United States Department of Agriculture

Biological Assessment for the Carson National Forest Land Management Plan

Rio Arriba, Taos, Mora, and Colfax Counties, New Mexico

Forest Service Carson National Forest December 2020

Executive Summary

A revised land management plan is being proposed for the Carson National Forest (figure 1). This biological assessment considers the potential effects of the proposed land management plan (preferred alternative) on nine species federally listed for the Carson National Forest (table 1). According to USDI Fish and Wildlife Service (2019b), these listed species include Jemez Mountain salamander, piping plover, least tern, Mexican spotted owl, southwestern willow flycatcher, western yellow-billed cuckoo, black-footed ferret, Canada lynx, and New Mexico meadow jumping mouse. There are no candidate species at this time for the Carson National Forest (USDI FWS 2019b).

The proposed action ***may affect,*** and is ***likely to adversely affect*** Mexican spotted owl. The proposed action **m*ay affect,*** and is ***not likely to adversely affect*** southwestern willow flycatcher and Canada lynx. The proposed action ***may affect,*** but is ***not likely to adversely affect designated critical habitat*** for the Mexican spotted owl and southwestern willow flycatcher. There is no proposed or designated critical habitat on the Carson for Canada lynx.

We determined that the following species were not likely to occur on the Carson National Forest nor be impacted by Forest Service actions addressed in the proposed land management plan: black-footed ferret, New Mexico meadow jumping mouse, western yellow-billed cuckoo, Jemez Mountain salamander, least tern, and piping plover. Therefore, ***no effect determinations*** were made for black-footed ferret, New Mexico meadow jumping mouse, western yellow-billed cuckoo, Jemez Mountain salamander, least tern, and piping plover (see Appendix A for more detail).

Table 1. Determination for federally listed species and designated critical habitats addressed in this biological assessment (USDI FWS 2019b)

Species Common Name and Scientific Name	Federal Status	Critical Habitat within Action Area	Recovery Plan	Species Determination	Critical Habitat Determination
Jemez Mountain salamander *Plethodon neomexicanus*	Endangered	None designated	No	*No Effect*	*Not applicable*
Least tern *Stern antillarum*	Endangered	None designated	Yes	*No Effect*	*Not applicable*
Mexican spotted owl *Strix occidentalis lucida*	Threatened	Yes	Yes	*May affect, likely to adversely affect*	*May affect, not likely to adversely affect*
Piping plover *Charadrius melodus*	Threatened	None designated	Yes	*No Effect*	*Not applicable*
Southwestern willow flycatcher *Empidonax traillii extimus*	Endangered	Yes	Yes	*May affect, not likely to adversely affect*	*May affect, not likely to adversely affect*
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	Threatened	None Proposed	No	*No Effect*	*Not applicable*
Black-footed ferret *Mustela nigripes*	Endangered	None designated	Yes	*No Effect*	*Not applicable*
Canada lynx *Lynx canadensis*	Threatened	None designated	No	*May affect, not likely to adversely affect*	*May affect, not likely to adversely affect*
New Mexican meadow jumping mouse *Zapus hudsonius luteus*	Endangered	None designated	No	*No Effect*	*Not applicable*

Commonly Used Acronyms

BO	biological opinion
CDNST	Continental Divide National Scenic Trail
CFR	Code of Federal Regulations
CO	conference opinion
CWD	coarse woody debris
DA	Designated Area
DBH	diameter at breast height
GIS	geographic information system
HUC	hydrologic unit code
IRA	inventoried roadless area
MA	management area
NEPA	National Environmental Policy Act
NF	National Forest
NM	New Mexico
RD	Ranger District
SWWF	southwestern willow flycatcher
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
VDDT	Vegetation Dynamics Development Tool
WUI	wildland-urban interface

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Introduction

This biological assessment has been prepared for the initiation of Endangered Species Act section 7(a)(2) consultation on the proposed revised land management plan (proposed land management plan) for the Carson National Forest (or Carson, figure 1) of the U.S. Department of Agriculture, Forest Service, Southwestern Region.

This biological assessment is an analysis of the potential effects to federally listed species and their designated critical habitats from implementing the direction described in the proposed action (preferred alternative). The Carson proposed land management plan was prepared and revised as required by the National Forest and Rangeland Renewable Resources Planning Act of 1974, and as amended by the National Forest Management Act of 1976, in compliance with the 2012 Planning Rule. Once finalized, the revised land management plan will replace the 1986 Carson land management plan and its amendments.

The proposed land management plan provides forest-level direction (plan components) to meet the Forest Service's mission for program management activities. It is largely strategic in nature but does address the types of activities to be conducted on the Carson National Forest. The proposed land management plan does not specifically authorize individual projects or activities. Site-specific actions will be subject to future and separate Endangered Species Act section 7(a) (2) consultations.

In this biological assessment, the Carson is consulting on the land management plan's resource program administration, as well as "plan components" (desired conditions, objectives, guidelines, standards, designated areas, and management areas; these are discussed in detail below). Plan components constitute the decisions being made by adopting the land management plan. Desired conditions describe an aspirational vision, objectives are quantifiable intended outcomes, standards and guidelines are constraints on project design. Most of the actions being consulted on are from program management activities and objectives, while standards and guidelines tend to mitigate effects of the actions (hence, they result in reduced effects). Desired conditions can also help to reduce effects or contribute to recovery as projects implemented under the plan must move toward desired conditions. Program management is similar to when the Carson National Forest consulted on the previous land management plan, so that analysis (consultation #2012-F-0002) serves as a partial basis for an effects determination, although the proposed land management plan contains a greater emphasis on vegetation and watershed restoration (which may have short-term effects while targeting long-term benefits).

The determination of effects for each species and designated critical habitats results from evaluating the potential outcome of plan components imposed in the land management plan direction (objectives, standards and guidelines, suitability determinations, and management area direction) and assumes that land management plan guidance will be followed when site-specific land management activities are carried out in the future. Because land management plans do not authorize site-specific actions, nor do they typically prescribe the timing or exact location of specific land management activities, there is substantial uncertainty about the timing, location, intensity, and actual environmental consequences of future actions implementing land management plan direction.

Land management plans are broad planning documents that guide the long-term management of national forests. Unless it expressly states otherwise, a land management plan does not authorize any on-the-ground or site-specific action. Future site-specific management actions will be subject to individual, project-level National Environmental Policy Act and Endangered Species Act requirements. Each site-specific project or activity implemented under the revised land management plan that may affect a listed

species or critical habitat will undergo a separate environmental analysis and Endangered Species Act section 7(a)(2) consultation.

While site-specific management actions must be consistent with the governing forest plan pursuant to the National Forest Management Act, many of these actions are already otherwise authorized under existing Federal statutes and regulations. For example, the General Mining Law of 1872 generally makes public lands available for mineral exploration. Likewise, the Organic Act and regulations codified at 36 CFR 222 allow for grazing on national forests. Land management plans provide guidance for and constraints on these actions on individual forests. Since these actions are otherwise allowed, the primary effect of the forest plan on listed species and critical habitat is often to constrain existing statutory and regulatory discretion in favor of recovery and protection of those species and habitat.

The Carson land management plan meets the definition of a 'framework programmatic document' under 50 CFR 402.14. The land management plan provides a strategic framework for future actions on the national forest, but does not authorize those actions. Under this programmatic plan, future actions with significant environmental impacts would be analyzed in future National Environmental Policy Act processes prior to authorization of on-the-ground activities. As outlined in this biological assessment, the land management plan does not prescribe the timing or exact location for specific land management activities in the future. Because of the programmatic nature of the land management plan, determination of the likelihood or extent of potential future incidental take would be highly speculative and difficult or impossible to determine for potential future actions. Therefore, we request that the USDI Fish and Wildlife Service use the revised regulation and consult on the land management plan as a framework programmatic action (50 CFR 402.12).

Because land management plans do not prescribe the timing or exact location of specific land management activities, there is some uncertainty about the potential environmental consequences of implementing land management plan direction. This uncertainty extends to effects on federally listed species and their designated critical habitats if applicable. Some of the objectives, however, prescribe an annual treatment rate that can be used to describe the timing and intensity of a particular activity or type of action. This biological assessment evaluates the potential effects of the land management plan's programmatic direction that may result in site-specific land management activities. The determination of effects results from evaluating the expected outcome of implementing land management plan direction (objectives, standards and guidelines, suitability determinations, designated areas direction, and management area direction). Amending a land management plan (for example, deleting/adding/changing standards and guidelines and other plan components) either for site-specific projects or programmatically (i.e., a permanent change for all future projects) should and will occur on an as-needed basis to adaptively keep the land management plan up to date. Such amendments would be considered outside of the scope of this consultation and would require their own site-specific Endangered Species Act section 7(a)(2) consultation to address the effects of the proposed actions.

A tiered approach to Endangered Species Act section 7(a)(2) consultation includes consultation at the land management plan programmatic level that may result in a biological opinion with no incidental take statement and reasonable and prudent measures. Additionally, each site-specific project or activity implemented under the revised land management plan that may affect a listed species or critical habitat will undergo a separate Endangered Species Act section 7(a)(2) consultation, which will be tiered to the programmatic-level land management plan biological opinion.

The objectives of this biological assessment are to comply with requirements of section 7(a)(2) of the Endangered Species Act for the Carson's proposed land management plan. This includes reviewing the current land management programs to identify ongoing activities and programmatic direction that may

affect federally listed, proposed, and candidate species, as well as designated or proposed critical habitats within the action area.

Only those species that use the national forest, have suitable habitat present, and/or could be impacted by off-forest management effects (for example, upstream/downstream effects) were fully analyzed.

Please note, wildland fire suppression activities are covered under Endangered Species Act section 7(a)(2) emergency procedures; therefore, they are not included in the proposed action for this consultation.

Species Addressed

Federally listed threatened and endangered species are those plant and animal species formally listed by the USDI Fish and Wildlife Service under authority of the Endangered Species Act of 1973, as amended. Pursuant to section 7(2)(a) of the act, a biological assessment will be prepared to assess the effects of implementing the Carson land management plan preferred alternative on endangered and threatened species and ensure that proposed actions in the selected alternative would not jeopardize the continued existence of listed species.

According to USDI Fish and Wildlife Services (2019, iPaC # 02ENNM00-2019-SLI-0621), listed species include Jemez Mountain salamander, piping plover, least tern, Mexican spotted owl, southwestern willow flycatcher, western yellow-billed cuckoo, black-footed ferret, Canada lynx, and New Mexico meadow jumping mouse (table 2). Only those species that use the forest, have suitable habitat present, and/or could be impacted by off-forest management effects (for example, downstream effects) are addressed within this biological assessment.

Mexican spotted owl has designated critical habitat (22,954 acres) on the Jicarilla Ranger District, but numerous surveys throughout the forest have not confirmed breeding of this species on the Carson since 1993. Southwestern willow flycatcher has designated critical habitat (123 acres) on the Camino Real Ranger District and is federally listed as endangered. Southwestern willow flycatchers has been detected in two locations on the Carson. Canada lynx is federally listed as threatened, and no critical habitat has been designated on the Carson. Canada lynx is not currently known to den or breed on the Carson National Forest, but occasionally an individual lynx may roam out of Colorado onto the national forest. Western yellow-billed cuckoo is federally listed as threatened west of the Rio Grande (distinct population segment), and no critical habitat has been designated on the Carson for this species.

We determined that the following species were not likely to occur on the Carson National Forest nor be impacted by Forest Service actions addressed in the proposed land management plan: black-footed ferret, New Mexico meadow jumping mouse, western yellow-billed cuckoo, Jemez Mountain salamander, least tern, and piping plover. Therefore, ***no effect determinations*** were made for black-footed ferret, New Mexico meadow jumping mouse, western yellow-billed cuckoo, Jemez Mountain salamander, least tern, and piping plover (see Appendix A for more detail).

Endangered Species Act consultation on the Carson land management plan addresses all federally listed species, and their designated or proposed critical habitats, as agreed to by the United States Forest Service and USDI Fish and Wildlife Service (USDI Fish and Wildlife Service-2021).

Table 2. Federally listed species and designated or proposed critical habitats addressed in this biological assessment (USDI FWS 2019b)

Species Common Name and Scientific Name	Federal Status	Critical Habitat within Action Area	Recovery Plan	Determination
Jemez Mountain salamander *Plethodon neomexicanus*	Endangered	None designated	No	*No Effect*
Least tern *Stern antillarum*	Endangered	None designated	Yes	*No Effect*
Mexican spotted owl *Strix occidentalis lucida*	Threatened	Yes	Yes	*May affect, likely to adversely affect*
Piping plover *Charadrius melodus*	Threatened	None designated	Yes	*No Effect*
Southwestern willow flycatcher *Empidonax traillii extimus*	Endangered	Yes	Yes	*May affect, not likely to adversely affect*
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	Threatened	None Proposed	No	*No Effect*
Black-footed ferret *Mustela nigripes*	Endangered	None designated	Yes	*No Effect*
Canada lynx *Lynx canadensis*	Threatened	None designated	No	*May affect, not likely to adversely affect*
New Mexican meadow jumping mouse *Zapus hudsonius luteus*	Endangered	None designated	No	*No Effect*

The Carson is not seeking concurrence for the no effect determination listed in table 2 above, but simply disclosing our conclusion of the effects of the proposed action and their inclusion on the official species list for the Carson land management plan (USDI FWS 2019b).

Critical Habitat for Listed Species

Section 7 of the Endangered Species Act requires Federal agencies to ensure that actions they authorize, fund, or carry out are not likely to destroy or adversely modify designated critical habitat. Mexican spotted owl and southwestern willow flycatcher have designated critical habitat on the Carson National Forest. No other species has designated or proposed critical habitat on the national forest.

Consultation History

During the planning process that led up to the land management plan, collaboration and consultation took place between the Carson and USDI Fish and Wildlife Service. This effort was ongoing and occurred through meetings and correspondence.

A chronology of past consultations associated with the proposed action, agreed-upon time extensions, and important meetings associated with this biological and conference opinion is provided below.

From 1985 to 1988, each of the 11 national forests in the Southwestern Region developed and approved land management plans pursuant to the National Forest Management Act. The Fish and Wildlife Service issued a non-jeopardy/no adverse critical habitat modification opinion on each of the land management plans for all federally listed species.

On April 15, 1993, the Mexican spotted owl was listed as threatened. On September 6, 1995, the Forest Service requested initiation of formal consultation on the 11 national forest land management plans for effects on the owl.

In 1995, the Fish and Wildlife Service issued a biological opinion on the 11 land management plans, which concluded jeopardy to the Mexican spotted owl and adverse modification for its designated critical habitat (USDI FWS 1995b). The Fish and Wildlife Service's reasonable and prudent alternative to the existing land management plans advised the Forest Service to implement the 1995 recovery plan for the Mexican spotted owl. This opinion was litigated in U.S. District Court because it did not quantify incidental take for the Mexican spotted owl. On November 25, 1996, the Fish and Wildlife Service issued another final jeopardy biological opinion that included incidental take for the Mexican spotted owl pursuant to a September 17, 1996 Court Order. Also, on November 25, 1996, the Fish and Wildlife Service issued a biological opinion on the Forest Service June 1996 regional amendment to the land management plans for the Mexican spotted owl. The 1996 regional amendment directs the implementation of the recovery plan for the Mexican spotted owl, as well as guidelines for the northern goshawk and old-growth management. The Fish and Wildlife Service concluded non-jeopardy for the Mexican spotted owl and no adverse modification of its designated critical habitat (USDI FWS 1995b).

On May 15, 1996, the Forest Service requested formal consultation on the effects to federally listed species on national forests as a result of the continued implementation of the 11 land management plans.

On December 19, 1997, the Fish and Wildlife Service issued a biological opinion/conference opinion (BO/CO) on the Forest Service 1996 regional amendment to the land management plans for all federally listed species other than the Mexican spotted owl (USDI FWS 1997). This biological opinion concluded non-jeopardy for all federally listed or proposed species, and no adverse modification for designated or proposed critical habitats. This opinion outlined conservation measures for seven listed species including the southwestern willow flycatcher, cactus ferruginous pygmy-owl, Sonora chub, Little Colorado spinedace, loach minnow, spikedace, and Pima pineapple cactus. The conservation measures were a product of a collaborative effort by Fish and Wildlife Service and Forest Service and became known as the "seven species direction." The conservation measures implemented by the Forest Service are discussed in the effects of the action sections for these species.

On December 24, 2002, Forest Guardians (et al.) sent the Forest Service a 60-day notice of intent to sue for failing to reinitiate formal consultation on the 11 land management plans for all federally listed species.

On January 13, 2003, the Fish and Wildlife Service finalized a biological opinion on the proposed rate of implementation of the grazing standards and guidelines in the 1996 regional amendment and its effect on the Mexican spotted owl. This opinion concluded no jeopardy for the Mexican spotted owl.

In February of 2003, the Forest Service and Fish and Wildlife Service began discussions on the relevance of the 1996 and 1997 land management plan and 1996 regional amendment consultations. In early April 2003, the agencies agreed that -the Forest Service would reinitiate consultation with the Fish and Wildlife Service on the 11 land management plans and the 1996 regional amendment.

On June 2, 2003, the Forest Service and Fish and Wildlife Service signed a consultation agreement that outlined timelines, responsibilities, and dispute resolution for the 11 land management plans consultation.

In November 2003, the Forest Service provided the Fish and Wildlife Service with a draft biological assessment for the consultation.

On April 5, 2004, the Forest Service requested re-initiation of formal consultation under section 7 of the Endangered Species Act on the 1996 Mexican spotted owl opinion and the 1997 opinion for all other federally listed species on the 11 national forests. The Forest Service provided the Fish and Wildlife Service with the final biological assessment for the continued implementation of the land management plan for the 11 national forests and national grasslands of the Southwestern Region.

On May 26, 2004, the Fish and Wildlife Service responded to the Forest Service, acknowledging formal consultation had been initiated.

On September 14, 2004, the Fish and Wildlife Service requested a 90-day extension. The Forest Service responded on November 10, 2004, and extended the timeline further for a draft to be available for Forest Service review on January 15, 2005.

On February 2, 2005, the Forest Service provided the Fish and Wildlife Service with supplemental information to their April 8, 2004 biological assessment. The supplemental information included the following four documents: (1) conservation measures for the spikedace, Little Colorado spinedace, Chiricahua leopard frog, and Sacramento prickly poppy; (2) replacement of pages 54 through 66 of the biological assessment regarding the rangeland management program; (3) clarification of grazing management level definitions; and (4) proposed amendment for noxious or invasive plant management for the Coconino, Kaibab, and Prescott, and Coconino National Forests, November 2004 forest plan amendment #20. Post-biological assessment submissions were also provided to the Fish and Wildlife Service informally throughout the consultation and are part of the administrative record.

On April 22, 2005, the Fish and Wildlife Service provided the Forest Service with a draft programmatic biological opinion/conference opinion.

On June 10, 2005, the Fish and Wildlife Service provided the Forest Service with a final programmatic land management plan biological opinion/conference opinion.

On April 17, 2009, the Forest Service requested re-initiation of the 2005 land management plan biological opinion/conference opinion because the threshold set for incidental take for the Mexican spotted owl could soon be approached and/or exceeded and due to issues related to term and condition 3.1 in the 2005 land management plan biological opinion/conference opinion for several species. Again, on May 18, 2010, the Forest Service requested re-initiation for all species addressed in the 2005 land management plan biological opinion/conference opinion, including the ocelot, a species now considered present in small numbers in Arizona.

On June 22, 2010, the Fish and Wildlife Service acknowledged the Forest Service request for re-initiation on the Mexican spotted owl and followed up with a clarification letter acknowledging the request to reinitiate the consultation for all other species, including the ocelot on August 9, 2010.

On April 9, 2011, the Carson requested re-initiation of consultation on the Forest Service's continued implementation of the land and resource management plans for the 11 southwestern national forests and national grasslands.

On March 30, 2012, the Fish and Wildlife Service issued a biological opinion (Consultation Number 2012-F-0002) titled "The Continued Implementation of the Land and Resource Management Plan for The Carson National Forest of the Southwestern Region U.S.D.A. Forest Service."

On December 11, 2018, the Carson Forest Supervisor (James Duran) and the USDI Fish and Wildlife Service New Mexico Ecological Services Field Office Field Supervisor (Susan Millsap) cooperatively

developed and signed a revised consultation agreement (Consultation Code 02ENNM00-2019-SLI-0621) for the revision of the Carson land management plan. The agreement addresses timeframes, personnel, and procedures for completing consultation pursuant to section 7(a)(2) of the Endangered Species Act, with a process for resolving disputes, should they arise.

On April 9, 2019, the USDI Fish and Wildlife Service's Information for Planning and Consultation (iPaC) website was used to formally request an official species list (iPaC # 02ENNM00-2019-SLI-0621) for the Carson administrative boundary area. This list has been updated bi-yearly through iPaC.

On August 22, 2019, Fish and Wildlife Service and Cibola, Santa Fe, and Carson joint meeting at the New Mexico field office in Albuquerque to discuss process and timeline.

On September 11, 2019, United States District Court District of Arizona Order issued on September 11, 2019 (CV-13-00151-TUC-RCC) instructing the Forest Service and the Fish and Wildlife Service to reinitiate and complete consultation on the effects of the Carson land management plan to "reassess the jeopardy analysis and the effects of the Forest Plan [LRMP] on the recovery of the Mexican spotted owl."

September 12, 2019: In response to litigation (court order 4:13-CV-00151-RCC), the Fish and Wildlife Service began to re-analyze the effects of the proposed action and our analysis of the proposed actions' effect on owl recovery to address the court's findings.

On November 18, 2019, the Fish and Wildlife Service Information for Planning and Consultation (iPaC) website was used to formally request an updated official species list for the Carson administrative boundary area.

November 19, 2019: The Fish and Wildlife Service sent a draft biological opinion on the 1986 Carson land management plan to the Forest Service for review.

November 20, 2019: The Fish and Wildlife Service received Forest Service comments on the draft biological opinion on the 1986 Carson land management plan and incorporated comments.

June 16, 2020: The Forest Service provided the Fish and Wildlife Service with a draft biological assessment for review.

September 2, 2020: The Fish and Wildlife Service sent comments on the draft biological assessment to the Forest Service.

October 1, 2020: Fish and Wildlife Service and Forest Service had a meeting to discuss comments and determination call of the draft biological assessment.

February 18, 2021: The Forest Service submitted to the Fish and Wildlife Service with a final biological assessment for formal consultation.

Description of the Action Area

The Carson National Forest stretches across northern New Mexico, and includes 1,486,372 acres within the San Juan, Rio Grande, Rio Chama, and Canadian River drainages (figure 1). The Carson is divided into six ranger districts: Camino Real, Canjilon, El Rito, Jicarilla, Tres Piedras, and Questa. East of the Rio Grande Gorge, Questa and Camino Real Ranger Districts span the Sangre de Cristo Mountains (referred to as the "east side"). West of the Rio Grande, Tres Piedras, El Rito, and Canjilon ranger districts cover the slopes of the Tusas Mountains (referred to as the "west side"). To the far west, the Jicarilla

Ranger District sits on the eastern edge of the San Juan Basin, with rugged buttes, steep canyons, and prominent mesas.

Elevations within the six ranger districts extend from 6,000 feet (Jicarilla Ranger District) to over 13,161 feet (at the summit of Wheeler Peak) above mean sea level. The lower elevations of the forest are grassland and sagebrush terrain cut by sandy washes and small canyons. Rock outcrops are prevalent. The Carson topography consists of two distinct mountain ranges, high plateaus or mesas, canyons, valleys, and normally dry arroyos. The landscape is generally mountainous, with numerous perennial streams mostly draining into the Rio Grande, small lakes, alpine valleys, meadows, aspen groves, and spruce-fir forests.

Elevation is the dominant localized influence on climate. The lower elevations receive less than 10 inches of precipitation per year, with temperature extremes above 90 degrees in the summer and well below freezing in the winter. The higher elevations receive over 24 inches of precipitation each year, with summer temperatures in the 80s and winter temperatures at zero or below.

The most predominant vegetation types on the Carson are Spruce-Fir, Mixed Conifer, and Ponderosa Pine Forests, each about 20 percent of the national forest. The remainder is comprised primarily of Piñon-Juniper Woodland and Sagebrush, totaling around 28 percent. There are also several isolated riparian areas at springs, seeps, creeks, and lakes. The Carson National Forest contributes over 40 percent of the waters that flow into the Rio Grande from northern New Mexico and southern Colorado. The main vegetation system drivers on the Carson are fire disturbances (or lack thereof), regional climate regime, insects, and natural vegetation succession.

Current condition of vegetation was assessed using characterizations of current condition and trend for specific ecosystem characteristics Carson National Forest Assessment Report (USDA FS Carson NF 2015). For each characteristic, where available, the following information is evaluated: reference[1] condition, deviation of current condition from reference condition (departure), and predicted future departure (trend). Departure from reference condition is equivalent to a loss of ecological integrity. To determine a loss of integrity, current departure and departure trend are considered. About 50 percent of the vegetation communities on the Carson are highly departed and trending away from reference conditions.

The identified boundaries for the vegetation communities are based on technical grouping of vegetation with similar site potential and disturbance processes such as fire. Desired conditions are described at multiple scales, where appropriate. Descriptions at various scales are sometimes necessary to provide adequate detail and guidance for the design of future projects and activities that will help achieve the desired conditions over time. The three scales used in this plan are fine scale, mid scale, and landscape scale. For the mid scale and landscape scale, features are averaged over the entire area within that scale. For example, in the mid scale, when basal area is stated, it is averaged over 100 to 1,000 acres. This means for areas smaller than the mid scale, there will be areas with less basal area and areas with higher basal area than what is shown within the mid-scale description. In addition, when the amount of snags, down woody materials, and logs are stated in mid scale, it is assumed that these amounts will not be the same on every acre, but when the amounts are averaged over the entire scale, will be equal to the

[1] Reference conditions are the environmental conditions that infer ecological sustainability. When available, reference conditions are represented by the characteristic natural range of variation (not the total range of variation), prior to European settlement and under the current climatic period.

description and well distributed across both the mid scale and landscape scale. This is what naturally occurs within ecosystems.

When using the land management plan to develop project specifications, it is important to keep in mind that all desired conditions at all scales are relevant regardless the size of the project. Smaller scale projects would consider larger scales in terms of how the project contributes to the mid-scale or landscape scale unit; larger projects would consider the design features needed to ensure that the finer scale desired conditions are maintained or achieved at each fine scale unit and are well distributed. Consideration of scale is also important when evaluating progress toward desired conditions because the appropriate analysis is scale-dependent. For example, when desired conditions are specified at the landscape scale, they are averaged across areas more than 10,000 acres and would appear less variable even though variability still exists at the smaller scale.

- **Fine scale** is a 10-acre area or less at which the distribution of individual trees (single, grouped, or aggregates of groups) is described. Fine-scale desired conditions provide the "view" that could be observed standing in one location on the ground. Fine-scale desired conditions contain desirable variation appropriate at smaller spatial scales. Between the 10-acre fine scale and 100-acre mid-scale, this is made up of multiple fine scale areas that are combined up to the mid-scale size.
- **Mid-scale** desired conditions are composed of assemblages of fine-scale units and include descriptions that are desirable when averaged across areas of 100- to 1,000-acre units. The mid-scale view is that which can be observed when on a hilltop or lookout. Between the mid scale and 10,000-acre landscape scale, this is made up of multiple mid-scale areas that are combined up to the landscape scale.
- **Landscape scale** is an assemblage of 10 or more mid-scale units, typically totaling more than 10,000 acres, composed of variable elevations, slopes, aspects, soils, plant associations, and disturbance processes. Landscape-scale desired conditions provide the "big picture" overview with resolution that could be observed from an airplane, or from a zoomed-out Google Earth view. The landscape scale is also appropriate for less common components that are not necessarily present on every mid-scale unit within the landscape.

Species cannot be managed apart from their habitats and much of this analysis of listed species focuses on potential and actual habitat available on the forest. Riparian and terrestrial vegetative communities were used to describe and map units of similar vegetation, soil, climate, and ecosystem disturbance across the landscape. These communities are the basis for analyzing the vegetative component of species' habitat. The following sections provide a summarized description of the action area relevant to evaluating effects to considered species. Additional details about all vegetation types within the national forest can be found in the Carson National Forest Assessment Report (USDA FS Carson NF 2015) and the Carson National Forest Environmental Impact Statement.

Relevant Terrestrial Habitats within Action Area

Major terrestrial habitats within the action area relevant to analyzed species (Mexican spotted owl and Canada lynx) include Spruce-Fir Forest, Mixed Conifer with Aspen, Aspen, and Mixed Conifer with Frequent Fire.

The Spruce-Fir Forest community is the second most abundant (289,929 acres or 18 percent) on the Carson, and occupies the coldest and wettest forested slopes, ridges, and valleys (USDA FS Carson NF 2015). Currently, 36 percent of this vegetation community occurs in designated wilderness. Spruce-fir is currently low to moderately departed, mostly from a legacy of timber harvest that removed old trees and

built roads. The risk of not achieving desired conditions in the future for Spruce-Fir Forest is low to moderate.

Mixed Conifer with Aspen covers 130,959 acres or 8 percent of the national forest (USDA FS Carson NF 2015). Mixed Conifer with Aspen is currently moderately departed from the lack of fire disturbances. The risk of not achieving desired conditions in the future is low to moderate.

Mixed Conifer–Frequent Fire occupies warmer, drier mixed conifer sites that support more frequent low to mixed severity fire than other mixed conifer sites and comprises 182,847 acres (11.5 percent) of the Carson. Currently, Mixed Conifer–Frequent Fire is highly departed due to fire exclusion, selective logging, and intensive unmanaged grazing. The future risk of not achieving desired conditions is high. The risk of coarse woody debris not meeting desired condition is also high (table 5). Across the forest, stands of Mixed Conifer–Frequent Fire vegetation community are dense and homogeneous with shade-tolerant, less fire-resistant (white fir and Douglas-fir) tree dominance (Reynolds et al. 2013).

Relevant Aquatic and Riparian Ecosystems within the Action Area

Riparian Areas

The new planning directive (36 CFR 219.19) defines riparian areas as “three-dimensional ecotones (the transition zone between two adjoining communities) of interaction that include terrestrial and aquatic ecosystems that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain to the water, laterally into the terrestrial ecosystem, and along the water course at variable widths.”

Riparian areas are associated with perennial waters (streams and springs) and intermittent streams, and springs. Riparian areas include Wetland Riparian and Forest and Shrub Riparian vegetation communities.

The Wetland Riparian (WR) vegetation community includes open water wetlands, slope wetlands, marshes, wet meadows, cienegas, bogs, and fens. Wetland riparian is extensive and inclusive, occurring at nearly all elevations on the Carson National Forest, and makes up 36,366 acres (2.3 percent). The risk of not achieving Wetland Riparian desired conditions in the future is moderate. In some places, particularly at lower elevations, flood regimes have been moderately altered, instream flows are reduced, and their timing is altered by human water uses (Romme et al. 2009). Decreased flooding, channelization, downcutting, and lowered water tables all contribute to a reduction in available soil moisture and an increase in upland species. Species composition is highly departed, riparian vegetative cover is moderately departed, and uncharacteristic shrub and tree cover are common. Species composition and riparian vegetative cover have been altered by changes resulting from historic overgrazing and continued grazing, fire exclusion, concentrated recreation, and dewatering from surface and groundwater withdrawal, upland species encroachment, or channel incision. Measured changes include woody species encroachment, a slight decline in sedges, conversion of native bunch grass cover to (mostly introduced) sod-forming grass cover, and the spread of invasive species, all of which are likely to continue in the future. Though overall vegetative groundcover is similar to historic levels, in some areas of the Carson vigor is significantly reduced, and species composition is altered due to historic and current management. Loss of hiding, breeding, and forage cover degrades species habitat and is a major impact in some areas. Reduced cover and dominance by sod-forming grasses negatively affects stream temperature, bank stability, and sedimentation.

The Forest and Shrub Riparian (FSR) community occurs across the Carson in different forms depending on elevation, adjacent upland species, and site-specific conditions. The Forest and Shrub Riparian

community includes five vegetation types (table 3, Willow–Thinleaf Alder, Upper Montane Conifer–Willow, Narrowleaf Cottonwood–Spruce, Narrowleaf Cottonwood–Shrub, and Rio Grande Cottonwood–Shrub) The overstory may be shrubby in the case of willow-thinleaf alder sites, or tree-dominated with a variety of species depending on elevation and site conditions, including spruce, narrowleaf cottonwood, and Rio Grande cottonwood. Willow species are common in the understory. Drought and flooding are the primary natural disturbances. Fire is an infrequent disturbance, but may enter from adjacent vegetation types during dry periods. Fire effects are generally less severe than in the surrounding uplands. Departure from desired conditions ranges from low to high with higher-elevation sites generally being less departed, though site-specific factors and history are dominant influences. Lower-elevation sites are more departed due to greater human activity, including water withdrawal, diversion, and storage, agriculture, livestock grazing, recreation, and seeding with non-native species. Degradation at lower, drier elevations is compounded by adjacent upland systems with inherently less groundcover, and less capacity to recover. Legacy impacts from intensive, unmanaged grazing, fire suppression, and beaver trapping are still evident in many Forest and Shrub Riparian communities. They are affected by drought, which shrinks the riparian zone, and by fire exclusion, which encourages conifer encroachment.

Table 3. Forest and shrub riparian vegetation types on the Carson National Forest

Forest and Shrub Vegetation Types	Acres of the Carson NF	Percent of the Carson NF
Willow-Thinleaf Alder (WTLA)	9,314 acres	0.6%
Upper Montane Conifer-Willow	1, 581 acres	0.1%
Narrowleaf Cottonwood–Spruce	4,148 acres	0.3%
Narrowleaf Cottonwood-Shrub	1,818 acres	0.1%
Rio Grande Cottonwood-Shrub	3,031 acres	0.2%
Total	19,892 acres	1.3%

Aquatic Ecosystems

Aquatic ecosystems include perennial streams, waterbodies, reservoirs, lakes, stock ponds, and seeps and springs. There are 1,044 miles of perennial streams in the plan area (USDA FS Carson NF 2015). As reported in the 2016–2018 State of New Mexico Clean Water Act Section 303(d)/303(b) Integrated report (NMED 2016), 131 miles of streams were assessed for attainment of water quality standards. Portions of 56 perennial streams are not in full attainment of water quality. The most common cause of impairment is high water temperature, turbidity, sedimentation, and specific conductance account for most water quality impairments. Turbidity and sedimentation often result from degraded upland vegetative conditions or roads and trails in poor condition.

There are 1,565 waterbodies on the Carson totaling over 1,308 acres. This habitat includes lakes, ponds, playas, and stock ponds.

There are 659 documented seeps or springs on the Carson, 597 of which are developed or degraded (90.6 percent). Springs and seeps occur where groundwater emerges on sloping terrain, toe-slope breaks, and geologic formation transition zones. Many springs on the forest flow almost constantly throughout the year, though flows can vary from year to year. The national forest has developed approximately 597 springs for livestock and wildlife use.

Relevant Cave-Like Structures, Cliffs, and Rocky Features within the Action Area

Cave-like structures or mine adits, screes, cliffs, and rock features are widespread microsites within all vegetation communities. These ecological characteristics are inherently stable for long periods of time because they are changed primarily by geologic forces. There are no known caves on the Carson. Examples of key ecosystem characteristics include cliffs used for nesting by many bird species; cave-like structures and crevices used for roosting and hibernating by many bat species; and rock outcrops or boulder and talus accumulations used by some mammals for hibernation, shelter from the weather, or to escape from predators.

Description of the Proposed Action

The proposed action analyzed in this biological assessment is the entirety of management direction provided in the proposed revised land management plan for the Carson National Forest as described in modified alternative 2 of the final environmental impact statement. The planning period for the proposed land management plan encompasses 15 years immediately following land management plan approval or until the land management plan is revised, whichever comes first. This biological assessment will analyze the anticipated effects to listed species and their habitats that could occur when applying the direction and guidance in the proposed land management plan to future projects. This direction is included in chapters 2 and 3 of the proposed land management plan.

As explained in the land management plan, the contents of the plan include “plan decisions” and “other content.” Any substantive changes to plan decisions will require a plan amendment. Changes to other content may be made through an administrative correction process. Plan contents are described more fully in Plan Content section of this document. See the proposed land management plan for more detail.

Land Management Plan Direction

The provisions in the 2012 Planning Rule (USDA FS 2012a) were used to develop the revised forest plan. Those expected to be most relevant to this biological assessment include the sections on sustainability and the diversity of plant and animal communities, in that they will influence the planning process and plan content with respect to federally listed species, species proposed for listing, and candidate species; the ecosystems upon which they depend; and furtherance of Endangered Species Act goals. In addition to the first two requirements, the land management plan must also provide for ecosystem services and multiple uses including outdoor recreation, range, timber, watershed, wildlife, and fish, within the Forest Service authority and the inherent capability of the plan area. These resource requirements are addressed through integrated plan components.

Within the requirements set forth in the 2012 Planning Rule, land management plans provide a programmatic framework and the sideboards to guide decisions for all-natural resource management activities on their respective National Forest System units. Plans include plan components (desired conditions, objectives, standards, guidelines, and suitability of areas) that influence the design and choice of future proposals for projects and activities in a plan area, and include monitoring items. They provide additional definition of resource management activities needed to implement and achieve desired conditions and objectives and, through suitability determinations, standards, and guidelines, they establish constraints upon the decision space for on-the-ground management decisions.

The land management plan provides the framework and text guiding day-to-day resource management. It is strategic and programmatic and does not provide project-level decisions or result in irreversible or irretrievable commitments of resources.

The purpose of the revised land management plan is to guide management toward attaining long-term desired conditions. Given the multiple resource nature of land management, the many types of projects, and the various activities that can occur over the life of the revised land management plan, it is not likely that a project or activity would maintain or contribute to the attainment of all desired conditions, as not all desired conditions are relevant to every activity (for example, recreation desired conditions may not be relevant to a fuels treatment project). Most projects and activities are developed specifically to maintain or move conditions toward one or more of the desired conditions of the revised land management plan. It should not be expected that each project or activity would contribute to all desired conditions in a plan; usually it would contribute to one or a subset.

Plan Content

The proposed land management plan includes components and other content as described in the 2012 Planning Rule. Plan components guide future project and activity decision making, once approved; any substantive changes to plan components would require a plan amendment with appropriate analysis as required under the National Environmental Policy Act (NEPA). A change to other plan content may be made using an administrative correction process. Administrative corrections are used to make changes such as updates to data and maps, management approaches, and relevant background information, and to fix typographical errors. The public is notified of all administrative corrections of the plan.

Plan Components

Plan components provide a strategic and practical framework for managing the plan area, are applicable to the resources and issues of the plan area, and reflect the plan area's distinctive roles and contributions. Plan components include desired conditions, objectives, standards, guidelines, suitability of lands, and goals. Plan components do not reiterate existing law, regulation, or policy. The plan components in the final plan were developed collaboratively with input from a variety of external and internal stakeholders with broad interdisciplinary representation.

Plan components have been given alphanumeric identifiers (plan codes) for ease in referencing within the land management plan. Acronyms used in the plan codes are in table 4. The plan codes include:

- The level of direction: FW (forestwide), DA (designated area), or MA (management area);
- The resource (for example, VEG for all vegetation or WFP for wildlife, fish, and plants);
- The type of direction (DC= desired condition, O = objective, S = standard, and G = guideline); and
- A unique number (numerical order starting with 1).

For instance, the unique coding for forestwide (FW) air resources (AIR) desired condition (DC) number 1 is FW-AIR-DC-1.

Plan codes with multiple resource identifiers indicate that the resources are nested. Management must integrate plan components from all resources identified in the code. For example, the plan code FW-WSW-RMZ-STM-O-integrates forestwide plan components found within the streams (STM) resource, plus all the plan components within riparian management zones (RMZ) resource and watershed and water (WSW) resource.

Table 4. Acronyms used in plan component identifier codes

Acronym	Resource	Acronym	Resource
AIR	Air Resources	NTRL	National Scenic, Historic, and Recreational Trails
ALP	Alpine and Tundra	O	Objective
ASP	Aspen	PART	Partnerships
BOT	Botanical Areas	PJO	Piñon-Juniper Woodland
BP	Bristlecone Pine	PJS	Piñon-Juniper Sagebrush
CAM	Caves and Abandoned Mines	PPF	Ponderosa Pine Forest
CDNST	Continental Divide National Scenic Trail	REC	Recreation
CR	Cultural Resources	RHC	Rural Historic Communities
CRF	Cliffs and Rocky Features	RMZ	Riparian Management Zones
DA	Designated Areas	RWMA	Recommended Wilderness Management Area
DC	Desired Condition	S	Standard
DEVRES	Developed Winter and Summer Resorts	SAGE	Sagebrush
EWSR	Eligible Wild and Scenic Rivers	SAMA	San Antonio Management Area
FAC	Facilities Infrastructure	SCEN	Scenery
FFP	Forestry and Forest Products	SFF	Spruce-Fir Forest
FIRE	Wildland Fire Management	SL	Soil Resources
FRT	Federally Recognized Tribes	SNS	Springs and Seeps
FSSR	Forest, Shrub, and Scrub Riparian	STM	Streams
FW	Forestwide	SU	Special Uses
G	Guideline	TFA	Transportation and Forest Access
GMMA	Grassland Maintenance Management Area	VEG	Vegetation
GRZ	Livestock Grazing	VFSYU	Vallecitos Federal Sustained Yield Unit
IRA	Inventoried Roadless Area	VVMA	Valle Vidal Management Area
JICMA	Jicarilla Natural Gas Management Area	WB	Waterbodies
LAND	Lands	WFP	Wildlife, Fish, and Plants
MA	Management Area	WHT	Wild Horse Territories
MCD	Mixed Conifer, with Frequent Fire	WILD	Existing Wilderness
MCW	Mixed Conifer, with Aspen	WR	Wetland Riparian
MM	Minerals and Mining	WSW	Watersheds and Water
MSG	Montane Subalpine Grassland	WSR	Existing Wild and Scenic Rivers
NIS	Nonnative Invasive Species	ZOO	Zoological Areas
NSBW	National Scenic Byway		

Following are the definitions and, where necessary, a description of the context of the required plan components (36 CFR 219.7(e)).

Management, geographic, and designated areas

Every plan must have management areas or geographic areas or both (36 CFR 219.7(d)). These areas are assigned sets of plan components such as desired conditions, suitable uses, and in some areas either standards or guidelines or both. Management area desired conditions describe what we want to achieve in specific areas that are not necessarily covered by forestwide desired conditions. Although all resources have been considered, the only desired conditions specified for a management area are those that are not adequately addressed by forestwide desired conditions.

Designated areas or features are identified and managed to maintain their unique special character or purpose. Some categories of designated areas may be designated only by statute and some categories may be established administratively in the land management planning process or by other administrative processes of the Federal executive branch. Examples of statutorily designated areas are national heritage areas, national recreational areas, national scenic trails, inventoried roadless areas, wild and scenic rivers, wilderness areas, and wilderness study areas. Examples of administratively designated areas are experimental forests, research natural areas, scenic byways, botanical areas, and significant caves (36 CFR 219.19).

Desired conditions

Desired conditions describe the aspirational vision for the Carson National Forest. They are the ecological, cultural, and socioeconomic aspirations toward which management of the land and resources of the plan area is directed. They are not commitments or final decisions approving specific projects or activities; rather, they guide the development of projects and activities. Projects are designed to maintain or move toward desired conditions and to be consistent with the plan over the long term. The desired conditions in this land management plan have been written to contain enough specificity so that progress toward their achievement may be determined. In some cases, desired conditions may already be achieved, while in other cases they may only be achievable over hundreds of years.

Objectives

Objectives describe how the Carson intends to move toward the desired conditions. Objectives are concise projections of measurable, time specific, and fiscally achievable intended outcomes. Objectives have been established for the work considered most important to address needs to change and make progress toward desired conditions. They also provide metrics for evaluating accomplishments.

Objectives should be based on reasonably foreseeable budgets (36 CFR 219.7(e)(1)(ii)). Objectives can be forestwide or specific to management areas or geographic areas. Refer also to potential management approaches and possible actions for possible strategies to achieve certain objectives within revised Carson land management plan.

It is important to recognize objectives were developed considering historic and expected budget allocations as well as professional experience with implementing various resource programs and activities. It is possible objectives could either exceed or not meet a target based upon several factors, including budget and staffing increases or decreases, increased or decreased planning efficiencies, and unanticipated resource constraints.

Standards

Standards are technical design constraints that must be followed when an action is being taken to make progress toward desired conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements (36 CFR 219.7(e)(1)(iii)). Standards can be developed for forestwide application or be

specific to a management area or geographic area. Standards differ from guidelines in that standards do not allow for any deviation without a plan amendment.

Guidelines

Guidelines are required technical design criteria or constraints on project and activity decision-making that help make progress toward desired conditions. A guideline allows for departure from its terms, so long as the intent of the guideline is met. Deviation from a guideline must be specified in the site-specific National Environmental Policy Act decision document with the supporting rationale. When deviation from a guideline does not meet the original intent, a plan amendment is required. Guidelines are established to help achieve or maintain a desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements (36 CFR 219.7(e)(1)(iv)). A guideline can be forestwide or specific to a management area or a geographic area.

Suitability of Lands

Suitability of lands means specific lands within a plan area are identified as suitable for various multiple uses or activities, based on the desired conditions applicable to those lands. The plan will also identify lands within the plan area as not suitable for uses that are not compatible with desired conditions for those lands. The suitability of lands need not be identified for every use or activity following guidance provided at 36 CFR 219.7(e)(1)(v). Every plan must identify those lands that are not suitable for timber production and this plan identifies such lands. Suitability of other resources is handled via the standards and guidelines applied to those resources.

The identification of suitability of lands for a particular use in the forest plan indicates that the use may be appropriate, but does not make a specific commitment to authorize that use. If certain lands are identified as not suitable for a use, then that use, or activity may not be authorized. Prohibiting an existing or authorizing a new use requires subsequent, site-specific environmental analysis. Generally, the lands on the Carson are suitable for uses and management activities appropriate for national forests, such as outdoor recreation or timber, unless identified as not suitable. The Carson National Forest only determined suitable for timber, and for suitability determinations, refer to chapters 2 and 3 of the Final Environmental Impact Statement.

Goals

Goals are optional plan components that are broad statements of intent, other than desired conditions, usually related to process or interaction with the public. Goals are expressed in broad, general terms, but do not include completion dates. This final plan contains no goals.

Other Plan Content

In addition to requiring that a plan have plan components, the 2012 Planning Rule includes other plan content, some required and some optional. The required content includes the identification of priority watersheds, a description of the distinctive roles and contributions of the plan area, a plan monitoring program, and proposed and possible actions.

Monitoring. Under the 2012 Planning Rule, monitoring consists of two elements: the plan monitoring program and broader-scale monitoring strategies. Together, these should enable the responsible official to determine if a change in plan components or other plan content that guide management of resources on the plan area may be needed.

The monitoring program is designed to test assumptions used in developing plan components and to evaluate relevant changes and management effectiveness of the plan components. **Monitoring**

determines the degree to which on-the-ground management is maintaining or making progress toward desired conditions. The monitoring plan includes questions and performance measures designed to inform implementation and effectiveness of plan decisions. It helps ensure that the plan remains adaptive, in that new knowledge and information can be analyzed and the plan changed accordingly. Typically, monitoring questions seek additional information to increase knowledge and understanding of changing conditions, uncertainties, and risks identified in the best available scientific information as part of an adaptive management framework. The best available scientific information can identify indicators that address associated monitoring questions. The best available scientific information is also important in the further development of the monitoring program, as it may help identify protocols and specific methods for the collection and evaluation of monitoring information (from Forest Service Handbook 1909.12 07.11). See chapter 4 of the revised land management plan for the monitoring program and additional information about adaptive management.

Optional plan content in this final plan includes background information, existing conditions, management approaches, and contextual information. Management approaches are not plan decisions, but they help clarify how plan direction may be applied. Management approaches include information for projects and activity decision making to help achieve desired conditions and objectives. Management approaches describe priorities, considerations, and strategies for achieving desired conditions and articulate the strategies needed to effectively make progress toward desired conditions within the context of the operating environment of the plan.

