy. As such, despite some alteration of canopy cover, the proposed action would not compromise the function and recovery role of this PCE.

PCE: Large, dead trees (snags) with a dbh of at least 12 inches.

Effect: Large snags would be retained, not targeted for removal under this proposed action. Some snags may be removed due to safety risks, such as at a staging area. However, this would be rare and the snag would be left to contribute to downed log habitat. Prescribed burning may burn some snags, however snags would not be targeted for burning. Lighting would be done in a manner so that snags are not directly ignited, but fire may creep to some snags, igniting some. Burn piles would not be placed near large snags to reduce the risk of igniting the snags. Burning may lead to the creation of new snags that could decay and develop into snags used for MSO habitat. Therefore it is anticipated that there would be no net change in snags on the landscape and the proposed action would not compromise the function and recovery role of this PCE.

PCE: High volumes of fallen trees and other woody debris.

Effect: Thinning would not target downed logs for removal. Prescribed burning treatments would likely reduce downed logs and woody debris, mostly in the smaller size ranges considering that burning would be done under conditions that favor a lower intensity burn with mosaic burn patterns. However, some larger logs could also be consumed, partially or completely during burning. This loss of large logs could result in short-term adverse effects to this PCE depending on how many logs are left after treatments and could result in localized effects to prey species habitat. However, over the long-term, it is expected that this PCE would be maintained across the landscape, as some additional trees fall and become downed logs. Additionally, there are requirements to maintain downed logs across the landscape and if downed logs are lacking, trees may be cut and left as downed logs to supplement this habitat feature. As such, the proposed action would not compromise the function and recovery role of this PCE.

PCE: A wide range of tree and plant species, including hardwoods.

Effect: Thinning and burning would positively affect this PCE. Plant species diversity would likely increase following thinning and burning treatments that result in small, localized canopy gaps. The proposed action focuses on retaining oaks and other hardwoods, but some level of short-term loss could occur if some are burned during prescribed fire implementation. However, hardwoods like oaks re-sprout following fire, so would be expected to return over the long-term. Prescribed fire results in increased plant species diversity by creating openings in the canopy and reducing small diameter conifer density. In frequent-fire forests, herbaceous understory response and plant regeneration tends to be positive following tree removal and prescribed fire (Springer et al. 2001). As such, the proposed action would not compromise the function and recovery role of this PCE.

PCE: Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

Effect: Mechanical thinning can disturb ground cover and damage vegetation due to off-road use of heavy equipment. Equipment limitations and BMPs would reduce these disturbances, and experience with similar activities has shown that most effects of heavy equipment on ground vegetation are small-scale and recover relatively quickly. Prescribed burning may also result in short-term loss of plant cover, but long-term increases in residual plant cover are expected because treatments would provide conditions suitable for increased herbaceous plant growth by removing thick layers of dead plant debris within treated areas. The mosaic effect created by burned and unburned areas and by creating small patches of forest within protected habitat is expected to increase herbaceous plant species growth and diversity, which would support the MSO prey base of small rodents. The proposed action would not compromise the function and conservation role of this PCE.

Overall, implementing this project would improve conditions in MSO critical habitat by retaining the largest trees and desired forest composition and structure, maintaining important habitat features such as snags and large downed logs, and using prescribed fire to reduce high fuel loads and promote herbaceous vegetation. It is likely that project activities will have some short-term negative effects on habitat on small spatial scales (e.g., logs that currently provide small mammal habitat may burn), but these effects will be moderated by the patchy application of thinning and burning and will be offset by habitat improvements resulting from the project. Note that two PACs in the project area are also within critical habitat; for these areas, implementing thinning and burning would follow the more restrictive guidelines for PACs, though the effects on the PCEs would remain within the effects analysis above.

4.5. Effects on Mexican spotted owl recovery habitat

The 2012 MSO Recovery Plan recommends management actions that contribute to conservation and recovery of the species and describes actions or habitat conditions that may adversely affect MSO. Most of the key elements of the recovery strategy (at USFWS 2012, p. 68) are either incorporated into the proposed action (e.g. amended standards and guidelines for vegetation and fire management to protect owls and manage threats) or are components of ongoing forest-wide programs (e.g. identifying and protecting PACs, monitoring owl populations). However, the forest has not conducted a comprehensive analysis to identify and map recovery nest/roost habitat. Therefore, to comply with the 2012 Recovery Plan and meet the Forest Service's commitments to conservation and recovery under Section 7(a)(1) of the Endangered Species Act, recovery nest/roost for the Santa Fe Mountains Landscape Resiliency project was identified and considered in developing and analyzing the proposed action. The methods used to identify recovery nest/roost habitat are described in a supplemental document available on the project website or upon request.