Summary of Key Issues

The proposed action outlined in the final land management plan, focuses on healthy ecological function and supports multiple uses through an accelerated restoration focus. It is designed to address needs for restored forested and non-forested vegetation, incorporating natural wildfires, terrestrial and aquatic wildlife habitat, improved riparian management zones, watershed health, improved rangeland forage and infrastructure, sustainable recreation, and desires for recommended wilderness.

The following sections describe key themes or “needs for change” identified during the plan revision process that have the most likely potential to impact wildlife, fish, or plants.

Restore Resilient Terrestrial Ecosystems and Habitat

The proposed action outlined in the final land management plan, focuses on healthy ecological function and supports multiple uses through an accelerated restoration focus. It is designed to address needs for restored forested and non-forested vegetation, incorporating natural wildfires, terrestrial and aquatic wildlife habitat, improved and connected riparian management zones, watershed health, improved rangeland forage and infrastructure, sustainable recreation, and desires for recommended wilderness.

The proposed action emphasizes accelerated restoration using mechanical treatments and wildfire to move toward vegetative desired conditions especially within highly departed frequent-fire forest vegetation systems. Higher amounts of prescribed fire would be used than managed wildfire for resource benefits from natural ignitions. Much of this work would occur in the wildland-urban interface and be concentrated in the Carson’s fire-adapted vegetation types—Ponderosa Pine Forest and Dry Mixed Conifer Forest.

Table 5. Modified alternative 2 acres of mechanical treatments, prescribed fire, and naturally ignited wildfire during each 10-year period

Vegetation Type	Mechanical Treatment (acres)	Prescribed Fire and Naturally Ignited Wildlife (acres)
Mixed Conifer with Frequent Fire (MCD)	5,500 to 10,000	20,000 to 40,000
Ponderosa Pine Forest (PPF)	22,000 to 50,000	80,000 to 125,000

Currently, the Carson National Forest contains uncharacteristically dense forests with many more young trees than were present historically. These stands are at high risk for stand-replacing wildfire due to the accumulated buildup of both live and dead fuels as well as increased canopy density and fuel continuity. Fire regimes are disrupted in many of the vegetation types present on the Carson, largely a result of past fire suppression policies. In general, this has led to an overall change in seral stage proportion in many of the woody vegetation types. Many stands are now characterized by a preponderance of smaller-diameter, densely distributed trees uncharacteristic of reference conditions. Reference conditions for the Carson are characterized by forest stands containing widely spaced medium- and large-diameter trees (Reynolds et al. 2013). This change in size class distribution and density affects wildlife species in a number of ways, such as the reduction in potential nest sites, foraging trees, and protection from predators, but also through changes in understory composition and connectivity. Denser stands decrease shrub and forb availability for ground-foraging species. Additionally, prolonged drought, combined with overstocked and denser stands, has increased the risk of uncharacteristic high-intensity wildfire that could potentially eliminate large expanses of habitat. This structural departure in vegetation contributes to the departure in fire regime condition class. In general, scientific evidence suggests fires are becoming more frequent, larger in size, and more severe in intensity across all vegetation types in the Southwest (Singleton et al. 2019; Stephens et al. 2018). Further, recent studies have shown that “megafires” (fires greater than approximately 25,000 acres) are a particular threat to species that use old-growth components that can take centuries to reestablish (Jones et al. 2016). Fuel reduction treatments that combine fire and mechanical removal can create current conditions that are more resilient to high-intensity wildfire (Kalies and Kent 2016; Stephens et al. 2012; Stephens et al. 2020) by reducing ladder fuels and interlocking canopy at the landscape scale.

The proposed action would use mechanical vegetation treatment and wildfire to manage highly departed areas such as fire-adapted ecosystems to improve habitat abundance and distribution for species that depend on those vegetation types. These fire-adapted ecosystems are all moderately to highly departed from reference conditions and address the significant issue of ecological resilience. Current science demonstrates the positive benefits that forest fuels reduction treatments can have in terms of improving resiliency in fire-adapted systems of the West/Southwest (Stephens et al. 2012; Stephens et al. 2020). Conditions and trends in the other vegetation types did not raise significant concerns and did not emerge as a core theme, therefore, no objectives were developed for them. The Carson has, however, identified desired conditions for these other vegetation types and would implement management to make progress toward desired conditions as capacity allows.

Provide Watersheds and Water Health

The Carson contains some of the most productive and important watersheds in New Mexico and there is a need to provide healthy watershed and water. There are plan objectives for a 10-year period to restore 200 to 300 acres of riparian areas, aligned with priority watersheds. Modified alternative 2 restores or enhances 100 to 150 miles of stream habitat, improves or maintains function of 10 to 20 individual springs, and improves or maintains watershed function on a total of 5,000 to 10,000 acres for a 10-year period.

Provide Multiple Uses and Support Cultural and Traditional Landscapes and Uses

The Carson National Forest is predominately a community forest, with numerous small unincorporated communities within the national forest boundaries, as well as several adjacent small incorporated towns and villages. The national forest contributes resources and uses, which are important to federally recognized tribes and pueblos, land grant communities, acequias, traditional Hispanic communities, and many contemporary residents all with historic, cultural, and social connections to the Carson. Most of these traditional communities and families continue to look to the forest for economic opportunity and vitality. Visitors to Carson come for some form of recreation, making tourism the single largest contributor to the local economy for surrounding communities. Many area residents have jobs or businesses that are directly or indirectly dependent on tourism. Issues, such as recognizing livestock grazing and fuelwood gathering as important uses to be continued on the Carson and a sustainable recreation program that will be able to adapt to changes in demand, available resources, and opportunities.

Consider New Wilderness and Management Areas

The land management plan is recommending the following areas for wilderness designation (9,295 acres, Figure 7): Ash Mountain (5,314 acres), Rito Claro (1,165 acres), Rudy (1,675 acres), Toltec (1,038 acres), Lobo (82 acres), and Huckaby (21 acres).

The proposed action also proposes San Antonio and Valle Vidal Management Areas, which have the purpose of protecting and enhancing values such as uninterrupted wildlife habitat, solitude, and scenic integrity and provide socioeconomic opportunities that emphasize backcountry and primitive recreation.

Description of the Preferred Alternative- Modified alternative 2

The proposed land management plan directs how activities will be implemented for the land and resource programs managed by the Carson National Forest. It contains sets of direction for 40 forestwide plan sections or program areas and area-specific direction for nine designated areas and seven management areas.

Modified alternative 2 has been identified as the preferred alternative for the final environmental impact statement. Modified alternative 2 was developed iteratively to respond to key issues identified by the interdisciplinary team and the public to address needs for change and issues and responds to the identified purpose and need for the revised land management plan. This alternative provides for restoration and diverse ecosystem services, or benefits that society obtains from the ecosystem. Modified alternative 2 addresses the need to better recognize and enhance the Carson's role in contributing to local economies, including service-based sectors such as recreation and tourism, timber and forest products, livestock grazing, and other multiple-use related activities and products. It addresses the need for restoring fire regimes, protecting communities, and reintroducing natural fire. Modified alternative 2 also includes plan direction that allows for adaptive management to address potential ecological changes that have the potential to alter the availability of ecosystem services from the Carson.

Below is a brief description of each forestwide plan section and area-specific direction for designated areas and management areas. The entire suite of desired conditions, standard, and guidelines addressing these federally listed species, their habitat, and potential threats can be found in Appendix C. Objectives are listed under each program area in the body of the document, if there are any listed for that area. There are two overarching guidelines that encompass all the programs that are worth mentioning here:

FW-VEG-G-1 and **FW-WFP-G-1.** Management activities and special uses occurring within federally listed species' habitat should integrate habitat management objectives and species protection measures from the most recent approved Fish and Wildlife Service recovery plan, to maintain the persistence or contribute to the recovery of that species.

FW-VEG-G-2 and **FW-WFP-G-2.** Where the Forest Service has entered into a signed conservation agreement that provides guidance on activities or actions to be carried out by the Carson, those activities or actions should be undertaken consistent with the guidance found within the conservation agreement, to maintain the persistence or contribute to the recovery of federally listed species and persistence of species of conservation concern.

These guidelines ensure management compliance with existing species recovery plans or other conservation agreements, and are considered conservation measures.

Description of Preferred Alternative Forestwide Direction

The 2012 Planning Rule at 36 CFR section 219.9 addresses the approach to maintaining the diversity of plant and animal communities in the plan area. It requires developing a set of ecosystem plan components designed to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including maintaining or restoring structure, function, and connectivity. Then, for each federally listed, proposed, or candidate species known to occur within the plan area, the plan area is evaluated to determine if ecosystem plan components should be modified, additional ecosystem plan components should be added, or if species-specific plan components are needed to contribute to the recovery of federally listed species or to conserve proposed and candidate species. This approach was applied in developing plan components for the land management plan. The primary needs for threatened and endangered species are addressed through law, regulation, and policy (such as recovery plans and conservation agreements), which are incorporated by reference. The land management plan provides the framework for implementing the recommendations from these higher-level laws, regulations, policies, plans, and agreements for these species, with limited needed additional direction.

For the purpose of this biological assessment, program actions and activities that may be expected to occur over the life of the land management plan and that may affect analyzed species are described for 11 major program areas: vegetation, watershed resources, soil, abandoned mines, cliffs and rocky features, species, wildland fire management, sustainable rangelands and livestock grazing, forestry and forest products, lands, transportation and forest access, minerals and mining, recreation, special uses, and facilities infrastructure. The Carson National Forest land management plan also includes management and designated areas. Management areas include recommended wilderness, eligible wild and scenic rivers, developed winter and summer resorts, Jicarilla natural gas, Valle Vidal, San Antonio, and grassland maintenance areas. Designated areas include designated wilderness, inventoried roadless areas, wild and scenic rivers, and wild horse territories. Because the land management plan provides the framework for future management, but does not authorize projects or require specific activities to occur, the types of actions and activities are presented generally to provide context to evaluate the avoidance, minimization, and mitigation measures developed for the proposed action. Brief descriptions of each major program area, management areas, and designated areas are listed below. These are presented as they appear in the land management plan and not in order of priority or significance.

Ecological, Animal, and Plant Resources

Vegetation (FW-VEG)

There are 11 major vegetation communities on the Carson. These vegetation communities are nested within the "All Vegetation" section. Broadly defined, these communities include forest, woodland, shrubland, and grassland vegetation types. The boundaries for these communities are based on ecological response units' delineations represent an ecosystem stratification based on vegetation characteristics that would occur when natural disturbance regime and biological processes prevail. Ecological response units combine potential vegetation and historic fire regimes to form ecosystem classes useful for landscape assessment.

Vegetation types have their own specific plan components, but plan components and management approaches identified within the "All Vegetation" section apply to all vegetation communities, as well. Specific vegetation type plan components, where more restrictive than those in this general section, take precedence. Vegetation types (sub-resources section) include Alpine and Tundra (FW-VEG-ALP), Montane and Subalpine Grasslands (FW-VEG-MSG), Bristlecone Pine (FW-VEG-BP), Spruce Fir Forest (FW-VEG-SFF), Aspen (FW-VEG-ASP), Mixed Conifer with Aspen (FW-VEG-MCW), Mixed Conifer with Frequent Fire (FW-VEG-MCD), Ponderosa Pine Forest (FW-VEG-PPF), Piñon-Juniper Woodland (FW-VEG-PJO), Piñon-Juniper Sagebrush (FW-VEG-PJS), and Sagebrush (FW-VEG-SAGE).

Plan Elements Common to All Vegetation Types

Desired conditions for vegetation are based on maintaining and promoting forest conditions that are resilient in the face of potential future disturbances and climate change and that contribute to social and economic sustainability. Desired conditions are based on the historical ecology of a vegetation community that can be inferred based on historic ranges of natural variability. They also reflect current conditions and stressors that may not have existed historically and also reflect social and economic desires in terms of the services that humans expect from ecosystems. Under modified alternative 2, a variety of vegetation management techniques would be used, including timber harvesting, planting, thinning, fuel treatments, natural unplanned ignitions, and prescribed burns. The role of fire, both planned and unplanned ignitions, as a tool to achieve desired vegetation and wildlife habitat conditions is articulated in the plan and direction related to its use and management is provided. Direction is also provided for fuels management to protect identified values, such as in wildland-urban interface areas and wildlife habitat. Biodiversity is addressed by providing desired conditions and management direction associated with a diverse array of plant communities and species, such as aquatic, wetland, riparian areas, deciduous forests, frequent fire forests, grasslands, and shrublands.

The mixed use of both mechanical treatments and wildfire (prescribed and naturally ignited) is conducted to provide for societal goods and to move the vegetation type toward desired conditions. Naturally occurring fires should be allowed to perform their natural ecological role in areas that meet conditions that will allow monitoring instead of suppression and not pose a threat of an uncharacteristic wildfire. Frequent fire forest objectives are for a 10-year period and include acre ranges specified for mechanical treatment and fire (table 6).

Table 6. Modified alternative 2 acres of mechanical treatments, prescribed fire, and naturally ignited wildfire during each 10-year period

Vegetation Type	Mechanical Treatment (acres)	Prescribed Fire and Naturally Ignited Wildlife (acres)
Mixed Conifer with Frequent Fire (MCD)	5,500 to 10,000	20,000 to 40,000
Ponderosa Pine Forest (PPF)	22,000 to 50,000	80,000 to 125,000

Climate Change: The Carson Assessment Report of Ecological Conditions (USDA FS Carson NF 2015) showed most of the Carson is vulnerable to climate change projections (USDA FS 2014a). A changing climate could impact vegetation health and, eventually, may displace endemic species characteristic of a site.

Insects and Disease: Endemic insects and pathogens (disease-causing agents) are integral components of ecosystems. Often there are numerous positive ecological impacts of insects and disease on the ecosystem, for instance, the creation of small openings and wildlife habitat, increasing biodiversity, enhancing nutrient cycling, and serving as food sources for animals. Apart from white pine blister rust, the insects and diseases on the Carson that are often considered pests are native organisms that have long been part of the ecosystem and have evolved with their plant hosts. However, under severe disease infection levels or episodic outbreaks of insects, their effects are more evident, sometimes negative, and cause greater change.

Soil (FW-SL)

Soil is the unconsolidated mineral and organic material on the immediate surface of the Earth that serves as a natural medium for the growth of land plants. As such, soil is the basis of the terrestrial ecosystem (USDA FS Carson NF 1987). In addition, soils provide habitat for many organisms, contribute to carbon storage, and act as filtration and storage system for water. Without soil, there are no plants. Soils have unique physical, chemical, and biological properties important to plant use. The location and kind of soil is determined by soil-forming factors such as parent material, climate (past and present), living organisms, topography, and time.

Desired Conditions for Soil Resource

FW-SL-DC-1. Soil productivity, function, and inherent physical, chemical, and biological processes remain intact or are enhanced. Soils can readily absorb, store, and transmit water vertically and horizontally; accept, hold, and release nutrients; and resist erosion.

Watershed and Water Resources (FW-WSW)

A watershed is a region or land area drained by a single stream, river, or drainage network. Watersheds encompass all the ecosystem elements—water, geology, soils, vegetation, and animals. Watersheds also span the landscape at many different scales. Watershed boundaries cross ownership boundaries, since they are based on topography. There is an established method for delineating watershed boundaries that is defined by a number code called the hydrologic unit code (HUC). Every two digits in the number system represent a drainage basin, with successive numbers referring to smaller basins nested within the larger one. On the Carson, the plan area is located within portions of 36 HUC 10 (10-digit) watersheds. Nested within these larger watersheds, there are 111 individual HUC 12 (12-digit) subwatersheds that intersect the plan area.

Nested within the “Watershed and Water Resource” section are individual plan components for water resource communities such as riparian areas (**FW-WSW-RMZ, FW-WSW-RMZ-WR, and FW-RMZ-**

FSR) , streams (**FW-WSW-RMZ-STM**), waterbodies (**FW-WSW-RMZ-WB**), and seeps and springs (**FW-WSW-RMZ-SNS**). Water resources communities have their own specific plan components, but plan components identified within the Watershed section apply to all water resource communities, as well. Water resource community-specific plan components, where more restrictive than those in "Watershed" section, take precedence.

Water resource features include perennial, intermittent, and ephemeral streams; floodplains; springs; wetlands; and riparian areas. Many of these features are groundwater-dependent, such as springs, perennial flows, and wetlands. Riparian habitats are among the most critical elements of biodiversity within the landscape and they provide key ecosystem services available from no other resource. This includes ecosystem-supporting services such as nutrient cycling; provisioning services such as fresh water, forage, and habitat for wildlife; regulating services such as carbon storage, water and flood regulation, water quality, erosion control; and cultural services such as recreation, scientific discovery and education, cultural, and intellectual and spiritual inspiration. Where riparian areas are intact and functioning, these ecosystem services can be assumed stable, but where riparian areas have degraded or been lost, these services are missing or at risk.

Desired Conditions for Watershed and Water Resource

FW-WSW-DC-5. Aquatic and riparian habitats support self-sustaining populations of native fish, as well as other aquatic and riparian species. Ecosystems provide the quantity and quality of aquatic and riparian habitat commensurate with reference conditions.

FW-WSW-RMZ-STM-DC-1. Stream ecosystems, riparian zones, and associated stream courses are functioning properly and are resilient to human and natural disturbances (e.g., flooding) and changes in climate patterns. Fluctuations in flow promote movement of water, sediment, and woody debris that is within the natural range of variability. Flooding creates a mix of stream substrates for fish habitat, including clean gravels for fish spawning and sites for germination and establishment of riparian vegetation.

FW-WSW-RMZ-STM-DC-9. Habitat conditions, as described in stream desired conditions, are capable of supporting self-sustaining native aquatic species populations. These habitat conditions include stream characteristics (i.e., riffles, runs, pools, and channel meandering) that allow for natural processes to occur (e.g., floodplain connectivity and organic matter and sediment transport). Quality aquatic habitat is provided by overhanging banks, woody and herbaceous overstory, and instream large woody debris, which regulate stream temperatures; maintain soil moisture; create structural and compositional diversity; and provide cover, food, and water for riparian species along streams.

FW-WSW-RMZ-WB-DC-2. Waterbodies support native biotic communities; there is adequate riparian vegetation and large woody debris to provide ecological conditions necessary for persistence. Commensurate with site capability, native vegetation around lakes and ponds exhibits various age classes and diverse composition of native species (e.g., grasses, forbs, sedges, shrubs, and deciduous trees) and includes species that indicate maintenance of riparian soil moisture characteristics (e.g., sedges, rushes, willows, and other riparian vegetation). Vegetation associations are variable, depending on waterbody size, location, and type and may include aquatic plants or algae, submergent and floating vegetation, emergent vegetation, grasses, forbs, sedges, shrubs, and deciduous trees.

FW-WSW-RMZ-SNS-DC-2. Commensurate with site capability, native vegetation around seeps and springs exhibits diverse age classes and diverse composition of native species and includes species that indicate maintenance of riparian soil moisture characteristics (e.g., sedges, rushes, willows, and other riparian vegetation). Vegetation associations are variable depending on seep or spring type and may

include aquatic plants or algae, submergent and floating vegetation, emergent vegetation, grasses, forbs, sedges, shrubs, and deciduous trees.

Objectives for Watershed and Water Resources

There are plan objectives for a 10-year period to restore 200 to 300 acres of riparian areas, aligned with priority watersheds. Modified alternative 2 restores or enhances 100 to 150 miles of stream habitat, improves or maintains function of 10 to 20 individual springs, and improves or maintains watershed function on a total of 5,000 to 10,000 acres for a 10-year period.

Caves, Abandoned Mines (FW-CAM), Cliff, and Rocky Features (Biophysical, FW-CRF)

Biophysical features include geological features such as caves, abandoned mines, cliffs, rocky outcrops, and talus slopes. Methods used to meet the overall desired conditions of these features include coordinating with partners and State and Federal agencies; educating the public; monitoring significant features; and fostering collaboration with New Mexico Department of Game and Fish, Fish and Wildlife Service, Bat Conservation International, and other stakeholders and researchers to address conservation. Future projects would be designed to protect and improve these features and would use standards, guidelines, and mitigation measures to protect these resources.

The Carson has no significant caves and karst resources.

Abandoned mines are the remains of former mining operations. The Forest Service abandoned mine lands program identifies mine features posing a danger to the public, which are prioritized and identified for closure or remediation. The classification as ‘abandoned mine’ applies when there are no entities or individuals left operating the mining activity or who have financial ties to the mine. Cultural ecosystem services provided by abandoned mines include history education and recreational mine exploring, when safe and appropriate.

Biophysical features occur in all vegetation types and at all elevations throughout the Carson. These features provide specialized seasonal and year-round habitats for a variety of wildlife species including bats, cliff-nesting birds, and reptiles and amphibians. Several species of rare plants are adapted for growth on rocky sites and cliff faces. Underground features such as abandoned mines and caves often contain unique geological, archaeological, and biological resources. There are no federally listed species that require caves or abandoned mines on the Carson. Federally listed species associated with rocky areas and cliffs include Mexican spotted owl.

Desired Conditions for Caves, Abandon mines, Cliff, and Rocky Features Resource

FW-CAM-DC-1. Cave and abandoned mine features provide microclimate (temperature and humidity) and geological features for associated species (e.g., bats and snakes) that require specialized niches for roosting and overwintering.

FW-CRF-DC-1. Geological and biological features (e.g., talus slopes and rocky outcrops) of cliffs and rocky features provide wildlife and plant habitat, as well as scenic diversity.

Wildlife, Fish, and Plants Species (FW-WFP)

The primary needs for threatened and endangered species are addressed through law, regulation, and policy (such as recovery plans and conservation agreements). Species of conservation concern are species (other than federally recognized threatened, endangered, proposed, or candidate species) that are known to occur in the plan area and for which the regional forester has determined that the best available scientific information indicates substantial concern about their capability to persist over the long term in

the plan area. For many species, essential ecological conditions may be provided for through "coarse filter" plan components such as desired conditions, standards, and guidelines for specific vegetation types. These may be adequate to ensure persistence of those species and maintain viable populations within the plan area. For other species, fine-filter plan components that are species-specific (timing restrictions, etc.) may be required to ensure species persistence. For instance, the Bald and Golden Eagle Protection Act, as amended, provides specific direction for those two species. As a result, this plan provides the framework for implementing the recommendations from these higher-level laws, regulations, policies, plans, and agreements for these species, with limited needed additional direction.

Modified alternative 2 has forestwide desired conditions, objectives, suitability, standards, and/or guidelines to support long-term persistence of species listed as threatened and endangered, as well as species of conservation concern, and to support key ecosystem characteristics for other species, such as those that are of interest for hunting, trapping, observing, and subsistence. Diversity is addressed by coarse-filter plan desired conditions and management direction as well as species-specific desired conditions and management direction. The Carson provides habitat for a wide variety of terrestrial and aquatic wildlife and plant species. Healthy, diverse, and functioning ecosystem processes help ensure diversity of habitats and wildlife, while reducing risks to the sustainability of those habitats and species.

In addition, unique habitats (for example, areas without roads, water features) are necessary to sustain other species. Streams, springs, groundwater, and constructed waters are centers of high biological diversity in semi-arid environments, and the ecological health of these resources is important for ecosystem sustainability. Wildlife is more concentrated around open water sources than in the general landscape, and obligate aquatic and semiaquatic species on the Carson National Forest are sometimes entirely dependent on these limited and scattered water sources. Collectively, water resources contribute to habitat connectivity for wildlife across the landscape.

This alternative includes 129,119 acres in designated wilderness, 105,000 acres of inventoried roadless, and 9,189 acres in recommended wilderness, thus contributing to high levels of habitat security and connectivity over large land areas for species that are sensitive to higher levels of human disturbance. The above designated areas and management areas also emphasize natural processes, with relatively high levels of habitat created by natural disturbances such as wildfire, insects, or disease. Forestwide plan components emphasize the close interrelationship of vegetation conditions and wildlife habitat. Forest plan components related to vegetation conditions provide key ecosystem characteristics that support wildlife habitat needs and diversity (for example, species associated with old-growth forests, riparian habitats, deciduous trees, grass/forb/shrub habitats, dead and defective tree habitat, and habitat connectivity). Management areas are proposed to address key aquatic and riparian ecosystem characteristics and their integrity and to improve resilience considering the changing climate and the anticipated future environment. Along with fish habitat and water quality, wildlife habitat is emphasized in riparian management zones, which are not suitable for timber production, but where timber harvest is allowable to meet desired conditions if it is compatible with other management direction.

Restoration treatments under modified alternative 2 would benefit wildlife by improving habitat. The San Antonio and Valle Vidal Management Areas recognize their importance as valuable wildlife habitat. There are objectives for a 10-year period to restore or enhance at least 50,000 to 150,000 acres of terrestrial habitat and reconstruct or maintain at least 20 to 30 existing water developments for wildlife. Additionally, nonnative fish are reduced in 4 to 6 stream reaches within native fish populations. There are objectives to improve habitat connectivity for terrestrial and aquatic species and provide products and activities to educate the public about wildlife, fish, and plants.

Nonnative, Invasive Species (FW-NIS)

Management activities for aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens) will be based on an integrated pest management approach in all areas within the National Forest System, and on areas managed outside of the National Forest System under the authority of the Wyden Amendment (Public Law 109-54, section 434), prioritizing prevention and early detection and rapid response actions as necessary (Forest Service Manual 2900). The four elements under the invasive species systems approach include: prevention, detection, control and management, and restoration and rehabilitation (Forest Service National Strategic Framework for Invasive Species Management 2013).

Desired Conditions for Nonnative, Invasive Species Resource

FW-NIS-DC-1. Nonnative invasive plant and animal species are absent or exist at levels where they do not disrupt ecological function or affect the sustainability of native and desirable nonnative species.

Objectives for Nonnative, Invasive Species Resources

FW-NIS-O-1. Contain, control, or eradicate at least 300 to 500 acres of invasive species (for example, musk thistle, spotted knapweed) annually.

Socioeconomic Resources

Demands for socioeconomic uses of the forest such as recreation, livestock grazing, hunting, and gathering fuelwood are expected to continue or even increase. Many of these uses have traditional roots and are important for sustaining local rural communities. They also contribute to employment and labor income of the surrounding area.

Federally Recognized Tribes (FRT)

Carson NF lands are part of many federally recognized tribes' aboriginal or traditional use areas as well as places for contemporary uses including cultural and religious activities. The trust responsibilities are maintained through consultation and engagement between the federally recognized tribes and the Forest Service. This consultation is critical when proposed management activities have a potential to affect tribal interests, including natural or cultural resources of importance. The Carson consults with federally recognized tribes and pueblos that have aboriginal territories within and traditional ties to the land now administered by the Forest Service. The Carson maintains government-to-government relationships with many of these federally recognized tribes and employs a variety of avenues to achieve meaningful consultation, with the preferred method being real-time, in-person dialogue between tribal leaders and Forest Service line officers. The Carson shares a common boundary with the Jicarilla Apache Nation, the Picuris Pueblo, the Southern Ute Indian Tribe, and the Taos Pueblo, and is near several other tribal communities. This resource should not have any effects for federally listed species or its critical habitat.

Desired Conditions for Federally Recognized Tribes

FW-FRT-DC-1. The uniqueness and values of the tribal cultures in the Southwest and the traditional uses important for maintaining these cultures are recognized and valued as important.

FW-FRT-DC-2. The long history of tribal communities and uses (e.g., livestock grazing, fuelwood gathering, acequias, and hunting) to NFS lands and resources is understood and appreciated.

FW-FRT-DC-3. Forest resources important for cultural and traditional needs (e.g., osha, piñon nuts, okote [pitch wood], and micaceous clay), as well as for subsistence practices and economic support of tribal communities, are available and sustainable.

Rural Historic Communities (FW-RHC)

There are deep and historic ties between nearby populations and the Carson National Forest. As a defining element of northern New Mexico's cultural context, the lands of the forest have continuously provided economic, social, and religious value to traditional communities. The continued use and access to the national forest for traditional uses contributes greatly to the preservation of local culture. This resource should not have any effects for federally listed species or its critical habitat.

Desired Conditions for Rural Historic Communities

FW-RHC-DC-1. The uniqueness and values of rural historic communities and the traditional uses important for maintaining these cultures are recognized and valued as important.

FW-RHC-DC-2. The long history and ties of rural historic communities and traditional uses (e.g., livestock grazing, fuelwood gathering, acequias, and hunting) to NFS lands and resources are understood and appreciated.

FW-RHC-DC-3. Forest resources important for cultural and traditional needs (e.g., osha, piñon nuts, okote [pitch wood], medicinal herbs, and micaceous clay), as well as for subsistence practices and economic support of rural historic communities (e.g., livestock grazing, acequias, firewood, vigas, latillas, gravel, soils, and other forest products) are available and sustainable.

FW-RHC-DC-4. Rural historic communities have access to places of traditional use (e.g., spiritual places, individual and group ceremonies, traditional activities, and the collection of forest products) that are important to them.

FW-RHC-DC-5. Acequia systems on NFS lands are accessible for operation, maintenance, repair, and improvement.

Range and Livestock Grazing (FW-GRZ)

The focus of range management on the Carson is the production of a diverse array of tangible and intangible products. Tangible products include forage for grazing and browsing livestock and wildlife. Intangible products include open and quiet places. Livestock grazing is permitted on about 93 percent of the Carson. Grazing use is administered through a grazing permit system on designated livestock grazing allotments.

Allotments are managed using an adaptive management strategy whereby results from long- and short-term monitoring are used to guide managers concerning yearly stocking rates, pasture rotations, and whether other adjustments are needed to meet desired conditions for rangelands. Periodic review of allotment management plans also results in decisions to exclude livestock grazing on individual allotments in response to drought, wildfire, and other factors that influence range conditions.

Based on projections of future climate change, conditions may be preferable for grassland habitat. However, suitable forage for grazing or browsing and availability of water for livestock may be reduced during extended drought periods and increased disturbances could favor nonnative species that are unsuitable for grazing.

The Carson National Forest revised land management plan does not substantially change resource direction for range management and is not expected to result in substantial changes from the current situation. Many mitigations to avoid or reduce impacts of permitted domestic livestock on federally listed species have already been implemented by the Carson National Forest and are part of the environmental baseline. The proposed action is not expected to change any of these existing allotment and permit-level

decisions made to protect federally listed species. The proposed action does not change the status of allotments across the national forest. Any proposed changes in allotment status would require site-specific analysis to change the Allotment Management Plan and would require consultation if it may affect federally listed species.

Desired Conditions for Rangelands and Livestock Grazing Resource

FW-GRZ-DC-4. Livestock grazing and associated management activities are compatible with ecological function and processes (e.g., water infiltration, wildlife habitat, soil stability, and natural fire regimes).

FW-GRZ-DC-6. Wetland and riparian areas consist of native obligate wetland species and a diversity of riparian plant communities consistent with site potential and relative to wetland riparian and forest and shrub riparian desired conditions.

Objectives for Rangelands and Livestock Grazing Resource

FW-GRZ-O-1. Annually improve or maintain at least 6 to 10 existing range improvement structures for livestock grazing.

Forestry and Forest Products (FW-FFP)

On the Carson National Forest, forest products include posts, poles, latillas, vigas, fuelwood, pellets, and rough-cut dimensional lumber (typically used for pallet production). This material primarily provides local subsistence and livelihood to rural communities, with small quantities sold across State lines. Timber harvest is conducted to provide for societal goods and to move the vegetation toward desired conditions. Approximately 455,844 acres (about 32 percent of the Carson) are suitable for timber production. Under modified alternative 2, with a constrained budget constrained, the projected timber sale quantity for the first decade would be 40.1 million board feet per year and the projected wood sale quantity would be 47.8 million cubic feet per year.

In addition to lands suitable for timber production, timber harvest is allowable on some lands not suitable for timber production, for such purposes as salvage, fuels management, insect and disease mitigation, protection or enhancement of wildlife habitat, to perform research or administrative studies, and recreation and scenic-resource management. Timber harvest on all National Forest System lands would have to be consistent with other plan management direction.

Desired Conditions for Forest Products Resource

FW-FFP-DC-4. Private and commercial timber harvest supplements other restoration and maintenance treatments at a scale that moves toward landscape desired conditions and contributes to watershed restoration, function, and resilience; enhances wildlife habitat; creates opportunities for small and large businesses and employment; and provides wood products.

Recreation (FW-REC)

The Carson National Forest provides a diversity of outdoor recreation opportunities, connecting people with nature in a variety of diverse settings and activities. Participation in recreational activities is what draws most people to the national forest, making it an important portal for understanding the meaning, history, and relevance of public lands. Recreation contributes greatly to the physical, mental, and spiritual health of individuals; bonds families and friends; instills pride in heritage; and provides economic benefits to communities, regions, and the Nation. The natural, cultural, and scenic environments of the Carson offer settings for a wide range of high-quality recreation and tourism opportunities. Quiet mountain, forested, and high-desert places provide an escape and climatic relief from urban environments. Cultural features provide historical context for the natural scenery, and add to the richness of the

experience and sense of place. Recreation opportunities on the Carson include nonmotorized, motorized, developed, and dispersed recreation on land, water, and in the air.

Overall, the proposed action does not, in and of itself, substantially change the expected magnitude or intensity of the recreation program from the current forest plan direction. It recognizes that there will be increased recreation demand in the future and provides clearer direction to manage future recreation demand sustainably within the capability of the plan area. The proposed action includes increased emphasis on partnerships as a means to increase capacity to provide quality recreation opportunities as well as increased opportunities to provide interpretive services to increase public awareness of natural resources and human impacts.

Desired Conditions for Recreation Resource

FW-REC-DC-3. A variety of high-quality developed and dispersed recreation opportunities and activities are available to a diverse group of forest users, including persons with disabilities. Recreation opportunities are commensurate with the recreation setting and other natural and cultural resource values.

FW-REC-DC-11. A spectrum of developed recreation opportunities characterized by varying levels of development and amenities consistent to the recreation setting are available. The quality, locations, and variety of recreation sites and their associated amenities add to visitor satisfaction and resource protection.

FW-REC-DC-12. Year-round dispersed recreation occurs in mostly undeveloped, natural areas consistent to the recreation setting and does not impact other cultural and natural resources.

FW-REC-DC-13. A system of motorized and nonmotorized trails is available in a variety of settings that provide differing levels of challenge, types of experiences, and linkages to local neighborhoods, communities, and other public lands.

Objectives for Recreation Resources

FW-REC-O-1. Develop and accomplish at least one strategy that raises awareness of discouraged practices (for example, illegal dumping, shooting practices, driving on closed roads) to promote visitor safety, during each 10-year period following plan approval.

FW- REC-O-2. Develop at least two additional methods for providing visitor information and education, during each 10-year period following plan approval.

FW- REC-O-3. Develop at least one collaborative partnership for the recreation program to expand public awareness and understanding and promote responsible behavior during each 10-year period following plan approval.

FW- REC-O-4. Accomplish two actions to maintain recreational program relevancy every 5 years following plan approval.

FW- REC-O-5. Rehabilitate five to seven areas where dispersed camping is causing unacceptable erosion during each 10-year period of the plan following plan approval.

Transportation and Forest Access (FW-TFA)

The motorized transportation system available for public use is displayed on motor vehicle use maps. The motor vehicle use maps include designated roads, trails, and areas for each ranger district. The designations include vehicle class, season of use, and any designations for motorized use associated with

dispersed camping or game retrieval. Motor vehicle use maps are reviewed and updated as needed on an annual basis. The Carson National Forest motorized transportation system also includes National Forest System roads that are only available for administrative and permitted use. This system of roads is not displayed on the motor vehicle use map.

The Carson provides management of the transportation system, including conducting inventories, surveys, and analyses; formulating plans; and executing reconstruction, maintenance, and obliteration operations.

The miles of road open to motorized use include roads where access may be restricted on a seasonal basis. Any road, regardless of maintenance level, may be closed during extreme weather conditions for public safety or to minimize resource damage. Motor vehicle use off of the designated system of roads, trails and areas is prohibited except as identified on the motor vehicle use map and as authorized by law, permits, and orders in connection with resource management and public safety. Where specifically prohibited, the motor vehicle use map for all districts identifies a 300-foot buffer on each side of system roads that allows cross-country travel for the purposes of camping.

Based on projections of future climate change for the region, roads are susceptible to the altered frequency, severity, timing, and spatial extent of disturbance events (for example, flash floods and landslides). Increased recreational use to escape summer heat could lead to additional maintenance needs and heavy use of roads in some areas.

All Carson lands are open to the public and can be accessed through nonmotorized means. To facilitate access and use, the national forest currently maintains approximately 600 miles of nonmotorized trails. Similar to the road system, the nonmotorized trail system allows visitors to gain access to the many provisioning and cultural ecosystems services important to them. This section provides forest management for the maintenance of its system trails. The “Recreation” section in this plan provides forest management for the many opportunities and experiences that can be provided by a well-maintained and functional trail system.

Methods used to meet the overall objective of this resource include assessing the transportation system to create a more effective road system and to restore natural resources that have been impacted and coordinating with other partners and Federal and State agencies. Future projects would be designed to restore and improve watershed conditions and would use best management practices, guidelines, and mitigation measures to protect watershed resources.

Desired Conditions for Transportation and Forest Access Resource

FW-TFA-DC-2. Motor vehicle use maps accurately reflect current designations.

FW-TFA-DC-4. System road and trail infrastructure has minimal impacts on ecological and cultural resources.

FW-TFA-DC-5. Unauthorized roads and trails are determined for their purpose in the transportation system or determined to be unneeded. Unneeded roads and trails are decommissioned to reduce impacts to ecological resources (i.e., watersheds, wildlife, and soil erosion) and improve habitat connectivity.

Objectives for Transportation and Forest Access Resources

FW-TFA-O-1. Obliterate or naturalize at least 20 miles of unneeded roads within the 10-year period following plan approval.

FW-TFA-O-2. Grade surfaces and clean culverts and ditches on at least 500 miles of open National Forest System roads annually.

FW-TFA-O-3. Maintain at least 100 to 300 miles of trails (including motorized) annually.

FW-TFA-O-4. Maintain at least 10 to 20 percent recreation signage during each 5-year period of the plan.

Special Uses (FW-SU)

Several acts of Congress authorize occupancy and use of National Forest System lands and interests in lands administered by the Forest Service. The applicable statutory authority determines the appropriate special uses authorization. Authorizations are issued when the proposed activities support the Forest Service mission, are in the public interest, and are consistent with national forest land and resource management plans. Authorizations are legal documents capturing the agreement of terms and conditions between the Forest Service and the individual or entity requesting occupancy and use of National Forest System lands. Special use authorizations are divided into two categories: recreation and non-recreation. Recreation special uses include activities related to resorts, ski areas, outfitting and guiding services, recreation events, commercial filming and still photography, and recreation residences. Recreation special uses are commercial in nature and generate revenue for the Forest Service, as well as for the local community. Non-recreation special uses include activities related to communication sites; rights-of-way or road access; research and utilities including powerlines, oil and gas pipelines, telephone lines, water transmission pipelines; and military training. Special uses authorizations are administered in a manner to protect the environment, promote health and safety, and serve the public.

Desired Conditions for Special Uses Resource

FW-SU-DC-2. Special uses activities support the public's need and conflicts with multiple-use opportunities afforded to other forest users are minimized.

FW-SU-DC-3. The number of communication sites are the minimum required to meet the needs of the Forest Service serve the public.

FW-SU-DC-4. Permitted utility infrastructure is in the public interest and is the minimum required to meet the needs of the public.

FW-SU-DC-5. Vegetation conditions and land uses within a right-of-way or easement facilitate the operation and management of the associated facilities and structures and may differ from the surrounding vegetation desired conditions.

Lands (FW-LAND)

The two primary functions of the lands program are to provide legally defensible boundary lines and clear title for land managed by the Forest Service. This program includes land ownership adjustments (donation, purchase, land exchange, and limited sales), withdrawals, right-of-way acquisition, landline location, and boundary modifications. Landline location surveys ensure that boundary lines are accurate. All these programs ensure that public access, watershed protection, wildlife habitat, recreation, open space, and scenic resources continue to flourish on the Carson.

The effects of future development projects such as for utilities and transportation systems would be addressed on a site-specific basis and mitigated individually following the Forest Service policy regarding special uses.

Desired Conditions for Land Resource

FW-LAND-DC-1. National Forest System lands exist as a mostly contiguous land base that best provides for and contributes to long-term socioeconomic diversity and stability of local communities, management of vegetation and watershed health, wildlife habitat and diversity, and recreation and scenic opportunity.

Wildland Fire Management (FW-FIRE)

Current species composition and fuel densities on the Carson greatly differ from historical conditions. Changes in species composition and fuel densities are a result of wildfire suppression, livestock grazing, regeneration, and encroachment of early and/or late successional species. These conditions, especially when combined with drought and climate change, create a more continuous canopy cover, ladder fuels, and accumulations of live and dead woody material. As a result, the probability of large, uncharacteristic, stand-replacing fires continues to increase. These fires burn with more intensity and severity; causing higher tree mortality, degrading watersheds, sterilizing soils, and threatening adjacent communities, forest infrastructure, and wildlife habitat. Examples of uncharacteristic wildfires on the Carson National Forest are the Hondo and Ponil Complex; these fires burned a total of 100,000 acres.

Desired Conditions for Wildland Fire Management

FW-FIRE-DC-1. Wildland fires burn within the range of severity and frequency of historic fire regimes for the affected vegetation communities. High-severity fires rarely occur where they were not historically part of the fire regime.

FW-FIRE-DC-2. Naturally ignited and planned wildland fires protect, maintain, and enhance resources and move ecosystems toward desired conditions. Fire functions in its natural ecological role on a landscape scale and across administrative boundaries, under conditions where safety and values at risk can be protected. In frequent fire systems, regular fire mitigates high-severity disturbances and protects social, economic, and ecological values at risk.

FW-FIRE-DC-3. Planned and natural ignitions predominate. Unplanned human-caused ignitions are rare.

Objectives for Wildland Fire Management

The mixed use of mechanical treatments and wildfire, both prescribed and naturally ignited, is conducted to provide for societal goods, to move the vegetation toward desired conditions, and to reduce the risk of stand-replacing fires. Naturally occurring fires should be allowed to perform their natural ecological role. Objectives are for a 10-year period and include acre ranges specified for mechanical treatment and fire (table 6).

Minerals and Mining (Including Renewable Energy (FW-MM)

There are three categories of minerals potentially found on the Carson. These are referred to as locatable, leasable, and salable minerals; each is subject to different laws and implementing regulations. Locatable minerals (include mostly metallic mineral deposits) are subject to the General Mining Law of May 10, 1872, as amended, and for the most part are outside the scope of the land management plan. The Forest Service role in managing such resources is to provide reasonable protection of surface resources. The agency does not have the authority to outright deny locatable mineral activities, providing they follow applicable laws and regulations. Leasable minerals include oil and gas, coal, and certain other commodities such as potash, which is a solid leasable mineral. The Forest Service role in managing such resources is to recommend or consent to the Department of the Interior, Bureau of Land Management whether leases for these commodities should be issued and to specify any surface resource protections that may be needed. The last category, salable minerals, applies to mineral materials such as sand and gravel, which the Forest Service has total discretion to manage. It is Forest Service policy to support

responsible, environmentally sound energy and mineral development and reclamation on the national forest.

No active locatable mineral mines occur on the Carson; although uranium deposits do exist, and the Carson has two inactive uranium mines. There are numerous abandoned gold and silver mines. Several streams are used for recreational gold panning. There are known rare-earth deposits in the Petaca Mining District. Pursuant to Federal mining laws, the Forest Service is required to respond to proposals for conducting exploration and mining operations. The Forest Service must determine whether to approve the preliminary plan of operations submitted or to require changes or additions deemed necessary to meet the requirement of the regulations for environmental protection. All proposals must comply with Federal and State laws and regulations and should be managed to reduce adverse environmental impacts to the extent practicable on National Forest System lands.

Within Valle Vidal of the Questa Ranger District, the Valle Vidal Protection Act of 2005 (Public Law 109-385) withdraws (1) all forms of entry, appropriation, and disposal under the public land laws; (2) location, entry, and patent under the mining laws; and (3) operation of the mineral leasing and geothermal leasing laws and common variety mineral materials laws. This withdrawal is subject to valid existing rights. A private corporation currently holds coal rights on approximately 60,000 acres of Valle Vidal.

Saleable materials on the Carson include sand and gravel, decorative stones, and clay. The national forest provides opportunity for local communities to harvest these products from designated areas. The current use of these materials is such that existing sites can remain functional over an extended time.

Renewable energy sources on the Carson National Forest are limited to solar and geothermal energy. There are no water resources that could support hydropower development and, due to terrain and accessibility issues, the Carson is considered to have low wind power potential. The national forest does have good potential to provide solar and geothermal power as a source of renewable energy. No existing renewable energy sources have been developed on the Carson for commercial or noncommercial use.

The potential for leasable minerals such as oil or gas is low. However, there is potential for leasable potash minerals bearing the commodity of potassium on the Carson. The Forest Service would make a recommendation for a lease to the Bureau of Land Management, which is the lead agency for solid leasable potash minerals. Stipulations to protect surface resources would be made for exploration or mining.

Methods used to meet the overall desired conditions of the program include incorporating best management practices into future leases as appropriate, considering withdrawal from locatable minerals entry and operations for congressionally designated areas, and coordinating with other Federal and State agencies. Future projects would be designed to incorporate opportunities for environmentally sound mineral development to protect social, cultural, and ecological values and would use best management practices, standards, guidelines, and mitigation measures to protect these resources.

Desired Conditions for Mineral and Mining Resource

FW-MM-DC-1. Energy, mineral, and mining activities meet the legal mandates to facilitate the development of minerals in a manner that minimizes adverse impacts to surface and groundwater resources, watershed and forest ecosystem health, wildlife and wildlife habitat, scenic character, and other desired conditions applicable to the area.

FW-MM-DC-2. Reclamation of energy, mining, and mineral activity sites provides for public safety and the protection of forest resources, restoring them to a natural condition.

Description of Preferred Alternative Designated Areas Plan Direction

The Carson National Forest has areas that contain special, exceptional, or unique values that provide important ecosystem services. Many of these areas meet the criteria to be considered special places and are awarded specially designated status. Designation protects the special values of the area and the ecosystem services those values provide. This status can be on a national, regional, or local scale. The term "designated area" refers to categories of area or feature established by, or pursuant to, statute, regulation, or policy. Designation of areas requires approval at upper levels of administration, including Congress, and in some cases requires multiple administrators. Once established, the designation continues until a subsequent decision by the appropriate authority removes the designation. Designated areas for the Carson are wilderness, Vallecitos Federal Sustained Yield Unit; inventoried roadless areas; wild and scenic rivers; national scenic, historic, and recreation trails; nationally designated scenic byways; wild horse territories; Sangre de Cristo Pea Clam Zoological Area; and *Smallheaded Golden Weed* Botanical Area. Critical habitat for Mexican spotted owl overlaps with wild horse territories on the Jicarilla Ranger District. No critical habitat for federally listed species has been designated within any other designated areas on the Carson. The only designated areas that would potentially affect federally listed species are wilderness, inventoried roadless, wild horse territories, and Vallecitos Federal Sustained Yield Unit.

Vallecitos Federal Sustained Yield Unit (DA-VFSYU)

The Sustained Yield Forest Management Act of 1944 authorized the Secretary of Agriculture to create Federal sustained yield units. In 1946, northern New Mexico was facing issues of community poverty, overgrazing, and new demands for timber off of National Forest System lands. To address these issues and mitigate the effects of recent grazing reductions in the Vallecitos area, the Forest Service created the Vallecitos Federal Sustained Yield Unit (figure 2) in 1948, allocating 73,400 acres of National Forest System lands toward sustained yield management. The primary purpose of the Vallecitos Federal Sustained Yield Unit is to provide the maximum feasible, permanent support to the Vallecitos community and nearby areas, including Petaca and Cañon Plaza, from forest products industries obtaining wood products supply from the national forest lands of the unit.