Within the project area 3,879 acres of recovery nest/roost habitat was designated. Nearly all of those areas (3,482 acres or 90%) are proposed for prescribed fire and nearly half (1,757 acres or 45%) are proposed for thinning and prescribed fire (Fig. 11). Desired conditions, management activities and design features for recovery nest/roost habitat are essentially the same as for PACs but without seasonal restrictions. As such, the analysis above in section 4.3 above is directly applicable to recovery nest/roost habitat and is not repeated here. Initial analysis suggests that very few of the areas designated as recovery nest/roost habitat currently meet the desired conditions for forest structure described in Appendix C of the 2012 Recovery Plan. Therefore, it is likely that a higher proportion of recovery nest/roost habitat will be thinned compared to stands within PACs. Despite the likelihood of effects on a larger spatial scale, project implementation will follow the same standards, guidelines and

design features developed to promote desired conditions for recovery nest/roost habitat and avoid adverse effects.

For purposes of this analysis, all stands within mixed conifer, ponderosa pine, pinyon/juniper, spruce/fir or riparian vegetation types that are not within PACs or designated recovery nest/roost areas are considered as recovery habitat suitable for foraging and dispersal. The general effects of the project activities on forest composition and structure described below and elsewhere in this analysis are applicable to those areas as well.

Thinning would create a clumpy tree distribution favoring the healthiest trees in all size classes. Fire tolerant species would be preferred leave trees, thus contributing to the overall health and resiliency of the forested vegetation types, such as those that provide MSO habitats. Trees larger than 16" DBH would not be cut, except for equipment access or for safety concerns. In most cases, the majority of trees to be cut as part of this project, would be well under 16" DBH. Desired conditions often can be achieved through the removal of smaller trees often under 11" DBH. With the majority of trees to be removed in that smaller size range, with lesser need to remove trees in the 12 to 16" DBH range, the majority of trees that contribute to MSO habitat, specifically nest/roost habitat basal area and canopy cover, would remain, thus continuing to contribute to MSO habitat needs.

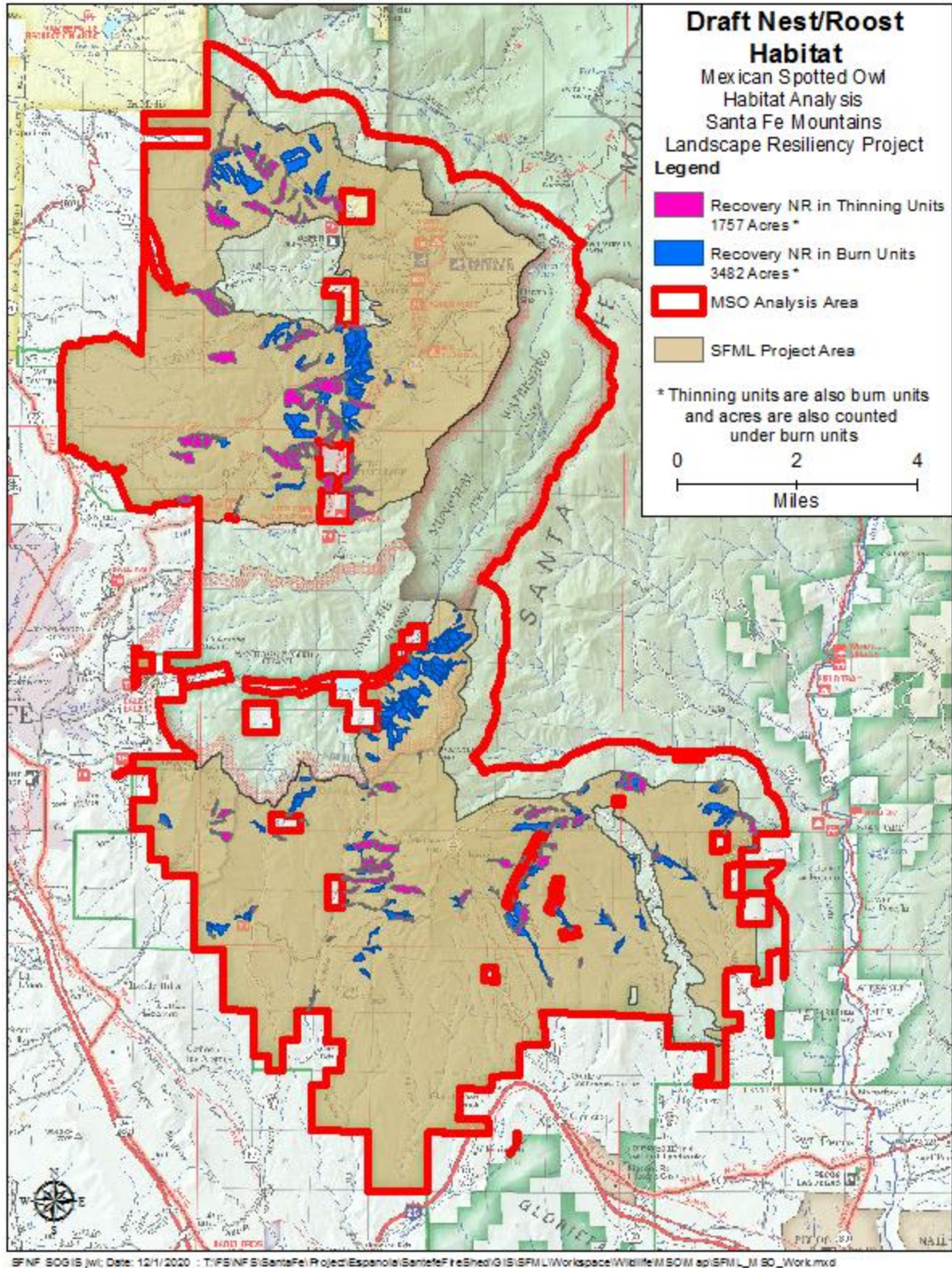


Figure 11. Map of project showing designated recovery nest/roost habitat that may be affected by proposed thinning and/or burning

Project implementation would take place in recovery habitats in which neighboring MSO may use for foraging and roosting, etc. Thinning would not remove large trees in recovery foraging/dispersal habitat (over 16" DBH), and snags or downed logs would be retained. Prescribed burning may have a small impact on these habitat features. Most large trees would survive low and moderate intensity burning, however, some larger firs may experience negative effects including mortality because they have relatively thinner bark than pines. These are expected to be minimal considering the lower intensities of fire prescribed. Prescribed fire may burn portions or whole snags or downed logs, however not all snags and downed logs would burn and more snags and downed logs may be created from burning of some individual trees or small clumps of trees (occasionally torching). The change in available large trees, snags and downed logs is not anticipated to result in a substantial difference. Thinning and burning would likely create more of these features in the long-term to replace those that may be removed during project implementation.

Riparian vegetation would not be removed by this project. Thinning and burning would be done in riparian areas in a manner that would protect and promote riparian vegetation. Riparian areas would be surrounded by Riparian Management Zones (RMZ) which provide an area for special consideration when treated by other project activities, such as thinning and burning. These RMZs cover approximately 9,378 acres across the project area and would protect the riparian and aquatic habitats they encompass. Some riparian areas would be thinned by having the conifers removed that are suppressing the riparian vegetation. This would allow the riparian vegetation, such as cottonwoods, willows and alders, to expand, contributing to diversity and improved MSO habitat. Riparian areas would also indirectly benefit from this project, as the surrounding area treated by this project would reduce the risk of catastrophic wildfire in the riparian areas, thus maintaining riparian areas for MSO use.

As part of this project, a desired condition is to protect and promote old growth habitat. Currently, there are no officially designated or mapped old growth areas in the project or analysis area. However, areas that most closely meet the characteristics for old growth habitats can be found in areas that would already be managed for MSO, such as PACs, Recovery Habitat and Restricted Areas. Managing these areas for MSO would also promote the old growth habitat as the areas are managed to maintain features such as the largest trees, higher basal areas, more downed logs and snags, and denser canopy cover. Additionally, some areas would not be thinned, as they are too steep, which may have old growth or have the potential to develop into such and thus would continue as old growth habitat or continue on their trajectories that may develop into old growth habitats. Burning is unlikely to change the old growth features as prescribed burning is proposed to be implemented at lower intensities and mosaic patterns.

Prescribed burning would be implemented by one or a combination of hand-torches, ATV/UTVs and aerial ignitions. In many cases, suitable recovery habitat is inaccessible via motorized travel, therefore aerial ignitions would likely be used with a smaller utilization of ATVs/UTVs for prescribed burning. This reduces soil disturbance from ATV/UTVs along with a reduced risk of weed introductions. Personnel would not be traversing the whole project area, but rather would mostly use areas with less steep slopes. Anticipated fire activity may include some moderate fire intensities with occasional single-tree or group touching occurring where ladder fuels are present. Some large diameter trees and logs could be consumed in areas of moderate fire intensity, however low intensity fires would primarily kill small trees less than 10-inches in diameter along with the smaller diameter dead and down fuels. Over most of the recovery habitats, the overstory forest canopy would be retained with minimal modifications (created openings), even though individual trees and small patches may be burned. Thus, the amount of MSO nesting and roosting habitat would not be substantially reduced in the short term and would increase in the future. Prescribed fire activities would be implemented with an approved burn plan assuring firefighter safety and low to moderate intensity fire to mitigate potential resource impacts. Burning

conditions and ignition patterns would limit the fires' rate of spread and consumption of downed woody materials.

4.6. Project Forest Plan Amendments Effects on Mexican spotted owl

As part of the proposed action, Forest Plan Amendments are proposed in order to meet the project objectives and to ensure the project proposed actions are following the current MSO Recovery Plan (2012) and best available science/management recommendations, such as for goshawks.

The Forest Plan Amendments would adopt aspects of the current MSO recovery plan (the existing Forest Plan includes the outdated MSO Recovery Plan (1995)), including to allow vegetation treatment that would benefit MSO and meet fuels objectives within MSO PACs, outside the nest/roost core, and during the breeding season if surveys indicate MSO are not breeding in the PAC proposed for treatment that year. This is unlikely to disturb MSO, considering the requirements to ensure MSO are not using the area for breeding and because the treatments would be focused on removing smaller trees that do not contribute to important habitat characteristics of nesting and roosting habitat, and would provide a benefit by reducing the risk of PAC habitat loss in the event of a wildfire. Allowing for treatments in PACs that would reduce the risk of catastrophic wildfire would provide a beneficial impact for MSO by protecting and maintaining occupied and potentially suitable habitat, both in and surround PACs, into the future.