Currently, there is no operable sawmill nearby to manage the Vallecitos Federal Sustained Yield Unit (as originally intended). The Carson continues to plan and accomplish thinning and fuels reduction projects in the Vallecitos Federal Sustained Yield Unit. Many of these projects are carried out to decrease fire hazard and maintain the health of the forested ecosystems in the Vallecitos Federal Sustained Yield Unit.

Wilderness (DA-WILD)

The Carson National Forest manages six designated wilderness areas for a total of 129,119 acres: Wheeler Peak, Columbine/Hondo, Rio Chama, Pecos, Cruces Basin, and Latir. Wilderness is managed in accordance with the Wilderness Act of 1964 (figure 3).

Inventoried Roadless Area (DA-IRA)

Inventoried roadless areas provide clean drinking water and function as biological strongholds for populations of threatened and endangered species. They provide large, relatively undisturbed landscapes with high scenic quality that are important to biological diversity and the long-term survival of many federally listed species and species of conservation concern. Inventoried roadless areas provide opportunities for dispersed outdoor recreation. They also serve as buffers against the spread of nonnative

invasive plant species and as reference areas for study and research. The Carson manages 12 inventoried roadless areas, totaling approximately 105,000 acres (figure 4).[2]

While a range of management and activities may occur in inventoried roadless areas including system roads and motorized recreation, generally road construction and timber harvest is prohibited with some exceptions. The regional forester reviews all projects involving road construction or reconstruction and the cutting, sale, or removal of timber in inventoried roadless areas, with the exception of the following management activities, which are reviewed by the forest supervisor:

- Any necessary timber cutting or removal or any road construction including road reconstruction in emergency situations involving wildfire suppression, search and rescue operations, or other imminent threats to public health and safety in inventoried roadless areas.
- Timber cutting, sale, or removal in inventoried roadless areas incidental to the implementation of an existing special use authorization. Road construction or road reconstruction is not authorized through this re-delegation without further project-specific review.
- The cutting, sale, or removal of generally small-diameter timber when needed for one of the following purposes:
    - To improve threatened, endangered, and proposed species habitat;
    - To maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period; or,
    - For administrative and personal use, as provided for in 36 CFR 223, where personal use includes activities, such as Christmas tree and fuelwood cutting, and where administrative use includes providing materials for activities, such as construction of trails, footbridges, and fences.

Wild Horse Territories (DA-WHT)

The Carson National Forest has four designated wild horse territories. Jarita Mesa Wild Horse Territory and Jicarilla Wild Horse Territory are the only two that are occupied and managed (figure 6). The Wild Free-Roaming Horses and Burros Act of 1971, as amended by the Federal Land Policy and Management Act of 1976 and the Public Rangeland Improvement Act of 1978, directs the protection and management of wild horses and burros on public lands. The Forest Service, by authority of the Secretary of Agriculture, is responsible for managing the nation's wild horses and burros on National Forest System lands. Management of wild horse and burro territories is guided by individual management plans. Critical habitat for Mexican spotted owl overlaps the Jicarilla Wild Horse Territory within the Jicarilla Ranger District.

Description of Preferred Alternative Management Area Plan Direction

Management areas are delineated to provide plan direction for certain areas to meet specific management needs. They have a corresponding common set of plan components that differ from that of the general forest. Some management areas apply to more than one area on the Carson while other areas are geographically specific. Forestwide plan components are applied, unless there is management direction

[2] The Carson National Forest inventoried roadless areas are managed according to the 2001 Roadless Area Conservation Rule (66 FR 3244).

for a specific management area. Management direction for each management area is outlined in the sections that follow. Management areas identified in this plan for the Carson are:

- Recommended Wilderness Management Area
- Eligible Wild and Scenic River Management Area
- Developed Winter and Summer Resort Management Area
- Jicarilla Natural Gas Management Area
- Grassland Maintenance Management Area
- Valle Vidal Management Area
- San Antonio Management Area

Those management areas that potential affect federally listed species are briefly summarized below. Full descriptions of all management areas are detailed in the land management plan. Critical habitat for federally listed species only occurs in within the eligible wild and scenic river management area and the Jicarilla natural gas management area.

Recommended Wilderness Management Area (MA-RWMA)

Recommended wilderness lands are lands that have the potential to become designated as official wilderness through legislation. The Forest Service only recommends these lands to the United States Congress for consideration. Congress and, ultimately, the President, must establish legislation to officially designate wilderness areas. The land management plan is recommending the following areas for wilderness designation (9,295 acres, figure 7):

- Ash Mountain (5,314 acres)
- Rito Claro (1,165 acres)
- Rudy (1,675 acres)
- Toltec (1,038 acres)
- Lobo (82 acres)
- Huckaby (21 acres)

These areas would be managed like designated wilderness, except for the following standard:

MA-RWMA-S-1. Motor vehicles, motorized equipment, and mechanical transport are prohibited unless specifically authorized for emergency use or the limited needs required for management activities (e.g., grazing management, or wildlife needs) when they do not permanently degrade wilderness characteristics of the area over the long term.

Eligible Wild and Scenic River Management Area (MA-EWSR)

Eligible wild and scenic rivers meet the basic criteria for inclusion in the National Wild and Scenic Rivers System. They are free-flowing and possess at least one value that is outstandingly remarkable regionally or nationally.

The agency has identified 50 river segments in the Carson National Forest totaling approximately 170 miles, as eligible to be included in the National Wild and Scenic Rivers System (figure 8). There are 78.8

miles classified as wild, 28.6 miles classified as scenic, and 62.1 miles classified as recreational. The Rio Grande del Rancho river segment contains critical habitat for southwestern willow flycatcher.

Agency-identified eligible rivers are managed to retain their status until a suitability determination is made about whether to recommend them for inclusion in the National Wild and Scenic Rivers System. A suitability study must analyze the effects of designation to other resource values, identify issues, and explore alternatives for protecting river values. The Carson may authorize projects and activities in eligible rivers or the surrounding corridor, so long as they preserve the free-flowing condition of the river, protect the outstandingly remarkable values that provide the basis of the river's eligibility for inclusion in the system, and do not affect the classification of the river segment. In most cases, in-stream structures that unnaturally impound water have a negative impact on free flow; however, some impoundments may be allowed if they are built from natural-appearing materials that harmonize with the river environment, mimic natural events (for example, trees falling across a river), do not cause hazards that interfere with the recreational use of the river, and do not prevent natural river processes in the future. Free flow may be positively affected when instream structures promote more natural levels of river processes (for example, bank erosion, channel shifting, groundwater infiltration, and floodplain development) and bed load or debris movement. For example, a degraded, incised river may be considered free flowing, but in some cases that free flow may be altered to restore a more natural flow by slowing water and reconnecting the river with its floodplain.

Developed Winter and Summer Resort Management Area (MA-DEVRES)

The Developed Winter and Summer Resorts Management Area includes the existing four resorts that are currently permitted and developed on the Carson. The existing resorts are Taos Ski Valley, Red River Ski and Summer Area, and Enchanted Forest Cross-Country Ski Area, located on the Questa Ranger District, and Sipapu Ski and Summer Resort, which is on the Camino Real Ranger District (figure 9). These resorts provide winter and summer sports activities and other intensively managed outdoor recreation opportunities for large numbers of national and international visitors in highly developed settings and altered vegetation. Opportunities for solitude within the Developed Winter and Summer Resort Management Area are limited.

Winter and summer resorts are managed under a special use permit. As a part of the special use permit, each ski area develops a master development plan that is accepted by the Forest Service. Master development plans describe the improvements and facilities that are desired at each resort and are the guiding document used to describe its expected future condition. A master development plan encompasses all of the area authorized for use under permit (permit area), including areas that are currently undeveloped.

Under modified alternative 2, the permitted ski area acres are 2,588, but the management area is 3,509 acres. The management area within modified alternative 2 would include the permitted boundary acres of the ski areas plus 921 acres surrounding the Sipapu Ski Area. These 921 acres are presently outside of the Sipapu permit boundary, undeveloped, and with mixed conifer forest type. Modified alternative 2 would not change the permit boundary surrounding the Sipapu Ski Area; any change to a ski area permit boundary would be a project-level environmental analysis decision and would have to be consistent with other plan direction and other laws and regulations.

Potential Developed Recreation Site Management Area (MA-PDRMA)

This management area surrounds the existing Sipapu Ski Area, encompasses 1,032 acres, and has potential to expand recreational opportunities and provide local economic benefit. Any future

development would need to be environmentally and economically feasible, and site development plans would be made available for review to the Carson National Forest and the general public.

MA-PDRMA-DC-1. Any developments or activities protect, maintain, or improve the value of the site for future recreation development.

Jicarilla Natural Gas Management Area (MA-JICMA)

Oil and natural gas development on the Carson National Forest is currently limited to the Jicarilla Ranger District (figure 10). Leasing is authorized over the entire Jicarilla Ranger District, except for the historic Gasbuggy Site (640 acres). Leasing activity varies with fluctuations in the price of oil and gas. Resource issues and conflicts surrounding oil and gas development on the Jicarilla Ranger District primarily consist of effects to cultural resources. Traditionally, these resources have been avoided, but in recent years site mitigation has been proposed, but not conducted. The Jicarilla Ranger District has a high density of archeological sites, and cultural resources are often the final driving force for well pad and access road location. Wildlife issues primarily influence projects proposed near northern goshawk or Mexican spotted owl habitat. These issues are mitigated with survey requirements and timing limitations.

It is important to note the special lease stipulations apply only to new leases. Pre-existing leases are subject to the stipulations of their leases. However, new development on existing leases must also comply with management direction in modified alternative 2. Any additional mitigation measures would need to be justifiable, still provide reasonable access for the leaseholder, and would be incorporated in a site-specific document.

Valle Vidal Management Area (MA-VVMA)

Valle Vidal Management Area comprises approximately 100,000 acres of rolling, grassland meadows surrounded by conifers, bristlecone pines, and aspen stands in the northern portion of the Questa Ranger District (figure 12). On December 31, 1981, the Pennzoil Company donated a portion of its 492,560-acre Vermejo Ranch in northeastern New Mexico to the people of the United States through the USDA Forest Service and called it Valle Vidal (“Valley of Life”). The special warranty deed that accompanied the donation specifically (1) excludes the mining claims and town site within the La Belle area; (2) conveys all improvements located on the lands transferred; (3) recognizes the perpetual coal royalty interest Indenture Agreement with Kaiser Corporation; and (4) includes two road easements to Vermejo Park. No other provisions or restrictions were included in the deed.

The Valle Vidal Management Area’s streams and lakes are the headwaters of the Costilla and Ponil watersheds. All the perennial streams within Valle Vidal are designated as outstanding national resource waters by the State of New Mexico. Forests are predominantly spruce-fir, ponderosa pine, and mixed conifer, interspersed with aspen. There are large, contiguous stands of mature bristlecone pine and mixed stands of bristlecone, aspen, and large Douglas-fir trees. The variety of forest age classes and structures provides diverse habitats with abundant wildlife.

The Valle Vidal Management Area under modified alternative 2 is managed for multiple uses, focusing on the restoration and protection of diverse, resilient, biological communities for future generations, while providing a quality backcountry outdoor recreation experience. Valle Vidal Management Area’s plan components limit development, road construction, and motorized trail construction. Existing closed and non-system roads would continue to naturalize and would diminish watershed and ecological condition impacts from sedimentation and habitat segmentation. Wildlife habitats provide for a diversity of native plants, fish, and wildlife. Frequent fire plays a role in lessening the probability of a stand-replacing wildfire, while contributing to the reestablishment of ecological processes. With its large, open meadows,

Valle Vidal supports one of New Mexico's largest elk herds. Meadows are not only significant to elk, but also provide one of Valle Vidal's many scenic features for outdoor recreationists.

San Antonio Management Area (MA-SAMA)

San Antonio Management Area is composed of approximately 117,035 acres of rolling grassland surrounded by conifers, ponderosa pines, and aspen stands in the northern portion of the Tres Piedras Ranger District (figure 13). The San Antonio Management Area contains the Rio San Antonio gorge, San Antonio Mountain, streams with Rio Grande cutthroat trout populations, Continental Divide National Scenic Trail, speckled granite outcrops, eligible wild and scenic rivers, wetlands, and the existing Cruces Basin Wilderness. San Antonio Mountain is the largest free-standing mountain in the Lower 48. It is the tallest of the Cerros, a solitary volcanic peak rising out of the desert floor. There is a crater (caldera) at the summit, with unique alpine grassland ecology. This area contains the renowned San Antonio Cave, one of the oldest lava tubes in North America, with some of the oldest mammalian fossils ever found. Forests are predominantly spruce-fir, ponderosa pine, and mixed conifer, interspersed with aspen. The variety of forest age classes and structures provides diverse habitats with abundant wildlife.

San Antonio Management Area under modified alternative 2 is managed for multiple uses, focusing on the protection of diverse, resilient, biological communities for future generations, while providing a quality backcountry outdoor recreation experience. San Antonio Management Area's plan components limit development and road construction. Existing closed and non-system roads would continue to naturalize and would diminish watershed and ecological condition impacts from sedimentation and habitat segmentation. Wildlife habitats provide for a diversity of native plants, fish, and wildlife. Frequent fire plays a role in lessening the probability of a stand-replacing wildfire, while contributing to the reestablishment of ecological processes. With its large grasslands, San Antonio Management Area supports one of New Mexico's largest elk herds during critical winter months.

Monitoring

The purpose of monitoring and evaluation is to evaluate, document, and report how the land management plan is applied, how well it works, and if its purpose and direction remain appropriate. Based upon this evaluation, recommendations may be made to the Forest Supervisor to change management direction, or revise, or amend the forest plan. The biennial monitoring and evaluation report is intended to inform adaptive management of the plan area especially in light of changing social or environmental conditions.

A plan monitoring program must contain at least one monitoring question and associated indicator to address each of the nine elements. These are the minimum monitoring requirements as specified in the 2012 Planning Rule (36 CFR 219.12(a)(5). See chapter 5 of the revised forest plan for the monitoring program and additional information about adaptive management and reporting frequency. Table 7 through table 11 describe monitoring questions that directly address listed species and or their habitat. Monitoring categories appear in order as they appear in the plan. Details of the plan monitoring program—including monitoring and analysis protocols, data collection schedules, responsible parties, and data management—will be part of a separate monitoring guide. See chapter 4 of the revised land management plan for the monitoring program and additional information about adaptive management.

Monitoring Topic I would primarily benefit southwestern willow flycatcher and potentially improve future habitat for western yellow-billed cuckoo and New Mexican meadow jumping mouse.

Table 7. Monitoring questions and associated indicators that evaluate select watershed conditions

Selected Plan Components	Monitoring Questions	Indicators
FW-WSW-DC-1 FW-WSW-O-1 FW-TFA-O-1	Are watersheds functioning properly? Are "impaired" or "functioning-at-risk" watersheds moving toward desired conditions?	Percentage of watersheds in proper functioning condition Number of acres treated to improve watershed condition Miles of road decommissioned
FW-WSW-RMZ-STM-DC-5 FW-WSW-RMZ-WB-DC-5 FW-WSW-RMZ-SNS-DC-5 FW-WSW-G-1	Are best management practices being implemented to minimize impacts and improve water quality? Are best management practices effectively protecting watershed condition, including water quality?	Visual confirmation of best management practices implementation Review a sample of soil-disturbing activities for compliance with best management practices by project and allotment operating instruction implementation Monitoring of best management practices
FW-VEG-DC-8	Are management actions maintaining or improving soil cover contributing to improved soil condition?	Ground cover Soil condition rating
FW-WSW-DC 4 FW-WSW-O-1 FW-TFA-O-1 FW-WFP-O-2 FW-WFP-O-3 FW-WFP-O-4 FW-WFP-O-5	To what extent are forest management activities improving ecological condition for Aquatic At-Risk[3] Species and providing habitat connectivity?	Number of fish passage barriers removed or created Number of roads decommissioned within the riparian management zone Number of culverts removed or upgraded Number of activities with stream miles of habitat improvements Stream miles treated for nonnative invasive species

Monitoring Topic II would primarily benefit Mexican spotted owl, Canada lynx, southwestern willow flycatcher and potentially improve future habitat for black-footed ferret, western yellow-billed cuckoo, and New Mexican meadow jumping mouse.

[3] Forest Service at-risk species include two categories: (1) federally designated species and habitat (species listed as threatened or endangered, species that are proposed or candidates for Federal listing, and species with designated critical habitat on the national forests), and (2) Forest Service-designated species of conservation concern.

Table 8. Monitoring questions and associated indicators that evaluate select ecological conditions for key characteristics of terrestrial and aquatic ecosystems

Selected Plan Components	Monitoring Questions	Indicators
FW-VEG-DC-3 FW-VEG-DC-2 FW-VEG-MCD-O-1 FW-VEG-PPF-O-1 FW-VEG-MCD-O-2 FW-VEG-PPF-O-2	What is the condition and trend of key characteristics of vegetation on the forest? Are management actions moving fire regimes toward desired conditions?	Vegetation composition, size class, and canopy cover Acres of Mixed Conifer with Frequent Fire treated Acres of Ponderosa Pine Forest treated Acres and location of insect and disease infestations
FW-WFP-DC-2 FW-WSW-RMZ-SNS-O-1 FW-WFP-O 1 FW-WFP-O 4 FW-WFP-O 5	Are management activities moving terrestrial habitat toward desired conditions? What is the status of habitat for At-risk Species associated with High Elevation Forest on NFS lands? What is the status of habitat for At-risk Species associated with Frequent Fire Forest on NFS lands? What is the status of habitat for At-risk Species associated with Woodlands on NFS lands? What is the status of habitat for At-risk Species associated with Non-Forested vegetation on NFS lands?	Number of water features maintained, improved, or installed Acres of terrestrial habitat restored or enhanced Focal Species presence
FW-WSW-RMZ-DC-1 FW-WSW-RMZ-DC-2 FW-WSW-RMZ-O-1 FW-NIS-O-1	What is the condition and trend of key ecosystem components for riparian vegetation in the plan area? Are management actions maintaining or moving riparian vegetation toward desired conditions?	Acres of impaired riparian restored Stream miles treated for nonnative invasive species
FW-WSW-RMZ-DC-2 FW-WSW-RMZ-DC-5 FW-WSW-RMZ-STM-O-1 FW-WSW-RMZ-SNS-O-1	Is aquatic habitat distributed, connected, and in a condition capable of supporting native aquatic species? Are management actions making progress toward desired conditions for native aquatic species?	Miles of aquatic habitat restored Number of beneficial barriers created/number of barriers removed to reduce undesired fragmentation Amount of large woody debris in streams 303d turbidity exceedance 303d temperature exceedance

Selected Plan Components	Monitoring Questions	Indicators
FW-FIRE-DC-1 FW-FIRE-DC-2 FW-FIRE-G-1	Are desired fuel levels and vegetation characteristics being maintained with wildland fire? Is wildland fire playing its natural ecological role? Are fires being managed across administrative boundaries?	Acres burned, by ecological response unit Range of fire sizes, by ecological response unit Percentage of acres burned by severity class, by ecological response unit Burned acres managed for resource objectives Number of multijurisdictional fires

Monitoring Topic III is monitoring questions and associated indicators that evaluate the status of focal species to assess the ecological conditions required under section 219.9. Focal species are a small subset of species whose status permits inference to the integrity of the larger ecological system to which they belong. Focal species, as used by the Forest Service, are not meant to act as surrogates for other species. Focal species monitoring is also not the same as monitoring those species in which we have a particular interest, such as threatened or endangered species, invasive species, or other species for which we deliberately manage the landscape. Focal species are intended to reduce the cost and effort of ecosystem monitoring and should only be used when direct measurement of resources is not efficient or practical.

Table 9. Monitoring questions and associated indicators that evaluate the status of focal species

Selected Plan Components	Monitoring Questions	Indicators
FW-VEG-DC-5 FW-VEG-DC-2 FW-VEG-PPF-DC-15 FW-VEG-PPF-DC-16 FW-VEG-PPF-O-1 and 2	What is the area of forest occupied by Grace's warbler?	Proportion of surveyed habitat in which the species is detected
FW-VEG-DC-5 FW-VEG-DC-2 FW-VEG-MCW-DC-2 FW-VEG-MCW-DC-5 FW-VEG-MCW-DC-15	What is the area of forest occupied by the hermit thrush?	Proportion of surveyed habitat in which the species is detected

Monitoring Topic IV monitors the status of at-risk species through ecological conditions. For particular at-risk species, a select set of ecological conditions, including habitat, is monitored. the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern identified for the Carson National Forest. The select set of ecological conditions monitored for at-risk species may include characteristics at both the ecosystem and species-specific levels of terrestrial, riparian, or aquatic ecosystems.

Table 10. Monitoring questions and associated indicators that evaluate the status of a select set of ecological conditions for at-risk species

Selected Plan Components	Monitoring Questions	Indicators
FW-VEG-DC 20 FW-VEG-DC 21	Are management actions maintaining or improving the appropriate number, distribution, and recruitment of snags?	Number, distribution, and recruitments of snags
FW-VEG-DC 2	Is vegetation structure meeting or approaching desired conditions?	Departure
FW-VEG-DC 5 FW-VEG-DC 10	Is vegetation structure meeting or approaching desired conditions to improve ecological for at-risk species?	Departure

Table 11. Monitoring Topic VI includes monitoring questions and associated indicators that measure change related to climate change and other stressors that may be affecting the plan area

Selected Plan Components	Monitoring Questions	Indicators
FW-VEG-DC-3 FW-WSW-DC-2	Are vegetation conditions resilient to a changing climate? Are insect and disease populations within reference conditions? What is the relationship between these stressors and climate vulnerability predictions?	Acres of vegetation treatments; Vegetation structure and composition; Acres of canopy loss in forested vegetation communities due to fire, drought, insects, or disease; Treatment effectiveness as it relates to the Climate Change Vulnerability Assessment (USDA FS 2014b); Tree planting and seeding success as it relates to Climate Change Vulnerability Assessment
FW-VEG-DC-3 FW-WSW-DC-2	What are seasonal temperature and precipitation trends?	NOAA climate trends

Conservation Measures

Risk to species viability is reduced by provisions in existing law and policy. The Carson National Forest would continue to follow the intent of all recovery plans for federally listed species even if actions within those plans do not match the Carson's desired conditions for the particular resource area. These include specific consideration of effects to federally listed species (proposed, threatened, and endangered species) in biological assessments and evaluations conducted as part of all national forest management decisions. These assessments and evaluations identify where additional protective measures are warranted to provide for continued existence of the species on National Forest System land. Projects that may affect federally listed or proposed species must be coordinated with the U.S. Fish and Wildlife Service during the planning stage to mitigate potential impacts to listed species under section 7(a)(2) of the Endangered Species Act. In addition, section 7(a)(1) of the Endangered Species Act directs Federal agencies to use their authorities to carry out programs for conserving and aiding in the recovery of threatened and endangered species. Some plan components (e.g., standards and guidelines) in the proposed action are also considered conservation measures. These plan components are identified as such under the analysis of effects for each species. For example, objectives to reduce stand area density and risk from uncharacteristic stand-replacing wildfire in spotted owl habitat.

A number of desired conditions, standards, and guidelines would have beneficial positive effects on all listed species. These plan components fall under the wildlife, fish, and plants program area and incorporate direction that complements and supports recovery plans and recovery actions, helps to prevent future listings, and ensures species protection measures are considered during project design and

implementation. These plan components support and reinforce plan components associated with the major program areas and activities that would likely occur during the life of the plan. Many of the management activities would be focused on restoration work, as described below under the proposed action. Table 12 through table 19 highlight key plan components that would support species recovery, restore critical habitats, and prevent future listings.

The following forestwide plan components (table 12 - Table 19) would have beneficial effects on all threatened and endangered species addressed in this analysis. Please see table 4 for a list of all plan component codes, and for full plan language see the land management plan.

Table 12. All vegetation desired conditions (FW-VEG-DC)

Number	Plan Language
3	Ecosystems maintain or recover all of their essential components (i.e., plant density, species composition, structure, coarse woody debris, and snags), processes (i.e., disturbance and regeneration), and functions (i.e., nutrient cycling, water infiltration, and carbon sequestration) despite changing and uncertain future environmental conditions.
4	Old growth is well distributed, dynamic in nature, and shifts on the landscape over time, as a result of succession and disturbance. Old growth attributes (e.g., multistory structure, large old trees, large trees with sloughing and exfoliating bark, snags, large downed logs, and other indicators of decadence) are present in all forest and woodland vegetation communities and provide habitat for associated species.
5	Ecological conditions affecting habitat quality, distribution, and abundance contribute to self-sustaining populations of native and desirable nonnative plants and animals that are healthy, well distributed, genetically diverse, and connected (on National Forest System lands and to adjacent public and privately conserved lands), enabling species to adapt to changing environmental and climatic conditions. Conditions provide for the life history, distribution, and natural population fluctuations of the species within the capability of the ecosystem.
14	Habitats and refugia for rare, endemic, and culturally important species are intact, functioning, and adequate for species' persistence and recovery.
20	The structure and function of the vegetation and associated microclimate and special features (e.g., snags, logs, large trees, interlocking canopy, cliffs, cavities, talus slopes, bogs, fens, rock piles, specific soil types, and wet areas) exist in adequate quantities within the capability of the Carson, to provide habitat and refugia for at-risk species with restricted distributions.
21	Ecological conditions, as described in these desired conditions, provide habitat to support, sustain, and recover rare, endemic, or at-risk species.

Table 13. All vegetation guidelines (FW-VEG-G)

Number	Plan Language
1	Management activities and special uses occurring within federally listed species' habitat should integrate habitat management objectives and species protection measures from the most recent approved U.S. Fish and Wildlife Service recovery plan, to maintain the persistence or contribute to the recovery of that species.
2	Where the Forest Service has entered into a signed conservation agreement that provides guidance on activities or actions to be carried out by the Carson, those activities or actions should be undertaken consistent with the guidance found within the conservation agreement, to maintain the persistence or contribute to the recovery of at-risk species.
3	Vegetation should provide for at-risk species' habitats by minimizing disturbance, providing recovery strategies, and managing for desired levels of key structural elements for at-risk species (for example, large old trees and snags, downed woody debris, denser vegetation structure, and soil structure) important for nesting, rearing, breeding, foraging, dispersal and other life history needs to maintain the persistence or contribute to the recovery of at-risk species.

Table 14. Riparian management zone desired condition and guideline (FW-WSW-RMZ)

Number	Plan Language
DC-1	Riparian ecosystems are not fragmented or constrained and are and properly functioning; commensurate with their type and capability, riparian ecosystems have vegetation, landform, large coarse woody debris, litter, and root masses to capture sediment, filter contaminants, dissipate stream energy and overland flow from uplands to protect and enrich soils and stabilize banks and shorelines.
DC-5	Riparian ecosystems exhibit connectivity between and within aquatic, riparian, and upland components that reflect their natural linkages and range of variability. Stream courses and other links provide habitat and movement that maintain and disperse populations of riparian-dependent species, including beaver. Riparian areas are connected vertically between surface and subsurface flows.
DC-9	Within the capability of individual riparian types and consistent with the hydrologic cycle, riparian vegetation provides life-cycle habitat needs for native and desirable nonnative, obligate riparian, and aquatic species and supports other wildlife.
G-2	Within riparian management zones, management activities, permitted uses, and structural developments (e.g., livestock water gaps, pipelines, fences, or other infrastructure) should occur at levels or scales that move toward desired conditions for water, soils, and vegetation and align with the most current regional riparian strategy. Management activities and facilities with a small footprint (e.g., intermittent livestock crossing locations, water gaps) may be necessary to manage larger scale impacts to riparian areas or to protect life, property, or cultural sites.

Table 15. Streams desired condition (FW-WSW-RMZ-STM-DC)

Number	Plan Language
2	Stream ecosystems, including ephemeral watercourses, provide connectivity that is important to at-risk species—for dispersal, access to new habitats, perpetuation of genetic diversity, seasonal movement, as well as nesting and foraging.
3	Aquatic species are able to move throughout their historic habitat, including opportunities for seasonal and opportunistic movements. Barriers to movement only exist to protect native aquatic species from nonnative aquatic species or for agricultural benefit (for example, headgates).
9	Habitat conditions, as described in stream desired conditions, are capable of supporting self-sustaining native aquatic species populations. These habitat conditions include stream characteristics (i.e., riffles, runs, pools, and channel meandering) that allow for natural processes to occur (e.g., floodplain connectivity and organic matter and sediment transport). Quality aquatic habitat is provided by overhanging banks, woody and herbaceous overstory, and instream large woody debris, which regulate stream temperatures; maintain soil moisture; create structural and compositional diversity; and provide cover, food, and water for riparian species along streams.

Table 16. Streams standard and guideline (FW-WSW-RMZ-STM)

Number	Plan Language
S-2	Heavy equipment and vehicles used for instream management activities must be free of petroleum-based fluid residue and must not leak.
G-2	Downed woody material in stream channels should be retained, to improve channel morphology, except where safety is a concern.

Table 17. Wetland and forest and shrub riparian desired conditions, standard, and guideline (FW-WSW-RMZ)

Number	Plan Language
WR-DC-1	Necessary soil, hydrologic regime, vegetation, and water characteristics of wetland riparian vegetation communities sustain the system's ability to support unique physical and biological attributes and the diversity of associated species (e.g., shrews and voles). Soils' ability to infiltrate water, recycle nutrients, and resist erosion is maintained and allows for burrowing by at-risk[4] species.
WR-DC-3	Wetlands have groundcover and species composition (richness and diversity) indicative of site potential with vegetation comprised mostly of sedges, rushes, perennial grasses, and forbs. Meadows with the potential for hardwood shrubs contain a diversity of age classes (at least 2) along the banks of perennial streams.
WR-S-3	Avoid using motorized equipment in wetland areas, except when there is a designated crossing or when short-term uses are required to improve resource conditions and maintain existing infrastructure.
FSR-DC-5	Woody riparian species are reproducing and are structurally diverse with all age classes present at the landscape scale. Diverse vegetation structure, including mature trees, snags, logs, and coarse woody debris, is present to provide habitat for riparian-dependent species.
FSR-DC-12	Dense willow conditions (70 percent cover or greater) are retained for at-risk species[5] habitat.
FSR-G-1	Connectivity within forest and shrub riparian vegetation communities should be restored or maintained by protecting ecological functions, tree density and growth, and native understory, to reduce the risk of predation and nest parasitism and to provide habitat for at-risk and other wildlife species.

Table 18. Wildlife, fish, and plant desired conditions (FW-WFP-DC)

Number	Plan Language
2	Ecological conditions (vegetation and watersheds and water desired conditions) affecting habitat quality, distribution, and abundance contribute to self-sustaining populations of terrestrial and aquatic plant and animal species, including at-risk species, that are healthy, well distributed, genetically diverse, and connected (on National Forest System lands and to adjacent public and privately conserved lands), enabling species to adapt to changing environmental and climatic conditions. Conditions as described in vegetation and watersheds and water desired conditions provide for the life history, distribution, and natural population fluctuations of the species within the capability of the ecosystem.
3	Ecological conditions (vegetation and watersheds and water desired conditions) provide habitat that contribute to the survival, recovery, and delisting of species under the Endangered Species Act; preclude the need for listing new species; improve conditions for species of conservation concern; and sustain both common and uncommon native species.
4	Habitat conditions (vegetation and watersheds and water desired conditions) provide the resiliency and redundancy necessary to maintain species diversity and metapopulations.
5	Habitat connectivity and distribution provide for genetic exchange, daily and seasonal movements of animals, and predator-prey interactions across multiple spatial scales, consistent with existing landforms and topography.
6	Habitat configuration and availability and species genetic diversity allow long-distance range shifts of plant and wildlife populations, in response to changing environmental and climatic conditions. Barriers to movement may exist to protect native species and prevent movement of nonnative species (e.g., a fish structure to protect Rio Grande cutthroat trout from nonnative invasion).

[4] Forest Service at-risk species include two categories: (1) federally designated species and habitat (species listed as threatened or endangered, species that are proposed or candidates for Federal listing, and species with designated critical habitat on the national forests), and (2) Forest Service-designated species of conservation concern.

[5]Forest Service at-risk species include two categories: (1) federally designated species and habitat (species listed as threatened or endangered, species that are proposed or candidates for Federal listing, and species with designated critical habitat on the national forests), and (2) Forest Service-designated species of conservation concern.

Number	Plan Language
7	To the extent possible, species are free from harassment and human disturbance at a scale that impacts vital functions (e.g., seasonal and daily movements, breeding, feeding, and rearing young) and could affect persistence of the species.

Table 19. Wildlife, fish, and plant guidelines (FW-WFP-G)

Number	Plan Language
1	Management activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from the most recent approved U.S. Fish and Wildlife Service recovery plan, to maintain the persistence or contribute to the recovery of federally listed species.
2	Where the Forest Service has entered into a signed conservation agreement that provides guidance on activities or actions to be carried out by the Carson, those activities or actions should be undertaken consistent with the guidance found within the conservation agreement, to maintain the persistence or contribute to the recovery of federally listed species.
3	Management activities should avoid disturbance at known active raptor nests and fledging areas, to maintain the persistence or contribute to the recovery of at-risk species. Timing restrictions, adaptive percent utilizations, distance buffers, or other means of avoiding disturbance should be based on the best available information, as well as on site-specific factors (e.g., topography and available habitat).

The land management plan references the most current recovery plans for listed species, which would allow them to adapt to changing ideas and thinking as new science emerges and the recovery plans are updated over time. Plan components, which incorporate recommendations from approved recovery plans and support a more adaptive approach based on the best available science, include:

- **FW-VEG-G-1** and **FW-WFP-G-1.** Management activities and special uses occurring within federally listed species' habitat should integrate habitat management objectives and species protection measures from the most recent approved U.S. Fish and Wildlife Service recovery plan, to maintain the persistence or contribute to the recovery of that species.
- **FW-VEG-G-2** and **FW-WFP-G-2.** Where the Forest Service has entered into a signed conservation agreement that provides guidance on activities or actions to be carried out by the Carson, those activities or actions should be undertaken consistent with the guidance found within the conservation agreement, to maintain the persistence or contribute to the recovery of federally listed species and persistence of species of conservation concern.
- **FW-VEG-G-3.** Vegetation should provide for at-risk species' habitats, by minimizing disturbance, providing recovery strategies, and managing for desired levels of key structural elements (e.g., large old trees and snags, downed woody debris, denser vegetation structure, and soil structure) important for nesting, rearing, breeding, foraging, dispersal, and other life history needs, to maintain the persistence or contribute to the recovery of at-risk species.

Additional plan components that would support species viability for Mexican spotted owl, Canada lynx, and southwestern willow flycatcher are described in individual sections.

The Forest Plan also include conservation recommendation not necessarily measures in the following Management Approaches. These management approaches are considered "other plan content" and not mandatory plan direction, but are included here to provide context on general approach and strategies the Carson may use at the project level under modified alternative 2. In addition to these strategies, the national forest will follow all higher-level laws, regulations, policies, plans, and agreements for species.

- Consider working closely with the U.S. Fish and Wildlife Service to provide for federally listed species' habitats, through minimizing disturbance, providing recovery strategies, and managing for desired levels of key structural elements (for example, large old trees and snags, downed woody debris, denser vegetation structure, and soil structure) important for nesting, rearing, breeding, foraging, and dispersal.

- Consider working collaboratively with federally recognized tribes, New Mexico Department of Game and Fish, local governments, and other partners to plan and accomplish projects that will make progress toward desired conditions.

- Coordinate with the New Mexico Department of Game and Fish, U.S. Fish and Wildlife Service, adjacent Federal and State land managers, and federally recognized tribes regarding listed and native species; reintroductions, introductions, or transplants and habitat improvements of listed or native species; control or eradication of nonnative species; and the management of sport and native fishes, including the identification of refugia for native fish.

- Work collaboratively with the U.S. Fish and Wildlife Service, New Mexico Department of Game and Fish, and other partners to develop conservation measures (for example, public education to reduce human impacts) to prevent listing and to aid to in the recovery and delisting of federally listed species.

- Consider the amounts, arrangements, and condition of natural communities and habitats that benefit wildlife during planning by multiple resource areas including range, fire, and timber.

Analysis Process and Assumptions

Assumptions

Plan components for the proposed action were developed in an iterative way, which included identifying desired conditions and potential threats to species, and identifying whether proposed plan components are sufficient to address species and their habitat needs. The basis for the analysis requires a determination of whether plan components such as desired conditions, objectives, standards, and guidelines provide direction to provide the ecological conditions necessary to contribute to the recovery of federally recognized species.

The complementary ecosystem and species-specific approach, described in the section above, will provide ecological conditions and viability for the vast majority of species within the plan area and for the diversity of plant and animal communities.

A combination of ecosystem (coarse filter) and species-specific (fine filter) conditions were considered. Ecosystem-level plan components (largely centered on desired conditions within the natural range of variation) are expected to provide for ecological conditions necessary to maintain the persistence or contribute to the recovery of native species within the plan area including federally recognized species. The ecosystem-level approach is considered the primary context for the species evaluation. Ecosystem-level plan components include desired conditions and objective statements that focus on achieving habitat conservation outcomes across the plan area landscape (desired conditions) using concise, measurable, and time-specific statements to guide progress (objectives). Where ecosystem-level plan components would not provide sufficient conditions for one or more federally recognized species, species-specific plan components, including standards and guidelines, were incorporated. These fine-filter components

(standards and guidelines), are developed to help achieve or maintain the desired condition, to avoid or minimize undesirable effects, or to meet applicable legal requirements.

Primary threats for each species were associated with the primary ecological conditions those species depend on and the plan components that would, reduce minimize, and/or eliminate potential risks or provide beneficial effects to these populations. We considered short-term and long-term effects. For example, some negative short-term effects could occur while implementing restoration activities; however, the overall net gain could still be beneficial for long-term recovery of the species.

In order to make determinations of effects to species and critical habitats in this biological assessment, the following assumptions were made:

- The Carson will implement site-specific management actions to move toward these desired future conditions. Funding, priorities, capacity, and other constraints will influence the actual timing, location, extent, and intensity of site-specific management actions, but this cannot be predicted in a program-level analysis.
- Objectives represent a minimum level of activities that may be implemented to move toward or maintain desired conditions during the 10- to 15-year life of the land management plan. Although many other activities, actions, and projects are expected to be implemented over the life of the land management plan, these objectives provide a reasonable expectation of the focus for plan implementation.
- Standards and guidelines in the land management plan will be followed when selecting, planning, and executing site-specific management actions. If a site-specific action does not follow the standards and at least the intent of the guidelines, the action must either be modified or the land management plan must be amended (either project-specific or full land management plan amendment) before the action can be allowed. In the situation where a site-specific action requires land management plan amendment, the action would be considered outside of the scope of this consultation and would require its own separate site-specific Endangered Species Act section 7(a)(2) consultation to address the effects of that particular proposed action.
- The land management plan provides a programmatic framework for future site-specific actions, but does not authorize or mandate any site-specific projects or activities.
- Implementation of the direction in the land management plan at the site-specific level may result in consequences to listed species or critical habitat. The indirect relationship of the programmatic framework in the land management plan to effects on the ground does not lend itself to a quantification of the consequences to individuals of a listed population or elements of critical habitat until the plan components are applied at the project level later in time.
- Future site-specific management actions that implement the land management plan will be subject to individual National Environmental Policy Act and Endangered Species Act requirements. Each site-specific project or activity implemented under the revised land management plan that may affect a listed species or critical habitat will undergo a separate Endangered Species Act section 7(a)(2) consultation.
- Law, policy, regulations, and applicable best management practices will be followed when planning or implementing site-specific projects and activities.
- Monitoring will occur as described in the monitoring section of the land management plan. Based on results, the land management plan may be amended, as needed, in the future."

For each species, the typical management activities associated with each major relevant program area (fire, vegetation and fuels, range, recreation, restoration activities, and roads and other infrastructure) were assessed, determining the:

- potential magnitude and intensity of these actions;
- potential effects from these management activities; and
- movement toward plan-level desired conditions from implementation of strategies and objectives and the degree to which implementing standard operating procedures, standards, and guidelines that would be expected to avoid, minimize, or mitigate potential effects.

For the Mexican spotted owl, overall vegetation structure was analyzed using mapping and ecosystem modeling for current conditions and future trends for major Carson vegetation types based on data sources of the Forest Service Southwestern Region and modeled using the Vegetation Dynamics Development Tool (VDDT) (ESSA 2007). All acreages are based on GIS layers or VDDT modeling (refer to Final Environmental Impact Statement Volume 3: Appendix C). These acreages are only used as indicators for this analysis. Exact acreages would be determined during project implementation because VDDT modeling is not spatially explicit—specific projections of a vegetation type's structure cannot take into account the specific location(s) of where any management action will (wildland-urban interface, restoration management area) or will not (recommended wilderness, conservation area, place-based management area) occur; only the alternative-specific forestwide acreages of proposed activity are taken into account.

Action Area

In general, the analysis area for direct and indirect effects includes all lands managed by the Carson National Forest (figure 1); and all adjacent lands that that may be affected by actions implemented consistent with the direction in the land management plan. For example, areas outside the forest boundary include riparian habitat. The analysis area for riparian-dependent species is consistent with the watershed section for the environmental impact statement and includes 6th code watersheds that intersect the plan area. This assumes vegetation treatments will occur in watersheds that intersect the proposed restoration management areas described in the revised plan.

The scope of the analysis for the Mexican spotted owl includes all habitat on the Carson, including designated critical habitat and protected activity centers, and recovery habitat as defined by the 2012 recovery plan.

The scope of the analysis for willow flycatcher includes riparian forest habitat on the Carson National Forest that supports potential habitat as well as 6th code watersheds that intersect with the forest boundary.

The scope of the analysis for the Canada lynx includes all potential habitat on the Carson, which occurs primarily in the spruce-fir vegetation type of Tres Piedras, Questa, and Camino Real Ranger Districts.

Status of the Species and Effects of the Action

This section summarizes legal status, habitat requirements, and historic and current occurrences of the federally listed species. Species that are not known to occur within the action area or are not anticipated to be negatively impacted by framework programmatic actions of the land management plan indirectly or cumulatively, and are described briefly in Appendix A. These species are dismissed from further effects

analysis in this biological assessment. Fish and Wildlife Service concurrence is not being requested for these species.

Species assessment for which Forest Service seeks formal consultation include the Mexican spotted owl, southwestern willow flycatcher and Canada lynx.

For each species, we consider the effects to the species and its habitat from implementation of the 2020 Forest Plan as guided by its plan components, including desired conditions, standards, and guidelines for the planning area. The analysis and subsequent discussion address specific plan components targeted for each species and its habitat, as well as key plan components not targeted for each species and its habitat but that still have the potential to affect the species and its habitat.

Plan Components Providing for Species Persistence

The proposed plan has components for resource areas that provide protection and conservation for listed species over the life of the plan and helps provide the section 7(a)(1) conservation actions for the Mexican spotted owl, southwestern willow flycatcher, and Canada lynx. Desired conditions provide the basis for most section 7(a)(1) actions. Beside the proposed plan components, the Carson National Forest will continue to implement the current section 7(a)(1) actions described below. The proposed plan components (desired condition, objectives, standards, and guidelines) that provide some type of protection or are likely to have the greatest beneficial effect on the species including those listed species not currently found on the Carson, are listed in Appendix C.

Plan components that would benefit each species can be primarily found under the vegetation sections each species relies on and the wildlife, fish, and plant section. Additional plan components that balance multiple use with species needs can be found under sustainable rangelands and livestock grazing, infrastructure, special uses, recreation and land adjustments. Plan components in several management and designated areas would also be positive. The potential impacts to each species from management actions are in an individual section below.

Mexican Spotted Owl

(Strix occidentalis lucida), and designated critical habitat

Effects finding for species: *May affect, likely to adversely affect*

Effects finding for critical habitat: *May affect, not likely to adversely affect*

Status of Species and Designated Critical Habitat

Legal Status and Description

In 1993, the Fish and Wildlife Service listed the Mexican spotted owl (*Strix occidentalis lucida*) (hereafter, referred to as Mexican spotted owl, spotted owl, or owl) as threatened under the Act (USDI FWS 1993). The Fish and Wildlife Service appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican spotted owl in 1995 (USDI FWS 1995b). The Fish and Wildlife Service released the Mexican Spotted Owl Recovery Plan, First Revision (Recovery Plan) in December 2012 (USDI FWS 2012b). Critical habitat was designated for the spotted owl in 2004 (USDI FWS 2004).

A detailed account of the taxonomy, biology, and reproductive characteristics of the Mexican spotted owl is found in the Final Rule listing the spotted owl as a threatened species (USDI FWS 1993), the original

Recovery Plan (USDI FWS 1995b), and in the revised Recovery Plan (USDI FWS 2012b). The information provided in those documents is included herein by reference.

Also, information from the 2012 and 2019 "Biological and Conference Opinion for the Continued Implementation of the Land and Resource Management Plan for the Carson NF" (USDI FWS 2012a, 2019a) is included in the status of the species and threats. The information provided in these documents is incorporated by reference into this document as summarized below.

Life History and Habitat

The spotted owl occurs in forested mountains and canyonlands throughout the southwestern United States and Mexico (Gutierrez et al. 1995). It ranges from Utah, Colorado, Arizona, New Mexico, and the western portions of Texas south into several states of Mexico. Although the owl's entire range covers a broad area of the southwestern United States and Mexico, it does not occur uniformly throughout its range. Instead, the Mexican spotted owl occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and, in some cases steep, rocky canyon lands. Known owl locations indicate that the species has an affinity for older, uneven-aged forest and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico.

Distribution, Abundance, and Population Trends

Mexican spotted owl surveys since the 1995 Recovery Plan have increased our knowledge of owl distribution, but not necessarily of owl abundance. Population estimates, based upon owl surveys, recorded 758 owl sites from 1990 to 1993 and 1,222 owl sites from 1990 to 2004 in the United States. The Recovery Plan (USDI FWS 2012b) lists 1,324 known owl sites in the United States. The increase in the number of known owl sites is mainly a product of new owl surveys being completed within previously unsurveyed areas (for example, several national parks within southern Utah, Arizona, West Texas, southeastern New Mexico, northeastern Colorado, Cibola National Forest, and Gila National Forest). Thus, an increase in abundance in the species range-wide distribution cannot be inferred from this data (USDI FWS 2012b). However, we do assume that an increase in the number of areas considered to be occupied is a positive indicator regarding owl abundance. Known Mexican spotted owl locations indicate the species has an affinity for older, uneven-aged forest, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico.

Threats

Since the owl was listed in 1993, the key threat has shifted from even-aged timber management to stand-replacing fire (USDI FWS 2012b). Some additional threats and factors influencing the Mexican spotted owl include fuels reduction activities, fuelwood collection, recreation, ungulate grazing, roads and trails, and land development. The threat of timber harvest on Carson is low.

Habitat Loss

Habitat loss from logging and high-severity, stand-replacing wildfire. Two primary reasons were cited for the original listing of the Mexican spotted owl in 1993: (1) the historical alteration of its habitat as the result of timber-management practices; and (2) the threat of these practices continuing. The danger of stand-replacing fire was also cited as a looming threat at that time. Since publication of the original Recovery Plan (USDI FWS 1995b), we have acquired new information on the biology, threats, and habitat needs of the Mexican spotted owl. Threats to its population in the United States (but likely not in Mexico) have transitioned from commercial-based timber harvest to the risk of stand-replacing wildland fire. Recent forest management has moved away from a commodity focus and now emphasizes

sustainable ecological function and a return toward pre-settlement fire regimes, both of which have potential to benefit the spotted owl.

Uncharacteristic Wildfire

Currently, high-intensity, stand-replacing fires are influencing ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Uncharacteristic, high-severity, stand-replacing wildland fire is probably the greatest threat to the Mexican spotted owl in the action area.

As throughout the West, fire severity and size have been increasing within this geographic area. Landscape level wildland fires, such as the Rodeo-Chediski Fire (2002), the Wallow Fire (2011), and the Whitewater-Baldy Complex (2012), have resulted in the loss of tens of thousands of acres of occupied and potential nest and roost habitat across significant portions of the Mexican spotted owl's range.

Livestock Grazing, Resource Extraction, and Human Recreation

Historical and current anthropogenic uses of Mexican spotted owl habitat include both domestic and wild ungulate grazing, recreation, fuels reduction treatments, resource extraction (for example, timber, oil, gas), and development. These activities have the potential to reduce the quality of owl nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season. Livestock and wild ungulate grazing are prevalent throughout the owls' range and are thought to negatively affect the availability of grass cover for prey species. The magnitude of grazing as a threat depends on the duration, timing, and intensity of grazing (or browsing) and can have both short- and long-term adverse effects on owl habitat for prey species, if managed insufficiently. For example, moderate to high intensity with no rest/rotation (USDI FWS 2012b). Recreation impacts are increasing throughout the Southwest, especially in meadow and riparian areas, and there have been significant increases in visitor- and OHV-related use throughout the owls' range. However, most impacts are likely to occur at the level of the individual owl (USDI FWS 2012b).

Fuels reduction treatments, though critical to reducing the risk of severe wildland fire, can have short-term adverse effects to owls through habitat modification and disturbance. As the human population grows in the southwestern United States, small communities within and adjacent to wildlands are being developed. This trend may have detrimental effects to spotted owls by further fragmenting habitat and increasing disturbance during the breeding season.

Predation and Disease

Several fatality factors have been identified as particularly detrimental to the Mexican spotted owl, including predation, starvation, accidents, disease, and parasites. For example, West Nile virus also has the potential to adversely impact the Mexican spotted owl. The virus has been documented in Arizona, New Mexico, and Colorado, and preliminary information suggests that owls may be highly vulnerable to this disease (Courtney et al. 2004). Unfortunately, due to the secretive nature of spotted owls and the lack of intensive monitoring of banded birds, we will most likely not know when owls contract the disease or the extent of its impact to the owl range-wide.

Climate Change

Global climate variability may also be a threat to the owl. Changing climate conditions may interact with fire, management actions, and other factors discussed above, to increase impacts to owl habitat. Studies have shown that since 1950, the snowmelt season in some watersheds of the western U.S. has advanced by about 10 days (Dettinger and Cayan 1995; Dettinger and Diaz 2000; Stewart et al. 2004). Such changes in the timing and amount of snowmelt are thought to be signals of climate-related change in high elevations (Reiners et al. 2003; S.J. Smith et al. 2000).

One predicted impact of climate change is the intensification of natural drought cycles and the ensuing stress placed upon high-elevation montane habitats (Breshears et al. 2005; Cook et al. 2004; IPCC 2007, 2014; Mueller et al. 2005). The increased stress put on these habitats is likely to result in long-term changes to vegetation, and to invertebrate and vertebrate populations within coniferous forests and canyon habitats that affect ecosystem function and processes.

Critical Habitat

The Fish and Wildlife Service designated critical habitat for the Mexican spotted owl in 2004 on approximately 8.6 million acres of Federal lands in Arizona, Colorado, New Mexico, and Utah (USDI FWS 2004). Within the designated boundaries, critical habitat includes only those areas defined as protected habitats (defined as protected activity centers and unoccupied slopes greater than 40 percent in the mixed conifer and pine-oak forest types that have not had timber harvest in the last 20 years) and restricted (now called "recovery") habitats (unoccupied owl foraging, dispersal, and future nest and roost habitat) as defined in the 1995 Recovery Plan (USDI FWS 1995b).

Overall, the status of the owl and its designated critical habitat have not changed significantly range-wide in the United States (which includes Utah, Colorado, Arizona, New Mexico, and extreme southwestern Texas), based upon the information we have, since issuance of the 2012 and 2019 land management plan biological opinion for the Carson National Forest (USDI FWS 2012a, 2019a). This indicates the distribution of owls continues to cover the same area and critical habitat is continuing to provide for the life history needs of the Mexican spotted owl throughout all ecological management units in the United States. We do not have detailed information regarding the status of the Mexican spotted owl in Mexico, so we cannot make inferences regarding its overall status.

Wildland fire has resulted in the greatest loss of protected activity centers and critical habitat relative to other actions (for example, forest management, livestock grazing, and recreation) throughout the U.S. range of the Mexican spotted owl. These wildland fires have mainly impacted Mexican spotted owls within the Upper Gila Mountains ecological management unit (for example, Rodeo-Chediski and Wallow Fires on the Apache-Sitgreaves National Forest and Whitewater-Baldy Complex on the Gila National Forest) and Basin and Range-West ecological management unit (for example, Horseshoe 2 and Frye Fires on the Coronado National Forest); but other ecological management units have been impacted as well (Southern Rocky Mountains ecological management unit, the Santa Fe National Forest by the Las Conchas Fire; Colorado Plateau ecological management unit by the Warm Fire; Basin and Range-East ecological management unit by the Little Bear Fire). We do not know the extent of the effects of these wildland fires on actual owl numbers. Very little recovery habitat and no protected activity center acres have been burned on the Carson National Forest.

Primary Constituent Elements of Critical Habitat

The primary constituent elements for Mexican spotted owl critical habitat were determined from studies of their habitat requirements and information provided in the Recovery Plan (USDI FWS 1995b). Since owl habitat can include both canyon and forested areas, primary constituent elements were identified in both areas.

The primary constituent elements identified for the owl within mixed-conifer and riparian forest types that provide for one or more of the owl's habitat needs for nesting, roosting, foraging, and dispersing are:

1. Primary constituent element 1: Related to forest structure:

a. 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 to 45 percent of which are large trees with mean diameter at breast height (4.5 feet above ground) of 12 inches or more;

b. A shade canopy created by the tree branches covering 40 percent or more of the ground; and

c. Large, dead trees (snags) with a mean diameter at breast height of at least 12 inches.

2. Primary constituent element 2: Related to maintenance of adequate prey species:

a. High volumes of fallen trees and other woody debris;

b. A wide range of tree and plant species, including hardwoods; and

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

The primary constituent elements listed above usually are present with increasing forest age, but their occurrence may vary by location, past forest management practices or natural disturbance events, forest-type productivity, and plant succession. These primary constituent elements may also be observed in younger stands, especially when the stands contain remnant large trees or patches of large trees. Certain forest management practices may also enhance tree growth and mature stand characteristics where the older, larger trees are allowed to persist.

Steep-walled rocky canyonlands occur typically within the Colorado Plateau ecological management unit, but also occur in other ecological management units. Canyon habitat is used by owls for nesting, roosting, and foraging and includes landscapes dominated by vertical-walled rocky cliffs within complex watersheds, including many tributary side canyons. These areas typically include parallel-walled canyons up to 1.2 miles in width (from rim to rim), with canyon reaches often 1.2 miles or greater, and with cool north-facing aspects. The primary constituent elements related to canyon habitat include one or more of the following:

- Presence of water (often providing cooler and often higher humidity than the surrounding areas);
- Clumps or stringers of mixed-conifer, pine-oak, pinyon-juniper, and/or riparian vegetation;
- Canyon walls containing crevices, ledges, or caves; and
- High percentage of ground litter and woody debris.

There are 20 critical habitat units in the state of New Mexico, for a total of 2,089,523 acres. The Forest Service manages the majority of that land (2,056,536 acres).

Status of the Species and Critical Habitat in the Action Area

Status of the Species in the Action Area

The environmental baseline defines the status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Two critical habitat units encompass 23,182 acres, some of which are on the Jicarilla Ranger District (Figure 14) within Southern Rocky Mountains-New Mexico (SRM-NM-11 and SRM-NM-12). Two

protected activity centers have been delineated within these critical habitat units and total 1,474 acres. The number of protected activity centers on the Carson National Forest has remained unchanged since the 2011 biological assessment (USDA Forest Service 2011). Monitoring of the two protected activity centers since their creation in the 1990s indicates they have not been occupied by spotted owls since 1993.

The Southwestern Region of the Forest Service has conducted the population monitoring recommended in the Recovery Plan on National Forest System lands in Arizona and New Mexico during the 2014 through 2019 breeding seasons (six years), including the Carson National Forest. The Recovery Team, Forest Service, Fish and Wildlife Service, and the Bird Conservancy of the Rockies (contractor) are continuing to collect data on NFS lands. According to Bird Conservancy of the Rockies, individual birds have been detected on the El Rito, Tres Piedras, and Camino Real Ranger Districts (table 20). Subsequently, surveys have been conducted in these locations and no spotted owls were detected. Also, of note is a 2012 record describing the movement of a Mexican spotted owl banded on the Gila National Forest and found dead on private property adjacent to the Questa Ranger District of the Carson National Forest (Ganey and Jenness 2013). This record indicates that owls may be dispersing or moving through the Carson and suggests that the area may provide important connectivity between owl habitat in New Mexico and Colorado.

Unoccupied habitat for the owl is defined as recovery habitat, using the habitat definition in the revised recovery plan (USDI Fish and Wildlife Service 2012b). The Carson National Forest Vegetation Dynamics Development Tool (VDDT, refer to Final Environmental Impact Statement Volume 3: Appendix C) models and vegetation states were used to calculate the actual amount of Mexican spotted owl recovery habitat on the Carson within mixed conifer with aspen, mixed conifer frequent fire, and associated riparian. It is estimated there are 196,971 acres of recovery habitat (MCD, MCW, riparian) on the Carson, which contain 41,439 acres (figure 15 through figure 19) of potential nesting and roosting recovery habitat (characterized by larger trees and closed canopy).

Table 20. Mexican spotted owl detection on the Carson since 2014

Date	Location General Description	District	Detection Type
July 4, 2015	BCR Occupancy Survey site CAR0153 Mondragon Canyon	Camino Real	One male vocalization
May 17, 2016	BCR Occupancy Survey site CAR0025 Cebedilla Canyon	Camino Real	One male and female vocalization
May 21, 2016	Lower El Rito Project Area-Stone Angel Canyon by BCR	El Rito	One male vocalization
2017	No Detection	NA	NA
May 14, 2018	BCR Occupancy Survey site CAR0153 Mondragon Canyon	Camino Real	One male vocalization
June 20, 2018	BCR Occupancy Survey site CAR0025 Cebedilla Canyon	Camino Real	Unknown vocalization
May 16, 2019	Rio Tusas/ Tusas Ridge-Lamy area by BCR	Tres Piedras	Unknown visual detection during daylight

BCR = Bird Conservancy of the Rockies

Status of Designated Critical Habitat within the Action Area

On the Carson, there are approximately 23,182 acres of designated critical habitat (Figure 14) within the Jicarilla Ranger District. These units are completely within the Southern Rocky Mountains-New Mexico (SRM-NM-11 and SRM-NM-12). These areas encompass habitat that has been determined to contain primary constituent elements, including mixed conifer forest types, canyons, and cliffs, and riparian areas that are required for survival by the Mexican spotted owl.

Mexican spotted owl habitat is found on all ranger districts primarily within the mixed conifer vegetation type. Currently, the Carson contains uncharacteristically dense forests with many more young trees than were present historically. These stands are at high risk for stand-replacing wildfire due to the accumulated buildup of both live and dead fuels, as well as increased canopy density and fuel continuity. Recent research has shown that "megafires" (fires greater than approximately 25,000 acres) are a particular threat to California spotted owl, which also use old-growth components and can take centuries to re-establish (Jones et al. 2016). While smaller patches of mixed-severity fire can be beneficial (Ganey et al. 2017; Jones et al. 2020), high-severity fire is widespread throughout the spotted owl range and poses a high-risk factor (Ganey et al. 2017). In general, science has shown that fires are more frequent, larger, and more severe across all vegetation types in the Southwest (Singleton et al. 2019; Stephens et al. 2018).

Within the mixed conifer vegetation type, there is an estimated 130,959 acres (8 percent of the Carson) that is mixed-conifer with aspen and another 182,847 acres (11.5 percent) within mixed conifer-frequent fire. This is a total of 313,806 acres of mixed conifer habitat on the Carson. Unoccupied habitat for the owl is defined as recovery habitat using the habitat definition in the revised recovery plan (USDI FWS 2012b). Carson National Forest GIS and VDDT modeling were used to calculate the actual amount of Mexican spotted owl recovery habitat on the national forest. It is estimated 196,971 acres (63 percent) are potential recovery habitat (figure 20). Of the 196,971 acres of potential recovery habitat, it is possible to calculate the primary vegetation types that likely contain potential nesting and roosting habitat (characterized by larger trees and closed canopy). It is estimated there is 41,439 acres (21%) available for nesting and roosting recovery habitat (figure 20) within the Carson National Forest. Refer to Final Environmental Impact Statement Volume 3: Appendix C for information on VDDT (Vegetation Dynamics Development Tool) models and vegetation states.

The Mexican spotted owl recovery habitat within critical habitat is estimated at 862 acres and the Mexican spotted owl recovery habitat that occurs outside designated critical habitat is estimated to be 196,971 acres.

One designated area (Jicarilla Wild Horse Territory) has Mexican spotted owl designated critical habitat.

Factors Affecting Mexican Spotted Owl and its Critical Habitat within the Action Area

The districts of the Carson National Forest contain both frequent fire-adapted mixed conifer and mixed conifer with aspen (a less frequent fire-adapted vegetation type). The Forest Service currently considers the frequent fire mixed conifer to be "high moderately departed" from reference condition and the mixed conifer with aspen to be "moderately departed" from reference condition (USDA FS Carson NF 2015). Historical timber harvest has been largely responsible for the overall decrease in large trees across Rocky Mountain forests since the reference period, while active fire suppression and passive fire suppression (roads, excessive removal of fine fuels by improper grazing, community development, etc.) have been largely responsible for reduced fire frequency (Schoennagel et al. 2004). A reduced fire frequency allows fuels to accumulate and tree canopies to close, facilitating insect and disease outbreaks, uncharacteristically severe fires, and increases in the early seral (grass/forb/shrub, seedling/sapling) states that follow fire. In September 1996, the Forest Service amended the Carson National Forest 1986 Land and Resource Management Plan to incorporate regional guidance for northern goshawk habitat and Mexican spotted owl recovery. As a result, the Carson National Forest shifted emphasis from producing and selling timber products to wildlife habitat management and restoration that integrated with the wildlife, watershed, and fuels management programs. From 2000 to 2008, there was a national effort in timber management that focused around fuel reduction for community protection, especially in wildland-urban interface (WUI). Since 2008, Carson timber management has primarily revolved around forest

ecosystem restoration, which includes improving forest health, watershed condition, and wildlife habitat, while reducing fuels and providing wood products to local communities (USDA FS Carson NF 2015).

Even with the use of silvicultural activity, managed wildfire, and prescribed fire in mixed conifer-frequent fire; wildfires continue to burn on the Carson National Forest. Wildland fire effects have mainly affected Mexican spotted owls within the Upper Gila Mountains ecological management unit (for example, Slide and Schultz Fires on the Coconino National Forest Rodeo-Chediski and Wallow Fires on the Apache-Sitgreaves National Forests and Whitewater-Baldy Complex on the Gila National Forest) and Basin and Range-West ecological management unit (e.g., for example, Frye Fire and Horseshoe 2 Fire on the Coronado National Forest). However, wildfire effects have caused significant effects to owl habitat within other ecological management units as well (for example, Southern Rocky Mountains ecological management unit by the Las Conchas Fire, and Colorado Plateau ecological management unit by the Warm Fire, USDI FWS 2019). Within the Carson, very little recovery habitat has been burned, and no protected activity centers or critical habitat have been burned. It is likely that fire effects on other national forests include a mix of positive low- to moderate-severity fire effects to habitat components (for example, reduced risk of high-severity fire, increase in snags), and potentially negative high-severity fire effects within nesting/roosting habitat (for example, loss of large, old trees; loss of large snags and logs). Since 2012, the Carson National Forest has implemented projects consistent with the 1986 Land and Resource Management Plan. Some projects have affected potential habitat of Mexican spotted owl, but the Fish and Wildlife Service determined that these projects resulted in insignificant and discountable effects. Therefore, the environmental baseline for the owl and its forested critical habitat within the action area of the Carson National Forest has not changed appreciably since 2005. However, it is important to note that the forest management actions described above have likely resulted in positive effects (such as reduced high-intensity wildfire risk and improved forest health) for the Mexican spotted owl and its forested recovery.

Conservation Measure: Conservation Actions 7 (a)(1)

Since the Mexican spotted owl was listed, the Carson National Forest has taken a number of actions to contribute toward recovery of the species. For any project within the range of the owl, the national forest considers needs for the species in project design, analyzes effects of the project, and consults with the Fish and Wildlife Service if effects are expected. Other conservation actions include:

- Surveys and monitoring are conducted under applicable permits and in accordance with the Fish and Wildlife Service survey protocol in advance of project implementation within suitable habitat across the forest.
- Monitor protected activity center occupancy annually.
- The Forest Service Southwestern Regional Office has funded implementation of a long-term population occupancy study on NFS lands in the region, which includes the Carson. In conjunction with the Bird Conservancy of the Rockies, the Forest Service has monitored Mexican spotted owls for six breeding seasons (2014 through 2019), and will continue to monitor in the future.
- The Carson conducts fuels reduction and forest restoration projects designed to improve owl habitat in the future. Projects focus on reducing the potential for high-severity, stand-replacing wildfire while still maintaining or enhancing structural habitat features (for example, large trees, snags and down woody materials).

As well, the proposed plan has components for resource areas that provide protection and conservation for listed species over the life of the plan and helps provide the 7(a)(1) conservation actions for the spotted owl by ameliorating threats to the species and by meeting recovery plan objectives to protect and improve occupied and recovery habitat for the species. Desired conditions provide the basis for most of the 7(a)(1) conservation actions in the proposed action.

Effects of the Action for Mexican Spotted Owl

The scope of the analysis for the Mexican spotted owl includes all mixed conifer habitat on the Carson National Forest, including designated critical habitat, protected activity centers, and recovery habitat as defined by the recovery plan.

Effects of Vegetation Management

Management Common to All Vegetation Types

Wildland-Urban Interface (WUI)

A combination of mechanical treatments and prescribed fire would be used to manage habitat conditions in the wildland-urban interface. Mechanical thinning is emphasized as a management tool because fire management can be riskier to use in those areas. The owl recovery plan notes that mechanical treatments may be necessary in some areas (like the wildland-urban interface) before fire can be effectively and safely applied to meet management objectives. Fire risk-reduction activities would balance treatments in a way to reduce the risk of high-severity, stand-replacing wildfire while maintaining owl habitat.

Due to the complexity in defining the wildland-urban interface, the Carson National Forest does not have the wildland-urban interface identified spatially. For this analysis, it is assumed there are portions of protected activity centers and critical habitat within the wildland-urban interface, as most of the Jicarilla Ranger District has gas wells. Nest and roosting recovery habitat in the wildland-urban interface has the highest likelihood of being negatively affected on the Questa and Camino Real Ranger Districts, as these districts have more towns adjacent to or within the administrative boundaries of the Carson.

Desired conditions for Mixed Conifer with Aspen and Mixed Conifer-Frequent Fire (**FW-VEG-MCW-DC-14, FW-VEG-MCD-DC-15**) promote understory development and openings that are more consistent with habitat requirements for foraging spotted owls in the wildland-urban interface. Wider spacing of tree groups and less interlocking canopy could be present than would be found outside the wildland-urban interface as low-intensity wildfire is desirable for all vegetation types. In addition, **FW-VEG-MCW-DC 14** and **FW-VEG-MCD-DC-15** describe conditions for snags, logs, and coarse woody debris at the lower range of desired conditions for the respective vegetation communities with wildland-urban interface. These desired conditions conflict with the higher density habitat needs for spotted owl. As a result, progress toward desired conditions for nesting and roosting owl recovery habitat would be less in these areas than outside the wildland-urban interface. Desired conditions within the wildland-urban interface could minimally adversely affect Mexican spotted owl recovery habitat; however, site-specific projects would follow guidance in the recovery plan as reinforced by forestwide guidelines (**FW-VEG-G-1 and FW-WFP-G-1**) to help moderate impacts. The wildland-urban interface may be managed for foraging habitat or other life history needs if foregoing these treatments compromises the purpose and need for the project.

There are no objectives, standards, or guidelines for the wildland-urban interface. Plan components for Vegetation, Wildland Fire, Forest Products, and individual Vegetation Communities (see hyperlinks) would guide project development.

Climate Change

Climate change has occurred to some degree and will continue in the future. Ramifications of a changing climate on Mexican spotted owl are likely to include: reduced snowfall or earlier snow melt in the spring, extended periods of drought or extended dry periods in the spring and summer, more frequent and larger wildfires, increased insect- and disease-induced mortality, and changes in site characteristics that promote type conversion or vegetation community changes. This pattern is consistent with current trends in other parts of the West (Bentz et al. 2010).

These changes cause seasonal ranges and food sources for Mexican spotted owl to shift and can affect the timing of reproduction. The timing of spring green-up can also affect food availability for Mexican spotted owl. Climate variability combined with current forest conditions may also synergistically result in increased loss of habitat from fire. More intense natural drought cycles and the ensuing stress placed upon forested habitats could result in even larger and more severe wildland fires in owl habitat (USDI FWS 2012b).

Climate change presents an aspect of uncertainty in future conditions, disturbance regimes, and vegetative and wildlife responses. Strategies that can be used to help reduce impacts from climate change include managing for diverse conditions; maintaining healthy and connected populations; reducing the risk of large, uncharacteristic fire; preventing and controlling invasive species; and ensuring ecosystem processes and habitat connectivity (The Heinz Center 2008). While how well the land management plan addresses these strategies varies, it is assumed that to a certain extent, climate change and associated effects to Mexican spotted owl would occur. The climate vulnerability assessment for the Carson (USDA FS 2014a) provides additional information on the vulnerability of the different vegetation communities and habitat types to climate change.

Climate change was addressed as an integrated part of the proposed LMP such that plan components for various program areas contain language that will support more resilient ecosystems that are better able to withstand stressors such as drought, fire, and insects and disease that are likely to intensify under a changing climate. As a result, climate related concerns will be further addressed in project-level planning. Desired conditions for the plan area consider potential climate effects to: Increased extreme weather related forest disturbances, water stress/drought, wildfire, vegetation changes, specific needs of threatened, endangered and sensitive species, insects and disease, outdoor recreation, and wildlife movement and diversity. The following management approach for all Vegetation Communities will serve as a guide for future projects implemented under the plan: In areas of high vulnerability to changing climate patterns, consider alternative management approaches to facilitate natural adaptation to changing conditions. In forest types where density management is appropriate, consider managing tree basal area at the low end of the range of desired conditions to mitigate water stress. In these areas, early- and mid-seral tree species may dominate over late-seral tree species, given the adaptations of many early- and mid-seral tree species for warmer and drier conditions. Early-seral species characteristic of lower-elevation life zones (e.g., Douglas-fir on a spruce-fir site) may be maintained. Late-seral tree species (especially large specimens) may be maintained primarily in locally cooler (north-facing aspects) and wetter (draws, seeps) areas to maintain diversity, wildlife habitat, and a local seed source.

Insects and Disease

Desired condition (**FW-VEG-DC-12**) provides an overarching goal of maintaining endemic levels of insect disturbance for all vegetation. Desired conditions for dwarf mistletoe (**FW-VEG-MWC-DC-6 and FW-VEG-MCD-DC-6**) emphasize keeping dwarf mistletoe at endemic levels and preventing widespread infestation. The intent is not to remove mistletoe from the system but to bring it back to endemic levels to decrease infestation, but also maintain structure that is preferred by Mexican spotted owl for potential

nesting sites. The long-term effects would be positive by promoting healthy stands that would be more resilient to drought, fire, and climate change. Additional information on insects and disease specific to each vegetation type can be found in those sections below.

Summary of Effects of Management Common to All Vegetation Types

Effects of proposed management actions to forest habitat types that address wildland-urban interface, climate change, and insects and disease would likely be a mix of short-term adverse effects, but mostly beneficial long-term effects.

Desired conditions within the wildland-urban interface would likely include a mix of beneficial and adverse impacts in Mexican spotted owl protected activity centers, recovery habitat, and/or critical habitat (described in more detail below in the Effects to Critical Habitat Section); however, adverse impacts of these management actions e would only be short term as guideline FW-VEG-G-1-3 requires all management activities to follow guidance in the recovery plan and to provide desired levels of key structural elements for at-risk species important for nesting, rearing, and breeding to contribute to the recovery of at-risk species.

Climate change presents an aspect of uncertainty in future conditions, disturbance regimes, and vegetative and wildlife responses. Effects of a changing climate on Mexican spotted owl are likely to include: reduced snowfall or earlier snow melt in the spring, extended periods of drought or extended dry periods in the spring and summer, more frequent and larger wildfires, increased insect- and disease-induced mortality, and changes in site characteristics that promote type conversion or vegetation community changes. However, there should be a mix of beneficial and short-term adverse effects, but mostly beneficial in the long term for the owl because overall forest health and resiliency will be improved through our management actions to better respond to Climate Change.

The net impact of this plan section on the owl is a mix of beneficial and short-term adverse effects, but mostly beneficial in the long term because overall forest health and resiliency will be improved.

Effects of All Vegetation (VEG)

This section of the plan includes desired conditions, standards, and guidelines that promote potential natural vegetation types that are consistent with soil classification, site potential, and that native species are emphasized. These plan components would be beneficial for the owl by promoting natural ecosystems and are considered conservation measures.

Mixed Conifer with Aspen and Mixed Conifer Frequent Fire are the predominant vegetation types that provide habitat for spotted owl on the Carson National Forest. Riparian vegetation also comprises a small proportion of potential habitat on the national forest. Mixed Conifer with Aspen and Mixed Conifer-Frequent Fire are analyzed for critical habitat.

Currently, the Carson contains uncharacteristically dense forests with many more young trees than were present historically. These stands are at high risk for stand-replacing wildfire due to the accumulated buildup of both live and dead fuels as well as increased canopy density, and fuel continuity. As such, forestwide desired conditions for all vegetation types (**FW-VEG-DC-1-4**) support vegetation structure with a low departure from reference conditions and with a mosaic of vegetation conditions, densities, and structures at various scales across landscapes reflective of natural disturbance regimes. This would address the primary threat of stand-replacing, landscape-level wildfire for spotted owl. Specifically, these desired conditions state that vegetation is reflective of natural regimes, according to indicators of tree mortality, road density, climate exposure, air pollution, catastrophic disturbance, wildfire potential, insect and pathogen risk, vegetation departure, and ecological process departure (Cleland et al. 2007).

A forestwide objective for frequent fire forest (**FW-VEG-MCD-O-1**) to mechanically treat (5,500 to 10,000 acres during each 10-yer period following plan approval of highly departed areas (such as dry mixed conifer in fire-adapted ecosystems) would increase potential suitable nest and roost habitat by 18 percent over the life of the plan (table 22). These activities would be consistent with the revised recovery plan for the owl, which states mechanical treatments in some protected activity centers may be needed to achieve recovery objectives. This objective is considered a conservation measure and this treatment would improve recovery habitat on the Carson National Forest (USDI FWS 2012b).

Under the proposed action, in 15 years, desired conditions for mixed conifer with aspen would decrease to lowly departed and would move closer to the desired state changing from a departure of 49 percent to 31 percent. Mixed conifer would improve but remain moderately departed (43 percent) from current conditions (64 percent departure, table 21).

Table 21. Departure from desired conditions rating (%) and departure category (Low, Moderate, High) for Mexican spotted owl vegetation types on the Carson National Forest for the proposed action current conditions and projected 15 and 50 years.

Vegetation type	Current Departure	Projected Departure 15 years	Projected Departure 50 years
Mixed conifer with aspen (MCW)	49 (mod)	31 (low)	37 (mod)
Mixed conifer frequent fire (MCD)	64 (mod)	43 (mod)	41 (mod)

For the owl, based on VDDT modeling, it is estimated that the amount of mixed conifer for nesting and roosting would increase in 15 years from 16 to 34 percent (41,439 to 87,347 acres) overall (table 22). Final Environmental Impact Statement Volume 3: Appendix C includes VDDT model states used to calculate nest and roost habitat. The vegetation section of the final environmental impact statement provides additional details.

Table 22. Current and projected Mexican spotted owl habitat, proposed action

Vegetation Community	Nest/roost acres current	Nest/roost acres in 15 Years	Percent change
MCW	5,723	37,978	+25
MCD	35,716	49,369	+7
Total	41,439	87,347	+18

No mechanical thinning would occur in Mexican spotted owl habitat within wilderness boundaries. Recovery habitat that would likely have some kind of mechanical thinning would be outside of wilderness or on slopes less than 40 percent. While some treatments could occur on slopes over 40 percent, the only types of activities that typically occur on slopes over 40 percent would be for wildlife habitat improvement.

Mechanical methods would incorporate mechanized treatments, hand-based treatments, or other methods that are effective for restoration. There are several standards and guidelines (**FW-VEG-G-1-2, FW-FFP-S-1-2, FW-FFP-S-5**, and **FW-FFP-G-1**) for vegetation management that are considered conservation measures and would mitigate habitat disturbance and damage that might occur as a result of timber harvest, so that watershed conditions are protected and the ecological needs of wildlife species including spotted owl, are maintained. During project implementation, desired conditions and guidelines (**FW-VEG-DC-3-4** and **FW-VEG-G-3-4**) would promote diversity of seral states and old-growth attributes, including large trees, snags, and coarse woody material important for owl nesting and foraging.

Guidelines further direct that a range of restoration methods, including thinning and prescribed fire, are used to protect old-growth components.

When treatments occur within mixed conifer-frequent fire, there is potential for some Mexican spotted owl short-term adverse effects. There is the potential for loss of snags, logs, large trees, and canopy closure within some of the Mexican spotted owl habitat, due to either conflict with restoration needs, Mexican spotted owl habitat enhancement goals, or both. As noted on page 269 of the revised recovery plan (USDI FWS 2012b), "treatments adequate to meet fuels and restoration management objectives in recovery habitats may result in the short-term loss of some habitat components in areas that could be occupied by spotted owls." Until projects are designed, it is not known how much habitat might be negatively affected in the short term. In the long term, the treatments should be beneficial to the Mexican spotted owl and help move more habitat toward the desired conditions for nesting and roosting habitat.

The following standards are considered conservation measures and apply to all vegetation communities. They support restoration purposes for creating resilient ecosystems and recovery needs for the owl:

- **FW-FFP-S-1.** Regulated timber harvest (tree harvest for the purpose of timber production) must occur only on lands classified as suitable for timber production.
- **FW-FFP-S-2.** Timber harvest must occur only where soil, slope, and watersheds will not be irreversibly damaged and protection must be provided for streams, streambanks, shorelines, lakes, wetlands, other waterbodies, fish, wildlife, recreation (including trails), and aesthetic resources.

Additional standards and guidelines that would promote retention of key habitat elements for the owl are identified in the following sections.

Mixed Conifer Frequent Fire (MCD)

Mixed Conifer Frequent Fire Forest are the major habitat types on the Carson that are important to Mexican spotted owls. The objectives identified above under All Vegetation and in the Wildland Fire Management section below, would complement the desired conditions for frequent fire forest on the Carson. Standards and guidelines help to mitigate site-specific risk that might occur as a result of project implementation, and ensure that habitat components for the owl are retained during restoration activities. Collectively these plan components would work toward restoring systems to conditions that are favorable for the owl, reduce current threats and contribute to the conservation and recovery of the owl and its habitat.

Forestwide-level plan components that would benefit spotted owl and its critical habitat include desired conditions to maintain appropriate seral states at the landscape (1,000 to 10,000 acres or more), mid (100 to 1,000 acres), and fine scales (less than 10 acres), while reducing fire risk through vegetation management and fuels reduction projects. Desired conditions that incorporate varying structural stages would guide the implementation of forest management activities and would move these systems toward a more favorable departure and trend from that which currently exists. These varying structural desired conditions include uneven-aged forest with openings and occasional even-aged structure, large trees and snags and abundant understory (for example, coarse woody debris, logs), and old-growth components. The full range of life history needs (for example, fledging, nesting, dispersal, roosting) as well as conditions that would support an adequate prey base for foraging are provided for at the landscape (**FW-VEG-MCD-DC-1-2**, and **4**); mid (**FW-VEG-MCD-DC-8**, and **11-12**); and fine scales (**FW-VEG-MCD-DC-16** and **18**). Table 23 highlights various seral state proportions in the proposed action for mixed conifer-frequent fire.

Table 23. Desired seral-stage proportions for dry mixed conifer (landscape scale)

Seral State	Proportion (%)	Description
Non-Tree-Early	9	Recently burned; grass, forb, and shrub types; seedling/sapling size trees
Mid-Closed	3	Small trees, closed canopy
Mid-Open	3	Small trees, open canopy
Late-Closed	25	Medium to large trees, closed canopy
Late-Open	60	Multi-storied with open canopy, largest trees are medium to large

Desired conditions at the landscape scale (**FW-VEG-DC-1-2**) strive to create vegetative conditions that are broadly resistant to a variety of disturbances and ecosystems that are intact and functioning within endemic levels of disturbance.

Desired conditions at the mid-scale **FW-VEG-MCD-DC-12** would ensure that in some areas, forest conditions would have 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest. Also, at the mid-scale, snags (greater than 18 inches), coarse woody debris, and downed logs (greater than 12 inches diameter at mid-point, greater than 8 feet long) would maintain conditions that support forest structure and nest and roost conditions (**FW-VEG-MCD-DC-11**). Desired conditions at the fine-scale (**FW-VEG-MCD-DC-16** and **18**) would provide mid to old age tree groups with the necessary interlocking canopy conditions for nest and roost habitat.

Where Gambel oak and other hardwoods occur as a component in conifer forest, desired conditions and guideline (**FW-VEG-G-3 and FW-VEG-MCD-DC-14**) would favor their retention during project design to promote canopy cover and moister site conditions for small mammals, plants, and insects. Retention of oaks would promote biodiversity and abundant prey for foliage gleaners as well as apex predators.

Mixed Conifer with Aspen (MCW)

Although most vegetation management work would occur in the frequent fire-adapted ecosystems mentioned above (ponderosa pine and frequent fire mixed conifer), desired conditions for Mixed Conifer with Aspen would ensure a variety of forest structural stages and tree species, including large trees, snags and coarse woody material, old growth conditions, and closed canopies are accounted for at the landscape (**FW-VEG-MCW-DC-1-2,** and **4-5**), mid (**FW-VEG-MCW-DC-8-10**) and fine scales (**FW-VEG-MCW-DC-15-16**). These desired conditions would support ecological conditions that should be compatible with needs of the owl by providing sustainable and resilient forests. And, where recovery habitat exists, desired conditions at the fine (**FW-VEG-MCW-DC-10**) and mid scales (**FW-VEG-MCW-DC-8**) would ensure that desired conditions for nesting, roosting, and raising young are provided for, as well as foraging, dispersal, or wintering habitats. Table 24 highlights various seral state proportions in the proposed action for mixed conifer with aspen.

Table 24. Desired seral-stage proportions for mixed conifer with aspen (landscape scale)

Seral State	Proportion (%)	Description
Non-Tree-Early	1	Recently burned; grass, forb, and shrub types
Mid-Closed	21	All aspen, deciduous tree mix, and evergreen-deciduous mix tree types
Mid-Open	29	Seedling/sapling, small trees and medium trees, all cover classes
Late-Closed	49	Large trees, closed canopy
Late-Open	0	Large trees, open canopy; contemporary landscapes only

Summary of Effects for All Vegetation Types

The primary contemporary threat for Mexican spotted owl is loss of habitat related to uncharacteristic stand-replacing fire. The preferred alternative's highest priority is to reduce the risk of stand-replacing wildfires and to restore the structure, species composition, and function of forested ecosystems.

Appendix C shows the land management plan components that are designed to reduce the threat of high-severity wildfire through the implementation of the plan. While there could be some localized short-term adverse impacts to the owl and its critical habitat, overall, there would long-term beneficial effects for the owl. Modified alternative 2 is intended to ensure that key habitat characteristics like interlocking canopy and old growth characteristics including large trees are retained and that disturbance is minimized near breeding sites. Beneficial impacts include a slight improvement in potentially suitable habitat in frequent fire forest by increasing the amount of habitat in the desired seral states for breeding and foraging. Objectives to treat acres in fire-adapted systems would move those systems toward a vegetative state more complementary to the owl's evolutionary needs. Overall, actions implemented under the preferred alternative are expected to retain the range of tree species (conifers and hardwoods associated with Mexican spotted 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 prefer. Some loss of trees, of all types and diameter at breast height size classes, could occur from actions such as hazard tree removal, prescribed fire, and forest thinning (as implemented under the wildland fire management and forest health programs).

Overall vegetation departure under the preferred alternative would trend toward reference conditions. Intensified treatments would decrease canopy cover continuity at the landscape scale and reduce ladder fuels that contribute to stand-replacing wildfires. Enhancements in vegetation structural state that reduce the number of smaller trees and ultimately improve conditions for large tree growth would in turn promote low-intensity ground fire.

Effects of Water Resources

Watersheds

Potential future watershed activities and projects are varied, and could include vegetation thinning, prescribed burning, channel stabilization, and other activities that could have impacts on habitats adjacent to riparian areas. Although short-term negative impacts that disturb soil or ground vegetation could occur with project implementation, the goal to improve watersheds is likely to be positive in the long term, by supporting maintenance and improvement of riparian habitat, including connectivity, that could be important for owl dispersal, foraging, and prey. Physical water resources and attributes assessed on the Carson include water quantity, water quality, groundwater, and watershed condition and function. Refer to the introduction for information on miles of flowing streams and proper functioning condition. While riparian forests and vegetation were used historically as nesting habitat, owls are not known to currently nest in riparian habitat on the Carson National Forest because habitat is sparse, unsuitable for nesting, and comprises a very small portion (4 percent) of the national forest. The remaining riparian vegetation could be used for dispersal or foraging. Desired conditions (**FW-WSW-DC-1**) support watersheds that are in proper functioning condition and that multiple uses (for example, timber, grazing, and recreation) are balanced with healthy ecological conditions. In general, the Watersheds Program seeks to maintain or improve watershed conditions and maintain good water quality. It complements and reinforces plan components from other program areas and strives to minimize or eliminate impacts from activities that might occur under those other program areas (for example, grazing, timber, fire and fuels). A guideline (**FW-WSW-G-1**) would require that best management practices are applied to site-specific projects with

the potential to adversely affect the watershed conditions. This would provide protection to the owl and its habitat from management activities.

Watershed and Riparian Areas (WSW and RMZ)

While riparian forests were used historically as nesting and roosting habitat, owls are not known to currently nest in predominately riparian habitat. Riparian vegetation comprises a very small portion (4 percent) of the Carson National Forest and there are no protected activity centers in this vegetation type. Rather, riparian forest constitutes a small proportion of recovery habitat and could be used for dispersal, foraging, or wintering.

Plan components that would benefit the owl focus on water quality and quantity and ground cover, and relate primarily to Mexican spotted owl prey habitat, rather than nest and roost habitat. Guidance for water resources generally promotes properly functioning condition and ecological integrity at multiple spatial scales, which would, in turn, support food and cover for prey (**FW-WSW-DC-1-2; FW-WSW-RMZ-DC-9; FW-WSW-RMZ-STM-DC-2** and **5**). An objective (**FW-WSW-RMZ-O-1**) to improve nonfunctioning and functioning-at-risk riparian areas by implementation of at least 200 to 300 acres annually could benefit recovery habitat for the owl by improving foraging and dispersal habitat. Guidelines (**FW-WSW-RMZ-G-1-2**) establish a riparian management zone around perennial water and prevent new infrastructure development (for example, roads and trails) in those areas, which would mitigate disturbance and help move these systems toward desired conditions. Guidelines (**FW-WSW-RMZ-FSR-G-2-3**) are conservation measures and promote retention of trees, snags, and downed logs in and near stream channels and riparian areas to provide wildlife habitat that would benefit Mexican spotted owl prey species.

Summary of Effects for Water Resources

The net impact of this plan section and its subsections on the owl is a mix of some limited short-term adverse (in the form of disturbance) and potentially long-term beneficial effects through habitat improvement projects that could occur in riparian areas. Implementation of the above objectives will likely contribute to recovery by restoring and/or conserving habitat in riparian systems where most restoration work will be implemented. Standards and guidelines will help offset those impacts, but adverse effects would not be eliminated completely.

Effect of Soil

There are no objectives associated with this section of the plan. Effects would be associated with other program activities (for example, forestry and forest products, wildland fire management). Desired conditions for soils (**FW-SL-DC-1-3**) promote properly functioning areas with adequate vegetative ground cover to prevent erosion from exceeding natural rates. These are consistent with protecting owl prey habitat and creating conditions for plant regeneration. Implementation of projects that disturb soil or ground vegetation could have short-term, but minor, adverse impacts on prey species and their habitat, but overall, the goal to improve vegetation structure and ecosystem function coupled with guidelines (**FW-SL-G-1-3)** when applied with best management practices at the project level would ensure long-term positive impacts on prey habitat through ground cover improvement and retention of woody material. These plan components in addition to best management practices (USDA FS 2012b) and other project-specific design features should minimize soil compaction and disturbance during and after project implementation, resulting in faster regeneration and recovery of ground conditions.

Summary of Effects for Soil

Some activities associated with this plan section could have short-term habitat or disturbance impacts to owls during implementation. However, application of standards and guidelines at the site-specific level along with best management practices should reduce impacts, so effects are expected to be insignificant.

Effect of Cliffs and Rocky Features (CRF)

There are no objectives associated with this section of the plan. Effects would be associated with other program activities (for example, recreation). Desired conditions and guidelines within Cliff and Rocky Features would ensure that cliff habitat is maintained, intact, and protected from disturbance during the nesting season.

Effects of Wildlife, Fish, and Plants (WFP)

This section supports activities that maintain or improve wildlife, fish, and rare plant habitats across the national forest. There are no objectives under this section of the plan; site-specific projects that would benefit the owl would occur through integrated program management and effects from those actions are analyzed under those sections of the plan. Species cannot be managed apart from their habitats. Therefore, plan components within vegetation and watershed resources must be used in combination with plan components found in wildlife, fish, and plants. The wildlife, fish, and plant program, in combination with other resource plan components, performs activities to maintain or improve wildlife, fish, and rare plants habitats. The land management plan integrates habitat management desired conditions, guidelines, and objectives (**FW-VEG-G 1-3**, **FW-WFP-DC 1-4**, **FW-WFP-DC 7**, **FW-WFP-0 1 and 4**, and **FW-WFP-G 1-3**) with species protection measure from approved recovery plans in the vegetation and wildlife, fish, and plant sections to provide protection and development of suitable Mexican spotted owl habitat.

Two desired conditions within this section promote conservation and recovery of the owl, which is included in the Carson land management plan as an at-risk species:

FW-WFP-DC-2. Ecological conditions (vegetation and watersheds and water desired conditions) affecting habitat quality, distribution, and abundance contribute to self-sustaining populations of terrestrial and aquatic plant and animal species, including at-risk species, that are healthy, well distributed, genetically diverse, and connected (on NFS lands and to adjacent public and privately conserved lands), enabling species to adapt to changing environmental and climatic conditions. Conditions as described in vegetation and watersheds and water desired conditions provide for the life history, distribution, and natural population fluctuations of the species within the capability of the ecosystem.

FW-WFP-DC-3. Ecological conditions (vegetation and watersheds and water desired conditions) provide habitat that contributes to the survival, recovery, and delisting of species under the Endangered Species Act; preclude the need for listing new species; improve conditions for species of conservation concern; and sustain both common and uncommon native species.

Two primary guidelines reinforce desired conditions under these sections of the plan that would benefit spotted owl by minimizing, reducing, or eliminating the potential for adverse effects that could occur during forest restoration activities. They would contribute to owl recovery and are considered conservation measures for the species. They include:

FW-WFP-G-1. Management activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from the most recent

approved USFWS recovery plan, to maintain the persistence or contribute to the recovery of federally listed species.

FW-WFP-G-3. Management activities should avoid disturbance at known active raptor nests and fledging areas, to maintain the persistence or contribute to the recovery of at-risk species. Timing restrictions, adaptive percent utilizations, distance buffers, or other means of avoiding disturbance should be based on the best available information, as well as on site-specific factors (e.g., topography and available habitat).

Additionally, desired conditions (**FW-VEG-DC-21**, and **FW-WSW-RMZ-FSR-DC-4**,) would ensure any owl habitat including canyon habitat is maintained. Two guidelines (**FW-VEG-G-3** and **FW-WSW-RMZ-FSR-G-3**) would retain or improve the condition of standing dead trees, down woody material, and large mature cottonwood trees as habitat for at-risk species in riparian areas. These would be beneficial to owl recovery habitat and prey species.

Summary of Effects for Wildlife, Fish, and Plants

The net effect of this section of the proposed plan is beneficial for the owl and its habitat.

Effects of Non-native invasive Species

This section includes desired conditions that support native ecosystems and recovery of native species. A standard directs the use of best management practices (as defined in the Region 3 Soil and Water Conservation Practices Handbook or other most current regional best management practices guidance) during project implementation to minimize the spread of nonnative invasive species. Although nonnative invasive species have not been identified as a threat to the owl (USDI FWS 2012b), this guidance would be generally positive for promoting ecological integrity as well as food and cover for owl prey. Potential disturbance resulting from invasive species management would be minimized or eliminated by timing restrictions mentioned above (**FW-WFP-G-3**).

Effects of Air

Air quality direction consists of desired conditions and guidelines. There are no objectives or standards. Air quality is not a component of habitat or critical habitat, so effects are only analyzed for the species.

Forest activities that have the primary influence on air quality are management of prescribed fires. Heat and smoke exposure from wildland fires can result in fatality of owls, although the USFWS does not consider direct fatalities from heat, smoke, and other causes to have a substantial influence on owl persistence (USDI FWS 2012b). Desired conditions and guidelines that call for meeting all air quality standards should minimize the potential for smoke impacts to owls.

Effects of these plan components on the owl are not expected to be adverse and potentially beneficial.

Effect of Wildland Fire Management (Fire)

Wildland fire management resource section includes direction for both prescribed fire and naturally ignited wildfire management. Wildfires are expected to continue across the Carson National Forest, and they will continue to be actively managed using a range of fire management responses. During emergency response to wildfires, the Carson would initiate emergency consultation in accordance with the section 7 implementation regulations as outlined in 50 CFR section 402.05 where suppression or emergency actions may affect listed species or designated critical habitats.

The preferred alternative aims to manage more naturally ignited wildfires where and when it can do so safely and where the expected fire effects are likely to provide a positive benefit to resources. As prescribed fires and naturally ignited wildfires are managed for resource benefits, it is likely that there will be longer periods of human activity when monitoring or managing the fire but with less intensity than under full suppression strategy. There could be some disturbance to individual animals from fire management activities, but any adverse effects from those activities would be mitigated during project-level decision-making that would require compliance with section 7 of the Endangered Species Act.

Key objectives under this program area that would support recovery plan objectives to reduce the risk of high-severity fire and maintain owl habitat across the landscape include:

FW-VEG-MCD-O 2. During each 10-year period following plan approval, treat at least 20,000 to 40,000 acres using a combination of prescribed fire and naturally ignited wildfire to make progress toward or to maintain desired conditions.

This objective could be considered a conservation measure as it could reduce the risk of high-severity fire within owl recovery habitat.

Desired conditions **(FW-FIRE-DC-1 and 2)** will benefit the owl and its habitat. The overall goal of this program area is to restore fire across the landscape so that it functions in its natural ecological roles and ecological resources are more adaptable to a changing climate. Historic fire regimes would mirror those with which the owl co-evolved and the primary threat to the owl will be reduced. These desired conditions would also include wilderness and inventoried roadless areas where recovery habitat exists.