Another Forest Plan amendment clarifies the need for interspaces related to Goshawk habitat as recommended in RMRS-GTR-310 (Reynolds et al. 2013). This would provide for achieving northern goshawk habitat objectives, which would benefit goshawk habitat by providing landscape level condition changes. The interspaces (spaces between trees, tree groups and tree clumps) contribute to "open canopy" character of frequent-fire forests. They often connect with other interspaces and thus are variably shaped and sized. This would contribute to a mosaic of habitats available, from open areas, to dense clumps of trees, which would provide a diversity of habitat for goshawks and their prey, such as nesting in dense clumps, but also foraging opportunities throughout the available habitats. This would largely occur in the ponderosa pine vegetation areas, which are not the preferred mixed conifer habitat of MSO. However, ponderosa pine often borders and blends into the mixed conifer vegetation areas, likely providing opportunities for MSO, including foraging. The diversity of tree clumps and openings would provide an array of habitats for many MSO prey species, specifically rodents and small birds, thus would provide a beneficial increase in foraging opportunities. Clumps of trees would continue to provide opportunities for roosting or nesting for MSO, if within suitable habitats.

Much of the Forest Plan Amendments are largely clarifications and simply shifts in terms and wording to ensure the project follows the current MSO Recovery Plan, which would benefit MSO by providing the proper protections and by guiding vegetation management.

The Forest Plan Amendments for this project would not negatively effect MSO and are likely to benefit MSO and their habitats.

4.7. Cumulative effects

Under ESA, cumulative effects are defined as the effects of the proposed federal action in the context of reasonably foreseeable future State or private activities that may also affect the analysis area (50 CFR 402.02). Forest thinning and burning are reasonably foreseeable activities that may occur within the analysis area. Actions similar to the proposed action may be conducted by the city of Santa Fe, Tribal and State entities throughout the Greater Santa Fe Fireshed Area. Forest thinning and prescribed burning on non-Forest Service land would largely be in areas that are typically not MSO

habitat (e.g. pinyon-juniper in lower elevations) or on relatively smaller areas of land. Table 10 below lists reasonably foreseeable activities in the general area, including both federal and non-federal actions. All previously authorized federal actions have been analyzed for MSO and have been consulted on with the USFWS as applicable, and future projects would also be subject to ESA consultation.

Table 10. Actions Considered for Cumulative Impacts to Resources within the Santa Fe Mountains (SFM) Project Analysis Area.

Action	Summary of Action	Cumulative Effects Related to MSO
Pacheco Canyon Forest Resilience Project	<p>The scope of the project is to thin and use prescribe fire on approximately 2,042 acres northeast of the City of Santa Fe, near several popular recreation sites, including the Big Tesuque Campground, Aspen Vista Picnic Area, and the Santa Fe Ski Basin. Tesuque Pueblo lands are within and northeast of the project area. The purpose of the project is to change stand conditions in predominantly ponderosa pine forests in the Pacheco Canyon area. The actions proposed to accomplish this change would be thinning and burning about 2,042 acres.</p> <p>Decision signed on June 1, 2018.</p>	<p>The Pacheco Project was determined to have no effects to MSO, however anticipated to have beneficial effects in the long-term. Those treatments, in conjunction with the SFM proposed action, would move ecosystems of the area toward desired conditions including for wildlife habitats. MSO and their habitats would continue to be protected and/or improved as per the Recovery Plan, Forest Plan and Project design. Neither of these projects are anticipated to have substantial negative effects, largely only short-term, and would have longer-term positive effects. Thus, it is anticipated that there would be no contribution to cumulative effects for MSO.</p>
La Cueva Fuelbreak Project	<p>The purpose of the project is to change fire behavior in treated areas to reduce the risk of a large-scale, high intensity wildfire spreading to or from the communities of La Cueva, Dalton Canyon, and the Santa Fe Watershed. This project proposes creation of a shaded fuelbreak by thinning 995 acres and conducting prescribed burns (pile and broadcast burning) on approximately 1,100 acres.</p> <p>Decision signed on February 4, 2005</p>	<p>The La Cueva Project likely had minimal to no effects to MSO, including anticipated beneficial effects. Those treatments, in conjunction with the SFM proposed action, would move ecosystems of the area toward desired conditions including for wildlife habitats. Species and habitats would continue to be protected and/or improved as per the Forest Plan and Project design. Neither of these projects are anticipated to have substantial negative effects, largely only short-term, and would have longer-term positive effects. Thus, it is anticipated that there would be no contribution to cumulative effects for MSO.</p>
County Line Fuel Wood Treatments	<p>The purpose of the project is to improve forest health and wildlife habitat through a combination of thinning and prescribed burning across approximately 900 acres on Borrego Mesa.</p> <p>Decision signed on August 6, 2010</p>	<p>The County Line Project for forest health and wildlife habitat would likely have minimal to no effects to MSO, including anticipated beneficial effects. Those treatments, in conjunction with the SFM proposed action, would move ecosystems of the area toward desired conditions including for wildlife habitats. Species and habitats would continue to be protected and/or improved as per the Forest Plan, Recovery Plans and Project design. Neither of these projects are anticipated to have substantial negative effects, largely only short-term, and would have longer-term positive effects. Thus, it is anticipated that there would be no contribution to cumulative effects for MSO.</p>