The above plan components for wildland fire management in combination with vegetation plan components, will generally move owl habitat toward desired conditions. Short-term, adverse effects may occur during the implementation of projects consistent with plan components. However, standards and guidelines minimize or eliminate these short-term adverse effects that might occur as a result of forest restoration work. The vegetation and fire section of the final environmental impact statement for the revised land management plan notes “Beneficial effects from fire consist of the acceleration of nutrient cycling, an increase in soil fertility, and improved plant productivity. Short-term effects of fire include the removal of vegetation that subsequently increases soil erosion and sedimentation.” A standard (**FW-FIRE-S 5**) directs managers to assess risk associated with wildfire response and balance with other resource needs. Guidelines (**FW-FIRE-G-1, 2, 5, and 8**) promote the natural ecological role of naturally ignited wildfire and across jurisdiction boundaries and that ground-disturbing activities should be avoided in threatened and endangered critical habitat (unless significant long-term benefits can be realized). Guideline **FW-FIRE-G-9** promotes post-fire rehabilitation in critical or endangered species habitat to mitigate adverse effects from naturally ignited wildfire.

Spotted owl and or its critical habitat could occur within wildland-urban interface areas, and goals for the wildland-urban interface could be inconsistent with management of nesting and roosting habitat for the Mexican spotted owl (see WUI section). The wildland-urban interface may be managed for foraging habitat or other life history needs if foregoing these treatments compromises the purpose and need for the project. Prescribed fire could consume downed logs and woody debris, some tree or other plant species or plant cover, which could have negative effects on Mexican spotted owl prey species and habitat.

Suppression actions for wildland fires are not a part of this consultation. Effect from suppression actions will be considered under the emergency consultation process.

Summary of Effects for Wildland Fire Management

While some activities designed to maintain or improve the natural fire regime could have some short-term negative impacts, application of standards and guidelines mentioned above (in addition to adopting recovery plan measures), at the site-specific level should reduce adverse effects. The net impact of this plan section on the owl is a mix of short-term adverse effects, but mostly beneficial in the long-term because overall forest health and resiliency will be improved.

Effects of Sustainable Rangelands and Livestock Grazing (GRZ)

Livestock management has the potential to affect habitat for spotted owl prey species if done at high intensity. However, over the last decade, the Carson National Forest range staff has worked with partners and permit holders to manage grazing pressure on sensitive areas (such as critical areas and riparian areas). The national forest staff manages for conservative use levels for livestock grazing and will continue to do so in the future. In the revised plan, a desired condition (**FW-GRZ-DC-4**) and a standard (**FW-GRZ-S-1**) for livestock grazing strive for compatibility with ecological functions and processes (such as water infiltration, wildlife habitat, soil stability, and natural fire regimes) and resilient ecosystems that are consistent with plan components for fire-adapted ecosystems and riparian habitat. In addition, desired condition (**FW-GRZ-DC-5**) emphasizes native plant communities with a diversity of shrubs and understories of grasses. These components promote understory and grassland to help improve habitat conditions for spotted owl prey species across the Carson. These plan components would complement and reinforce desired conditions in frequent fire mixed conifer vegetation types and help to ensure that understory development is balanced with grazing management and the needs of the owl.

Standard **FW-GRZ-S-1** would reinforce the desired conditions and is considered a conservation measure for the species: Livestock management must be compatible with capacity and address ecological concerns (such as forage, invasive plants, at-risk species, soils, riparian health, and water quality) that are departed from desired conditions, as determined by temporally and spatially appropriate data.

A guideline (**FW-GRZ-G-1**) would balance forage use with desired ecological conditions and livestock grazing during permit renewals and development of annual operating instructions. In riparian management zones, a guideline (**FW-GRZ-G-2**) would ensure that livestock grazing is done in a way that support riparian desired conditions.

Guidelines (**FW-GRZ-G-6-7**) seek to reconsider vacant, understocked allotments for livestock use when other active allotments are unavailable and require ecosystem recovery. This could affect understory habitat for owl prey species; however, site-specific environmental analysis would be conducted before restocking vacant allotments for grazing to ensure compatibility with other uses and these effects are therefore likely be minor.

Summary of Effects for Sustainable Rangelands and Livestock Grazing

Guidance under this section of the plan, in combination with grazing management handbook direction and annual operating instructions is not expected to be adverse for the owl. Plan components noted above would eliminate and minimize the potential for adverse effects. Standards and guidelines are generally consistent with supporting habitat for owl prey populations.

Effects of Sustainable Forestry and Forest Products (FFP)

The sustainable forestry and forest products program area would ensure private and commercial timber harvest is used as a restoration tool and desired conditions for that program (**FW-FFP-DC-1, 3-5**) would ensure these types of activities are done in a way that enhances ecological conditions for wildlife through

restoration and maintenance of desired vegetation conditions. There are no objectives identified for this section.

Fuelwood collection has remained relatively constant on the Carson National Forest. The preferred wood is any species of tree that is dead or down near roads, excluding standing ponderosa pine. However, the removal of fuelwood is usually limited to areas near roads and not too far from private land. Fuelwood collection does not occur everywhere on the national forest. The following are desired conditions and guidelines for fuelwood collection.

FW-FFP-DC-3. Forest products that are a byproduct of management activities are available for personal use (for example, fuelwood) by the public.

FW-FFP-DC-5. Harvest of dead and dying trees for economic value is consistent with the desired conditions of wildlife habitat, soil productivity, and ecosystem functions.

FW-WSW-RMZ-FSR-G-2. Fuelwood cutting or wood removal should be managed to protect understory species, maintain tree density (including wildlife cover and stream shading), promote large woody material recruitment, and avoid channel down cutting and accelerated erosion.

FW-WSW-RMZ-FSR-G-3. Large mature cottonwood trees should be protected from management activities that could degrade them as suitable habitat for at-risk species. Projects occurring in these areas should incorporate restoration prescriptions, to ensure persistence of this habitat type.

Harvesting activities for timber products are likely to be most influential on the Mexican spotted owl and its habitat within mixed conifer vegetation types. These activities can include firewood collection, harvest for sawtimber and pulpwood, and acquisition of other products. Harvesting can directly impact Mexican spotted owl habitat structure, along with associated activities such as piling, creating temporary haul roads, etc. Impacts can be positive or negative, depending on the design and implementation of the project. No objectives are identified for this program area, but desired conditions (**FW-FFP-DC-1, 3-5**) would ensure consistency with desired conditions for vegetation types and promote enhancement of wildlife habitat, including dead and dying trees. **FW-FFP-DC-5,** which directs that harvest of dead and dying trees for economic value, is consistent with the desired conditions of wildlife.

Although there are no objectives or standards, guidance for all vegetation types, ponderosa pine, frequent fire mixed conifer, and wildlife, fish, and plant sections (land management plan) would help to further mitigate impacts.

Summary of Effects for Sustainable Forestry and Forest Products

Activities under this section of the plan would largely support forest restoration objectives (vegetation, fire and fuels management) and traditional cultural uses (below). While short-term negative effects may occur under implementation of the Forest Products program, the net long-term gain should be positive for the owl. Application of desired conditions (mentioned above) at the site-specific level should help to reduce, minimize or eliminate any adverse effects, and direction from all other relevant sections in the plan would be applied to the Mexican spotted owl, its habitat, and critical habitat when implementing projects. Negative effects would likely be short-term and collective guidance in the plan is expected to maintain or improve conditions for the owl.

Effects of Traditional Communities and Uses

There are no anticipated effects from the subsection titled federally recognized tribes. This section focuses largely on protection of tribal resources and culturally significant places, and this guidance is not in conflict with the spotted owl or its habitat needs.

There could be some limited effects from the rural historic communities section related to firewood gathering, which could primarily affect spotted owl prey by reducing hiding cover and habitat. However, a guideline (**FW-RHC-G-1**) provides an important sideboard that says "Traditionally used products (such as fuelwood, latillas, and vigas) should be available on the national forest to rural historic communities, except in areas with resource concerns or any areas otherwise restricted by standards or guidelines set forth in other sections of this plan." This guidance, in addition to the desired conditions mentioned above under sustainable forestry and forest products, as well as other relevant sections of the plan should help reduce or eliminate negative impacts to the owl and its prey.

Summary of Effects for Traditional Communities and Uses

Negative impacts under this section would primarily occur in the form of localized disturbance to the owl and or its prey species and habitat. However, any effects would be short-term and minimized or eliminated through plan guidance noted above as well as timing restrictions and adopting recovery plan measures (as noted under the wildlife, fish, and plant sections). Based on this information, effects are expected to be insignificant and/or discountable.

Effects of Recreation (REC)

Recreation activities and Developed Winter and Summer Resort Management Areas have the potential to impact Mexican spotted owl both by removal of habitat and disturbance during the breeding season from management activities. Activities related to developed and dispersed recreation, and recreational use of trails and trailheads could cause disturbance to the owl and/or its habitat. However, **FW-REC-G-1 and FW-REC-G-5** (listed below) would ensure that improvements related to developed recreation sites do not conflict with wildlife needs and desired conditions for dispersed recreation and strive to minimize impacts to other resources, which would reduce potential impacts to the owl. Standards for transportation and forest access related to dispersed recreation (**FW-TFA-S-1, FW-TFA-S-2**) would be generally positive in that they prohibit the construction of new roads and trails in primitive and semi-primitive settings, limit motorized vehicle use, and require decommissioning of temporary roads related to project work in semi-primitive settings. And guideline **FW-TFA-G-6** promotes sustainable trail design. The recreation; special use; transportation and forest access; wildlife, fish, and plants; and Valle Vidal and San Antonio Management Areas' plan components will reduce the impacts to the Mexican spotted owl from recreation activities such as the prohibition of cross-country off-highway vehicle travel and the minimization of construction of new infrastructure. Some of these plan components are listed below:

FW-WFP-DC-7. To the extent possible, wildlife and fish are free from harassment and human disturbance at a scale that impacts vital functions (e.g., seasonal and daily movements, breeding, feeding, and rearing young) and could affect persistence of the species.

FW-REC-DC-3. A variety of high-quality developed and dispersed recreation opportunities and activities are available to a diverse group of forest users, including persons with disabilities. Recreation opportunities are commensurate with the desired recreation setting and other natural and cultural resource values.

FW-REC-DC-5. Recreation opportunities, including motorized and non-motorized trails, are responsive and adaptable to changing uses and trends and are available commensurate with public interest, resource capacity, and other natural and cultural resource values.

FW-REC-S-1,[6] FW-REC-S-2

FW-REC-G-1. Recreation activities should be compatible with and managed adaptively to minimize impacts to at-risk species and ecological desired conditions, including in riparian management zones (e.g., along streams, around seeps, springs, lakes, and wetlands).

FW-REC-G-5. Dispersed sites that are no longer consistent with the area's scenic integrity objective or result in unacceptable ecological resource damage should be closed or rehabilitated.

FW-TFA-DC-4[7], **FW-TFA-S-1, FW-TFA-S-2, and FW-TFA-G-6**

FW-SU-G-6. Organized group events (nonmotorized and motorized) authorized under a special use permit should be limited to existing National Forest System trails and roads, suitable developed sites, or where resource impacts are determined to be minimal.

All **standard** and **guidelines** found in the Valle Vidal and San Antonio Management Areas will reduce the impacts to Mexican spotted owl from recreation activities.

Summary of Effects for Recreation

There is the potential for short-term adverse effects in the form of disturbance or habitat removal or alteration, related to recreation development and maintenance as well as rock-climbing or canyoneering, but this would be limited in extent and minimized by the standards and guidelines above as well as timing restrictions under the wildlife, fish, and plant section of the plan. Effects to the owl from this section of the plan would likely be insignificant or discountable.

Effects of Transportation and Forest Access (TFA)

Activities under the roads program include construction, maintenance, relocation, modifications, and obliteration of roads. These activities can result in short-term ground disturbance, long-term removal of vegetation where new roads are constructed, and noise disturbance from machinery. There is some potential for new and temporary road construction to help support forestwide restoration activities. Temporary roads can increase the chances of off-road vehicle use and disturbance. Additional guidance to follow the intent of the approved recovery plan for the owl should help avoid and minimize the effects of any new roads at the site-specific level. It is not anticipated that any new or temporary roads will be constructed within protected activity centers. Several plan components would help to minimize disturbance to the owl that might occur during the breeding season. A guideline (**FW-TFA-G-6**) ensures road usage does not hinder wildlife movement or interrupt critical life-cycle needs (such as nesting or breeding).

An objective (**FW-TFA-O1**) and conservation measure to obliterate or naturalize at least 2 miles of unneeded roads annually to protect ecosystems and watersheds could have some short-term adverse effects during implementation. However, habitat conditions would be improved for the owl in the long term by minimizing potential disturbance if roads occur in owl habitat. A standard (**FW-TFA-S-3**) would

[6]If plan component is repeated in another section, then will only repeat plan component code. Please review previous sections for entire plan component text or see the Carson land management plan.
[7] If plan component is repeated in another section, then will only repeat plan component code. Please review previous sections for entire plan component text or see the Carson land management plan.

require that temporary road for management activities be decommissioned upon project completion. In general, the standards and guidelines under this section of the plan generally seek to minimize the construction of new roads and to offset any resource damage that could occur during temporary road construction needed to support site-specific project-level restoration work. Additional guidance for roads can be found in the wildlife, fish, and plants section.

Summary of Effects for Transportation and Forest Access

There is the potential for short-term adverse effects in the form of disturbance or habitat removal or alteration, related to trail and road development and maintenance, and during road decommissioning. These effects would be limited in extent and minimized by the standards and guidelines above as well as timing restrictions under the wildlife, fish, and plants section of the plan.

Effects of Special Uses (SU)

Lands special use authorizations include utility lines, communication sites, research permits, and others. Recreation special uses include things such as outfitter-guide services, skiing, and special events. Most special uses on the Carson National Forest are commercial. There are no objectives for this section of the plan. There are eight desired conditions that include direction to minimize impacts to ecological resources. Guidelines **FW-SU-G-1** and **FW-SU-G-5** would minimize negative effects on the owl resulting from utility permits by ensuring utility location does not conflict with wildlife needs.

Summary of Effects for Special Uses

While there could be special uses that impact the owl and its habitat, plan components described above, in addition with the timing restrictions from the wildlife, fish, and plants section of the plan, should lessen any potential impacts. Effects are not anticipated to be adverse.

Effects of Minerals and Mining

Locatable, Leasable and Salable Minerals

No active, locatable, mineral mines occur on the Carson National Forest, although uranium deposits do exist, and there are two inactive uranium mines. There are numerous abandoned gold and silver mines. Several streams are used for recreational gold panning. There are known rare-earth deposits in the national forest. Also known as mineral materials, saleable minerals include sand and gravel, decorative stones, and clay. The Carson provides opportunities for the public to harvest these products from designated areas. Energy or mineral extraction sites can cause the removal of habitat and/or disturbance to spotted owl during the breeding season. Guidelines for timing restrictions and adopting recovery plan measures (as noted under the wildlife, fish, and plants sections) would help reduce or eliminate these impacts within spotted owl habitat (**FW-WFP-G-1-3**).

Summary of Effects for Minerals and Mining

Anticipated negative effects from this section could occur due to locatable, leasable and salable minerals, and renewable energy. There is the potential for adverse effects in the form of disturbance or habitat removal or alteration, but this would be limited in extent and minimized by the guidelines above as well.

Management Areas (MA) and Designated Areas (DA)

The following section characterizes the management and designated areas with Mexican spotted owl recovery habitat and discusses the effects of the resulting management direction on the species. For a more detailed description of the Management and Designated Areas see the Introduction.

Table 25. Mexican spotted owl recovery habitat in each Carson proposed management area and designated area

Management or Designated Area	Approximate Mexican spotted owl Recovery Habitat Acres within Area	Percent of Mexican spotted owl Recovery Habitat within Area	Critical Habitat Acres within Area
Recommended Wilderness	763	0.3%	0
San Antonio Mountain Management Area	15,265	6%	0
Valle Vidal Management Area	20,354	8%	0
Developed Winter and Summer Resorts	254	0.1%	0
Jicarilla Natural Gas Management Area	5,088	100%	23,182
Designated Wilderness	17,810	7%	0
Inventoried Roadless Areas	1,484	0.4%	0
Vallecitos Federal Sustain Yield Unit Designated Area	17,810	7%	0
Wild Horse Territories Designated Areas	1,005	0.3%	1,430
Total	79,833	31%	23,182

Effects of Management Areas

Recommended Wilderness (RWMA)

Modified alternative 2 recommends 9,189 acres within the Questa, Tres Piedras, and Canjilon Ranger Districts for wilderness designation. These additions will expand existing wilderness (figure 7). None of these areas include critical habitat or protected activity centers (Figure 14).

In recommended wilderness, a desired condition (**MA-RWMA-DC-2**) supports a natural level of disturbance from fire, insects, and disease, while **MA-RWMA-S-4** prohibits timber harvest. Desired condition **MA-RWMA-DC-3** preserves the unmodified nature of the landscape with minimal constructed features; these areas enhance wildlife habitat for species like the owl and would minimize disturbance during the breeding season. A standard (**MA-RWMA-S-1**) would further minimize disturbance by restricting new permanent or temporary roads. Motorized travel is generally restricted and mechanized recreation is not allowed unless designated in recommended wilderness management areas.

Planned (prescribed fire) and unplanned ignitions could be used as a management tool (**MA-RWMA-G-2**) to reduce the risks of uncharacteristic wildfire and to enhance ecosystem function in wilderness. This guideline complements the guidance for Wildland Fire Management and fire-adapted ecosystems under Vegetation Types above.

Activities that are anticipated in recommended wilderness areas include managed fire, trail building and maintenance, and dispersed recreation. Some could have negative impacts on owls and their habitat, at least in the short term. Also, progress toward desired conditions could be slower in wilderness areas because restoration activities would be limited to wildfire. Overall, however, progress toward desired conditions is expected to have a net positive effect for the owl over the long term.

San Antonio and Valle Vidal Management Area (SAMA and VVMA)

Several plan components could potentially benefit the owl within these management areas. Desired conditions (**MA-VVMA-DC-1–5** and **MA-SAMA-DC-1–3**) emphasize natural ecological conditions

that would occur with minimal human influence. Standards (**MA-VVMA-S-5** and **MA-SAMA-S-1**) prohibit new roads or motorized trails for public access within these areas, which would help minimize disturbance. Wildland Fire Management desired conditions would still apply to these areas and would reinforce forestwide goals to treat fire-adapted ecosystems (ponderosa pine and frequent fire mixed conifer) with planned and unplanned ignitions and that vegetation management emphasizes wildlife habitat and range improvement projects.

Developed Winter and Summer Resorts (DEVRES)

The Carson National Forest has four developed winter and summer resorts within this management area: Enchanted Forest Cross Country Ski Area, Red River Ski and Summer Area, Taos Ski Valley, and Sipapu Resort. Developed Winter and Summer Resort Management Area has the potential to impact Mexican spotted owl through habitat loss by clearing trees for ski runs, roads, and other developments associated with ski areas. Activities associated with ski resorts, including skiing, ski lift operation, grooming of ski runs, mountain biking in the summer, may also cause disturbance or displacement of individual Mexican spotted owl.

Only, about 254 acres of Mexican spotted owl recovery habitat may be included in this management area (table 25). Most of this management area is already developed and would most likely be avoided by Mexican spotted owl. There would continue to be minimal effect on Mexican spotted owl attributable to this management area.

Potential Developed Recreation Site Management Area (PDRMA, page 168)

This management area surrounds the existing Sipapu Ski Area and encompasses 1,032 acres. Currently, there is no development in this management area, and it is managed as general forest. In the future, the management area has the potential to impact Mexican spotted owl through habitat loss by clearing trees for ski runs or other developments associated with recreational sites. Recreational activities and developments may cause disturbance or displacement of individual Mexican spotted owl. Development of this area in the future would undergo a separate planning process and Endangered Species Act section 7(a)(2) consultation.

Jicarilla Natural Gas Management Area (JICMA)

Jicarilla Natural Gas Management Area is on the Jicarilla Ranger District and includes critical habitat and protected activity centers. Gas extraction sites can cause the removal of habitat, disturbance to the Mexican spotted owl during the breeding season, or both. The desired conditions (**MA-JICMA-DC-1–2**), standards (**MA-JICMA-S-9–10**), and all the guidelines within this management area would help reduce or eliminate these impacts within Mexican spotted owl habitat by restricting or prohibiting surface use in Mexican spotted owl habitat and concentrated uses to the extent possible would limit the amount of habitat that would be affected by development of these facilities. **MA-JICMA-S-10** prohibits new surface use within owl critical habitat units.

Summary of Effect of Management Areas

Effects from Recommended Wilderness, San Antonio, and Valle Vidal Management Areas is expected to be positive for the owl in the long term. There could be some short-term adverse effects from Jicarilla Natural Gas Management Area; however, over the long term these impacts could be minimized as **MA-JICMA-S-10** prohibits new surface use within owl critical habitat units. Developed Winter and Summer Resort Management Area and Potential Developed Recreation Management Area have the potential to impact Mexican spotted owl through habitat loss and disturbance associated with recreation developments and activities. This would be limited in extent, however, and minimized through the combination of standards and guidelines listed in other sections of the plan (for example, vegetation management,

forestry, wildland fire) and by following recommendations in the recovery plan as referenced in the wildlife, fish, and plants section above.

Effects of Designated Areas

Designated Wilderness Areas (Wild)

None of the current designated wilderness areas include critical habitat for the owl (figure 3 and Figure 14). Effects to the owl from plan components for designated wilderness would be similar to those found under recommended wilderness. Plan components are generally consistent with maintenance and improvement of Mexican spotted owl populations and habitat. They focus on enhancing wildlife habitat and wilderness character and promote the natural ecological role of fire in the system (**DA-WILD-DC-1–3**). Standards (**DA-WILD-S-1–2**) minimize disturbance by limiting recreationists' group size and promoting "leave no trace" practices by outfitter guides.

Inventoried Roadless Areas (IRA)

Inventoried roadless areas occur on every district of the Carson National Forest except Jicarilla Ranger District. There are no critical habitat or protected activity centers within this designated area. This designated area would provide positive beneficial effects for owl recovery by preserving the natural character of the land and minimizing disturbance. These areas emphasize semi-primitive recreation settings. Desired conditions that would be positive for the owl include **DA-IRA-DC-1–2** and all standards and guidelines.

Vallecitos Federal Sustained Yield Unit Designated Area (VFSYU)

Effects to the owl from plan components for Vallecitos Federal Sustained Yield Unit would be similar to those found under Sustainable Forestry and Forest Products. There are no critical habitat or protected activity centers within this designated area. Harvesting can directly impact Mexican spotted owl habitat structure (for example, primary constituent elements 1a-b), along with associated activities such as piling, creating temporary haul roads, etc. Impacts can be positive or negative, depending on the design and implementation of the project. There are no objectives identified for this designated area, but desired condition **DA-VFSYU-DC-5** would ensure consistency with desired conditions for vegetation types and promote enhancement of wildlife habitat.

Wild Horse Territories Designated Areas (WHT)

Effects to the owl from plan components for wild horse territories would be similar to those found under Sustainable Rangelands and Livestock Grazing. The Jicarilla Wild Horse Territory does contain critical habitat and protected activity centers. Wild horses have the potential to adversely affect habitat for spotted owl prey species. A desired condition (**DA-WHT-DC-3**) strives for compatibility with ecological functions and processes (such as water infiltration, wildlife habitat, soil stability, and natural fire regimes) and resilient ecosystems that are consistent with plan components for fire-adapted ecosystems and riparian habitat. Plan components found within the wild horse territories section (see plan) would complement and reinforce desired conditions in mixed conifer and help balance wild horse management with the needs of the owl.

Summary of Effects of Designated Areas

Effects from designated areas are expected to be positive for the owl in the long term, although some short-term adverse effects could occur primarily from vegetation treatments in Vallecitos Federal Sustained Yield Unit. This would be limited in extent, however, and minimized through the combination of standards and guidelines listed in other sections of the plan (for example, vegetation management,

forestry, wildland fire) and by following recommendations in the recovery plan as referenced in the wildlife, fish, and plants section above.

Effects to Critical Habitat

Since 2005, there have been no formal consultations on effects to Mexican spotted owl designated critical habitat on the Carson National Forest. However, as described below, it is possible that implementation of projects could result in short-term adverse effects to primary constituent elements.

In the analysis of the effects of the action on critical habitat, the national forest considered whether the implementation of the land management plan would result in removal of critical habitat. To determine this, we analyzed whether the plan describes a reduction in primary constituent elements within mixed conifer and riparian forest that provide for one or more of the owl's habitat needs for nesting, roosting, foraging, and dispersing within critical habitat. Restoring fire to critical habitat or habitats used by spotted owl would be designed to protect or restore vegetation structure and composition that would sustain or improve the primary constituent elements within critical habitat and improve the condition of forage and cover outside of critical habitats, dispersal corridors, and connectivity. Mechanical treatments are not likely to occur within critical habitat. Most mechanical treatments may impact potential recovery habitat outside of critical habitat.

Much of analysis for the species in the preceding section is also relevant to the critical habitat analysis. The primary difference is the action area. Critical habitat occurs only on a portion of Jicarilla Ranger District of the planning area (Figure 14). Detailed discussions of actions covered above in the owl assessment will not be duplicated here, but rather referenced, only those differing effects or particularly relevant guidance specific to critical habitat (the primary constituent elements) will be presented and discussed. See table 26 for a complete summary of all effects to critical habitat by plan section or management area. See Appendix C Section 2 for a list of relevant plan components and associated risk factors.

The primary constituent elements (1 and 2) may be minimally impacted by how the proposed action relates to forest structure and adequate prey species within mixed-conifer and riparian forest types. They provide for one or more of the owl's habitat needs for nesting, roosting, foraging, and dispersing. The third primary constituent element relates to canyon habitat and effects to this primary constituent element are expected to be minimal.

Sections of the plan that are expected to have a mix of short-term adverse and long-term beneficial effects are summarized below. These include: Insects and Disease, Forested Vegetation Types (MCW and MCD), Water Resources (includes riparian), Wildlife, Fish, and Plants, Wildland Fire Management, Sustainable Forestry and Products, Traditional Communities and Uses, Recreation, Infrastructure, Management Areas, Designated Areas.

Primary Constituent Element 1a:

A range of tree species, including mixed conifer 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 diameter at breast height of 12 inches or more.

Effects to 1a

Actions that may be implemented under the land management plan are expected to retain the range of tree species (conifers and hardwoods associated with Mexican spotted owl habitat) and will not reduce the range of tree sizes needed to create the diverse forest and multi-layered forest canopy preferred by

Mexican spotted owls. Removal of trees and various trees species may occur during implementation of the transportation resource (creation, maintenance of roads), but these effects should be small in extent and intensity and would not likely impact areas within critical habitat. Some loss of trees, of all types and diameter at breast height size classes, will occur from actions such as hazard tree removal from prescribed fire and forest thinning. However, actions implemented under the land management plan are expected to maintain a range of tree species and sizes needed to maintain to improve this primary constituent element in recovery habitat across the national forest. Plan components at the landscape, mid, and fine scale provide desired conditions that promote trees and groups of trees comprised of various age and size classes of mixed conifer vegetation. Patch size would vary depending on vegetation type, but typically would be larger on north-facing slopes. These plan components also state that the greatest amount of basal area is contributed by larger trees. Guidelines promote the retention of old growth components important for maintaining forest structure for owl nest and roost habitat.

As stated in the analysis for the species, objectives to treat highly departed areas in fire-adapted ecosystems (see All Vegetation and Wildland Fire Management) could result in a 21 percent increase in nest and roost habitat for the owl under the proposed action depending on where treatments are implemented. These objectives would contribute to recovery and could improve conditions in designated critical habitat and act as conservation measures for the species.

The following plan components would support primary constituent element 1a by directing the land manager during project implementation to manage the project area for a composition of different tree sizes reflecting different ages of trees, 30 percent to 45 percent of which are large trees with diameter at breast height of 12 inches or more, and requiring federally listed species' habitat to be integrated into habitat management objectives:

FW-VEG-MCD-DC-16. Tree groups are typically less than 1 acre and consist of 2 to 50 trees per group, but are sometimes larger, such as on north-facing slopes. Regeneration openings occur as a mosaic and are similar in size to nearby groups.

FW-VEG-MCD-DC-18. Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Trees within groups are of similar or variable ages, often containing more than one species. Crowns of trees within mid-aged and old groups are interlocking or nearly interlocking.

FW-VEG-MCW-DC-8. At the mid-scale, the distribution of groups and patches varies in the mixed conifer with aspen vegetation community, depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary, but are frequently in the hundreds of acres, with rare disturbances in the thousands of acres. Groups and patches of tens of acres or less are relatively common. A mosaic of groups and patches of trees, primarily even-aged, and variable in size, species composition, and age is present. Disturbance-created grass, forb, and shrub openings may comprise 10 to 100 percent of the mid-scale area, depending on the local disturbance history.

FW-VEG-MCD-DC-8. At the mid-scale, appearance is variable, but generally uneven-aged and open. Openness typically ranges from 50 percent in more productive sites to 90 percent in less productive sites. Occasionally small patches (generally less than 60 acres) of even-aged forest structure are present, based upon disturbance events and regeneration establishment. A small percentage of the landscape may be predisposed to larger even-aged patches, based on physical site conditions that favor mixed-severity and stand-replacement fire and other disturbances. Disturbances sustain the overall variation in age and structural distribution.

FW-VEG-MCW-DC-10 and **FW-VEG-MCD-DC-12.** Basal area is 10 to 20 percent higher in some areas than in the general forest. Examples include goshawk post-fledging family areas, north-facing slopes, and canyon bottoms. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the dry mixed conifer type.

FW-VEG-MCD-DC-14. Where the potential exists, Gambel oak thickets with various diameter stems and low-growing, shrubby oak are present. These thickets provide forage, cover, and nesting habitat for species (for example, small mammals, birds, deer, and elk). Gambel oak mast (acorns) provides food for wildlife species, such as black bear. The distribution and abundance of oak balances wildfire hazard fuels reduction and tree regeneration with wildlife habitat, grazing conditions, age class diversity, and soil condition.

FW-VEG-MCD-DC-4. Old growth structure occurs throughout the landscape, generally in small areas as individual old growth components or as clumps of old growth. Old growth may be intermixed with groups of younger trees or distinct groups of mostly old trees.

FW-VEG-MCD-DC-5. Vigorous trees dominate, but older declining, top-killed, lightning-scarred, and fire-scarred trees are a component that provide for snags and coarse woody debris and are well distributed throughout the landscape.

FW-VEG-MCD-DC-6. Dwarf mistletoe infestations may be present on ponderosa pine and Douglas-fir, but rarely in other tree species. It occurs in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures. Infestation size, severity, and amount of mortality varies among infected trees. Witches' brooms may be scattered throughout the infestations providing structural diversity in the stand and improved foraging and nesting habitat for wildlife species, such as small mammals (for example, tree squirrels) and raptors (for example, goshawks).

FW-VEG-DC-17. The composition, density, structure, and mosaic of vegetation conditions reduce the threat of uncharacteristic wildfires to ecosystems and local communities.

FW-VEG-DC-20. The structure and function of the vegetation and associated microclimate and special features (for example, snags, logs, large trees, interlocking canopy, cliffs, cavities, talus slopes, bogs, fens, rock piles, specific soil types, and wet areas) exist in adequate quantities within the capability of the Carson, to provide habitat and refugia for at-risk species with restricted distributions.

FW-VEG-DC-21. Ecological conditions, as described in these desired conditions, provide habitat to support, sustain, and recover rare, endemic, or at-risk species.

FW-VEG-G-1. Management activities and special uses occurring within federally listed species' habitat should integrate habitat management objectives and species protection measures from the most recent approved Fish and Wildlife Service recovery plan, to maintain the persistence or contribute to the recovery of that species.

FW-VEG-G-2. Where the Forest Service has entered into a signed conservation agreement that provides guidance on activities or actions to be carried out by the Carson, those activities or actions should be undertaken consistent with the guidance found within the conservation agreement, to maintain the persistence or contribute to the recovery of federally listed species and persistence of species of conservation concern.

FW-VEG-G-3. Vegetation should provide for at-risk species' habitats, by minimizing disturbance, providing recovery strategies, and managing for desired levels of key structural elements for at-risk

species (for example, large old trees and snags, downed woody debris, denser vegetation structure, and soil structure) important for nesting, rearing, breeding, foraging, and dispersal, to maintain the persistence or contribute to the recovery of at-risk species.

FW-WFP-DC-1. Sustainable populations of terrestrial and aquatic plant and animal species, including at-risk species, are supported by healthy ecosystems, as described by vegetation and watersheds and water desired conditions.

FW-WFP-DC-2. Ecological conditions (vegetation and watersheds and water desired conditions) affecting habitat quality, distribution, and abundance contribute to self-sustaining populations of terrestrial and aquatic plant and animal species, including at-risk species, that are healthy, well distributed, genetically diverse, and connected (on National Forest System lands and to adjacent public and privately conserved lands), enabling species to adapt to changing environmental and climatic conditions. Conditions as described in vegetation and watersheds and water desired conditions provide for the life history, distribution, and natural population fluctuations of the species within the capability of the ecosystem.

FW-WFP-DC-3. Ecological conditions (vegetation and watersheds and water desired conditions) provide habitat that contributes to the survival, recovery, and delisting of species under the Endangered Species Act; preclude the need for listing new species; improve conditions for species of conservation concern; and sustain both common and uncommon native species.

FW-WFP-DC-6. Habitat configuration and availability and species genetic diversity allow long distance range shifts of plant and wildlife populations, in response to changing environmental and climatic conditions. Barriers to movement may exist to protect native species and prevent movement of nonnative species (for example, a fish structure to protect Rio Grande cutthroat trout from nonnative invasion).

FW-WFP-G-1. Management activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from the most recent approved Fish and Wildlife Service recovery plan, to maintain the persistence or contribute to the recovery of federally listed species.

FW-WFP-G-2. Where the Forest Service has entered into a signed conservation agreement that provides guidance on activities or actions to be carried out by the Carson, those activities or actions should be undertaken consistent with the guidance found within the conservation agreement, to maintain the persistence or contribute to the recovery of federally listed species and persistence of species of conservation concern .

FW-FFP-S-2

FW-FFP-S-8. Harvesting systems shall primarily be selected for their ability to move toward ecological desired conditions for the site and not for their ability to provide the greatest dollar return or unit output of timber.

FW-FFP-G-2. On lands classified as not suitable for timber production, timber harvesting should only be used for making progress toward ecological desired conditions or for salvage, sanitation, public health, or safety.

In addition to the guidance above that would affect forest vegetation in mixed conifer, several plan components would have beneficial effects on riparian forest conditions. These are considered

conservation measures and would ensure diverse size class distribution and forest structural diversity is maintained during site-specific projects.

FW-WSW-RMZ-DC-1. Riparian ecosystems are not fragmented or constrained, and are properly functioning; commensurate with their type and capability, riparian ecosystems have vegetation, landform, large coarse woody debris, litter, and root masses to capture sediment, filter contaminants, dissipate stream energy and overland flow from uplands to protect and enrich soils and stabilize banks and shorelines.

FW-WSW-RMZ-DC-7. Compared to surrounding uplands, riparian corridors have characteristics (for example, surface water and saturated soils) that reduce the frequency and severity of fire. Fire is limited or absent. Fire that occurs is typically smoldering and of low intensity. High- to mixed-severity fire occurs very infrequently.

FW-WSW-RMZ-O-1. Restore structure and function of at least 200 to 300 acres of nonfunctioning and functioning-at-risk riparian areas annually.

FW-WSW-RMZ-WR-DC-3. Wetlands have groundcover and species composition (richness and diversity) indicative of site potential with vegetation comprised mostly of sedges, rushes, perennial grasses, and forbs. Meadows with the potential for hardwood shrubs contain a diversity of age classes (at least two) along the banks of perennial streams.

FW-WSW-RMZ-FSR-DC-1–3

FW-WSW-RMZ-FSR-DC-4. Riparian forest vegetation provides nesting and foraging habitat for neotropical migrant birds, raptors, and cavity-dependent wildlife.

FW-WSW-RMZ-FSR-DC-5. Woody riparian species are reproducing and are structurally diverse with all age classes present at the landscape scale. Diverse vegetation structure, including mature trees, snags, logs, and coarse woody debris, is present to provide habitat for riparian-dependent species.

FW-WSW-RMZ-FSR-G-1. Connectivity within forest and shrub riparian vegetation communities should be restored or maintained by protecting ecological functions, tree density and growth, and native understory, to reduce the risk of predation and nest parasitism and to provide habitat for at-risk and other wildlife species.

FW-WSW-RMZ-FSR-G-2. Fuelwood cutting or wood removal should be managed to protect understory species, maintain tree density (including wildlife cover and stream shading), promote large woody material recruitment, and avoid channel down-cutting and accelerated erosion.

FW-WSW-RMZ-FSR-G-3. Large mature cottonwood trees should be protected from management activities that could degrade them as suitable habitat for at-risk species. Projects occurring in these areas should incorporate restoration prescriptions, to ensure persistence of this habitat type.

Primary Constituent Element 1b:

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

Effects to 1b

The Carson National Forest expects tree shade canopy will be reduced following thinning and burning treatments implemented under the proposed plan to help work towards desired conditions for fire-adapted systems (see All Vegetation Effects). However, these treatments would not likely impact areas within the

critical habitat unit. We do not expect canopy cover in Mexican spotted owl forested habitat to be reduced below 40 percent except in limited areas (the wildland-urban interface, for example). Additionally, some small reduction in existing canopy cover may aid in increasing understory herbaceous vegetation and forb production, which in turn would maintain forest structure for owl prey species. Plan components for mixed conifers show that within tree groups, crowns of trees within mid-aged and old groups are interlocking or nearly interlocking at the fine scale. Additional plan components provide guidance for old growth conditions and denser patches of forest. For seral state proportions, see **FW-VEG-MCW-DC-1** and **FW-VEG-MCD-DC-1** in the land management plan. Standards and guidelines for vegetation (VEG) and forestry products (FFP) would help to minimize adverse effects that could occur during project implementation, particularly in the wildland-urban interface where restoration work will be a forest priority and where desired conditions for basal area and tree canopy cover are less than for other areas. Overall effects are expected to be positive; however, because they would reduce the risk of wholesale habitat loss from uncharacteristic fire, some short-term adverse effects may occur through limited canopy and basal area reduction. This would unlikely occur within critical habitat units.

The following plan components would support primary constituent element 1b by directing land manager during project implementation to manage the project area for limiting reduction of canopy cover to below 40 percent: **FW-VEG-MCW-DC-15[8], FW-VEG-MCD-DC-16**, **FW-VEG-MCD-DC-18, FW-VEG-MCW-DC-8, FW-VEG-MCD-DC-8, FW-VEG-MCD-DC-12, FW-VEG-MCW-DC-10,**

FW-VEG-MCD-DC-19. Density is variable, with canopy cover ranging from very open to closed.

FW-VEG-MCW-DC-9. Tree density ranges from 20 to 180 square feet of basal area per acre, depending on disturbance history and site productivity.

FW-VEG-MCD-DC-9. Tree density ranges from 30 to 125 square feet of basal area per acre, with the majority coming from larger trees.

FW-VEG-MCW-DC-2 and **FW-VEG-MCD-DC-2.** The mixed conifer with frequent fire vegetation community comprises multiple species of varying ages in a mosaic of seral stages and structures. Its arrangement on the landscape is similar to historic patterns, with groups and patches of variably sized and aged trees and other vegetation. Portions of the forest may be in various stages of development (including temporary openings or groups of very young trees) providing a source of future old growth structure on the landscape. Even-aged structure may be present on up to 10 percent of the landscape to provide structural diversity.

FW-VEG-MCD-DC-4 and **FW-VEG-MCW-DC-4.** Old growth structure occurs throughout the landscape, generally in small areas as individual old growth components or as clumps of old growth. Old growth may be intermixed with groups of younger trees or distinct groups of mostly old trees.

Primary Constituent Element 1c:

Large, dead trees (snags) with a diameter at breast height (dbh) of at least 12 inches.

Effects to 1c

Burn plans for prescribed fire would generally retain large-diameter snags; however, some large snags could still be removed as projects are implemented to move the forest toward desired conditions for frequent fire forest, particularly hazard tree removal actions. Some snags will be created through prescribed burning, which could benefit the Mexican spotted owl. Snags currently used by Mexican

[8] Included written out plan component only if not seen previously.

spotted owls for nesting are typically very old, large diameter at breast height, highly decayed snags with cavities. These snags are rare and are not typically created through fire disturbance, but by decay, fungi, and insects. The desired conditions below are designed to retain old growth components and increase the number of large trees over the action area. Desired conditions for old growth also emphasize retention of larger snags, since these habitat components are rarer across the landscape. Snags are generally not removed unless they pose a safety hazard or are lost during prescribed fires. **FW-VEG-G-3 and 4**, as well as, several standards and guidelines under All Vegetation and Watershed and Water and desired conditions under Sustainable Forestry and Forest Products would ensure consistency with desired conditions for wildlife by maintaining large snags during management activities, but some short-term adverse effects could still occur.

The following plan components would support primary constituent element 1c by directing land manager during project implementation to manage the project area to retain large, dead tree (snags): **FW-VEG-DC-20, FW-VEG-DC-21, FW-VEG-MCD-DC-4, FW-VEG-MCW-DC-4, FW-VEG-MCD-DC-5, FW-WFP-DC-3,**

FW-VEG-DC-3. Ecosystems maintain all of their essential components (plant density, species composition, structure, coarse woody debris, and snags), processes (disturbance and regeneration), and functions (nutrient cycling, water infiltration, and carbon sequestration) despite changing and uncertain future environmental conditions.

FW-VEG-DC-4. Old growth is well distributed, dynamic in nature, and shifts on the landscape over time, as a result of succession and disturbance. Old growth attributes (for example, multistory structure; large old trees; large trees with sloughing, exfoliating bark; snags; large downed logs; and other indicators of decadence) are present in all forest and woodland vegetation communities and provide habitat for associated species.

FW-VEG-G-3. Vegetation should provide for at-risk species' habitats by minimizing disturbance, providing recovery strategies, and managing for desired levels of key structural elements for at-risk species (for example, large old trees and snags, downed woody debris, denser vegetation structure, and soil structure) important for nesting, rearing, breeding, foraging, and dispersal, to maintain the persistence or contribute to the recovery of at-risk species.

FW-VEG-G-4. For cavity-nesting birds, snags should be retained at levels indicated in vegetation desired condition statements or in the largest diameter classes available, if available, and replaced at natural recruitment rates, to maintain the persistence of cavity-nesting birds.

FW-VEG-MCD-DC-11. Snags are typically 18-inch diameter (dbh) or larger, and average 3 per acre. Downed logs (greater than 12-inch diameter at mid-point, more than 8 feet long) average 3 per acre in forested areas. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre.

FW-VEG-MCW-DC-5. Vigorous trees dominate, but older declining, top-killed, lightning-scarred, and fire-scarred trees are a component. Declining trees are well distributed throughout the landscape and provide for snags and coarse woody debris. Generally, there are an average of 20 snags greater than 8 inches in diameter per acre and 1 to 5 of those snags are 18 inches or greater in diameter. Lower snag densities are associated with early seral stages and higher densities are associated with late seral stages. Coarse woody debris, including downed logs, ranges from 5 to 20 tons per acre for early-seral stages; 20 to 40 tons per acre for mid-seral stages; and 35 tons per acre or greater for late-seral stages.

FW-VEG-MCD-DC-1

FW-VEG-MCD-DC-2. The mixed conifer with frequent fire vegetation community comprises multiple species of varying ages in a mosaic of seral stages and structures. Its arrangement on the landscape is similar to historic patterns, with groups and patches of variably sized and aged trees and other vegetation. Portions of the forest may be in various stages of development (including temporary openings or groups of very young trees) providing a source of future old growth structure on the landscape. Even-aged structure may be present on up to 10 percent of the landscape to provide structural diversity.

FW-VEG-MCD-DC-6. Dwarf mistletoe infestations may be present on ponderosa pine and Douglas-fir, but rarely in other tree species. It occurs in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures. Infestation size, severity, and amount of mortality varies among infected trees. Witches' brooms may be scattered throughout the infestations providing structural diversity in the stand and improved foraging and nesting habitat for wildlife species, such as small mammals (for example, tree squirrels) and raptors (for example, goshawks).

FW-VEG-MCW-DC-6. Dwarf mistletoe infestations may be present in stands with a Douglas-fir or spruce component, but rarely in other tree species. Infestation size, severity, and amount of mortality varies among infested stands. Witches' brooms may be scattered throughout the infestations, providing structural diversity in the stand and improved foraging and nesting habitat for wildlife species, such as small mammals (for example, tree squirrels) and raptors (for example, goshawks and red-tailed hawks).

FW-WFP-G-1. Management activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from the most recent approved Fish and Wildlife Service recovery plan, to maintain the persistence or contribute to the recovery of federally listed species.

Summary of Effects to Primary Constituent Elements 1a–c

Overall, the plan components would help maintain or create the stand structure to meet these primary constituent elements. The plan components for all vegetation, mixed conifer with aspen, mixed conifer-frequent fire, wildland fire management, sustainable forestry products, and wildlife, fish, and plants sections of the plan contain the primary plan components affecting these primary constituent elements. Long-term effects would be beneficial for maintaining and restoring critical habitat with some short-term adverse effects likely to occur during project implementation.

Primary Constituent Element 2a:

High volumes of fallen trees and other woody debris.

Effects to 2a

Fallen trees and woody debris would likely be reduced by the proposed burning treatments (broadcast, piling, and maintenance burning) in order to meet the desired conditions for wet mixed conifer, frequent fire mixed conifer, wildland-urban interface, and wildland fire management. This loss of large logs would result in short-term adverse effects to this primary constituent element through localized impacts to prey species habitat. The landscape and mid-scale desired conditions (all, vegetation, mixed conifer with aspen, mixed conifer-frequent fire) describe coarse woody debris to be greater than 3 inches, ranging from 5 to 15 tons per acre in frequent fire mixed conifer, and 5 to 35 tons per acre for mixed conifer with aspen. The amount of down woody debris would vary depending on seral stages of the stands. These desired conditions also describe the retention of large logs as part of the down woody debris. Across the action area, it is likely that hazard tree removal and prescribed burning will also create fallen trees and woody debris as trees are cut and left on the ground to die post-burn and fall.

Most of the plan components shown below would help maintain or create forest conditions favorable to snag retention and creation, as well down logs and coarse woody debris, which would benefit both primary constituent elements 1c and 2a. However, in the wildland-urban interface, down logs and coarse woody debris would be retained at the lower end of the range recommended by the recovery plan, to protect values at risk. As a result, habitat for prey species would be maintained or restored at a slower rate than in other areas. A desired condition under forestry and forest products (**FW-FPP-DC-5**) states "Harvest of dead and dying trees for economic value is consistent with the desired conditions of wildlife habitat, soil productivity, scenic integrity objectives, and ecosystem functions." This would act as a conservation measure for the species and help to minimize negative effects from activities like salvage or fuelwood removal, which could affect this primary constituent element

The following plan components would support primary constituent element 2a by directing land manager during project implementation to manage the project area to retain fallen trees and woody debris: **FW-VEG-DC-3**, **FW-VEG-DC-4, FW-VEG-DC-20**, **FW-VEG-DC-21, FW-VEG-MCW-DC-4, FW-VEG-MCW-DC-5, FW-VEG-MCW-DC-6, FW-VEG-MCD-DC-4, FW-VEG-MCD-DC-5, FW-VEG-MCD-DC-6, FW-VEG-MCD-DC-11, FW-WSW-RMZ-FSR-DC-5**

FW-VEG-G-1. Management activities and special uses occurring within federally listed species' habitat should integrate habitat management objectives and species protection measures from the most recent approved Fish and Wildlife Service recovery plan, to maintain the persistence or contribute to the recovery of that species.

FW-VEG-G-2. Where the Forest Service has entered into a signed conservation agreement that provides guidance on activities or actions to be carried out by the Carson, those activities or actions should be undertaken consistent with the guidance found within the conservation agreement, to maintain the persistence or contribute to the recovery of federally listed species and persistence of species of conservation concern.

FW-VEG-MCW-G-1 and **FW-VEG-MCD-G-1.** Slash piles should be retained across the landscape for several years, to increase small mammal occupancy in areas where coarse woody debris is deficient and provide nesting habitat and cover for associated wildlife species (for example, turkeys, birds, small mammals, reptiles, and invertebrates).