Action	Summary of Action	Cumulative Effects Related to MSO
Southern Rowe Mesa Restoration Project	<p>The purpose of this project is to promote a mosaic of healthy forest stands and natural grasslands through thinning and prescribed burning activities on approximately 17,500 acres on Rowe Mesa.</p> <p>Decision signed on February 21, 2013.</p>	<p>The Southern Rowe Mesa Project was determined to have minimal to no effects to species, including anticipated beneficial effects. Those treatments, in conjunction with the SFM proposed action, would move ecosystems of the area toward desired conditions including for wildlife habitats. Species and habitats would continue to be protected and/or improved as per the Forest Plan, Recovery Plans and Project design. Neither of these projects are anticipated to have substantial negative effects, largely only short-term, and would have longer-term positive effects. Thus, it is anticipated that there would be no contribution to cumulative effects for MSO.</p>
Hyde Park Wildland Urban Interface Project	<p>The scope of the project is to thin and use prescribe fire on up to 1,840 acres. The project area is dominated by dense stands of ponderosa pine forests with a lesser component of mixed conifer and pinon-juniper. The project area is located in forests east of the community of Hyde Park Estates, near Hyde Memorial State Park, and adjacent to Black Canyon campground. The purpose of this project is to reduce the risk of uncharacteristic, stand-replacing wildfire and reduce the risk for insect and disease related tree mortality within the project area.</p> <p>Decision signed on March 21, 2018.</p>	<p>The Hyde Project was determined to have minimal effects to MSO, including anticipated beneficial effects. Those treatments, in conjunction with the SFM proposed action, would move ecosystems of the area toward desired conditions including for wildlife habitats. Species and habitats would continue to be protected and/or improved as per the Recovery Plan, Forest Plan and Project design. Neither of these projects are anticipated to have substantial negative effects, largely only short-term, and would have longer-term positive effects. Thus, it is anticipated that there would be no contribution to cumulative effects for MSO.</p>
Santa Fe Municipal Watershed	<p>The scope of the project is to use a combination of tree thinning and prescribed burning on up to 7,270 acres of national forest and city lands in the Santa Fe Municipal Watershed. The proposal is designed to reduce the risk of a severe crown fire and to restore sustainable forest and watershed conditions in the Watershed.</p> <p>Record of Decision signed in October 2001.</p>	<p>The SF Watershed Project was determined to have minimal to no effects to species, including anticipated beneficial effects. Those treatments, in conjunction with the SFM proposed action, would move ecosystems of the area toward desired conditions including for wildlife habitats. Species and habitats would continue to be protected and/or improved as per the Recovery Plan, Forest Plan and Project design. Neither of these projects are anticipated to have substantial negative effects, largely only short-term, and would have longer-term positive effects. Thus, it is anticipated that there would be no contribution to cumulative effects for MSO.</p>
Santa Fe Municipal Watershed Pecos Wilderness Prescribed Burn Project	<p>The project proposes to perform prescribed burns of between 200 and 2,100 acres at one time in ponderosa pine and mixed conifer stands within an approximately 2,900-acre, mid elevation (8,500 – 10,000 ft) treatment area within the Pecos Wilderness.</p> <p>Decision signed on April 28, 2015.</p>	<p>The SF Watershed Wilderness Burn Project would likely have minimal to no effects to species, including anticipated beneficial effects. Those treatments, in conjunction with the SFM proposed action, would move ecosystems of the area toward desired conditions including for wildlife habitats. Species and habitats would continue to be protected and/or improved as per Recovery Plan, the Forest Plan and Project design. Neither of these projects are anticipated to have substantial negative effects, largely only short-term, and would have longer-term positive effects. Thus, it is anticipated that there would be no contribution to cumulative effects for MSO.</p>