Primary Constituent Element 2b:

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

Effect to 2b

Activities that support the plan components for wet and frequent fire mixed conifer, vegetation, wildland fire management, and watershed and water would likely be beneficial for these primary constituent elements. Plant species richness would likely increase following thinning treatments, burning treatments, or both that result in small, localized canopy gaps. The desired conditions for frequent fire mixed conifer and ponderosa pine include small clumps and groups of trees interspersed within variably sized openings of grass/forb/shrub vegetation associations. These conditions would provide understory cover and foraging resources for owl prey species. Desired conditions for the wildland-urban interface also include interspaces with higher levels of grasses and forbs than the surrounding forest, which would be compatible for small mammalian species. Desired conditions for mixed conifer also promote a mosaic of changing forest conditions including the establishment of aspen, and guidelines favor the retention of Gambel oak and other native hardwoods. **FW-VEG-G-3, FW-Fire-G-1** and **9, and FW-FFP-S-2** would protect ground cover from damaging activities and ensure that timber harvest is consistent with wildlife

protection, and also prevent ground disturbance in threatened and endangered species critical habitat. This would further contribute to maintaining a diversity of tree and plan species for the owl prey species.

The following plan components would support primary constituent element 2b by directing land manager during project implementation to manage the project area for a wide range of tree and plant species, including hardwoods: **FW-VEG-DC-21, FW-VEG-G-1, FW-VEG-G-2, FW-VEG-MCD-DC-4, FW-VEG-MCW-DC-8, FW-VEG-MCD-DC-8, FW-VEG-MCD-DC-14, FW-VEG-MWC-DC-15**, **FW-VEG-DC-5.**

Ecological conditions affecting habitat quality, distribution, and abundance contribute to self-sustaining populations of native and desirable nonnative plants and animals that are healthy, well distributed, genetically diverse, and connected (on National Forest System lands and to adjacent public and privately conserved lands), enabling species to adapt to changing environmental and climatic conditions. Conditions provide for the life history, distribution, and natural population fluctuations of the species within the capability of the ecosystem.

FW-VEG-DC-8. All age classes of deciduous trees (for example, aspen, cottonwood, and Gambel oak) are well represented on appropriate ecological settings and provide habitat for wildlife and rare plants.

FW-VEG-MCW-DC-2. The mixed conifer with aspen vegetation community comprises variable species of varying ages in a mosaic of seral stages and structures. Its arrangement on the landscape is similar to historic patterns, with groups and patches of variably-sized and aged trees and other vegetation. A range of seral states, each characterized by distinct dominant species composition and biophysical conditions, are distributed across the landscape, such that each state adequately supplies the subsequent states progressively through time. Canopies in older seral stages are generally more closed than in dry mixed conifer.

FW-VEG-MCD-DC-2. The mixed conifer with frequent fire vegetation community comprises multiple species of varying ages in a mosaic of seral stages and structures. Its arrangement on the landscape is similar to historic patterns, with groups and patches of variably-sized and aged trees and other vegetation. Portions of the forest may be in various stages of development (including temporary openings or groups of very young trees) providing a source of future old growth structure on the landscape. Even-aged structure may be present on up to 10 percent of the landscape to provide structural diversity.

FW-VEG-MCW-DC-11. The prevalence of aspen is dependent on seral stage, but is occasionally present in large patches, providing habitat for organisms (for example, cavity-nesting birds, fungi, and microorganisms) that depend on it. Where they naturally occur, all age classes of aspen are present in even-aged groups or patches and are regenerating and vigorous. A diverse understory of native herbaceous and shrub species has a variety of seral and age classes and is vigorous and regenerating.

FW-VEG-MCD-DC-13. Groups of aspen are present in the mixed conifer with frequent fire vegetation community where they naturally occur.

Primary Constituent Element 2c

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

Effects to 2c

Objectives for wildland fire management could create short-term decreases in plant cover as a result of prescribed burning, but the overall intent and expectation is that, over the long term, there would be an increase in residual plant cover as duff and dead plant debris decreases within treated areas. This should

favor regeneration and improved vigor in residual plants stimulating fruit and seed production. Burned and unburned areas would also create a mosaic of habitat conditions with small openings in the canopy; this should increase herbaceous plant species and regeneration, which would support habitat conditions for owl prey. Mechanical treatments and low-intensity prescribed burns could result in short-term adverse effects as restoration treatments are implemented across the landscape; however, the overall effect would be positive and beneficial. The objectives and desired conditions for wet and frequent fire mixed conifer would provide the direction for creating openings and understory regeneration. There may be some short-term loss of residual plan cover due to ungulate grazing, including permitted livestock and wild horses, but the loss should be short term. In particular, as **FW-GRZ-S-1** states "Livestock management shall must be compatible with capacity and address ecological concerns (such as forage, invasive plants, at-risk species, soils, riparian health, and water quality) that are departed from desired conditions, as determined by temporally and spatially appropriate data." Improvement in long-term soil condition within protected and recovery habitat would lead to improved vegetative ground cover for prey species, and for recruitment and establishment of tree species. Standards for All Vegetation and Wildland Fire Management would protect ground cover from damaging activities and ensure that timber harvest is consistent with wildlife protection.

The following plan components would support primary constituent element 2c by directing land manager during project implementation to manage the project area for adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration: **FW-VEG-G-1, FW-WFP-DC-1**, **FW-WFP-DC-3,**

FW-VEG-DC-7. Vegetation characteristics (for example, tree density, litter depth) support favorable water flow and quality.

FW-VEG-DC-9. Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.

FW-VEG-DC-16. Diverse cool and warm season grasses, forb species, and litter are abundant and contiguous enough to support natural fire regimes, consistent with site potential. Herbaceous vegetation amount and structure (for example, plant density, height, litter, and seed heads) provide habitat to support wildlife and prey species.

FW-VEG-MCW-DC-7. An understory consisting of native grass, forbs, and shrubs is present. Mosses and lichens are prevalent and function to recycle soil nutrients.

FW-VEG-MCD-DC-17. Interspaces between groups are variably shaped, comprised of a native grass-forb-shrub mix, and may contain individual trees or snags.

FW-VEG-MCD-DC-20. Groundcover consists primarily of perennial grasses and forbs capable of carrying surface fire. Fires generally burn as surface fires, but single-tree torching and isolated group torching is not uncommon.

FW-SL-DC-3. Vegetation, woody debris, and litter are distributed across the soil surface in adequate amounts to limit accelerated erosion and contribute to soil deposition and development.

FW-GRZ-DC-4. Livestock grazing and associated management activities are compatible with ecological function and process (for example, water infiltration, wildlife habitat, soil stability, and natural fire regimes).

FW-GRZ-G-1. Forage use should be based on current and desired ecological conditions as determined by temporally and spatially scientific data during planning cycles (for example, annual operating instructions, permit renewal), to sustain livestock grazing and maintain ecological function and processes.27

FW-GRZ-G-6. Restocking and management of grazing allotments following a major disturbance (for example, fire, flood) should occur on a case-by-case basis after consideration of site-specific resource conditions, to sustain livestock grazing.

DA-WHT-DC-3. Forage, browse, and cover needs of wild horses, wildlife, and authorized livestock are available and are at or moving toward a healthy, persistent state relative to site potential.

DA-WHT-G-1. Horse numbers within a territory should be aligned with the appropriate management level as described in wild horse territory management plans.

Summary of Effects to Primary Constituent Elements 2a-c

Overall, the plan components would help maintain or provide the key forest structural element, plant species composition, and ground cover conditions to meet these primary constituent elements. The plan components for all vegetation, dry mixed conifer, wet mixed conifer and wildland fire sections of the plan will be the primary plan components affecting these primary constituent elements. Overall, long-term effects would be beneficial for maintaining and restoring critical habitat with some short-term adverse effects likely to occur during project implementation.

Cumulative Effects to Owl and Critical Habitat

Cumulative effects include the effects of future State, tribal, local, or private actions, or a combination of these actions that are reasonably certain to occur in the action area considered in this biological assessment. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act.

State Actions

The State of New Mexico manages game animals on all jurisdictions in the State including the Carson National Forest. Big game hunting has the potential to affect the Mexican spotted owl and its critical habitat on NFS lands. Within the action area, the New Mexico Department of Game and Fish manages big game in Management Units 2, 5B, 45, 49, 50, 51, 52, 53, and 55A. Grazing by large ungulates may affect habitat for prey species for the Mexican spotted owl by reducing herbaceous and woody vegetation that small mammals use for food and cover. There could also be human disturbance to spotted owl during hunting season. These effects vary across the action area. However, these effects do not result in significant effects (for example, loss of herbaceous understory or woody plant species) to owl prey habitat (USDA FS 2019).

The New Mexico Game and Fish Department is active, both directly and indirectly, in species conservation and recovery, which includes the Mexican spotted owl. The State lists the owl as a Species of Greatest Conservation Need.

Other possible State actions include issuance of hunting and scientific collection permits for birds, including the use of firearms as a means of collection (also used during the breeding season), which could cause localized, short-term disturbance to individuals. The State may also issue similar permits for night-time collections of other taxa and could be involved in habitat enhancements on adjacent private lands or

private inholdings, which could affect the owl. Overall, the long-term net benefit to the owl from habitat restoration related work is anticipated to be beneficial and positive.

Private and Tribal Actions

Actions on private lands occur on multiple inholdings and adjacent to the administrative boundary of the Carson National Forest. Actions include livestock grazing, mining, residential and commercial developments, water developments, and recreation. Tribal lands also occur within and adjacent to the national forest's administrative boundary. Activities similar to those on private lands occur on tribal lands, which may affect Mexican spotted owls in the action area. The effects of these actions most likely affect owl foraging habitat through effects from livestock grazing on herbaceous plant cover and the removal of coarse woody debris, snags, and trees from localized development and construction.

The potential cumulative environmental consequences of the proposed plan when combined with the cumulative effects of activities on private lands is a mix of beneficial and adverse effects, with most of the adverse effects being short term and the beneficial effects being long term. The overall effects of the proposed plan are beneficial, as well as the overall effects of other land management agencies in the cumulative effects' analysis area. Therefore, when combined, the net cumulative effect is positive for the Mexican spotted owl and critical habitat.

Summary and Determinations of Effects (Mexican Spotted Owl and Critical Habitat)

Summary

The primary contemporary threat for Mexican spotted owl is loss of habitat related to uncharacteristic high-severity, stand-replacing fire. The proposed action's highest priority is to reduce the risk of uncharacteristic wildfire and to restore the structure, species composition, and function of forested ecosystems. Appendix C Section 2 shows how the proposed plan components that are designed to reduce the threat of high-severity wildfire through the implementation of the plan. There could be some localized short-term adverse impacts to the owl and its critical habitat, but overall, the action would result in long-term beneficial effects. The proposed action is intended to ensure that key habitat characteristics like interlocking canopy and old growth characteristics including large trees are retained and that disturbance is minimized near breeding sites. This would benefit both the owl as well as primary constituent elements for its critical habitat. Other beneficial impacts include a slight increase in the desired state and improvement in potentially suitable habitat in mixed conifer systems by increasing the amount of habitat in the desired seral states for breeding and foraging. Objectives to treat acres in fire-adapted systems would move those systems toward a vegetative state more complementary to the owl's habitat needs. Overall, actions implemented under the proposed action are expected to retain the range of tree species (conifers and hardwoods associated with Mexican spotted owl habitat) and would not reduce the range of tree sizes needed to create the diverse forest and multi-layered forest canopy preferred by Mexican spotted owls. Some loss of trees, of all types and diameter size classes, could occur from actions such as hazard tree removal, prescribed fire, and forest thinning (as implemented under the wildland fire management and forest and forest health programs).

Overall, vegetation departure under the proposed action would trend toward reference conditions. Intensified treatments would decrease canopy cover continuity at the landscape scale and reduce ladder fuels that contribute to uncharacteristic fires. Enhancements in vegetation structural state that reduce smaller trees and ultimately improve conditions for large tree growth would, in turn, promote low-intensity ground fire and more desirable fire regime condition class.

Key conclusions:

- The land management plan provides a programmatic framework for future site-specific projects and actions, but does not prescribe specific projects or assign project locations. Plan components exist to ensure proposed actions avoid, mitigate, or minimize impacts to Mexican spotted owl. All future project-level activities that may affect this species will require project-specific assessments and consultation under section 7 of the Endangered Species Act.

- A combination of ecosystem-level plan components and species-specific plan components for spotted owl provide for the ecological conditions that would contribute to the conservation and recovery of the species.

- The forest plan includes direction to avoid, mitigate, or minimize the loss of key habitat features such as large trees and snags during forest restoration activities, but cannot eliminate the risk entirely.

- The land management plan includes direction to minimize the risk of habitat loss from uncharacteristic stand-replacing wildfire, but cannot eliminate the risk entirely.

- As stated in the analysis for the species, objectives to treat highly departed areas in fire-adapted ecosystems (see All Vegetation and Wildland Fire Management) could result in a 21 percent increase in nest and roost habitat for the owl under the proposed action, depending on where treatments are implemented. These objectives would contribute to recovery and could improve conditions in designated critical habitat and acts as conservation measures for the species.

- Critical habitat may also benefit from restoration of the ecological role of fire.

Table 26. Summary of impacts to the Mexican spotted owl and its critical habitat by plan section[9]

Plan Section or Management Area	Species and Habitat	Critical Habitat
Wildland-Urban Interface	Potential for adverse	NA
Climate Change	Neutral to beneficial. Plan components support resilient plant communities and vegetation. Conservation measures.	Neutral to beneficial to PCEs 1a-b, 2b-c. Plan components support resilient plant communities and vegetation. Conservation measures.
Insects and Disease	Some short term adverse, but limited in extent, long term beneficial	Some short term adverse to PCE 1 but limited in extent, long term beneficial
Plant Community Species Composition	Beneficial supports potential natural vegetation. Conservation measures.	Beneficial to PCE 1a, 2b; supports potential natural vegetation. Conservation measures.
All Vegetation Types (VEG)	Objectives focus on restoration work in fire-adapted systems, short-term impacts minimized through standards and guidelines. Long term positive effects through reduced fire risk. Conservation measures.	Some short term adverse, long-term positive. Potential impacts to PCE 1a-c and 2a-c minimized through standards and guidelines under Vegetation and guidelines under **MCW, MCD, and WFP** sections. Conservation measures

[9] NA=Not applicable and means the species and its habitat would not be affected by activities occurring under those sections of the plan because there is no causal mechanism for effects (activities would not overlap with species habitat or cause effects to species or habitat) or there are no plan components that apply directly to the species or its primary threats.

Plan Section or Management Area	Species and Habitat	Critical Habitat
All Vegetation Types (Forested, MCD, MCW)	Some short term adverse, long-term positive in fire adapted ecosystems. Conservation measures	Some short term adverse, long-term positive. Potential impacts to PCE 1a-c and 2a-c minimized through standards and guidelines under **VEG, MCW, MCD, and WFP** sections. Potential increases in nest and roost habitat. Conservation measures
Watersheds and Water Resources (WSW, RMZ, WR, FSSR)	Potential for some short-term adverse, minimized by BMPs, standards and guidelines. Long-term beneficial if restoration work conducted in riparian habitat. Conservation Measures	Potential for some short-term adverse to 1 and 2 if projects are implemented in riparian areas, but minimized through standards and guidelines under WSW, RMZ, FSSR and WFP sections. Long-term beneficial. Conservation Measures
Soil (SL)	Not adverse; insignificant	Not adverse; insignificant
Wildlife, Fish, and Plants (WFP)	Beneficial, emphasize recovery and management of listed species, promotes healthy habitat conditions. Conservation measures.	Beneficial, emphasize recovery and management of listed species, promotes healthy habitat conditions. Conservation measures.
Air	Not adverse; potentially beneficial	NA
Wildland Fire Management (FIRE)	Likely short-term adverse impacts; minimized through guidance. Long-term beneficial as systems are moved toward desired conditions and risk of stand-replacing wildfire is lowered. Conservation Measures	Likely short-term adverse impacts to PCEs 1a-c, 2a-c; minimized through guidance Long-term beneficial as systems are moved toward desired conditions and risk of stand replacing wildfire is lowered. Conservation Measures
Sustainable Rangelands and Livestock Grazing (GRZ)	Potential for effects but not adverse, minimized through guidance	Potential effects to PCE 2c, but not adverse, minimized through guidance
Sustainable Forestry and Forest Products (FPP)	Potential for effects but not adverse, Minimized through guidance and direction in other sections of the plan (e.g. All Vegetation).	Potential for effects to PCE 1a-c and 2a-b, but not adverse, Minimized through guidance and direction in other sections of the plan (e.g. All Vegetation).
Traditional Communities and Uses (RHC)	Potential for effects (from fuelwood gathering) but not adverse (insignificant and/or discountable). Minimized through guidance and fuelwood permitting process.	Potential for effects (from fuelwood gathering) to PCEs 1c, 2a but not adverse. Minimized through plan guidance and fuelwood permitting process (insignificant and/or discountable).
Minerals and Mining (MM)	Potential for adverse, but limited extent; insignificant/discountable	Potential for adverse to PCE 3 but limited extent; insignificant/discountable
Recreation (REC)	Potential negative impacts from new construction of sites and trails and rock climbing on canyon walls; minimized through guidance (insignificant or discountable).	Potential negative impacts from new construction of sites and trails and rock climbing on canyon walls; PCEs 1-3; limited in extent and minimized through guidance (insignificant or discountable).
Special Uses (SU)	Not adverse. Can result in impacts if these occur in potential habitat but guidance would minimize. Unlikely	Not adverse. Can result in impacts if these occur in potential habitat but guidance would minimize. Unlikely.
Transportation and Forest Access (TFA)	Potential for short-term adverse, some long-term positive as roads are decommissioned. Conservation Measures	Potential for short-term adverse to PCEs 1a, 2b, 2c; some long-term positive as roads are decommissioned. Conservation Measures

Plan Section or Management Area	Species and Habitat	Critical Habitat
Management Areas: Recommended Wilderness (RWA), San Antonio (SAMA), Valle Vidal (VVMA), Developed Winter and Summer Resorts (DEVRES), Potential Developed Recreation Site Management Area (PDRMA), and Jicarilla Natural Gas Management Area (JICMA)	Guidance is expected to have generally positive long-term effects, thought there may be short-term adverse effects particularly in Developed Winter and Summer Resorts, Potential Developed Recreation Site, and Jicarilla Natural Gas Management Areas. Other effects based on activities implemented through other sections of the plan. Conservation Measures	Guidance is expected to have generally positive long-term effects, thought there may be short-term adverse effects to PCEs 1 and 2 particularly in Developed Winter and Summer Resorts, Potential Developed Recreation Site, and Jicarilla Natural Gas Management Areas. Other effects based on activities implemented through other sections of the plan. Conservation Measures
Designated Areas: Designated Wilderness (WILD), Inventoried Roadless Areas (IRA), Vallecitos Federal Sustain Yield Unit (VFSYU), and Wild Horse Territories (WHT)	Long-term beneficial with potential for some short-term adverse. Plan guidance would minimize activities and disturbance in potential habitat; enhance wildlife habitat and promote the natural ecological role of fire in the system. Conservation Measures	Long-term beneficial with potential for some short-term adverse to PCEs 1 and 2. Plan guidance would minimize activities and disturbance in potential habitat; enhance wildlife habitat and promote the natural ecological role of fire in the system. Conservation Measures

Determination of Effects

Species

While the land management plan generally strives to move degraded ecosystems toward historical reference conditions and a more desired state, some programs and activities could have adverse effects to the Mexican spotted owl and its habitat as projects are implemented to reach those goals. Overall coordination and implementation of all guidance in the plan is expected to minimize potential adverse impacts, but not all adverse impacts will be insignificant or discountable over the life of the plan. While it is difficult to predict the scope and intensity of effects of future projects, management activities under several program areas could result in adverse effects, at least in the short term, including the wildland-urban interface, vegetation, wildland fire management, and forestry and forest products (for firewood gathering). Based on our analysis, we determined that because some actions and activities may disturb and displace individuals and habitat could be affected by restoration activities, implementation of projects consistent with the revised Carson land management plan ***May affect, and is Likely to Adversely Affect*** the Mexican spotted owl.

Critical Habitat

The Carson National Forest land management plan recognizes that resource program activities will occur within critical habitat units. Most negative impacts would be short term, and the land management plan does contain plan components to reduce or eliminate impacts to areas within critical habitat. Since 2005, there have been no formal consultations on effects to Mexican spotted owl designated critical habitat on the national forest.

The impacts and effects for critical habitat are similar to the effects to the owl. Although most negative impacts would be short-term and it is unlikely that primary constituent elements would be adversely affected from projects or activities under several of the programs, transportation and forest access, wildland fire management, and restoration management (VEG, MCD, MCW). Components of the primary constituent elements will continue to be well distributed and available for individual owls to use in critical habitat throughout the life of the proposed action. There is potential for some primary

constituent elements to be affected during the implementation of activities authorized under the proposed plan, these include loss of large snags and removal of high volumes of down wood. However, the removal of these elements would have to comply with recovery plan and plan components as described under FW-WFP-G-1, FW-MCW-DC-11, and FW-MCW-DC-5. While these impacts are assumed to be short-term effects due to plan component requirements and only affect a small percentage of the critical habitat if at all (primarily for restoration management) in order to maintain PCEs within Critical Habitat. These short-term effects would be insignificant or discountable. The Carson National Forest has and will continue to designate 600 acres surrounding known Mexican spotted owl nesting and roosting sites as required by 2012 Recovery Plan. Protected activity centers are established around Mexican spotted owl sites and are intended to protect and maintain occupied nest and roost habitat. Nesting and roosting habitat is rare across the range of the owl and by identifying these areas for increased protection, the Forest Service is aiding in recovery. The national forest has also identified and is managing mixed-conifer and riparian forest habitats that have potential for becoming replacement Mexican spotted owl nest and roost habitat through vegetation plan components, or is currently providing habitat for owl foraging, dispersal, or wintering habitats as described above. As stated above, nesting and roosting habitat is a limiting factor for the Mexican spotted owl throughout its range. By managing critical habitat for future nest and roost habitat, the Forest Service is aiding in recovery. We determined that the implementation of projects consistent with the revised Carson National Forest land management plan ***May Affect and is Not Likely to Adversely Affect*** the Mexican spotted owl critical habitat.

Southwestern Willow Flycatcher

(*Empidonax traillii extimus*), including designated critical habitat

Effects finding for species: *May affect, not likely to adversely affect*

Effects finding for critical habitat: *May affect, not likely to adversely affect*

Status of Species and Designated Critical Habitat

Legal Status, Description, and Life History

The southwestern willow flycatcher (*Empidonax traillii extimus*, flycatcher) was listed as endangered, without critical habitat on February 27, 1995 (USDI FWS 1995a). Critical habitat was designated on October 19, 2005 (USDI FWS 2005a). A final recovery plan for the willow flycatcher was completed in August 2002 (USDI FWS 2002). The plan describes the reasons for endangerment and the current status of the willow flycatcher, addresses important recovery actions, includes detailed issue papers on management issues, and provides recovery goals (USDI FWS 2002).

Southwestern willow flycatcher is a small grayish-green passerine bird (Family Tyrannidae) measuring approximately 5.75 inches. The song is a sneezy “fitz-bew” or a “fit-a-bew,” and the call is a repeated “whit.” Southwestern willow flycatcher is one of four currently recognized willow flycatcher subspecies (Browning 1993; Phillips 1948; Unitt 1987). It is a Neotropical migrant that breeds in the southwestern U.S. and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Howell and Webb 1995; Peterson 1990; Phillips 1948; Ridgely and Tudor 1994; Stiles and Skutch 1989). The historical breeding range of the flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Unitt 1987).

Life History and Habitat

The southwestern willow flycatcher breeding season extends from mid-May to mid-August (Sogge et al. 2010). They use dense riparian habitats from sea level in California to approximately 8,500 feet in Arizona and southwestern Colorado. Four basic habitat types can be described for the willow flycatcher: monotypic willow, monotypic nonnative, native broadleaf dominated, and mixed native/exotic (Sogge et al. 2010).

Tamarisk (nonnative species) is an important component of the southwestern willow flycatcher nesting and foraging habitat. In 2002 within Arizona, 80 percent of known nests were built in a tamarisk (A. B. Smith et al. 2004). Tamarisk was thought to be a habitat type of lesser quality for the willow flycatcher; however, comparisons of reproductive performance (USDI FWS 2002), prey populations (Durst 2004), and physiological conditions (Owen and Sogge 2002) of southwestern willow flycatcher breeding in native and exotic vegetation reveal no difference (Sogge et al. 2010).

Southwestern willow flycatcher habitat is dynamic and can change rapidly: nesting habitat can grow out of suitability; saltcedar habitat can develop from seeds to suitability in about four to five years; heavy runoff can remove or reduce habitat suitability in a day; and river channels, floodplain width, location, and vegetation density may change over time. The flycatcher's use of habitat in different successional stages may also be dynamic. For example, over-mature or young habitat not suitable for nest placement can be occupied and used for foraging and shelter by migrating, breeding, dispersing, or non-territorial flycatchers (Cardinal and Paxton 2005; McLeod et al. 2005).

The southwestern willow flycatcher typically inhabits dense riparian areas usually dominated by willows, occurring along rivers, streams and other wetlands. Specifics vary among nest sites, but nests are placed in areas with dense vegetation that have trees and shrubs near ground level (USDI FWS 2005a). Common tree and shrub species include willows, seep willow, boxelder, stinging nettle, blackberry, cottonwood, arrowweed, tamarisk, and Russian olive (USDI FWS 2002).

Distribution, Abundance, and Population Trends

Durst et al. (2008), in the most recent compilation of southwestern willow flycatcher breeding sites and territories, reported 288 known breeding sites in California, Nevada, Arizona, Utah, New Mexico, and Colorado (all sites from 1993 to 2007 where a territorial flycatcher had been detected) holding an estimated 1,299 territories. It is difficult to arrive at a total of southwestern willow flycatcher territories because not all sites are surveyed annually. Numbers have increased since the bird was listed and some habitat remains unsurveyed; however, after nearly a decade of intense surveys, the existing numbers are just past the upper end of Unitt's (1987) estimate of 20 years ago (500 to 1,000 pairs). About 50 percent of the 1,299 estimated territories throughout the species' range are in four general locations: Cliff/Gila Valley; the middle Rio Grande River in New Mexico; Roosevelt Lake and its inflows; and the lower San Pedro River/middle Gila River confluence in Arizona.

Threats

Threats include loss, modification, and fragmentation of riparian breeding habitat, along with a host of other factors including loss of wintering habitat and brood parasitism by the brown-headed cowbird (McCarthey et al. 1998). Habitat loss and degradation are caused by a variety of factors including urban, recreational, and agricultural development; water diversion and groundwater pumping; channelization; dams; and excessive livestock grazing.

Fire is an increasing threat to southwestern willow flycatcher habitat (Paxton et al. 1996), especially in monotypic saltcedar vegetation and where water diversions, groundwater pumping, or both desiccate

riparian vegetation (Sogge et al. 1997). Nests can be parasitized by brown-headed cowbirds (*Molothrus ater*), which lay their eggs in the host's nest. Cowbird feeding sites are enhanced by the presence of livestock and range improvements such as waters and corrals; agriculture; urban areas; golf courses; bird feeders; and trash areas. When these feeding areas are near southwestern willow flycatcher breeding habitat, especially coupled with habitat fragmentation, cowbird parasitism of flycatcher nests may increase (Hanna 1928; Mayfield 1977a, 1977b; Tibbitts et al. 1994).

The tamarisk leaf beetle causes defoliation and ultimately death, of tamarisk, a tree species that provides nesting habitat for flycatchers (Hatten 2016). The rapid expansion of the tamarisk leaf beetle population is threatening the habitat of an endangered songbird and other native wildlife. The insects' ravenous appetite for tamarisk trees (the invasive plant the bug was brought and released to control) is removing a key habitat component for flycatchers and is drying up miles of vegetation, which experts fear will fuel future wildfires. Currently, most riparian vegetation on the Carson does not include Tamarisk, and no tamarisk leaf beetles have been detected.

Critical Habitat

The Fish and Wildlife Service designated critical habitat for the southwestern willow flycatcher in 2005, on approximately 120,824 acres of Federal lands in Arizona, California, Nevada, New Mexico, and Utah (USDI FWS 2005a).

There are five critical habitat units in the State of New Mexico, for a total of 16,735 acres. On the Carson National Forest, there are approximately 123 acres of designated critical habitat, which is primarily composed of native riparian shrubs. Designated critical habitat from 2005 occurs on the Camino Real Ranger District along the Rio Grande Del Rancho and is within the Upper Rio Grande Management Unit and Rio Grande Recovery Unit (USDI FWS 2005a). The designated critical habitat covers three occupied patches within a 2-mile stretch. No proposed critical habitat occurs on the national forest.

The Fish and Wildlife Service revised the critical habitat in 2013, and determined the primary constituent elements for the southwestern willow flycatcher. Primary constituent elements include those habitat features required for the physiological, behavioral, and ecological needs of the species (USDI FWS 2005a).

Primary Constituent Elements of Critical Habitat

1. Primary constituent element 1: Riparian vegetation. Riparian habitat along a dynamic river or lakeside, in a natural or human-made successional environment (for nesting, foraging, migration, dispersal, and shelter) that is comprised of trees and shrubs (that can include Goodding's willow, coyote willow, Geyer's willow, arroyo willow, red willow, yewleaf willow, pacific willow, boxelder, tamarisk, Russian olive, buttonbush, cottonwood, stinging nettle, alder, velvet ash, poison hemlock, blackberry, seep willow, oak, rose, sycamore, false indigo, Pacific poison ivy, grape, Virginia creeper, Siberian elm, and walnut) and some combination of:
    a. Dense riparian vegetation with thickets of trees and shrubs that can range in height from about 2 to 30 meters (about 6 to 98 feet.). Lower-stature thickets (2 to 4 meters or 6 to 13 feet. tall) are found at higher-elevation riparian forests and tall-stature thickets are found at middle- and lower-elevation riparian forests;
    b. Areas of dense riparian foliage at least from the ground level up to approximately 4 meters (13 feet) above ground or dense foliage only at the shrub or tree level as a low, dense canopy;

c. Sites for nesting that contain a dense (about 50 percent to 100 percent) tree or shrub (or both) canopy (the amount of cover provided by tree and shrub branches measured from the ground);

d. Dense patches of riparian forests that are interspersed with small openings of open water or marsh or areas with shorter and sparser vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.1 hectare (0.25 acre) or as large as 70 hectares (175 acres).

2. Primary constituent element 2: Insect prey populations. A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, which can include flying ants, wasps, and bees (Hymenoptera); dragonflies (Odonata); flies (Diptera); true bugs (Hemiptera); beetles (Coleoptera); butterflies, moths, and caterpillars (Lepidoptera); and spittlebugs (Homoptera).

Status of Southwestern Willow Flycatcher and Critical Habitat within the Action Area

Status of the Species within the Action Area

The environmental baseline defines the status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

The Carson National Forest is part of the Upper Rio Grande flycatcher management unit. Occurrence of flycatchers on the Carson has been documented along a 2-mile stretch of the Rio Grande del Rancho (Critical Habitat, figure 20), and on the lower section of El Rito Creek. Flycatcher territories appear to occur in low numbers on the national forest, and have only been documented on the Rio Grande del Rancho. Territory estimates from surveys completed from 1993 through 2007 are between two to five territories on the Carson, with as many as five in 2006. Since 2006, there has been a decline in territories.

Vegetation types that could support the southwestern willow flycatcher include coyote willow, Bebb willow, mountain willow, narrowleaf cottonwood, Rio Grande cottonwood, ponderosa pine/willow, upper montane conifer/willow, and willow-thinleaf alder. Currently, most known potential southwestern willow flycatcher habitat on the Carson is primarily composed of native riparian shrubs. Collectively, these vegetation types total 19,892 acres, or only 1 percent of the national forest (see Riparian Areas above for more information). Riparian vegetation is highly departed from reference conditions. Flycatcher territory size varies greatly, but they typically encompass 0.5 to 1.2 acres (USDI FWS 2002). Currently, most riparian vegetation on the Carson does not include Tamarisk, and no tamarisk leaf beetles have been detected.

Status of Designated Critical Habitat with the Action Area

There are approximately 123 acres of designated critical habitat (figure 20) within three sometimes occupied territories with a 2-mile stretch on the Camino Real Ranger District. This unit is within the Upper Rio Grande Management Unit and Rio Grande Recovery Unit (USDI FWS 2005a). No other designated or proposed critical habitat occurs on the Carson National Forest.

Southwestern willow flycatcher designated critical habitat on the Carson National Forest is mostly composed of native riparian shrubs that are decadent with a dry understory or no undergrowth due to a lack of disturbance. Other areas have a mixture of undesirable habitat characteristics such as: cattail (Typha spp.) understory in wet soils without a tree or shrub component; overstory juniper trees with a dry, grassy understory; or consist of areas that would previously provide good habitat, but wetland condition is

likely contributing to drier soil conditions. This Critical habitat contains minimal fishing trails and does not have large enough waterways for watercrafts.

Factors Affecting Southwestern Willow Flycatcher and Critical Habitat within the Action Area

The factors affecting the flycatcher and its designated critical habitat in the Carson National Forest are discussed in this section. However, as a note, no formal consultations that have occurred from 2012 to the present for the flycatcher, therefore, no incidental take has occurred. Designated critical habitat occurs; however, no proposed critical habitat exists on the national forest.

Conservation Measure: Conservation Actions 7 (a)(1)

Since the southwestern willow flycatcher was listed, the Carson National Forest has taken a number of actions to contribute toward recovery of the species. For any project within the habitat of southwestern willow flycatcher, the national forest considers needs for the species in project design, analyzes effects of the project, and consults with the Fish and Wildlife Service as needed. Other conservation actions include:

- Surveys and monitoring are conducted under applicable permits and in accordance with Fish and Wildlife Service survey protocol in advance of project implementation within suitable habitat across the Carson NF.
- Monitor critical habitat occupancy (annually).
- In addition, the national forest continues to improve the riparian condition at Stewart Meadows and Lower El Rito Creek to improve the site as a future nesting site. Stewart Meadows is excluded from livestock grazing, while Lower El Rito Creek is seasonally excluded from grazing.
- As well, the proposed plan has components for resource areas that provide protection and conservation for listed species over the life of the plan and helps provide the 7(a)(1) conservation actions for the flycatcher by ameliorating threats to the species and by meeting recovery plan objectives to protect and improve occupied and recovery habitat for the species. Desired conditions, described in the effects section, provide the basis for most of the 7(a)(1) conservation actions.

Effects of the Action for Southwestern Willow Flycatcher

The scope of the analysis for the southwestern willow flycatcher includes all forested and shrub riparian habitat on the Carson, including designated critical habitat as defined by the Recovery Plan.

Effects of Vegetation Management

Effects of Management Common to All Vegetation Types

Climate Change

Climate change has occurred to some degree and will continue in the future. Ramifications of a changing climate on southwestern willow flycatcher are likely to include reduced snowfall or earlier snow melt in the spring, extended periods of drought or extended dry periods in the spring and summer, more frequent and larger wildfires, and changes in site characteristics that promote type conversion or vegetation community changes. This pattern is consistent with current trends in other parts of the West (IPCC 2014).

Climate change presents an aspect of uncertainty in future conditions, disturbance regimes, and vegetative and wildlife responses. Strategies that can be used to help reduce impacts from climate change include

managing for diverse conditions; maintaining healthy and connected populations; reducing the risk of large, uncharacteristic fire; preventing and controlling invasive species; and ensuring ecosystem processes and habitat connectivity (The Heinz Center 2008). While how well the land management plan addresses these strategies varies, it is assumed that to a certain extent, climate change and associated effects to southwestern willow flycatcher would occur. The climate vulnerability assessment for the Carson (USDA FS 2014a) provides additional information on the vulnerability of the different vegetation communities and habitat types to climate change.

Plan components support resilient vegetation ecosystems, which could contribute to overall watershed health and some limited positive benefit to riparian habitat by supporting healthy vegetation communities resilient to effects of climate change (for example, drought and drying conditions). These are considered conservation measures.

Wildland-Urban Interface

Neither southwestern willow flycatcher nor its designated critical habitat occurs in the wildland-urban interface and most associated activities would occur in fire-adapted systems, not riparian areas. There is some potential of short-term indirect impacts (ground disturbance, ash, sedimentation in waterways), but this would be minimized through guidance. Plan components under this section would not likely affect willow flycatcher or its designated critical habitat (insignificant/discountable).

Summary of Effects of Management Common to All Vegetation Types

Given that critical habitat and potential habitat for southwestern willow flycatcher do not occur in wildland-urban interface, there would be insignificant or discountable effects. Some potential of short-term indirect impacts (ground disturbance, ash, sedimentation in waterways), but this would be minimized through guidance.

Climate change presents an aspect of uncertainty in future conditions, disturbance regimes, and vegetative and wildlife responses. Effects of a changing climate on southwestern willow flycatcher are likely to include: reduced snowfall or earlier snow melt in the spring, extended periods of drought or extended dry periods in the spring and summer, increased insect- and disease-induced mortality, and changes in site characteristics that promote type conversion or vegetation community changes. However, plan components support resilient vegetation ecosystems, which could contribute to overall watershed health and some limited positive benefit to riparian habitat by supporting healthy vegetation communities resilient to effects of climate change (for example, drought and drying conditions). The net impact of this plan section on the southwestern willow flycatcher is a mix of beneficial and short-term adverse effects, but mostly beneficial in the long term because overall forest health and resiliency will be improved.

Effect of All Vegetation (VEG)

The desired conditions strive toward balanced and functional ecosystems. Plan actions will be more fully described under specific program areas in the following sections. Forestwide desired conditions and guidelines for water quality, quantity and soil focus on protection and enhancement of water quality and soil productivity, which would support healthy riparian habitat (function, structure, composition). Forestwide desired conditions for all vegetation types (**FW-VEG-DC-1–4)** support vegetation structure with a low departure from reference conditions and with a mosaic of vegetation conditions, densities, and structures at various scales across landscapes reflective of natural disturbance regimes. This would address the secondary threat of ash deposition from uncharacteristic landscape-level wildfire. Specifically, these desired conditions state that vegetation is reflective of natural regimes, according to indicators of tree mortality, road density, climate exposure, air pollution, catastrophic disturbance, wildfire potential, insect and pathogen risk, vegetation departure, and ecological process departure.

Guidelines for all vegetation (**FW-VEG-G-1–3**) would protect the ecological integrity of watershed conditions by minimizing potentially adverse effects like ground disturbance, soil erosion, and sedimentation that can move down slopes into ephemeral channels and perennial streams during timber harvest operations.

A forestwide objective for frequent fire forest (**FW-VEG-MCD-O-1**, and **FW-VEG-PPF-O-1**) to mechanically treat 2,750 to 6,000 acres annually of highly departed areas (such as ponderosa pine and dry mixed conifer in fire-adapted ecosystems) would move upland ecosystems toward a more desired condition, reducing the risk of fire that could cause widespread impacts to water resources in those vegetation types and would be considered conservation measures. Several standards and guidelines (**FW-FFP-S-1–2; FW-FFP-G-1–3**) will ensure that timber harvest only occurs in areas deemed suitable for timber production, that activities will not irreversibly damage watershed conditions, and that they will be carried out in a way that protects soil, watersheds, wildlife, and water resource features. Collectively, these standards and guidelines would mitigate the potential adverse effects from heavy sediment deposition from slopes that can move into ephemeral channels and perennial streams.

Summary of Effects for All Vegetation Types

Overall, vegetation departure under the preferred alternative would trend toward balanced and functional ecosystems. Forestwide desired conditions and guidelines for water quality and quantity and soil focus on protection and enhancement of water quality and soil productivity, which would support healthy riparian habitat (function, structure, composition). Intensified treatments would decrease canopy cover continuity at the landscape scale and reduce ladder fuels that contribute to stand-replacing wildfires, and decrease the threat of ash deposition within riparian and water systems. Plan components could have some neutral to positive effects by improving watershed function and minimizing the threat of uncharacteristic stand-replacing wildfire, which can move sediment and ash into waterways, impeding natural hydrological processes and function.

Effects of Watershed and Water (WSW)

Potential future watershed activities and projects are varied, and could include vegetation thinning, prescribed burning, channel stabilization, and other activities that could have impacts on habitats adjacent to riparian areas. Although short-term negative impacts that disturb soil or ground vegetation could occur with project implementation, the goal to improve watersheds is likely to be positive in the long term, by supporting maintenance and improvement of riparian habitat that is important to southwestern willow flycatchers. Desired conditions (**FW-WSW-RMZ-WR-DC-3** and **FW-WSW-RMZ-FSR-DC-1-5**) would support diverse seral state condition and vegetation composition. Any watershed activities occurring adjacent to critical habitat could affect primary constituent elements in the short term, but should result in long-term improvement in riparian habitat.

Riparian forest and vegetation are used as nesting habitat, and comprise 19,892 acres, or only 1 percent of the Carson National Forest. Desired conditions (**FW-WSW-DC-1 and 6–7**) support watersheds that are in proper functioning condition and that multiple uses (for example, timber, grazing, and recreation) are balanced with healthy ecological conditions. In general, the watersheds program seeks to maintain or improve watershed conditions and maintain good water quality. It complements and reinforces plan components from other program areas and strives to mitigate impacts from activities that might occur under those other program areas (for example, grazing, timber, wildland fire management). A guideline (**FW-WSW-G-1**) would require best management practices are applied to every site-specific project that has the potential to adversely affect the watershed conditions. This would minimize potential adverse effects to southwestern willow flycatchers and their habitat.

Effects of Riparian Management Zones (RMZ and FSR)

Riparian management zones (RMZ), wetland riparian (WR), and forest and shrub riparian (FSR) include riparian habitat around streams (STM), wetlands, springs (SNS), and waterbodies (WB), which could provide suitable habitat and or contribute to the development of suitable habitat. Riparian management zones should be defined by either a site-appropriate delineation of the riparian area or mapped wetlands and a minimum buffer of 100 feet from the edge of all perennial and intermittent streams, lakes, seeps, and springs and 15 feet from the edges of ephemeral channels. The exact width of riparian management zones may vary based on ecological or geomorphic factors or waterbody type, but includes those areas that provide riparian and aquatic ecosystem functions and connectivity (**FW-WSW-RMZ-G-1**). Plan components that would benefit flycatcher focus on water quality and quantity, and ground cover (**FW-WSW-RMZ-DC-1–4; FW-WSW-RMZ-STM-DC-1, 4–5, 8; FW-WSW-RMZ-WB-DC-3; FW-WSW-RMZ-WR-DC-1–3; and FW-WSW-RMZ-FSR-DC-1–13**). These desired conditions generally promote properly functioning condition and ecological integrity at multiple spatial scales, which would, in turn, support habitat conditions and healthy vegetation growth for nesting and foraging.

Desired conditions (**FW-WSW-RMZ-WR-DC-1–3 and FW-WSW-RMZ-FSR-DC-1–13**) emphasize movement of riparian areas toward reference condition while protecting them from multiple uses. Desired conditions would help to ensure that structure, function, composition, connectivity, water quality, sediment, and aquatic and terrestrial habitats are maintained or restored. **FW-WSW-DC-1–5, FW-WSW-RMZ-DC-1–4, FW-WSW-RMZ-STM-DC-1, 4–5, 8, FW-WSW-RMZ-WB-DC-3, FW-WSW-RMZ-WR-DC-1–3, FW-WSW-RMZ-FSR-DC-1–13, and FW-WSW-RMZ-FSR-G-1** direction supports functional connectivity between and within aquatic, riparian, and upland components that reflect their natural linkages and range of variability. **FW-WSW-DC-4–5, FW-WSW-RMZ-DC-5, FW-WSW-RMZ-STM-DC-2–4, and FW-WSW-RMZ-FSR-G-1** support functional connectivity and promote dispersal and genetic diversity, which is necessary for sustaining healthy populations.

Objectives (**FW-WSW-RMZ-O-1** and **FW-WSW-RMZ-STM-O-1–2**) to restore or enhance structure and function of soils by implementation of restoration work and projects on least 200 to 300 acres of nonfunctioning and functioning-at-risk riparian areas and at least 10 to 15 miles of stream habitat annually could benefit riparian habitat conditions. These projects could lead to improvements in riparian areas by protecting vegetation through fencing, gully stabilization, or other practices that improve proper functioning condition and move systems toward an advanced ecological status. This increase in proposed projects has the potential to improve the riparian condition across the plan area. These restoration activities would be required to following best management practices (**FW-WSW-G-1, FW-NIS-S-1**) and to integrate habitat management objectives and species protection measures from the most recent approved Fish and Wildlife Service recovery plan (**FW-VEG-G-1** and **FW-WFP-G-1**).

The land management plan addressed the needs for change for riparian areas. The objectives for mechanical vegetation treatments and fire are directed at upland areas where fire regimes are departed within frequent fire forest. As a result, the risk of fire that could cause widespread impacts to riparian areas by impacting the uplands or direct fire in the riparian area would be decreased. Riparian management zones provide for targeted treatments in these areas while protecting riparian values. In frequent fire forest riparian areas, fire condition regimes are improved, leading to reduced possibilities of stand-replacing wildfires that would have impacts to riparian areas such as loss of vegetation and reduced functioning to dissipate floods and provide ecosystem functions. Mechanized vegetation treatments in riparian management zones would be uncommon under this alternative and guidelines ensure that, if planned, these activities would benefit the riparian area in the long term, with a few exceptions such as road crossings. **FW-WSW-RMZ-G-2** requires management activities within riparian management zones to move toward desired conditions for water, soils, and vegetation and align with the most current

regional riparian strategy. Restoration treatments in riparian areas have the potential to impact flycatcher habitat where it exists. Types of treatments that might occur within these habitats could include selective thinning, riparian vegetation planting, noxious weed treatments (for example, mechanical, herbicide, mastication), and possibly erosion control. The long-term effects of such activities would be positive for flycatcher habitat by reducing fire risk and promoting native species composition and desired forest structure. Such projects would likely be small in scale; however, some short-term adverse impacts could occur during such activities. These restoration activities would be required to following best management practices (**FW-WSW-G-1, FW-NIS-S-1**) and to integrate habitat management objectives and species protection measures from the most recent approved Fish and Wildlife Service recovery plan (**FW-VEG-G-1** and **FW-WFP-G-1**). Vegetation treatments that create ground disturbance would also be required to seed weed-free native plant species (**FW-WFP-G-5**). Also, **FW-NIS-G-2** requires that any nonnative species that is desired should be managed in such a way that it does not conflict with the recovery of native species or existing multiple uses.

Several standards and guidelines (**FW-WSW-G-1-3; FW-WSW-RMZ-G-2-3; FW-WSW-RMZ-WR-S-1-3; and FW-WSW-RMZ-FSR-G-1**) would mitigate adverse effects from road construction or reconstruction, or trail development (which can cause erosion and sedimentation) and would rehabilitate instream structures that could improve hydrologic function and habitat connectivity by ensuring barriers to movement are minimized and subsurface flows and groundwater recharge are within the natural range of variation. This would benefit southwestern willow flycatcher habitat needs for free-flowing water. **FW-GRZ-DC-4–6** and **FW-GRZ-G-1–3** support and reinforce direction in the livestock and grazing management program area by promoting livestock grazing that supports healthy plant development, which contributes to properly function wetland and riparian areas and plant communities composed of various structural stages and healthy understory for wildlife. The net effect for all these plan components is positive for the flycatcher.

Valid existing water rights, however, have a significant influence on water uses so the preferred alternative can only implement guidelines which focus on diversion and withdrawals (**FW-WSW-G-4 and FW-WSW-RMZ-G-4**) in accordance with these rights. Nonetheless, the guidelines place emphasis during project-level planning on protecting water features and the adoption of those guidelines through forest plan implementation would have beneficial effects for southwestern willow flycatcher and its designated critical habitat. The mixture of adverse and beneficial effects described above applies to critical habitat as well.