Action	Summary of Action	Cumulative Effects Related to MSO
Rowe Mesa II (U.S. Forest Service n.d.)	<p>Fuel treatment to promote a mosaic of healthy forests stands and natural grasslands by thinning and prescribed burning in pinon/juniper, and ponderosa pine trees that have encroached into the understory of woodlands and into meadows of Rowe Mesa.</p> <p>Project initiation 12/19/2018; expected implementation 4/2020.</p>	<p>The Rowe Mesa II Project on Rowe (Glorieta) Mesa does not yet have a developed proposed action enough to determine potential impacts, however, assuming it would follow Forest Plan requirements for all species (T&E, Sensitive, MIS, etc.), it would likely be consider and protect those species through project IDFs, thus likely having minimal to no effects to species, including anticipated beneficial effects. Those treatments, in conjunction with the SFM proposed action, would move ecosystems of the area toward desired conditions including for wildlife habitats. Species and habitats would continue to be protected and/or improved as per the Forest Plan and Project design. There is very little potentially suitable habitat on Glorieta Mesa. Neither of these projects are anticipated to have substantial negative effects, largely only short-term, and would have longer-term positive effects. Thus, it is anticipated that there would be no contribution to cumulative effects for MSO.</p>
Century Link/PNM Santa Fe to Los Alamos Fiber Optic Project (U.S. Forest Service n.d.)	<p>Proposal to bury a fiber optic line along Forest Road 24 on Santa Fe National Forest land to a PNM transmission line where it will be carried to DOE facilities to improve service to Los Alamos National Lab and Los Alamos community.</p> <p>Notice of initiation 10/1/2018.</p>	<p>Project is beyond the analysis area for the SFM project. Potential impacts from each project are unlikely to overlap or be considered cumulative effects to species and their habitats.</p>
Issuance of Forest-wide Temporary and Priority Special Use Permits (SUPs) for Non-Motorized Over-Snow Activities (U.S. Forest Service n.d.)	<p>Proposal to approve issuance of temporary and priority SUPs for outfitter and guides throughout the Santa Fe National Forest to conduct guided recreation activities related to over-snow uses, including but not limited to cross country skiing and snow shoeing.</p> <p>Notice of initiation 12/1/2019.</p>	<p>Outfitter and Guide Permits are highly variable in scope. Most can be mitigated to reduce impacts to species and habitats. Therefore, many of these projects would not have considerable effects on species if they include mitigations or if they do not occur near species habitat or during breeding seasons. If they did though, then there could be an effect, however these permit activities are usually spread across the landscape and would generally not focus repeated impacts in a specific area. It is unlikely that these projects in conjunction with the SFM project would result in cumulative negative effects.</p>
Rio Chama Aquatic and Wetland Habitat Restoration Project (U.S. Forest Service n.d.)	<p>Species habitat improvement project to increase diversity and quality of aquatic habitat for fish and invertebrates in Rio Chama downstream from Abiquiu Dam approximately 5.6 miles between Santa Fe and Carson National Forests to point 1.34 miles upstream of Highway 84 bridge.</p> <p>Notice of initiation 10/1/2019; expected implementation 4/2020.</p>	<p>Project is beyond the analysis area for the SFM project. Potential impacts from each project are unlikely to overlap or be considered cumulative effects to species and their habitats.</p>

Action	Summary of Action	Cumulative Effects Related to MSO
Comexico Jones Hill Exploration (U.S. Forest Service n.d.)	<p>Exploratory drilling operation on unpatented mining claims in Pecos/Las Vegas Ranger District of SFNF. Proposal will cause approximately 5-7 acres of surface disturbance in an area that has been previously disturbed by earlier exploration date. All activities will occur within 1-3 year of the state date.</p> <p>Scoping was conducted in December 2019; expected implementation 10/2021.</p>	<p>Project is beyond the analysis area for the SFM project. Potential impacts from each project are unlikely to overlap or be considered cumulative effects to species and their habitats. Both projects include mitigations to protect MSO and their habitats.</p>
Pecos Bike Trails (U.S. Forest Service n.d.)	<p>Project to develop trail system and impress access and promote visitor safety in Canada de Los Alamos/Glorieta area.</p> <p>Notice of initiation 11/1/2019; expected implementation 2/2020.</p>	<p>Bike trails may slightly increase human presence near MSO habitats. Project mitigations may reduce this potential. The slight increase of human presence is unlikely to measurably alter MSO habitats or present substantial disturbance to the species.</p>
Pecos Rio Grande Cutthroat (RGCT) Trout Restoration (U.S. Forest Service n.d.)	<p>Project to restore RGCT populations to Willow Creek and upper Cow Creek by adding 9 miles of stream to currently occupied distribution.</p> <p>Scoping occurred February 2019.</p>	<p>Project is beyond the analysis area for the SFM project. Potential impacts from each project are unlikely to overlap or be considered cumulative effects to species and their habitats.</p>
Non-Forest Service Projects		
Aztec Springs, Phase 2 & 3 (City of Santa Fe, The Nature Conservancy, New Mexico State Forestry)	<p>150 acres of thinning, piling, and prescribed burning activities.</p>	<p>Project is likely similar to nearby planned FS projects, such as SFM project. Project likely complement each other in the protection of habitats from catastrophic wildfire. Projects likely have similar anticipated impacts to species, which are none or minimal, including some benefits. Projects are not anticipated to cumulatively exceed any negative impact thresholds for MSO and their habitats.</p>
Aspen Ranch (Pueblo of Tesuque)	<p>160 acres of thinning, piling, and prescribed burning activities in ponderosa pine and mixed conifer.</p>	<p>Project is likely similar to nearby planned FS projects, such as SFM project. Project likely complement each other in the protection of habitats from catastrophic wildfire. Projects likely have similar anticipated impacts to species, which are none or minimal, including some benefits. Projects are not anticipated to cumulatively exceed any negative impact thresholds for MSO and their habitats.</p>
Vigil Grant (Pueblo of Tesuque)	<p>158 acres of thinning, piling, and prescribed burning activities in ponderosa pine and mixed conifer.</p>	<p>Project is likely similar to nearby planned FS projects, such as SFM project. Project likely complement each other in the protection of habitats from catastrophic wildfire. Projects likely have similar anticipated impacts to species, which are none or minimal, including some benefits. Projects are not anticipated to cumulatively exceed any negative impact thresholds for MSO and their habitats.</p>