Summary of Effects for Watershed and Riparian Management Zones

The physical and biological components of the watersheds and water, riparian management zones, streams, wetland riparian, and forest and shrub riparian programs on the Carson National Forest encompasses the main factors that comprise the primary constituent elements for southwestern willow flycatcher. Physical water resources and attributes assessed include water quantity, water quality, groundwater, and watershed condition and function. Refer to Aquatic and Riparian Ecosystems for information on miles of flowing streams and proper functioning condition. In general, the watersheds program seeks to maintain or improve watershed conditions and maintain good water quality. It complements and reinforces plan components from other program areas and strives to mitigate impacts from activities that might occur under those other program areas (for example, grazing, timber, wildland fire management). A guideline (**FW-WSW-G-1**) would ensure best management practices are applied to every site-specific project that has the potential to adversely affect the watershed conditions. This would be beneficial for southwestern willow flycatchers and their habitat.

Plan components in the water resources and associated subsections could have some neutral to positive longer-term effects on critical habitat by improving watershed function and minimizing the threat of uncharacteristic stand-replacing wildfire, which can move sediment and ash into waterways, impeding natural hydrological processes and function. This could provide some minor benefit to primary constituent elements 1 and 3 for the cuckoo, which generally promote dynamic riverine processes and healthy riparian vegetation conditions.

Effects of Soil (SL)

As project-level work improves soil condition on the Carson National Forest, other watershed-related benefits (reduced runoff, raised water tables, reduced stream sedimentation, etc.) may be realized in areas adjacent to, and downhill from, the national forest. Off the Carson, vegetation management is expected to reduce wildfire risk on the national forest, thereby reducing the potential negative effects on soil condition. Desired conditions for soils strive to have properly functioning areas with adequate vegetative ground cover to prevent erosion from exceeding natural rates; these are consistent with protecting habitats for aquatic and riparian-dependent species on the Carson. Implementation of projects that disturb soil or ground vegetation could have short-term, but minor, adverse impacts on riparian vegetation. But overall, the goal to improve watersheds and the guidelines (**FW-VEG-G-3** and **FW-SL-G-1–3**) to apply at the project level are expected to provide long-term positive impacts on riparian habitat through ground cover improvement and retention of woody material. These guidelines, in addition to best management practices and other project-specific design features should minimize the short-term adverse effects of sediment entering water courses during and after project implementation. The national core best management practices technical guide for watershed management includes recommended practices that help guide the development of project design (USDA FS 2012b). Examples of best management practices include practices that consider water quality, quantity, timing, and flow, and soil stabilization. Long-term benefits of these projects would be reduced chronic sedimentation effects.

Summary of Effects for Soil

The net effect of this section of the proposed plan is beneficial for southwestern willow flycatcher and its habitat.

Effects of Wildlife, Fish, and Plants (WFP)

Species cannot be managed apart from their habitats. Therefore, plan components within vegetation and watershed resources must be used in combination with plan components found in the wildlife, fish, and plants section. Plan components for wildlife, fish, and plants, when combined with plan components from other resources, promote proper functioning condition and ecosystem sustainability. This guidance is consistent with and supports maintenance and improvement of riparian habitat. Several are particularly relevant and positive for southwestern willow flycatcher habitat and additional species-specific plan components were added to ensure multiple uses (grazing, vegetation treatment, and recreation) minimize habitat loss and disturbance for riparian-dependent species. Plan guidance in this section emphasizes species that use riparian and aquatic habitats and complements and reinforces management direction under program areas where specific activities might occur (for example, timber, vegetation recreation).

Desired conditions (**FW-WFP-DC-1–3**) promote habitat conditions that support self-sustaining populations; contribute to the survival, recovery, and delisting of species under the Endangered Species Act; and ensure that compatible multiple uses contribute to the recovery of federally listed species. Desired conditions (**FW-WFP-DC-6** and **10**) promote healthy stream flow for riparian-dependent species. This would ensure that riparian and wetland areas are in proper functioning condition with diverse vegetation that supports habitat diversity for wildlife.

Two guidelines (**FW-WFP-G-6** and **FW-WSW-RMZ-FSR-G-1)** are expected to have positive effects by promoting free-flowing water conditions. The first guideline strives to conserve aquatic habitat connectivity through proper maintenance and removal (if applicable) of constructed features (such as exclosures, wildlife drinkers, range improvements, fences, and culverts) to restore hydrologic function. The second guideline directs functional connectivity between and within aquatic, riparian, and upland components that reflect their natural linkages and range of variability. These guidelines are consistent with recovery plan goals for the flycatcher and would support objectives (above) to improve water resource features.

Summary of Effects for Wildlife, Fish, and Plants

The net effect of this section of the proposed plan is beneficial for southwestern willow flycatcher and its habitat.

Effects of Nonnative Invasive Species (NIS)

The expansion of nonnative vegetation or the conversion of native vegetation to nonnative vegetation can also threaten riparian habitat by altering fire regime and water regime and reducing native species composition. A desired condition (**FW-NIS-DC-1**) would strive to limit both threats within the capability of forest service management authority. Desired conditions, standards, and guidelines within the nonnative invasive species resource complement and reinforce guidance for nonnative species that can also be found under program areas where management actions might likely occur. Invasive plant species can negatively impact riparian vegetation structure and function and introduce fire into systems it was not native to. The desired condition stated above, in addition to standards (**FW-NIS-S-1-2**) would minimize the inadvertent spread of invasive plant species (for example, tamarisk) that could occur during forest management activities. These are considered conservation measures. Multiple guidelines (**FW-NIS-G-1–7**) promote best management practices for treating noxious and nonnative species. This includes minimizing the potential for negative effects on non-target species from biological control agents and herbicides and pesticides. It would also help minimize the establishment of new infestations as well as the spread of established invasive populations through preventative measures such as cleaning equipment and using weed-free material to prevent the transport of seeds and vegetative material capable of reproducing. Also, **FW-NIS-G-2** requires that any nonnative species that is desired should be managed in such a way that they do not conflict with the recovery of native species or existing multiple uses.

Summary of Effects for Nonnative Species

The net effect of this section on the southwestern willow flycatcher is positive and beneficial. There would be no effect on critical habitat for this species.

Effects of Wildland Fire Management (FIRE)

Three desired conditions (**FW-FIRE-DC-1–2, 4**) under this program area would mitigate negative effects to riparian habitat from downstream sedimentation caused by upland restoration fire management activities. The overall purpose of this program area is to restore fire across the landscape so that it functions in its natural ecological role and ecological resources are more adaptable to a changing climate. These desired conditions are generally consistent with maintenance and improvement of flycatcher populations and habitat.

The preferred alternative aims to manage more naturally ignited wildfires where and when it can do so safely and where the expected fire effects are likely to provide a positive benefit to resources. Key objectives under this program area that would reduce the risk of uncharacteristic stand-replacing wildfire and the deposition of ash and sedimentation include:

FW-VEG-MCD-O-2. During each 10-year period following plan approval, treat at least 20,000 to 40,000 acres using a combination of prescribed fire and naturally ignited wildfire to make progress toward or to maintain desired conditions.

FW-VEG-PPF-O-2. During the 10 years following plan approval, treat at least 80,000 to 125,000 acres using a combination of prescribed fire and naturally ignited wildfire to make progress toward or maintain desired conditions.

Proposed vegetation and fire activities in frequent fire forest would reduce the number of acres susceptible to adverse fire effects such as soil erosion, sedimentation, and flooding which lead to decreased watershed conditions. The above plan components for wildland fire management generally strive to move upland vegetation in frequent fire forest (ponderosa pine and frequent fire mixed conifer) toward desired conditions. There are several standards and guidelines that provide sideboards for fire management by protecting the watershed from short term adverse effects that might occur as a result of forest restoration work. A standard (**FW-FIRE-S-2**) directs that wildfire response balances risk with integrated resources. Guidelines (**FW-FIRE-G-1** and **4**) promote the natural ecological role of naturally ignited wildfire and the prevention of the spread of invasive plant species. Two guidelines (**FW-FIRE-G-8-9**) promote post-fire restoration and recovery where spread of invasive species and the protection of critical or endangered species habitat is of concern, would be positive for the flycatcher and its habitat. The intent is to prevent, control, contain, or eradicate invasive species to protect native species, which would improve watershed condition and ecosystem function in the long term. Wildland fire management activities include thinning, piling, building line by hand or dozer, and other activities.

For the flycatcher, indirect effects could include a mix of negative and beneficial effects. Short-term adverse effects could occur from sedimentation and ground disturbance if projects occur in flycatcher habitat, though prescribed fire and fuels management projects in adjacent upland areas would ultimately improve conditions in the long term by reducing fire risk. Direct effects of prescribed fire are unlikely in either species habitat or critical habitat, and only indirect minor effects would be expected in upland habitat; overall effects are not expected to be adverse.

Summary of Effects for Wildland Fire Management

Potential future watershed activities and projects are varied, and could include vegetation thinning, prescribed burning, channel stabilization, and other activities that could have impacts on habitats adjacent to riparian areas. Although short-term negative impacts that disturb soil or ground vegetation could occur with project implementation, the goal to improve watersheds is likely to be positive in the long term, by supporting maintenance and improvement of riparian habitat that is important to southwestern willow flycatchers. Any watershed activities occurring adjacent to critical habitat could affect primary constituent elements in the short term, but should result in long-term improvement in riparian habitat.

Effects of Rangelands and Livestock Grazing (GRZ)

Historic overgrazing by livestock is identified as one of the primary factors threatening southwestern willow flycatcher and its critical habitat. Overutilization and trampling can alter plant community structure, species composition, relative abundance of species, vegetative density, and alter stream channel morphology. At the time of plan approval, the Carson National Forest administers 61 active grazing allotments. Livestock management on National Forest System lands has shifted to an adaptive management philosophy that allows changes in livestock numbers or timing of use in response to changes in forage production, water availability, and precipitation patterns. Since 2010, the number of authorized livestock has averaged about 82 percent of the number permitted because of drought-related issues such as reduced forage production or lack of livestock water. Over the last decade, the national forest range

staff has worked with partners and permit holders to manage grazing pressure on sensitive areas (such as critical areas and riparian areas). The Carson has excluded livestock from the allotment that includes Rio Grande del Rancho critical habitat since 1990, and has excluded livestock with fencing from potential southwestern willow flycatcher habitat in Stewart Meadows for the last 10 years. The national forest has also excluded livestock seasonally from that pasture that contains Lower El Rito Creek. Other potential riparian areas are grazed but not excessively. There is the potential for some minor short-term adverse effects to flycatcher habitat in that area, but these would be minimized by plan guidance. Plan components for the sustainable rangelands and livestock grazing program areas (**FW-GRZ-DC-4–6; FW-GRZ-S-1; FW-GRZ-G-2–3**) emphasize that livestock grazing within riparian management zones must be compatible with ecological function and the needs of at-risk species, and that desired conditions for riparian vegetation and proper stream channel morphology and floodplain function are sustained. These plan components would be beneficial by balancing multiple use with healthy riparian systems and are considered conservation measures.

Brood parasitism of southwestern willow flycatcher nests by brown-headed cowbirds is a risk factor typically associated with livestock grazing. However, important southwestern willow flycatcher sites, such as Rio Grande del Rancho critical habitat unit, Stewart Meadows, and Lower El Rito Creek (both suitable southwestern willow flycatcher habitat), have been excluded from grazing (permanently or seasonally), which reduced the risk of cowbird presence. Also, FW-WSW-RMZ-FSR-G-1 would reduce that risk of nest parasitism by promoting more connected forest and shrub riparian vegetation and more riparian habitat, in general.

Summary of Effects for Rangelands and Livestock Grazing

This program would not affect critical habitat, because livestock are excluded from Rio Grande del Rancho. Any effect to potential habitat would be minimal as plan components described above would be beneficial by balancing multiple use with healthy riparian systems.

Effects of Recreation (Rec)

Recreation can impact riparian vegetation through trampling, clearing, woodcutting, soil compaction, bank erosion, and increased incidence of wildfire, promoting invasion by exotic plant species, increasing the presence of predators and scavengers due to refuse, promoting increases in brood parasitism, and noise disturbance. Development of sites, trails, and buildings can remove or fragment habitat. Desired conditions, standards, and guidelines for recreation would mitigate these potential impacts. **FW-REC-G-1** and **3** would minimize impact to other resources. Standards and guidelines (**FW-REC-S-1–2; FW-TFA-G-1–4, 8–9**) restrict new motorized trail and road construction. The most current motor vehicle use map would direct use of designated roads and trails. Guidelines (**FW-TFA-G-6, 9**) promote trail and road maintenance and construction that protects other resources, and that existing trails that may adversely affect other natural resources be dealt with to resolve any impacts. There could be some potential negative impacts from new construction of sites and trails that could affect sediment load in waterways, but this would be limited in extent and minimized through guidance (insignificant or discountable). There is also no established trails with the Rio Grande del Rancho Critical Habitat aside from fishing access.

Summary of Effects for Recreation

There could be some potential negative impacts from recreation that could affect sediment load in waterways or habitat removal, but this would be limited in extent and minimized through guidance (insignificant or discountable).

Effects of Transportation and Forest Access (TFA)

Activities under the transportation and forest access program include construction, maintenance, relocation, modifications, and obliteration of roads. Standards and guidelines (**FW-REC-S-1-2; FW-TFA-G-1–4, 8–9**) restrict new motorized trail and road construction. The most current motor vehicle use map would direct use of designated roads and trails. Guidelines (**FW-TFA-G-6, 9**) promote trail and road maintenance and construction that protects other resources, and that existing trails that may adversely affect other natural resources be dealt with to resolve any impacts. There could be some potential negative impacts from new construction of roads and trails that could affect sediment load in waterways and loss of vegetation, but this would be limited in extent and minimized through guidance (insignificant or discountable).

An objective (**FW-TFA-O-1**) to obliterate or naturalize at least 2 miles annually of unneeded roads to protect ecosystems and watersheds could have some short-term adverse effects but habitat conditions would be improved in the long term by minimizing potential for sediment deposition. Road decommissioning would reduce concentrated runoff and hydrologic connectivity across the watersheds that drain into surface waters. One guideline (**FW-TFA-G-3**) would be especially beneficial as it ensures the decommissioning of unneeded roads so that habitat is restored. Standards and guidelines for the transportation and forest access (**FW-TFA-G-1–4**) would minimize disturbance (for example, water flow changes, sedimentation) and the spread of nonnative invasive species (for example, nonnative plants) from road construction.

Summary of Effects for Transportation and Forest Access

Overall guidance in this section of the plan could provide some long-term benefits to potential riparian habitat and act as conservation measures for flycatcher by minimizing sedimentation into the watershed.

Effects of Special Uses (SU)

There is the potential for some minor impacts in the form of disturbance and sedimentation if these occur in potential habitat (unlikely), but guidance would minimize. Standards and guidelines for the special use program areas (**FW-SU-S-2** and **FW-SU-G-1–6**) would minimize disturbance (for example, water flow changes, sedimentation) and spreads of nonnative invasive species (for example, nonnative plants) from constructing energy corridors by including mitigations to co-locating infrastructure and prohibiting the development of new utility corridors.

Effects of Minerals and Geology

No active, locatable, mineral mines occur on the Carson National Forest, although uranium deposits do exist, and there are two inactive uranium mines. The national forest contains numerous abandoned gold and silver mines, and several streams are used for recreational gold panning. None of which occurs within Critical Habitat on the Carson NF. There are known rare-earth deposits. Also known as mineral materials, saleable minerals include sand and gravel, decorative stones, and clay. The national forest provides opportunities for the public to harvest these products from designated areas. Energy or mineral extraction sites can cause the removal of habitat and/or disturbance to the southwestern willow flycatcher during the breeding season.

Mineral exploration and associated activities can affect hydrologic function through diversions and groundwater pumping, which are listing factors for flycatchers. Activities associated with mineral resources include blasting, drilling, vegetation clearing, and other ground-disturbing activities. Depending on where they occur, mining activities could negatively affect water quality and cause sedimentation, which reduces water flow and proper hydrologic function. However, mining activities do not occur with

Critical Habitat on the Carson NF. Three primary plan components would help minimize the potential for negative effects from mining activities. A standard (**FW-MM-S-3**) ensures any suction dredging using a 2-inch hose or larger or excavating greater than 2 cubic yards per year must submit a notice of intent identifying the area involved. A guideline (**FW-MM-G-1**) states that *"restoration and reclamation of surface disturbance associated with mineral activities should be implemented to achieve 70 percent of groundcover (as compared to nearby undisturbed areas) with permanent weed-free native vegetation within 3 growing seasons."* Desired condition **FW-MM-DC-1** strives to minimize negative impacts to surface resources, including groundwater. Collectively, these plan components would help minimize streambed and floodplain alteration as well as surface and groundwater contamination that might occur. These standards and guidelines would provide protective measures to riparian habitat where it exists, though some short-term adverse effects could still affect flycatcher habitat, depending on where potential future mining activities are located.

Summary of Effects of Minerals and Geology

Depending on where they occur, mining activities could negatively affect water quality and cause sedimentation, which reduces water flow and proper hydrologic function. However, the plan components described above would help minimize streambed and floodplain alteration as well as surface and groundwater contamination that might occur. These standards and guidelines would provide protective measures to riparian habitat where it exists, though some short-term adverse effects could still affect flycatcher habitat, depending on where potential future mining activities are located.

Management Areas (MA) and Designated Areas (DA)

Effects of Management Areas

Recommended Wilderness (RWMA)

Modified alternative 2 recommends 9,189 acres within the Questa, Tres Piedras, and Canjilon Ranger Districts for wilderness designation. The additions are expanding existing wilderness (figure 7). None of these areas include critical habitat (figure 20).

In recommended wilderness, a desired condition (**MA-RWMA-DC-2**) supports a natural level of disturbance from fire, insects, and disease while **MA-RWMA-S-4** prohibits timber harvest. Desired condition **MA-RWMA-DC-3** preserves the unmodified nature of the landscape with minimal constructed features; these areas enhance wildlife habitat for species. A standard (**MA-RWMA-S-1**) would further minimize disturbance by restricting new permanent or temporary roads. Motorized travel is generally restricted and mechanized recreation is not allowed in designated wilderness and recommended wilderness management areas.

Planned (prescribed fire) and unplanned ignitions could be used as a management tool (**MA-RWMA-G-2**) to reduce the risks of uncharacteristic wildfire and to enhance ecosystem function in wilderness. This guideline complements the guidance for Wildland Fire Management and fire-adapted ecosystems under Vegetation Types above.

Activities that are anticipated in recommended wilderness areas include managed fire, trail building and maintenance, and dispersed recreation. These could result in negative short-term habitat removal and disturbance impacts on flycatcher and its habitat, but plan components for the wildland fire management and recreation program areas would also help to minimize those effects. Progress toward desired conditions could be slower in wilderness areas because restoration activities would be limited to wildfire.

Overall, however, progress toward desired conditions is expected to have a net positive effect for watershed conditions in the long term, which would be beneficial for the flycatcher and its habitat.

San Antonio (SAMA) and Valle Vidal (VVMA) Management Area

Several plan components could potentially benefit southwestern willow flycatcher within these management areas. Desired conditions (**MA-VVMA-DC-1–5** and **MA-SAMA-DC-1–3**) emphasize natural ecological conditions that would occur with minimal human influence. Standards (**MA-VVMA-S-5 and MA-SAMA-S-1**) prohibits new roads or motorized trails for public access within these areas, which would help minimize disturbance. All the waters within the Valle Vidal have been designated as outstanding national resource waters. These designations would be positive by minimizing nonpoint sources of pollution in these areas using best management practices. These areas would have a net positive effect for watershed conditions in the long term, which would be beneficial for the flycatcher and its habitat.

Eligible Wild and Scenic Rivers (EWSR, page 168)

A comprehensive evaluation of wild and scenic rivers was conducted as part of the plan revision process, which resulted in 50 eligible wild and scenic rivers on the Carson National Forest (figure 8). In particular, Rio Grande del Rancho (Camino Real Ranger District), which contains southwestern willow flycatcher critical habitat was found eligible for wildlife outstandingly remarkable values, recreational classification. This would have potentially beneficial impacts on wildlife species that use riparian habitat by ensuring those areas remain undeveloped and their remote character is preserved. This would minimize disturbance and promote habitat connectivity for riparian-dependent species like southwestern willow flycatcher. Eligible wild and scenic rivers must be protected sufficiently to maintain the free flow and outstandingly remarkable values unless a determination of ineligibility or non-suitability is made. If an eligible river is determined to be suitable and is designated as a wild and scenic river, the designation would not affect existing water rights, or the existing jurisdiction of states and the Federal Government as determined by established laws. **FW-EWSR-DC-1** promotes free-flowing river condition, and protection or enhancement of the area until it is designated or released from consideration. Several standards (**FW-EWSR-S-1–8**) ensure desired conditions would be maintained during project implementation and that any proposed activities that might compromise the outstandingly remarkable values, potential classification, or free-flowing character of an eligible wild and scenic river segment or corridor shall have a suitability study conducted beforehand. A guideline (**FW-EWSR-G-1**) complements and reinforces plan components for roads and recreation by limiting the construction of new roads or motorized trails within one-quarter mile of a wild or scenic eligible river segment. This direction would limit the potential for disturbance-related effects in riparian habitat including erosion, trampling, sedimentation, and introduction of noxious plant species. Overall, these plan components combined with eligible wild and scenic river status would be positive for southwestern willow flycatcher.

Summary of Effects for Management Areas

Effects from Recommended Wilderness, San Antonio, Valle Vidal, and Eligible Wild and Scenic Rivers management areas are expected to be positive for the flycatcher in the long term.

Effects of Designated Areas

Designated Wilderness Areas (WILD)

None of the current Designated Wildernesses include critical habitat for the southwestern willow flycatcher (figure 3 and figure 20). Effects to southwestern willow flycatcher from plan components for designated wilderness would be like those found under recommended wilderness. Plan components are generally consistent with maintenance and improvement upland habitat conditions which would benefit

watershed conditions and eventually improve flycatcher habitat by improving hydrological flow and minimizing the negative effects of downstream ash deposition and sedimentation that could occur from stand-replacing wildfire. Plan components focus on enhancing wildlife habitat and wilderness character and promote the natural ecological role of fire in the system (**DA-WILD-DC-1-3**). In addition, standards (**DA-WILD-S-1-2**) minimize disturbance to trails and vegetation by limiting recreations group size and promoting "leave no trace" practices by outfitter guides.

Designated Wild and Scenic Rivers (WSR, page 147)

One segment of the Lower Red River (Questa Ranger District) has been designated as a wild and scenic river on the Carson (figure 3). This would have potentially beneficial impacts on wildlife species that use riparian habitat by ensuring this area remains undeveloped and their remote character is preserved. This would minimize disturbance and promote habitat connectivity for riparian-dependent species like southwestern willow flycatcher. Designated wild and scenic rivers preserve the free-flowing natures of the designated river. **FW-WSR-DC-1** preserves free-flowing river condition, and classification. Several standards (**FW-WSR-S-1–3**) ensure desired conditions would be maintained during project implementation and that no proposed activities compromise the classification or free-flowing character of a designated wild and scenic river segment. This direction would limit the potential for disturbance-related effects in riparian habitat including erosion, trampling, sedimentation, and introduction of nonnative plant species. Overall, these plan components combined with designated wild and scenic river status would be positive for southwestern willow flycatcher.

Summary of Effects for Designated Areas

Effects from wilderness, designated wild and scenic rivers are expected to be positive for the flycatcher in the long-term.

Effects to Critical Habitat

In the analysis of the effects of the action on critical habitat, the national forest staff considered whether the implementation of the land management plan would result in the removal of critical habitat. To determine this, we analyze whether the plan describes a reduction in primary constituent elements within dense riparian habitat that provide for one or more of the flycatcher's habitat needs for nesting, foraging, and dispersing.

Primary Constituent Elements 1a and b:

1a. Dense riparian vegetation with thickets of trees and shrubs that can range in height from about 2 to 30 meters (about 6 to 98 feet). Lower-stature thickets (2 to 4 meters or 6 to 13 feet tall) are found at higher-elevation riparian forests and tall-stature thickets are found at middle and lower-elevation riparian forests.

1b. Areas of dense riparian foliage at least from the ground level up to approximately 4 meters (13 feet) above ground or dense foliage only at the shrub or tree level as a low, dense canopy;

Effects to 1a and 1b

Actions that may be implemented under the land management plan are expected to retain and enhance dense thickets of riparian trees and will not reduce the range of tree sizes needed to create the diverse forest riparian and multi-layered forest riparian canopy preferred by southwestern willow flycatcher at all elevations. Removal of trees and various trees species may also occur during implementation of the livestock grazing program and fuelwood cutting, but these effects should be small in extent and intensity. These effects should also not occur within critical habitat as grazing has been removed from this area.

Actions implemented under the land management plan are expected to maintain a variety of tree species and dense thickets of riparian trees of all heights needed to maintain this primary constituent element in all riparian habitat across the national forest. The land management plan provides desired conditions, standards, and guidelines that promote dense forested riparian vegetation of various heights important for maintaining forested riparian habitat for southwestern willow flycatcher nest and foraging habitat.

The following plan components would support primary constituent elements 1a and b by directing land manager during project implementation to manage the project area for retention of dense riparian vegetation with thickets of trees and shrubs:

- **FW-WSW-RMZ-FSR-DC-1–3.** (These describe desired seral state proportions. See plan page 86.**)**
- **FW-WSW-RMZ-FSR-DC-4.** Riparian forest vegetation provides nesting and foraging habitat for neotropical migrant birds, raptors, and cavity-dependent wildlife.
- **FW-WSW-RMZ-FSR-DC-5.** Woody riparian species are reproducing and are structurally diverse with all age classes present at the landscape scale. Diverse vegetation structure, including mature trees, snags, logs, and coarse woody debris, is present to provide habitat for riparian-dependent species.
- **FW-WSW-RMZ-FSR-DC-8.** Bebb, coyote, red, and Arizona willows are reproducing with a range of age classes present, where the potential for these species exists.
- **FW-WSW-RMZ-FSR-DC-12.** Dense willow conditions (70 percent cover or greater) are retained for at-risk species habitat.
- **FW-WSW-RMZ-FSR-G-1.** Connectivity within forest and shrub riparian vegetation communities should be restored or maintained by protecting ecological functions, tree density and growth, and native understory, to reduce the risk of predation and nest parasitism, and to provide habitat for at-risk and other wildlife species.
- **FW-WSW-RMZ-FSR-G-2.** Fuelwood cutting or wood removal should be managed to protect understory species, maintain tree density (including wildlife cover and stream shading), promote large woody material recruitment, and avoid channel down-cutting and accelerated erosion.
- **FW-WSW-RMZ-FSR-G-3.** Large mature cottonwood trees should be protected from management activities that could degrade them as suitable habitat for at-risk species. Projects occurring in these areas should incorporate restoration prescriptions, to ensure persistence of this habitat type.
- **FW-WSW-RMZ-DC-2.** Riparian vegetation, particularly native species, support a wide range of vertebrate and invertebrate animal species. There is adequate recruitment and reproduction to maintain diverse native plant species composition indicative of the soil moisture conditions for the site and desired conditions for the vegetation community.
- **FW-WSW-RMZ-DC-3.** Native obligate wetland species dominate herbaceous bank cover.
- **FW-WSW-RMZ-DC-4.** Riparian vegetation (density and structure) provides site-appropriate shade to regulate water temperature in streams.
- **FW-WSW-DC-1.** Watersheds are functioning properly or trending toward proper functioning condition and resilience in that they exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential condition.
- **FW-WSW-DC-2.** Ecological components (e.g., soil, vegetation, and fauna) are resilient or adaptive to disturbances, including human activities, changes in climate patterns, and natural ecological

disturbances (e.g., fire, drought, flooding, wind, grazing, insects, disease, and pathogens) and maintain or improve water quality and riparian and aquatic species habitat.

- **FW-VEG-DC-17.** The composition, density, structure, and mosaic of vegetation conditions reduce the threat of uncharacteristic wildfires to ecosystems and local communities.
- **FW-VEG-DC-20.** The structure and function of the vegetation and associated microclimate and special features (e.g., snags, logs, large trees, interlocking canopy, cliffs, cavities, talus slopes, bogs, fens, rock piles, specific soil types, and wet areas) exist in adequate quantities within the capability of the Carson, to provide habitat and refugia for at-risk species with restricted distributions.
- **FW-VEG-DC-21.** Ecological conditions, as described in these desired conditions, provide habitat to support, sustain, and recover rare, endemic, or at-risk species.
- **FW-VEG-G-1.** Management activities and special uses occurring within federally listed species' habitat should integrate habitat management objectives and species protection measures from the most recent approved USFWS recovery plan, to maintain the persistence or contribute to the recovery of that species.
- **FW-VEG-G-2.** Where the Forest Service has entered into a signed conservation agreement that provides guidance on activities or actions to be carried out by the Carson, those activities or actions should be undertaken consistent with the guidance found within the conservation agreement, to maintain the persistence or contribute to the recovery of at-risk species.
- **FW-VEG-G-3.** Vegetation should provide for at-risk species' habitats by minimizing disturbance, providing recovery strategies, and managing for desired levels of key structural elements for at-risk species (e.g., large old trees and snags, downed woody debris, denser vegetation structure, and soil structure) important for nesting, rearing, breeding, foraging, dispersal, and other life history needs, to maintain the persistence or contribute to the recovery of at-risk species.
- **FW-WFP-DC-1.** Sustainable populations of terrestrial and aquatic plant and animal species, including at-risk species, are supported by healthy ecosystems, as described by vegetation and watersheds and water desired conditions.
- **FW-WFP-DC-2.** Ecological conditions (vegetation and watersheds and water desired conditions) affecting habitat quality, distribution, and abundance contribute to self-sustaining populations of terrestrial and aquatic plant and animal species, including at-risk species, that are healthy, well distributed, genetically diverse, and connected (on NFS lands and to adjacent public and privately conserved lands), enabling species to adapt to changing environmental and climatic conditions. Conditions as described in vegetation and watersheds and water desired conditions provide for the life history, distribution, and natural population fluctuations of the species within the capability of the ecosystem.
- **FW-WFP-DC-3.** Ecological conditions (vegetation and watersheds and water desired conditions) provide habitat that contributes to the survival, recovery, and delisting of species under the Endangered Species Act; preclude the need for listing new species; improve conditions for species of conservation concern; and sustain both common and uncommon native species.
- **FW-WFP-DC-10.** All aquatic and riparian habitats are hydrologically functioning and have sufficient emergent vegetation (as described in watersheds and water desired conditions or by site potential), as well as macroinvertebrate populations to support resident and migratory species.
- **FW-WFP-G-1.** Management activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from the

most recent approved USFWS recovery plan, to maintain the persistence or contribute to the recovery of federally listed species.

- **FW-WFP-G-2.** Where the Forest Service has entered into a signed conservation agreement that provides guidance on activities or actions to be carried out by the Carson, those activities or actions should be undertaken consistent with the guidance found within the conservation agreement, to maintain the persistence or contribute to the recovery of at-risk species.
- **FW-GRZ-DC-4.** Livestock grazing and associated management activities are compatible with ecological function and process (e.g., water infiltration, wildlife habitat, soil stability, and natural fire regimes).
- **FW-GRZ-DC-6.** Wetland and riparian areas consist of native obligate wetland species and a diversity of riparian plant communities consistent with site potential and relative to wetland riparian and forest and shrub riparian desired conditions.
- **FW-GRZ-S-1.** Livestock management must be compatible with capacity and address ecological resources (e.g., forage, invasive plants, at-risk species, soils, riparian health, and water quality) that are departed from desired conditions, as determined by temporally and spatially appropriate data.
- **FW-GRZ-G-2.** Livestock grazing within riparian management zones (e.g., along streams, around seeps, springs, lakes, and wetlands) should be managed to sustain proper stream channel morphology, floodplain function, and riparian vegetation desired conditions.

Summary of Effects for 1a and 1b

Removal of trees and various trees species may also occur during implementation of livestock grazing program and fuelwood cutting, but these effects should be small in extent and intensity. These effects should also not occur within critical habitat, as grazing has been removed from this area. Actions implemented under the land management plan are expected to maintain a variety of tree species and dense thickets of riparian trees of all heights needed to maintain this primary constituent element in all riparian habitat across the national forest.

Primary Constituent Elements 1c and 1d:

1c. Sites for nesting that contain a dense (about 50 percent to 100 percent) tree or shrub (or both) canopy (the amount of cover provided by tree and shrub branches measured from the ground);

1d. Dense patches of riparian forests that are interspersed with small openings of open water or marsh or areas with shorter and sparser vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.1 hectare (0.25 acre) or as large as 70 hectares (175 acres).

Effects to 1c and 1d

The Carson National Forest staff expects that tree or shrub canopy will be reduced following hazard tree removal within recreation sites, livestock grazing, and fuelwood cutting implemented under the land management plan. There also may be some habitat disturbance to wetlands from livestock grazing. These effects should be small in extent and intensity. However, we do not expect reduction of canopy cover or habitat disturbance to wetlands in southwestern willow flycatcher critical habitat as grazing has been removed from this area, and critical habitat is not located near any recreation site. Plan components for forested and shrub riparian habitat show 50 to 75 percent tree and shrub cover that are interlocking depending on elevation. Additional plan components provide guidance for woody species recruitment and a range of age classes for native willow. For seral state proportions see **FW-WSW-RMZ-FSR-DC-1–3** in the land management plan. **FW-WSW-WR-DC-1–3** provide the vegetation composition desired within

wetlands. Standards and guidelines for riparian and forest and shrub riparian and wetland riparian would help to minimize adverse effects that could occur during project implementation.

The following plan components would support primary constituent element 1c and 1d by directing land manager during project implementation to manage the project area for dense tree or shrub canopy cover and to maintain or restore wetlands: **FW-VEG-DC-20[10], FW-VEG-DC-21, FW-WSW-RMZ-FSR-DC-1–3, FW-WSW-RMZ-FSR-DC-5, FW-WSW-RMZ-FSR-DC-8, FW-WSW-RMZ-FSR-DC-12, FW-WSW-RMZ-FSR-G-2, FW-WSW-RMZ-FSR-G-3, FW-WSW-RMZ-DC-2, FW-WSW-RMZ-DC-4, FW-WSW-DC-1, FW-WSW-DC-2, FW-WFP-DC-1, FW-WFP-DC-3, FW-GRZ-DC-4, FW-GRZ-DC-6.**

- **FW-VEG-DC-3.** Ecosystems maintain or recover all of their essential components (i.e., plant density, species composition, structure, coarse woody debris, and snags), processes (i.e., disturbance and regeneration), and functions (i.e., nutrient cycling, water infiltration, and carbon sequestration) despite changing and uncertain future environmental conditions.
- **FW-WSW-RMZ-WR-DC-1.** Necessary soil, hydrologic regime, vegetation, and water characteristics of wetland riparian vegetation communities sustain the system's ability to support unique physical and biological attributes and the diversity of associated species (e.g., shrews and voles). Soils' ability to infiltrate water, recycle nutrients, and resist erosion is maintained and allows for burrowing by at-risk species.
- **FW-WSW-RMZ-WR-DC-2.** Upland vegetation is not encroaching and the extent of wetlands is widening or has achieved its potential extent and is within the natural range of variability. Development of fens continues.
- **FW-WSW-RMZ-WR-DC-3.** Wetlands have groundcover and species composition (richness and diversity) indicative of site potential with vegetation comprised mostly of sedges, rushes, perennial grasses, and forbs. Meadows with the potential for hardwood shrubs contain a diversity of age classes (at least two) along the banks of perennial streams.
- **FW-WSW-RMZ-WR-S-2.** Management activities, permitted uses, and structural developments (e.g., livestock water gaps, pipelines, or other infrastructure) will occur in wetland areas only when necessary to move toward water, soils, and vegetation desired conditions or to protect life and property.
- **FW-WSW-RMZ-WR-S-3.** Avoid using motorized equipment in wetland areas, except when there is a designated crossing or when short-term uses are required to improve resource conditions and maintain existing infrastructure.
- **FW-WSW-RMZ-WR-S-4.** Construct no new permanent roads or motorized trails in wetland areas.
- **FW-WSW-RMZ-FSR-G-1.** Connectivity within forest and shrub riparian vegetation communities should be restored or maintained by protecting ecological functions, tree density and growth, and native understory, to reduce the risk of predation and nest parasitism and to provide habitat for at-risk and other wildlife species.
- **FW-WSW-G-1.** For all management activities, applicable best management practices should be identified and implemented, to maintain water quality, water quantity, and timing of flows and to prevent or reduce accelerated erosion.

[10] Included written out plan component only if not seen previously.

- **FW-WSW-G-2.** New or rerouted roads should not be located within 300 feet of water resource features (except where necessary for stream crossings or to provide for resource protection), to avoid the long-term adverse impacts associated with the occupancy and modification of floodplains and water resource features.
- **FW-WFP-G-1.** Management activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from the most recent approved USFWS recovery plan, to maintain the persistence or contribute to the recovery of federally listed species.
- **FW-WFP-G-2.** Where the Forest Service has entered into a signed conservation agreement that provides guidance on activities or actions to be carried out by the Carson, those activities or actions should be undertaken consistent with the guidance found within the conservation agreement, to maintain the persistence or contribute to the recovery of at-risk species.
- **FW-GRZ-S-1.** Livestock management must be compatible with capacity and address ecological resources (e.g., forage, invasive plants, at-risk species, soils, riparian health, and water quality) that are departed from desired conditions, as determined by temporally and spatially appropriate data.
- **FW-GRZ-G-2.** Livestock grazing within riparian management zones (e.g., along streams, around seeps, springs, lakes, and wetlands) should be managed to sustain proper stream channel morphology, floodplain function, and riparian vegetation desired conditions.
- **FW-REC-G-1.** Recreation activities should be compatible with and managed adaptively to minimize impacts to at-risk species and ecological desired conditions, including in riparian management zones (e.g., along streams, around seeps, springs, lakes, and wetlands).

Summary of Effects for 1c and 1d

Removal of trees and various trees species and habitat disturbance may occur during implementation of riparian restoration and fuelwood cutting, but these effects should be small in extent and intensity. Actions implemented under the land management plan are expected to maintain high canopy cover and wetlands needed to maintain this primary constituent element in all riparian habitat across the national forest.

Primary Constituent Element 2:

Insect prey populations. A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, which can include flying ants, wasps, and bees (Hymenoptera); dragonflies (Odonata); flies (Diptera); true bugs (Hemiptera); beetles (Coleoptera); butterflies, moths, and caterpillars (Lepidoptera); and spittlebugs (Homoptera).

Effects to 2

Prey population may be decreased due to invasive vegetation species encroachment. Actions implemented under the land management plan are expected to maintain insect prey population and reduce invasive vegetation species encroachment in all riparian habitat across the national forest while protecting native species (**FW-NIS-S-1–2, and FW-NIS-G-1–7**). Critical habitat for flycatcher on the Carson is mostly native shrubs with a mix of nonnative and native plant species understory. The plan provides desired conditions, standards, and guidelines that promote healthy riparian areas that are important for maintaining southwestern willow flycatcher nest and foraging habitat.

The following plan components would support primary constituent element 2 by directing land manager during project implementation to manage the project area to reduce nonnative invasive species encroachment while maintaining habitat components for flycatcher as describe in current recovery plans

(**FW-WFP-G-1** and **FW-VEG-G-1**): **FW-VEG-DC-21, FW-VEG-G-2, FW-WSW-RMZ-WR-DC-1, FW-WSW-RMZ-WR-DC-2, FW-WSW-RMZ-WR-DC-3, FW-WSW-RMZ-FSR-DC-1-3, FW-WSW-RMZ-FSR-DC-4, FW-WSW-RMZ-FSR-G-1, FW-WSW-RMZ-DC-2, FW-WSW-RMZ-DC-3, FW-WSW-DC-1, FW-WFP-DC-1, FW-WFP-DC-2, FW-WFP-DC-3, FW-WFP-G-2**

- **FW-VEG-DC-3.** Ecosystems maintain all of their essential components (i.e., plant density, species composition, structure, coarse woody debris, and snags), processes (i.e., disturbance and regeneration), and functions (i.e., nutrient cycling, water infiltration, and carbon sequestration) despite changing and uncertain future environmental conditions.
- **FW-VEG-DC-11.** Native plant communities dominate the landscape, while invasive species are nonexistent or low in abundance and do not disrupt ecological function.
- **FW-VEG-DC-18.** Native plants provide nectar, floral diversity, and pollen throughout the seasons when pollinator species are active.
- **FW-WSW-RMZ-FSR-DC-13.** Beaver are present and play a role in wetland development and riparian dynamics.
- **FW-WSW-G-1.** For all management activities, applicable best management practices should be identified and implemented, to maintain water quality, water quantity, and timing of flows and to prevent or reduce accelerated erosion.
- **FW-WSW-G-2.** New or rerouted roads should not be located within 300 feet of water resource features, (except where necessary for stream crossings or to provide for resource protection), to avoid the long-term adverse impacts associated with the occupancy and modification of floodplains and water resource features.
- **FW-NIS-DC-1.** Nonnative invasive plant and animal species are absent or exist at levels where they do not disrupt ecological function or affect the sustainability of native and desirable nonnative species.
- **FW-NIS-S-1.** Forest management activities must apply best management practices and management guidance from the most current Forest Service Southwestern Region Guidance for Invasive Species Management, to minimize the introduction or spread of invasive species, including decontamination procedures on vehicles and equipment and using weed-free products.
- **FW-NIS-S-2.** Projects, authorized activities, and special uses must be designed (e.g., weed hay, off-highway vehicle washing, waders) to reduce the potential for introducing new species or spreading existing invasive or undesirable aquatic or terrestrial nonnative populations.
- **FW-NIS-G-3.** Integrated pest management approaches and other treatments to control, treat, or retreat noxious and invasive species should be used to improve watershed condition and maintain ecosystem function, while minimizing project impacts on native species.
- **FW-NIS-G-4.** If chemical application is necessary near sensitive habitat (e.g., developed sites, known at-risk plants, riparian areas), techniques (e.g., buffers, type of chemical, mixture) should be applied to minimize effects on native species and sensitive habitat.

Summary of Effects for 2

Prey population may be decreased due to invasive vegetation species encroachment. Actions implemented under the land management plan are expected to maintain insect prey population and reduce invasive vegetation species encroachment in all riparian habitat across the national forest while (**FW-NIS-S-1-2,**

and **FW-NIS-G-1–7**) maintaining habitat components for flycatcher as described in current recovery plans (**FW-WFP-G-1** and **FW-VEG-G-1**).

Cumulative Effects for Southwestern Willow Flycatcher and Critical Habitat

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological assessment. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act.

Actions on private lands occur on multiple inholdings and adjacent to the administrative boundary of the Carson National Forest. Actions include livestock grazing, mining, residential and commercial developments, water developments, and recreation. Tribal lands also occur within and adjacent to the administrative boundary of the national forest where activities similar to those occurring on private lands, may result in effects to southwestern willow flycatcher within the action area. The effects of these actions most likely affect riparian habitat conditions through water quality, quantity, and hydrologic flow.

Almost all the watersheds associated with the Carson National Forest have private inholdings and areas outside of the national forest boundary. There is the potential for off-forest activities to create sediment movement that could occur on lands of other ownership. Examples include usage of unpaved roads, livestock grazing, mining, timber management, and fuel treatments that could affect watershed condition. The Upper Rio Grande watershed is not wholly contained within the Carson and the national forest personnel have little control over off-forest water management. For this reason, it will be difficult for the Carson to fully restore riparian habitat that could support willow flycatcher to reference conditions. Water resource management activities, including maintaining perennial water quality, quantity, and timing of flows contribute a very important role in overall ecological function and sustainability of these watersheds and riparian habitat. Human populations will likely increase over the life of the plan having subsequent effects on water demand. The New Mexico State Water Plan (NM OSE/ISC 2018) and associated regional plans are strategic management tools that address key water issues throughout the state. Regional plans for the Rio Grande Basin provide a positive framework for managing water use in a sustainable way and include considerations for threatened and endangered species including the southwestern willow flycatcher.

The potential cumulative environmental consequences of the proposed action when combined with the cumulative effects of activities on lands within the watershed boundaries is a mix of beneficial and adverse effects for the southwestern willow flycatcher with most of the adverse effects on the national forest being short-term and localized. Dispersed recreation is expected to continue within southwestern willow flycatcher habitat on the national forest. Given expected population increases in New Mexico in the future, it is reasonable to expect that there will be more recreationists (e.g., fishing, hiking, etc.) within southwestern willow flycatcher habitat on the Forest, which could increase disturbance to southwestern willow flycatcher. The potential cumulative environmental consequences of the land management plan when combined with the cumulative effects of activities on private lands is a mix of beneficial and adverse effects, with most of the adverse effects being short term and the beneficial effects being long term. The overall effects of the land management plan are beneficial.

Summary and Determination of Effects (Southwestern Willow Flycatcher and Critical Habitat)

Riparian forest and vegetation are used as nesting habitat, and comprise 19,892 acres, or only 1 percent of the Carson National Forest. The biggest threat to southwestern willow flycatcher is potential future

invasion of tamarisk and conifer encroachment and drought. Watershed restoration activities could have long term beneficial effect to mitigate these threats, but short term adverse impacts from vegetation thinning, prescribed burning, channel stabilization, and other activities that could have impacts on habitats adjacent to riparian areas. Objectives for riparian and stream resources would restore structure and function of at least 200 to 300 acres of nonfunctioning and functioning-at-risk riparian areas (**FW-WSW-RMZ-O-1**) as well as restore at least 100 to 150 miles of stream habitat annually (**FW-WSW-RMZ-STM-O-1**). These objectives would move those systems closer to desired conditions and be considered conservation measures. This could include activities that improve the natural flood regime, contribute to native plant species composition and structure, and ephemeral and perennial water supply. In the long term, however, restoration activities would improve habitat condition. Although short-term negative impacts that disturb soil or ground vegetation could occur with project implementation, the goal to improve watersheds is likely to be positive in the long term, by supporting maintenance and improvement of riparian habitat that is important to southwestern willow flycatchers.

Secondary indirect effects could include ash deposition that could impede hydrological function through reduction in free-flowing water. Indirect effects of fire include ash and debris flows, increases in water temperature, increased nutrient inputs, and sedimentation which can impede establishment of riparian vegetation and healthy insect populations. Under the preferred alternative, there would be moderate improvements to the watershed fire regime condition class resulting from increased objectives for prescribed fire and mechanical treatments as described above for the owl. These improvements would also benefit riparian-dependent species by decreasing the risk from uncharacteristic stand-replacing fire and be considered conservation measures. In addition, there would be at least 2 miles of road decommissioned annually, which would also have beneficial impacts on sedimentation and discharge (**FW-TFA-O-1**). Sedimentation can negatively affect riparian habitat through reduction in water flow needed for vegetation establishment.

The 224,851 acres of designated wilderness, recommended wilderness, and inventoried roadless would help to limit mechanical activities that can negatively affect riparian areas through soil compaction and erosion. Only managed wildfire would occur in wilderness.

Table 27. Summary of impacts to the southwestern willow flycatcher and its critical habitat by plan section[11]

Plan Section or Management Area	Species and Habitat	Critical Habitat
Wildland-Urban Interface	Potential for adverse	NA
Climate Change	Neutral to beneficial. Plan components support resilient plant communities and vegetation. Conservation measures.	Neutral to beneficial to PCEs 1a-d, 2. Plan components support resilient plant communities and vegetation. Conservation measures.
Plant Community Species Composition	Beneficial supports potential natural vegetation. Conservation measures.	Beneficial to PCE 1a-d, 2; supports potential natural vegetation. Conservation measures.

[11] NA=Not applicable and means the species and its habitat would not be affected by activities occurring under those sections of the plan because there is no causal mechanism for effects (activities would not overlap with species habitat or cause effects to species or habitat) or there are no plan components that apply directly to the species or its primary threats.