Action	Summary of Action	Cumulative Effects Related to MSO
Hyde Memorial State Park (New Mexico State Forestry)	Thinning, piling, and prescribed burning across 276 acres in Hyde Memorial State Park.	Project is likely similar to nearby planned FS projects, such as SFM project. Project likely complement each other in the protection of habitats from catastrophic wildfire. Projects likely have similar anticipated impacts to species, which are none or minimal, including some benefits. Projects are not anticipated to cumulatively exceed any negative impact thresholds for MSO and their habitats.
City of Santa Fe Planned Communities and Infrastructure Projects	<p>Three master planned communities that is projected to absorb most of Santa Fe’s growth through 2030</p> <ul style="list-style-type: none"> • Tierra Contenta Master Plan (1995) • Las Soleras Master Plan (2008) • Northwest Quadrant (2010) <p>Roadway improvements, trails and urban mixed use and parks (Southwest Activity Node, Las Soleras Park, and South Meadows Park) (City of Santa Fe 2017).</p> <p>Multiple drainage projects are proposed by City of Santa Fe in Council Districts 1, 2, 3, and 4 to be completed in three phases between 2019 and 2022 (City of Santa Fe n.d.).</p>	Project is beyond the analysis area for the SFM project. Potential impacts from each project are unlikely to overlap or be considered cumulative effects to MSO and their habitats.
Santa Fe River Greenway R&PP Lease Project	EA (released 11/21/19) for the conveyance of 23.5 acres of BLM-administered public lands to Santa Fe County under the Recreation and Public Purpose Act (R&PP) for the construction and maintenance of a short segment of the greenway and for bank stabilization of the Santa Fe River. The proposed project will create a greenway of public parks and multi-use recreational trails along the Santa Fe River from Two-mile Reservoir in eastern Santa Fe west to the Santa Fe County wastewater treatment plant, which is located just west of New Mexico Highway 599 (BLM 2019a).	Santa Fe Greenway project is unlikely to have negative impacts and cumulatively would improve and protect habitats (bank stabilization) adjacent to the SFM projects. With little to no negative impacts from these projects and the SFM project, it is not anticipated to cumulatively exceed any negative impact thresholds for MSO and their habitats.

Note: Projects listed as on hold in the Schedule of Proposed Action (SOPA) were not included in this table.

The proposed project would not contribute adverse cumulative effects on T&E species, or proposed or designated critical habitat for the following reasons:

- The SFM project would follow MSO Recovery Plan requirements
- The SFM project would implement Integrated Design Features that protect and improve MSO habitats
- This project would add to and magnify the beneficial effects to MSO habitat through future forest restoration treatments.
- Potential cumulative effects projects within the SFM analysis area are not likely to adversely affect MSO, but rather would likely protect and benefit them.

The proposed project would have no cumulative adverse effects on MSO because the proposed project would not adversely affect the species and no known or reasonably foreseeable activities are proposed that would have adverse effects on this species. This project and adjacent projects, even when combined, do not rise to a cumulative level that would adversely affect this species.

4.8. Summary and determination of effects

The Forest Plan and Recovery Plan provide implementation guidance to avoid or reduce potential effects to Mexican spotted owls, designated critical habitat and forest conditions that contribute to conservation and recovery. The project-level Integrated Design Features (IDFs) provide further guidance for avoiding direct and indirect adverse effects to MSO. This project was developed to improve forest conditions, including habitat for Mexican spotted owls, and the implementation guidance further minimizes the risk of adverse effects. Overall, potential affects to MSO are expected to be insignificant and discountable, whereas there will be substantial benefits to forest conditions resulting from project implementation (Table 11).

Table 11. Summary of effects of implementing the SFM project on habitat conditions important for Mexican spotted owls, compared against taking no action.

Resource	Proposed Action	No Action
Mexican Spotted Owl Suitable Habitat Acres	Increase in habitat diversity. Potential for long term increase. Reduced risk of habitat loss from high intensity wildfire. See specific components below.	No change short term. Risk of habitat loss from high intensity wildfire remains elevated. See specific components below.
Large Snags	Snags would not be removed during thinning. Some may burn during prescribed burning, but would not be targeted. Some snags may be created by burning or other intentional means if lacking. Therefore, overall, no change. The proposed action promotes larger trees, which would eventually die over time, creating large snags.	No change short term. Risk of high intensity wildfire remains elevated which could lead to an excess of snags.
Large Downed Logs	Large Downed Logs would not be removed during thinning. Some may burn during prescribed burning, but would not be targeted. Some burned snags may fall and become downed logs. Overall, no change.	No change short term. Risk of habitat loss from high intensity wildfire remains elevated.
Large Trees (>16" DBH)	Large trees would not be removed during thinning. Some may burn during prescribed burning, but would not be targeted. Larger pine trees would likely not be killed during	Large tree loss would continue over long term due to competition, insects and disease. Risk of habitat loss from high intensity

Resource	Proposed Action	No Action
	burning due to fire-resistant bark. Large trees may experience less competition and improved health and resilience.	wildfire remains elevated.
Canopy Cover over 40%	Smaller/Medium-sized trees that are not removed would be allowed to expand their crowns to contribute to higher canopy cover. Recovery Habitats that are currently over 40% canopy cover, would not be reduced below 40%.	No change short term. Risk of habitat loss from high intensity wildfire remains elevated.
MSO Prey	Burning would limit cover for small mammals for a short period (less than a year), but subsequent growth would provide more cover and forage. Stimulation of herbaceous understory; creates more prey forage in grasses, leaves, flowers and seeds. Improved aspen stands would contribute to diversity and abundance of prey.	No change short term. Risk of habitat loss from high intensity wildfire remains elevated. Aspen loss would continue so that species associated with aspen would decline.
Risk of catastrophic fire	The 2012 Recovery Plan identified catastrophic wildfire as one of the most significant threats to MSO. By reducing fuels through thinning and prescribed fire, and by generating patchy fuel conditions across the project area, implementation of this project is expected to decrease the risk of catastrophic wildfire.	Continued accumulation of fuels. Risk of habitat loss from high intensity wildfire remains elevated.

Based upon the analysis of the proposed activities within the project and analysis area, which assume compliance with the forest plan, the 2012 MSO Recovery Plan and all project integrated design features, implementation of the SFM project **may affect, but is not likely to adversely affect** the Mexican spotted owl. Thinning and prescribed fire activities in PACs may result in minor disturbance to owls during the non-breeding season. However, most of these actions would be implemented where owls are not present and implementation within PACs would follow design features to avoid harm or harassment of Mexican spotted owls. This project may also have some potential short-term negative effects on potential MSO habitat resulting in beneficial long-term effects (e.g., disturbance associated with thinning dense stands of small trees to promote desired conditions of vegetation structure and reduced wildfire risk). However, these effects would only occur in areas with suboptimal forest structure, so there would be no reduction in the area or quality of MSO habitat within PACs that meets the desired conditions in the 2012 Recovery Plan.

Critical Habitat is designated within project and analysis area, including areas where activities are proposed. All Recovery Plan guidance regarding Critical Habitat management would be followed to maintain existing Primary Constituent Elements and improve conditions for MSO. The proposed action is likely to have some short-term effects on PCEs (e.g., temporary habitat disturbance from prescribed fire or thinning), but the activities would produce long-term beneficial effects to PCEs through promoting desired habitat conditions for MSO and reducing the risk of catastrophic wildfire. Therefore, the project **may affect, but is not likely to adversely affect** MSO Critical Habitat.

The effects to recovery nest/roost habitat of the proposed activities were analyzed, and nest/roost habitat was designated for this project to comply with the forest plan amendment aligning this project with the 2012 Recovery Plan. Recovery nest/roost habitat is, by definition, unoccupied by MSO, and potential disturbance activities would be preceded by owl surveys, so direct effects on MSO from

project implementation in these areas is very unlikely. Indirect effects through habitat alteration are possible, but such an analysis would be speculative given the uncertainty of where and when MSO may establish nesting or roosting sites. Therefore, the evaluation of how the project will affect recovery nest/roost habitat is not incorporated into the determination of effects subject to ESA Section 7(a)(2) consultation. Overall, the project is expected to improve forest composition and structure in recovery habitats (both nest/roost and foraging/dispersal) and reduce the risk of catastrophic wildfire. By managing for the desired conditions described in the 2012 Recovery Plan and following implementation guidance to avoid departure from those conditions where they already occur, this project contributes to the Santa Fe National Forest's commitment to support Mexican spotted owl conservation and recovery.

5. Contributors

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Appendix A – Project Integrated Design Features (IDFs)

The IDFs below are implementation parameters that would be incorporated into treatments, contracts, and used to guide Forest Service personnel in conducting implementation. IDFs are developed by resource specialists to ensure the avoidance and minimization of effects from implementation actions and would be integrated as part of this project. The following are IDFs that are relevant to biology resources (e.g. T&E wildlife), but a full list of IDFs for other resources (e.g. heritage, recreation, etc.) can be found in the EA and project record and as appendices for the project Decision. These design features would be implemented as part of this project. The design features described below may not include existing requirements through the current Forest Plan, but may include items proposed in the ongoing Forest Plan revision as well as project-specific design features.

This section comes directly from the EA and provides a list of integrated design features that would be implemented to avoid, minimize, or eliminate adverse impacts that might result from implementation of the Proposed Action (40 CFR 1508.20). These design features are integral to, and are considered part of, the Proposed Action. The analysis of effects presented in **Error! Reference source not found.** of the EA is based on implementation of these non-discretionary features. No mitigation actions are required to implement the Proposed Action because the analysis of effects (**Error! Reference source not found.**) does not indicate the need for any protective measures in addition to the project design features.

These would be implemented in addition to standards and guidelines from the Santa Fe National Forest LRMP Best Management Practices (BMPs), Regional Invasive Species guidance, New Mexico Air Quality Regulations, as well as Threatened and Endangered Wildlife Species Recovery Plans.

Place holder - INSERT CURRENT IDFS