Plan Section or Management Area	Species and Habitat	Critical Habitat
All Vegetation Types (VEG)	Objectives focus on restoration work in fire-adapted systems, short-term sedimentation impacts minimized through standards and guidelines. Long term positive effects through reduced fire risk. Conservation measures.	NA
Watersheds and Water Resources (WSW, RMZ, WR, FSSR)	Potential for some short-term adverse, minimized by BMPs, standards and guidelines. Long-term beneficial if restoration work conducted in riparian habitat. Conservation measures	Potential for some short-term adverse to 1a-d and 2 if projects are implemented in riparian areas, but minimized through standards and guidelines under WSW, RMZ, FSSR and WFP sections. Long-term beneficial. Conservation measures
Soil (SL)	Not adverse; insignificant	Not adverse; insignificant
Wildlife, Fish, and Plants (WFP)	Beneficial, emphasize recovery and management of listed species, promotes healthy habitat conditions. Conservation measures.	Beneficial, emphasize recovery and management of listed species, promotes healthy habitat conditions. Conservation measures.
Wildland Fire Management (FIRE)	Likely short-term adverse impacts; minimized through guidance. Long-term beneficial as systems are moved toward desired conditions and risk of stand replacing wildfire is lowered. Conservation measures	NA
Sustainable Rangelands and Livestock Grazing (GRZ)	Potential for effects but not adverse, minimized through guidance	NA
Sustainable Forestry and Forest Products (FPP)	Potential for effects but not adverse, Minimized through guidance and direction in other sections of the plan (for example, All Vegetation).	NA
Minerals and Mining (MM)	Potential for adverse, but limited extent; insignificant or discountable	NA
Recreation (REC)	Potential negative impacts from new construction of sites and trails; minimized through guidance	NA
Special Uses (SU)	Not adverse. Can result in impacts if these occur in potential habitat but guidance would minimize. Unlikely	NA
Transportation and Forest Access (TFA)	Potential for short-term adverse, some long-term positive as roads are decommissioned. Conservation measures	NA

Plan Section or Management Area	Species and Habitat	Critical Habitat
Management Areas: Recommended Wilderness (RWA), San Antonio (SAMA), Valle Vidal (VVMA), Developed Winter and Summer Resorts (DEVRES), Potential Developed Recreation Site Management Area (PDRMA), and Jicarilla Natural Gas Management Area (JICMA)	Guidance is expected to have generally positive long-term effects, though there may be short-term adverse effects particularly in Developed Winter and Summer Resorts, Potential Developed Recreation Site, and Jicarilla Natural Gas Management Areas. Other effects based on activities implemented through other sections of the plan. Conservation measures	NA
Designated Areas: Designated Wilderness (WILD), Inventoried Roadless Areas (IRA), Vallecitos Federal Sustain Yield Unit (VFSYU), and Wild Horse Territories (WHT)	Long-term beneficial with potential for some short-term adverse. Plan guidance would minimize activities and disturbance in potential habitat; enhance wildlife habitat and promote the natural ecological role of fire in the system. Conservation measures	NA

Determination of Effects

Species

Generally, the desired conditions, objectives, standards, and guidelines in the preferred alternative are positive in maintaining water quality, watershed conditions, and riparian conditions, which would be positive for the flycatcher. Recreational use within or near potential southwestern willow flycatcher critical habitat is considered light, with no new motorized recreation permitted. There is potential for some sediment entering waterways as a result of habitat improvement projects and from trails and recreation activities although both are limited in nature. Most recreation along riparian area is hiking, fishing, and wildlife watching. There is the potential for some noise and thus disturbance from transportation and forest access activities, but these effects would be insignificant and discountable to the species. There is the potential for some minor short-term adverse effects to potential flycatcher habitat form livestock grazing, but these would be minimized by plan guidance. There are numerous plan components (desired conditions, objectives, standards, and guidelines) that support healthy riparian ecosystems including a plan objective to improve water resource features (including riparian areas, spring and streams) that could provide positive beneficial effects to the willow flycatcher habitat and invertebrate prey species. There is, however, the potential for some short-term effects (for example ground disturbance, sedimentation) resulting from some program activities (for example, fire and fuels, recreation, roads). Forest plan components would present a minor to moderate potential for adverse impact to potential southwestern willow flycatcher habitat through the life of the plan, depending upon the activity. In general, though, plan components are protective of habitat features required by this species and expected to help address impacts when they are identified. Therefore, the conclusion is that the continued implementation of the Carson land management plan **may affect, but is not likely to adversely affect the southwestern willow flycatcher**.

Critical Habitat

Critical habitat is excluded from livestock grazing permanently. Numerous plan components (desired conditions, standards, and guidelines) support healthy riparian ecosystems including a plan objective to improve water resource features including riparian areas, springs, and streams that could provide positive

beneficial effects to the southwestern willow flycatcher habitat and invertebrate prey species. Lastly, the unobstructed, free-flowing attributes of the river running through critical habitat will likely persist in part because of the management directions associated with eligible wild and scenic rivers. There is the potential for some negative effects, such as from conducting wildlife surveys; however, these effects are insignificant or discountable. Therefore, based on this analysis, we determined that the preferred alternative **may affect, but is not likely to adversely affect southwestern willow flycatcher critical habitat.**

Canada Lynx

(*Lynx canadensis)*

Effects finding for species: *May affect, not likely to adversely affect*

Effects finding for critical habitat: *No effect*

Status of Species and Designated Critical Habitat

Legal Status and Description

On March 24, 2000, the U.S. Fish and Wildlife Service published the final rule listing the contiguous United States distinct population segment of Canada lynx as a threatened species (65 FR 16052); however, Canada lynx is currently being considered for delisting due to recovery as of January 2018 (USDI FWS 2018). Lynx habitat was not ranked as core, secondary, or even peripheral for the Carson National Forest (USDI FWS 2005b), and critical habitat has not been designated on the national forest (USDI FWS 2019b).

The Canada lynx is a mid-sized boreal forest carnivore that occurs across most of northern North America (USDI FWS 2017). Lynx are similar to bobcats (*Lynx rufus*) in size and appearance, but the lynx's exceptionally large paws, long, black ear tufts, and short, black-tipped tail distinguish it from the more common bobcat. With its large feet and long hind legs, the lynx is highly adapted to hunting its primary prey, the snowshoe hare (*Lepus americanus*), in deep, powdery snow (USDI FWS 2017).

Life History and Habitat

The distribution of lynx in North America is closely associated with the distribution of North American boreal forest. The range of lynx populations extends south from the classic boreal forest zone into the subalpine forest of the western United States, and the boreal/hardwood forest ecotone in the eastern United States. Forests with boreal features extend south into the contiguous United States along the North Cascade and Rocky Mountain Ranges in the west, the western Great Lakes Region, and northern Maine. Lynx habitat can generally be described as moist boreal forests that have cold, snowy winters and a high-density snowshoe hare prey base . The predominant vegetation of boreal forest is conifer trees, primarily species of spruce (*Picea* spp.) and fir (*Abies* spp.). Within these general forest types, lynx are most likely to persist in areas that receive deep snow and have high-density populations of snowshoe hares, the principal prey of lynx.

Lynx do not occur everywhere within the range of snowshoe hares in the contiguous United States, as discussed in both Bittner and Rongstad (1982) and McCord and Cardoza (1982). This may be due to inadequate abundance, density, the spatial distribution of hares in some places, the absence of snow conditions that would allow lynx to express a competitive advantage over other hare predators, or a combination of these factors (USDI FWS 2014b).

Distribution, Abundance, and Population Trends

In 1999, the Canada lynx was reintroduced in Colorado, specifically in the San Juan Mountains. A total of 218 lynx were released from 1999 to 2006, and this population is currently thought to be stable and dispersing (Boster 2019). Records of lynx occurrence are distributed throughout mountainous areas of Colorado. The southernmost record is from the southern San Juan Mountains, one mile from the New Mexico border (Ruediger et al. 2000). Historically, the Carson did not support a naturally resident lynx population (USDI FWS 2014b), but occasionally, an individual lynx may roam out of Colorado onto the Carson National Forest.

In New Mexico, this species is a habitat specialist confined largely to mid- to high-elevation boreal and subalpine spruce-fir forests at 9,800 to 12,000 feet in elevation (Koehler and Brittell 1990; Ruggiero et al. 1999) that can maintain the presence of deep snow. In the southern part of its range, including New Mexico, the low densities of lynx populations are likely a result of naturally patchy habitat and lower densities of their snowshoe hare prey (Griffin 2004; Mills et al. 2005). Currently, lynx are not known to den or breed on the Carson.

Threats

The 2000 Lynx Conservation Assessment and Strategy (Ruediger et al. 2000) and 2017 Species Status Assessment (USDI FWS 2017) identified several specific management activities and practices termed as risk factors. Risk factors affecting lynx productivity included vegetation management, wildland fire management, grazing, winter recreational uses that create compacted snow conditions, and climate change.

Vegetation Management

Vegetation management can have beneficial to adverse effects on lynx and snowshoe hare habitat (ILBT 2013, USDI FWS 2017). Vegetation management influences habitats for lynx and prey by possible removal of large trees, change in canopy cover, soil disturbance, and removal of coarse woody debris. Loss of these features could result in the loss of denning potential.

Wildland Fire Management

Wildfire is a natural and essential component of boreal and montane forests that plays an important role, along with forest insects and other disturbance factors, in creating and maintaining the shifting mosaic of stand ages and forest structure across spruce-fir forest that provide snowshoe hare and lynx habitats (ILBT 2013; Ruediger et al. 2000). Wildfire creates and maintains lynx habitats by providing periodic vegetation disturbances.

Current Federal wildland fire management policy recognizes fire as a natural ecological process essential to the health and resilience of some forest systems, and it attempts to balance the ecological, social, and legal aspects of wildfire (USDA and USDI 2009). However, the prior history of fire response was largely one of active suppression for most of the last century (Ruediger et al. 2000) which, combined with other land-use practices, dramatically altered fire regimes in some places and created conditions prone to larger and more severe fires (Ryan et al. 2013). Over time, continued fire exclusion alters vegetative mosaics and species composition, and may have reduced the quality and quantity of habitat for snowshoe hares. Reduction in the quality and quantity of habitat for snowshoe hare could result in the loss of prey base for lynx.

Livestock Grazing

Both domestic and wild ungulate grazing is an historical and current use within portions of lynx range on the Carson National Forest. Throughout the Rocky Mountains, grazing has been a factor in the decline or loss of aspen as a seral species in subalpine forests (Ruediger et al. 2000). Aspen stands with a well-developed understory provide good quality habitat for snowshoe hares and other potential lynx prey species, such as grouse. Domestic livestock, wild ungulates, or both may change the structure, composition, or both of native plant communities, thus changing their ability to support lynx and their prey.

Winter Recreation Use

Recreational activities are becoming increasingly more popular on the Carson National Forest. Some anecdotal information suggests that lynx are quite tolerant of humans and that a wide variety of behavioral responses to human presence can be expected (Mowat et al. 2000; Olson et al. 2018; Squires et al. 2019). However, packed trails created by snowmobiles and cross-country skiers may serve as travel routes for potential competitors and predators of lynx, especially coyotes (Buskirk et al. 2000; Lewis and Wenger 1998; Murray et al. 1994).

Also, ski area development may result in permanent habitat loss and fragmentation. Ski resorts that are built or expanded in lynx habitat may impact lynx by removing forest cover, reducing the snowshoe hare prey base, and creating or increasing human disturbance. Lynx have been known to incorporate smaller ski resorts within their home ranges, but may not use the large resorts (ILBT 2013). Preliminary information from an ongoing study in Colorado suggests that some recreational use may be compatible, but lynx may avoid some areas with concentrated recreation use (Olson et al. 2018; Squires et al. 2019).

Climate Change

Global climate variability may also be a threat to the lynx. Changing climate conditions may interact with fire, management actions, and other factors discussed above to increase impacts to lynx habitat. One predicted impact of climate change is the intensification of natural drought cycles and the ensuing stress placed upon high-elevation montane habitats (Breshears et al. 2005; Cook et al. 2004; IPCC 2007, 2014; Mueller et al. 2005). The increased stress put on these habitats is likely to result in long-term changes to vegetation, and to invertebrate and vertebrate populations within boreal forests that affect ecosystem function and processes.

Critical Habitat

On September 12, 2014, the Fish and Wildlife Service issued a final rule revising the critical habitat designation and the distinct population boundary for the contiguous United States distinct population segment of the Canada lynx (USDI FWS 2014a). Under the Endangered Species Act, specific areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features that (1) are essential to the conservation of the species and (2) may require special management considerations or protection. Areas outside the geographical area occupied by the species at the time it is listed could also be designated as critical habitat if a designation limited to its current range would be inadequate to ensure the conservation of the species.

Status of the Species and Critical Habitat in the Action Area

Status of Canada Lynx within the Action Area

The environmental status of the species and its habitat in the action area provide a platform to assess the effects of the action now under consultation.

Historically, the Carson National Forest did not support a naturally resident lynx population (USDI FWS 2014b), and this species is currently not known to den or breed there. Lynx populations within the San Juan Mountains of Colorado are currently stable and dispersing (Boster 2019), and occasionally an individual lynx may roam out of Colorado onto the Carson.

Status of Designated Critical Habitat within the Action Area

There is no critical habitat for Canada lynx designated on the Carson.

Canada lynx on the Carson National Forest occasionally use spruce-fir forests at 9,800 to 12,000 feet elevation that can maintain the presence of deep snow and dense canopy. Spruce-fir forests occupy the coldest and wettest forested slopes, ridges, and valleys on every ranger district except Jicarilla.

Spruce-Fir Forest (SFF) community is the third most abundant (289,929 acres) on the Carson National Forest and is currently low to moderately departed from reference condition (see Forested Ecosystems above). Historically, fire, insects, and disease were the primary processes that affected spruce-fir forest, reverting them to an early stage of succession or creating openings within the forest canopy (USDA FS Carson NF 2015). Spruce-fir forest tend to support higher-severity fires due to the lower fire frequency, higher tree densities, multiple canopy layers, and greater litter depths and fuel loads. These stand-replacing fires make lynx habitat temporarily unsuitable. The multistory forest conditions that typically develop in spruce-fir forests are also highly susceptible to damage from western spruce budworm. In contrast with stand-replacing wildfires, beetles may only kill some of the overstory trees, allowing the understory to respond. Natural disturbances (wildfire, forest insect outbreaks, and storms) are essential components of lynx habitats that historically have maintained the mosaic of forest stand seral stages and distributions that temporarily impact lynx, but in the long term benefit lynx. Although, these events may diminish lynx and hare habitats by removing forest cover; these affected areas typically regenerate into the dense, young conifer stands that are associated with high hare and lynx densities (McKenzie et al. 2004).

Under the recovery outline, lynx habitat was ranked into core, secondary, and peripheral habitat areas based on lynx occupancy, reproduction, and use as documented by historical and current records. Lynx habitat was not ranked for core, secondary, or even peripheral for the Carson National Forest (USDI FWS 2005b), and critical habitat has not been designated (USDI FWS 2019b). Based on VDDT modeling, it is estimated there are currently 236,516 acres (82 percent) potential lynx habitat acres within spruce-fir forest with dense canopy on the national forest (refer to Final Environmental Impact Statement Volume 3: Appendix C for information on VDDT models and vegetation states).

Factors Affecting Canada Lynx within the Action Area

In Colorado, the Southern Rockies Lynx Amendment provides an overview of all activities that might influence Canada lynx and the key ecosystem characteristics that define their primary habitat and that of their important prey species. The most influential management action that could affect lynx on the Carson National Forest is forest vegetation management, primarily because of potential effects of vegetative structure that supports snowshoe hare and, to a lesser degree, other important prey species. However, forest vegetation management can also be an important tool for improving lynx habitat both spatially and temporally over time, and thus, have beneficial influences on lynx habitat as well.

Recreational programs may have negative influences on lynx habitat, primarily as associated with winter recreational use of motorized over-the-snow machines and developed winter and summer resort management areas. Effects can include potential disturbance and displacement, and potential facilitation of completion by other carnivores, such as coyotes, for food resources. Livestock grazing can be a

concern on vegetation structure and composition, particularly in riparian zones where aspen and willow provide important summer foraging habitat for a wider variety of prey species than during the winter periods. Other human uses and key habitats involving road management, summer recreation, and habitat connectivity can also be influential, depending on location, scale, and intensity.

Appendix C, section 1, 2, 4, and 5 list land management plan components that address these activities.

Conservation Measure: Conservation Actions 7 (a)(1)

Since the Canada lynx was listed, the Carson National Forest has taken actions to contribute toward recovery of the species. For any project within the habitat of Canada lynx, the national forest staff considers needs for the species in project design, analyzes effects of the project, and consults with the Fish and Wildlife Service as needed.

- the proposed plan has components for resource areas that provide protection and conservation for listed species over the life of the plan and helps provide the 7(a)(1) conservation actions for the Canada lynx by ameliorating threats to the species and by meeting recovery plan objectives to protect and improve occupied and recovery habitat for the species. Desired conditions provide the basis for most of the 7(a)(1) conservation actions.

Effects of the Action for Canada Lynx

The scope of the analysis for the lynx includes all spruce-fir habitat on the Carson National Forest.

Effects of Vegetation Management

Management Common to All Vegetation Types

Climate Change

Climate change has occurred to some degree and will continue in the future. Ramifications of a changing climate on Canada lynx are likely to include: reduced snowfall or earlier snow melt in the spring, extended periods of drought or extended dry periods in the spring and summer, more frequent and larger wildfires, increased insect- and disease-induced mortality, and changes in site characteristics that promote type conversion or vegetation community changes. This pattern is consistent with current trends in other parts of the West (Bentz et al. 2010; McKelvey et al. 2011).

These changes cause seasonal ranges and food sources for wildlife to shift and can affect the timing of reproduction. Reduced snowpack and changes in precipitation can affect lynx by loss of prey base through increased competition with bobcats and coyotes. Halofsky et al. (2018) states that lynx have little or no adaptive capacity to live in areas lacking snow and limited ability to shift their diet away from snowshoe hares. Regardless of snow depth, the timing of snowmelt has been occurring about two weeks earlier in recent decades. An analysis of streamflow data from several USGS gauge stations in the southern Sangre de Cristo Mountains showed an average flow reduction of 20 percent from 1996 (drought initiation) through 2013, and an average snowmelt runoff duration that was reduced by 12 days (USGS 2014). Overall, less water has been available in recent years, both in terms of the annual total and the springtime snowmelt pulse. Unless snowshoe hares show enough plasticity to adapt to earlier snowmelt, the reduced snow duration will increase the number of days that white hares will be mismatched on a snowless background. This lack of camouflage coloration may make lynx more successful in detecting their primary prey, but in the long term it may also reduce snowshoe hare numbers, especially at relatively lower elevations where snow reductions are anticipated to be greatest.

Large wildfires in lynx habitat are also believed to be strongly associated with changing climate factors. Westerling et al. (2006) compiled information on large wildfires in the western United States from 1970 to 2004 and found that large wildfire activity increased suddenly and markedly in the mid-1980s, with higher frequency of large wildfire, longer wildfire durations, and longer wildfire seasons. Fuels reduction programs have ramped up in recent years and are expected to continue. Plan components for fire would allow the Carson to adapt its future management to changing conditions.

Climate change presents an aspect of uncertainty in future conditions, disturbance regimes, and vegetative and wildlife responses. Strategies that can be used to help reduce impacts from climate change include managing for diverse conditions; maintaining healthy and connected populations; reducing the risk of large, uncharacteristic fire; preventing and controlling invasive species;, and ensuring ecosystem processes and habitat connectivity (The Heinz Center 2008). While how well each of the alternatives addresses these strategies varies, it is assumed that to a certain extent, climate change and associated effects to Canada lynx would occur. The Climate Vulnerability Assessment for the Carson (USDA FS 2014a) provides additional information on the vulnerability of the different vegetation communities and habitat types to climate change.

Summary of Effects of Management Common to All Vegetation Types

Climate change presents an aspect of uncertainty in future conditions, disturbance regimes, and vegetative and wildlife responses. Effects of a changing climate on lynx are likely to include: reduced snowfall or earlier snow melt in the spring, extended periods of drought or extended dry periods in the spring and summer, more frequent and larger wildfires, increased insect- and disease-induced mortality, and changes in site characteristics that promote type conversion or vegetation community changes. There will also be impact to lynx food source the snowshoe hare. Unless snowshoe hares show enough plasticity to adapt to earlier snowmelt, the reduced snow duration will increase the number of days that white hares will be mismatched on a snowless background. This lack of camouflage coloration may make lynx more successful in detecting their primary prey, but in the long term it may also reduce snowshoe hare numbers, especially at relatively lower elevations where snow reductions are anticipated to be greatest.

Effects of All Vegetation (VEG)

This section of the plan includes desired conditions, standards, and guidelines that promote potential natural vegetation types that are consistent with soil classification, site potential, and that native species are emphasized. These plan components would be beneficial for the lynx by promoting natural ecosystems and are considered conservation measures.

Spruce-fir forest is the major habitat type on the Carson National Forest that is important to Canada lynx. Objectives (**FW-WSW-O-1** and **FW-WFP-O 1**) to maintain or improve watershed function and terrestrial wildlife habitat by implementation of restoration work on at least 5,000 to 15,000 acres annually, would complement the desired conditions for spruce-fir forest on the Carson, and would be considered conservation measures.

Ecosystem-level plan components that would benefit Canada lynx include desired conditions to maintain appropriate seral states at the landscape (1,000 to 10,000 acres or more), mid (100 to 1,000 acres) and fine scales (less than 10 acres). Desired conditions that incorporate varying structural stages would guide the implementation of forest management activities and would maintain spruce-fir forest current low departure and trend. These varying structural desired conditions include dense tree canopies, large trees and snags, abundant understory (for example, coarse woody debris, logs), and old-growth components. The full range of life history needs (for example, denning and dispersal) as well as a mosaic of habitat conditions through time that support dense horizontal cover that would in turn support high densities of

snowshoe hare are provided for at the landscape (**FW-VEG-SFF-DC-1-4**); mid (**FW-VEG-SFF-DC-8-10**); and fine scales (**FW-VEG-SFF-DC-15-16**).

Forest-wide desired condition for all vegetation types (**FW-VEG-DC-1-4**) support vegetation structure with a low departure from reference conditions and with a mosaic of vegetation conditions, densities, and structures at various scales across landscapes reflective of natural disturbance regimes. Specifically, these desired conditions state that vegetation is reflective of natural regimes, according to indicators of tree mortality, road density, climate exposure, air pollution, catastrophic disturbance, wildfire potential, insect and pathogen risk, vegetation departure, and ecological process departure (Cleland et al. 2007).

Desired condition at the mid-scale, **FW-VEG-SFF-DC-13,** would ensure that in some areas, forest conditions would have 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest. Also, at the landscape scale, snags (greater than 18 inches), coarse woody debris, and downed logs (greater than 12 inches diameter at mid-point, greater than 8 feet long) would maintain conditions that support forest structure and improve conditions for denning (**FW-VEG-SFF-DC-4**). Desired condition at the fine-scale, (**FW-VEG-SFF-DC-15**), would provide mid to old age tree groups with the necessary interlocking canopy conditions.

There are no forestwide objectives to mechanically thin spruce-fir forest. Also, no mechanical thinning would occur within potential lynx habitat found in wilderness boundaries. However, there are objectives (**FW-WSW-O-1 and FW-WFP-O 1**) to maintain or improve watershed function and terrestrial wildlife habitat by implementing restoration work on at least 5,000 to 15,000 acres annually that could benefit spruce-fir forest habitat condition.

Several standards and guidelines (**FW-VEG-G-1-2, FW-WFP-G-1-2, FW-FFP-S-1-2, FW-FFP-S-5, and FW-FFP-G-1**) for vegetation management would mitigate habitat disturbance and damage that might occur as a result of timber harvest, so watershed conditions are protected and the ecological needs of wildlife species including Canada lynx, are maintained. During project implementation, desired conditions and guidelines (**FW-VEG-DC-3–4, FW-VEG-SFF-DC 2–3, FW-VEG-SFF-DC 9, FW-VEG-ASP-G 1, and FW-VEG-G-3–4**) would promote diversity of seral states, higher tree densities, and old-growth attributes, including large trees, snags, and coarse woody material important for lynx and its prey. Guidelines further direct that a range of restoration methods, including thinning and prescribed fire, are used to protect old-growth components. Standards and guidelines help to mitigate site-specific risk that might occur as a result of project implementation, and ensure that habitat components for the lynx are retained during restoration activities. Collectively, these plan components would work toward maintaining systems to conditions that are favorable for the lynx, reduce current threats and contribute to the conservation and recovery of the lynx and its habitat.

On the rare occasion when timber harvest occurs within spruce-fir, there is potential for some lynx short-term adverse effects. There is the potential for loss of snags, logs, large trees, and canopy closure within some of the Canada lynx habitat, due to conflict with restoration needs. Until projects are designed, it is not known how much habitat might be negatively affected in the short term. In the long term, the treatments should be beneficial to the lynx and improve dense horizontal cover for snowshoe hare. Restoration actions in suitable lynx habitat will most likely be positive, by pushing forest structure toward a more diverse, multi-storied condition, which would favor great forage availability for snowshoe hare in winter months. The possibility that effects may diminish snowshoe hare numbers cannot be ruled out; however, such an impact would not adversely affect lynx habitat, as lynx habitat in northern New Mexico and in the Carson is more to support dispersing individuals, not to sustain self-supporting reproduction.

The following standards apply to all vegetation communities. They support restoration purposes for creating resilient ecosystems and recovery needs for the lynx.

- **FW-FFP-S-1.** Regulated timber harvest (tree harvest for the purpose of timber production) must occur only on lands classified as suitable for timber production.
- **FW-FFP-S-2.** Timber harvest must occur only where soil, slope, and watersheds will not be irreversibly damaged and protection must be provided for streams, streambanks, shorelines, lakes, wetlands, other waterbodies, fish, wildlife, recreation (including trails), and aesthetic resources.

Summary of Effects for All Vegetation Types

Overall vegetation departure under the preferred alternative would trend toward reference conditions. Treatments would decrease canopy cover continuity at the landscape scale and reduce ladder fuels which contribute to stand-replacing wildfires. Standards and guidelines help to mitigate site-specific risk that might occur as a result of project implementation, and ensure that habitat components for the lynx are retained during restoration activities. Collectively these plan components would work toward maintain systems to conditions that are favorable for the lynx, reduce current threats and contribute to the conservation and recovery of the lynx and its habitat.

Effects of Watershed and Water (WSW)

Watersheds (WSW)

Potential future watershed activities and projects are varied, and could include vegetation thinning, prescribed burning, channel stabilization, and other activities that could have impacts on habitats adjacent riparian areas. Although short-term negative impacts that disturb soil or ground vegetation could occur with project implementation, the goal to improve watersheds is likely to be positive in the long term, by supporting maintenance and improvement of riparian habitat, including connectivity, that could be important for lynx dispersal and prey. Physical water resources and attributes assessed on the Carson National Forest include water quantity, water quality, groundwater, and watershed condition and function. Refer to the introduction for information on miles of flowing streams and proper functioning condition. Desired conditions (**FW-WSW-DC-1–2; FW-WSW-RMZ-DC-9; FW-WSW-RMZ-STM-DC-2 and 5**) support watersheds that are in proper functioning condition and that multiple uses (e.g. timber, grazing, and recreation) are balanced with healthy ecological conditions. In general, the watersheds and riparian program seeks to maintain or improve watershed conditions and maintain good water quality. It complements and reinforces plan components from other program areas and strives to minimize or eliminate impacts from activities that might occur under those other program areas (for example, grazing, timber, fire and fuels). An objective (**FW-WSW-RMZ-O-1**) to improve nonfunctioning and functioning-at-risk riparian areas by implementation of at least 200 to 300 acres annually could move riparian vegetation toward desired conditions. Guidelines (**FW-WSW-RMZ-G-1-2**) establish a riparian management zone around perennial water and prevent new infrastructure development (for example, roads, trails) in those areas, which would mitigate disturbance and provide connectivity within riparian management zones. Lastly, **FW-WSW-G-1** would require best management practices to be applied to site-specific projects that have the potential to adversely affect the watershed conditions. This would provide protection to the lynx and its habitat from management activities.

Summary of Effects for Water Resources

The net impact of this plan section and its subsections on the lynx is a mix of some limited short-term adverse (in the form of disturbance) and potentially long-term beneficial effects through habitat improvement projects that could occur in riparian areas. Implementation of the above objectives will

likely contribute to recovery by habitat connectivity in riparian systems where most restoration work will be implemented. Standards and guidelines will help offset those impacts, but adverse effects would not be eliminated completely.

Effect of Soil (SL)

Implementation of projects that disturb soil or ground vegetation could have short-term, but minor, adverse impacts on lynx and their habitat. Soil guidelines (**FW-SL-G-1–3)** when applied with best management practices at the project level would ensure project would provide long-term positive impacts on lynx habitat through ground cover improvement and retention of woody material.

Effects of Wildlife, Fish, and Plants (WFP)

Species cannot be managed apart from their habitats. Therefore, plan components within vegetation and watershed resources must be used in combination with plan components found in wildlife, fish, and plants. The wildlife, fish, and plants program, in combination with other resource plan components, performs activities to maintain or improve wildlife, fish, and rare plants habitats. The land management plan integrates habitat management desired conditions, guidelines, and objectives (**FW-VEG-G 1-3**, **FW-WFP-DC 1-4**, **FW-WFP-DC 7**, **FW-WFP-0 1 and 4**, and **FW-WFP-G 1-3**) with species protection measure from approved recovery plans in the vegetation and wildlife, fish, and plants sections to provide protection and development of suitable lynx habitat. This would benefit the Canada lynx by helping to recover the species.

Effects of Wildland Fire Management (FIRE)

The wildland fire management resource section includes direction for both prescribed fire and naturally ignited wildfire management. Wildfires are expected to continue across the Carson National Forest, and they will continue to be actively managed using a range of fire management responses. During emergency response to wildfires, the national forest would initiate emergency consultation in accordance with the section 7 implementation regulations as outlined in 50 CFR section 402.05 where suppression or emergency actions may affect listed species or designated critical habitats.

The preferred alternative aims to manage more naturally ignited wildfires where and when it can do so safely and where the expected fire effects are likely to provide a positive benefit to resources. As prescribed fires and naturally ignited wildfires are managed for resource benefits, it is likely that there will be longer periods of human activity when monitoring or managing the fire, but with less intensity than if full suppression actions are taken. The effect of wildland fire in class V fire regime systems will likely have short- to mid-term negative effects on lynx depending upon individual fire characteristics and patterns, with large openings created by high-intensity fire being avoided by lynx until such time that forest vegetation returns and grows dense enough to support prey species such as snowshoe hare. In many local spruce-fir sites, aspen is likely to be a pioneer species on local wildfire sites. Aspen may support snowshoe hare and other prey species for the first couple decades or more, but is not expected to provide higher quality habitat values until such time that spruce or other conifer trees take hold and grow into foraging habitat condition for snowshoe hare. This could take several decades or more, depending upon site conditions and other factors. In the long term, wildland fire in lynx habitat can be expected to result in high-quality habitat for primary prey species, and can be expected to be of high value to lynx depending upon the landscape patterns involving unburned areas of larger, intact forest that provides other cover, foraging, and denning values to lynx.

The preferred alternative includes fire management direction that would support Canada lynx by emphasizing actions that move the national forest toward desired conditions for lynx habitat. Short-term,

adverse effects may occur during the implementation of projects consistent with plan components. However, standards and guidelines minimize or eliminate these short-term adverse effects that might occur as a result of forest restoration work. Standard **FW-FIRE-S 5** directs managers to assess risk associated with wildfire response and balance with other resource needs. Meeting resource objectives generally means progress toward or maintaining desired conditions. Guidelines (**FW-FIRE-G-1, 2, 5,** and **8**) promote the natural ecological role of naturally ignited wildfire and across jurisdiction boundaries and that ground-disturbing activities should be avoided in threatened and endangered critical habitat. Guidelines (**FW-FIRE-G-8–9**) promote post-fire rehabilitation in critical or endangered species habitat to mitigate adverse effects from naturally ignited wildfire.

Suppression actions for wildland fires are not a part of this consultation. Effect from suppression actions will be considered under the emergency consultation process.

Summary of Effects for Wildland Fire Management

While some activities designed to maintain or improve the natural fire regime could have some short-term negative impacts, application of standards and guidelines mentioned above (in addition to adopting recovery plan measures), at the site-specific level should reduce adverse effects. The net impact of this plan section on the lynx is a mix of short-term adverse effects, but mostly beneficial in the long term because overall forest health and resiliency will be improved.

Effects of Sustainable Rangelands and Livestock Grazing (GRZ)

Livestock management has the potential to affect habitat for lynx prey species if done at high intensity. Livestock grazing can reduce shrub size and vigor, generally leading to more open conditions in contrast to the lynx's preference for dense undergrowth (Buskirk et al. 2000). It can also reduce winter forage and cover for snowshoe hares and is correlated with decreases in snowshoe hare abundance. The primary concern from livestock grazing on lynx habitat involves browsing and trampling impacts on understory or riparian associated species such as aspen and willow, which function as important cover and forage habitats for prey species such as snowshoe hare. However, over the last decade, the Carson range staff has worked with partners and permit holders to manage grazing pressure on sensitive areas (such as riparian areas). The forest manages for conservative use levels for livestock grazing and will continue to do so in the future.

A desired condition (**FW-GRZ-DC-4**) and a standard (**FW-GRZ-S-1**) for livestock grazing strive for compatibility with ecological functions and processes (such as water infiltration, wildlife habitat, soil stability, and natural fire regimes) and resilient ecosystems that are consistent with plan components for spruce-fir and aspen ecosystems. In addition, desired conditions (**FW-GRZ-DC-5–6**) emphasize native plant communities with a diversity of shrubs, willows, and understories of grasses to help improve habitat conditions for lynx prey species across the Carson National Forest. These plan components would complement and reinforce desired conditions in spruce-fir and aspen ecosystems and help to ensure that understory development is balanced with grazing management.

The following standard (**FW-GRZ-S-1**) would reinforce the desired conditions and is considered a conservation measure for the species: Livestock management shall be compatible with capacity and address ecological concerns (such as forage, invasive plants, at-risk species, soils, riparian health, and water quality) that are departed from desired conditions, as determined by temporally and spatially appropriate data.

A guideline (**FW-GRZ-G-1**) would balance forage use with desired ecological conditions and livestock grazing during permit renewals and development of annual operating instructions. In riparian

management zones, a guideline (**FW-GRZ-G-2**) would ensure that livestock grazing is done in a way that supports riparian desired conditions.

Summary of Effects for Sustainable Rangelands and Livestock Grazing

Guidance under this section of the plan, in combination with grazing management handbook direction and annual operating instructions is not expected to be adverse for the lynx. Plan components noted above would eliminate and minimize the potential for adverse effects. Standards and guidelines are generally consistent with supporting habitat for lynx prey populations.

Effects of Sustainable Forestry and Forest Products (FFP)

The sustainable forestry and forest products program area would ensure private and commercial timber harvest is used as a restoration tool and desired conditions for that program (**FW-FFP-DC-1, 3–5**) would ensure these types of activities are done in a way that enhances ecological conditions for wildlife through restoration and maintenance of desired vegetation conditions.

Fuelwood collection has remained relatively constant on the Carson National Forest. The preferred wood is any species of tree that is dead or down near roads, excluding standing ponderosa pine. However, the removal of fuelwood is usually limited to areas near roads and not too far from private land. Fuelwood collection does not occur everywhere on the national forest, and **FW-FFP-DC-3**, **FW-FFP-DC-5**, **FW-WSW-RMZ-FSR-G-2, and FW-WSW-RMZ-FSR-G-3** minimize impacts from fuelwood collection on lynx.

Harvesting activities for timber products are likely to be most influential on the lynx and its habitat within spruce-fir and aspen vegetation types. These activities can include firewood collection harvest for sawtimber and pulpwood, and acquisition of other products. Harvesting can directly impact lynx habitat structure, along with associated activities such as piling, creating temporary haul roads, etc. Impacts can be positive or negative, depending on the design and implementation of the project. There are no objectives identified for this program area, but desired conditions (**FW-FFP-DC-1, 3–5**) would ensure consistency with desired conditions for vegetation types and promote enhancement of wildlife habitat, including dead and dying trees. **FW-FFP-DC-5,** which directs that harvest of dead and dying trees for economic value, is consistent with the desired conditions.

Although there are no objectives or standards, guidance for all vegetation types, spruce-fir, and wildlife species sections (plan) would help to further mitigate impacts. There would continue to be little or no effect on lynx attributable to the forest products program.

Summary of Effects for Sustainable Forestry and Forest Products

Activities under this section of the plan would largely support forest restoration objectives (vegetation, fire and fuels management) and traditional cultural uses. While short-term negative effects may occur under implementation of the forest products program, the net long-term gain should be positive for the lynx. Application of desired conditions (mentioned above) at the site-specific level should help to reduce, minimize or eliminate any adverse effects and direction from all other relevant sections in the plan. Negative effects would likely be short term and collective guidance in the plan is expected to maintain or improve conditions for the Canada lynx in most cases.

Effects of Recreation (REC)

The impact that outdoor recreation may have to lynx is not clear, although Lynx do not appear to be as sensitive to low and moderate levels of recreation activities (Olson et al. 2018; Squires et al. 2019). As stated previously, snowmobile use of lynx habitat may have impacts to the species by facilitating the

movement of competitive species such as coyote (Kolbe et al. 2007), as well as noise disturbance. Non-motorized over-snow travel may have a similar effect, although at a lesser scale and intensity. This may not directly impact lynx, as the species spends the majority of its time in thick brush and timber that is generally not suitable for over-snow travel, mechanized or not.

Standard **FW-TFA-S-2** addresses designated over-the-snow routes or designated play areas and areas of consistent snow compaction, which are defined as areas that get enough human use that individual tracks are indistinguishable. Areas such as over-snow motorized vehicle use routes, groomed cross-country ski routes, parking lots, and adjacent openings with consistently high levels of use would meet this definition. Most of these routes and areas are currently in more open slopes that are not often used by lynx or snowshoe hare (Olson et al. 2018; Squires et al. 2019).

There is no indication that other types of recreation have much impact on lynx or their habitat, as hikers and other recreationists generally stay out of the thickest brush that makes up the lynx's preferred habitat. A number of desired conditions, standards, and guidelines for recreation would mitigate these potential impacts. **FW-REC-G-1** and **3** would strive for compatibility with ecological functions and processes and minimizing wildlife and human conflict. Desired condition **FW-WFP-DC-7** would help to minimize human disturbance from recreation activities. While standards and guidelines (**FW-REC-S-1-2; FW-TFA-G-1–4, 8–9**) would mitigate habitat fragmentation cause by recreation through restricting new trail, motorized trails, and road construction.

The suitability of over-the snow areas and routes will not be determined until the travel management planning process and will undergo a separate Endangered Species Act section 7(a)(2) consultation.

Summary of Effects for Recreation

There is the potential for short-term adverse effects in the form of disturbance or habitat removal or alteration, related to recreation development and over-snow travel. Effects to the lynx from this section of the plan would likely be insignificant or discountable.

Transportation and Forest Access (TFA)

Activities under the roads program include construction, maintenance, relocation, modifications, and obliteration of roads. These activities can result in short-term ground disturbance, long-term removal of vegetation where new roads are constructed, and noise disturbance from machinery. There is some potential for new and temporary road construction to help support forestwide restoration activities; however, these activities would occur in lower elevation than lynx use. Additional guidance to follow the intent of the approved recovery plan for the lynx should help avoid and minimize the effects of any new roads at the site-specific level. A guideline (**FW-TFA-G-6**) ensures road usage does not hinder wildlife movement or interrupt critical life-cycle needs (such as denning or dispersal). An objective (**FW-TFA-O-1**) to obliterate or naturalize at least 2 miles of unneeded roads annually could have some short-term adverse effects but habitat conditions would be improved for the lynx in the long term by minimizing potential disturbance from the road and reconnecting habitat. this objective would also be considered a conservation measure. Collectively, these plan components would be beneficial to the lynx. Additional guidance for roads can be found under the transportation and forest access section of the plan.

Summary of Effects for Transportation and Forest Access

There is the potential for short-term adverse effects in the form of disturbance or habitat removal or alteration, related to trail and road development and maintenance, and during road decommissioning. These effects would be limited in extent and minimized by the standards and guidelines above.

Special Uses (SU) and Minerals and Mining Programs (MM)

Energy or mineral extraction, powerlines, and communication sites can cause the removal of habitat and/or disturbance to the lynx. The desired conditions and guidelines for these activities would help reduce or eliminate the impacts. There are no objectives for this section of the plan. There are sight desired conditions which include direction to minimize impacts to ecological resources. Guidelines **FW-SU-G-1** and **FW-SU-G-5** would minimize negative effects on the lynx resulting from utility permits by ensuring utility location does not conflict with wildlife needs.

Summary of Effects for Special Uses

While there could be special uses that impact the lynx and its habitat, plan components described above should lessen any potential impacts. Effects are not anticipated to be adverse.

Management Areas (MA) and Designated Areas (DA)

The following section characterizes the management and designated areas in Canada lynx potential habitat and discusses the effects of the resulting management direction on the species. For a more detailed description of the Management and Designated areas, see above section of the introduction.

Table 28. Canada lynx habitat in each Carson NF proposed management area and designated area

Management or Designated Area	Approximate Lynx Potential Habitat Acres	Percent of Lynx Potential Habitat Acres
Recommended Wilderness	2,365	1%
San Antonio Mountain Management Area	33,112	14%
Valle Vidal Management Area	23,652	10%
Developed Winter and Summer Resorts	1,419	0.6%
Designated Wilderness	80,596	29%
Inventoried Roadless Areas	15,290	7%
Total	156,434	66%

Effects of Management Areas

Recommended Wilderness (RWMA)

Modified alternative 2 recommends 9,189 acres within the Questa, Tres Piedras, and Canjilon Ranger Districts for wilderness designation, of which 2,365 acres are potential lynx habitat (table 28). These additions will be expanding existing wilderness (figure 7).

In recommended wilderness, a desired condition (**MA-RWMA-DC-2**) supports natural level of disturbance from fire, insects, and disease, while **MA-RWMA-S-4** prohibits timber harvest. Desired condition (**MA-RWMA-DC-3**) preserves the unmodified nature of the landscape with minimal constructed features; these areas enhance wildlife habitat for species like the lynx and would minimize human disturbance. A standard (**MA-RWMA-S-1**) would further minimize disturbance by restricting new permanent or temporary roads. Like wilderness, this management area maintains large, remote, and secure habitats for lynx that are likely to have a lower amount of human presence due to management area direction that does not allow wheeled or over-the-snow motorized use and limits management actions to those that maintain wilderness character.

Planned (prescribed fire) and unplanned ignitions could be used as a management tool (**MA-RWMA-G-2**) to reduce the risks of uncharacteristic wildfire and to enhance ecosystem function in recommended wilderness. This guideline complements the guidance for Wildland Fire Management above.

Activities anticipated in recommended wilderness areas are managed fire, trail building and maintenance, and dispersed recreation. Some could have negative impacts on lynx and their habitat, at least in the short-term, but overall recommended wilderness would be beneficial to lynx.

San Antonio (SAMA) and Valle Vidal (VV) Management Areas

Several plan components could potentially benefit the lynx within these management areas. Desired conditions (**MA-VVMA-DC-1-5** and **MA-SAMA-DC-1-3**) emphasize natural ecological conditions that would occur with minimal human influence. Standards (**MA-VVMA-S-5** and **MA-SAMA-S-1**) prohibits new roads or motorized trails for public access within these areas which would help minimize disturbance. Wildland Fire Management Desired conditions would still apply to these areas with planned and unplanned ignitions and that vegetation management emphasizes wildlife habitat and range improvement projects. Overall, San Antonio and Valle Vidal Management Areas would be beneficial to lynx.

Developed Winter and Summer Resorts (DEVRES)

The Carson has four developed winter and summer resorts within this management area: Enchanted Forest Cross Country Ski Area, Red River Ski and Summer Area, Taos Ski Valley, and Sipapu Resort. Developed Winter and Summer Resort Management Area has the potential to impact lynx through habitat loss by clearing trees for ski runs, roads, and other developments associated with ski areas. Activities associated with ski resorts, including skiing, ski lift operation, grooming of ski runs, mountain biking in the summer, may also cause disturbance or displacement of individual lynx. According to Squires et al. (2019) and Olson et al. (2018), “lynx appeared to avoid high-intensity developed ski resorts, however, especially when recreation was most intense”. As lynx only occasional use the Carson, it is highly unlikely lynx would utilize this management area over spruce-fir habitat found within more secluded areas of the national forest.

About 1,419 acres of potential lynx habitat maybe included with the four ski resorts (table 28), and since 2014, the Carson has consulted on the effects of projects on lynx within this management area. These areas are small and spatially disconnected and wound not appreciably decrease travel connectivity in the landscape. Most of this management area is already developed and would most likely be avoided by lynx. There would continue to be minimal effect on lynx attributable to this management area.

Potential Developed Recreation Site Management Area (PDRMA)

This Management Area surrounds the existing Sipapu Ski Area and encompasses 1,032 acres. Currently there is no development in this management area, and is managed as general forest. In the future the management area has the potential to impact Canada lynx through habitat loss by clearing trees for ski runs or other developments associated with recreational sites. Recreational activities and developments may cause disturbance or displacement of individual Canada lynx. Development of this area in the future would undergo a separate planning process and Endangered Species Act section 7(a)(2) consultation.

Summary of Effect of Management Areas

Effects from Recommended Wilderness, San Antonio, and Valle Vidal management areas is expected to be positive for the lynx in the long-term. Developed Winter and Summer Resort Management Area and Potential Developed Recreation Management Area has the potential to impact lynx through habitat loss and disturbance associated with recreation developments and activities. This would be limited in extent, however and minimized through the combination of standards and guidelines listed in other sections of the Plan (e.g. Vegetation Management, Forestry, Wildland Fire).

Effects of Designated Areas

Designated Wilderness Areas (WILD)

Within designated wilderness there is approximately 80,596 acres of potential lynx habitat- a total of about 29 percent of the Carson's potential lynx habitat acreage (table 28). This management area maintains large, remote, and secure habitats for lynx that are likely to have a lower amount of human presence due to the lack of wheeled or over-the-snow motorized use and limited nonmotorized access. Plan components on enhancing wildlife habitat and wilderness character and promoting the natural ecological role of fire in the system (**DA-WILD-DC-1-3**). Standards (**DA-WILD-S-1-2**) minimize disturbance by limiting recreations group size and promoting "leave no trace" practices by outfitter guides.

Inventoried Roadless Areas (IRA)

Inventoried roadless areas occur on every district of the Carson except Jicarilla Ranger District. This designated area would provide positive beneficial effects for lynx by preserving the natural character of the land and minimizing disturbance. These areas emphasize semi-primitive recreation settings. Desired conditions which would be positive for the lynx include **DA-IRA-DC-1-2** and all standards and guidelines.

Summary of Effects for Designated Areas

Effects from wilderness and inventoried roadless areas is expected to be positive for the lynx in the long term.

Cumulative Effects to lynx

Cumulative effects include the effects of future State, tribal, local, or private actions, or a combination of these actions that are reasonably certain to occur in the action area considered in this biological assessment. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act.

State Actions

The State of New Mexico manages game animals on all jurisdictions in the State including the Carson NF. The species that has the potential to affect the lynx and its habitat on NFS lands is big game hunting. Within the action area, the New Mexico Department of Game and Fish manages big game in Management Units 2, 5B, 45, 49, 50, 51, 52, 53, and 55A. Lynx can be accidentally trapped during hunting season and can be disturbed by human hunting activities. These effects vary across the action area, but do not result in significant effects. The New Mexico Game and Fish Department is active, both directly and indirectly, in species conservation and recovery, which includes the Canada Lynx.

The State may also be involved in habitat enhancements on adjacent private lands or private inholdings which could potentially affect the lynx. Overall, the long-term net benefit to the lynx from habitat restoration related work is anticipated to be beneficial and positive.

Private and Tribal Actions

Actions on private lands occur on multiple inholdings and adjacent to the administrative boundary of the Carson National Forest. Actions include livestock grazing, mining, residential and commercial developments, water developments, and recreation. Tribal lands also occur within and adjacent to the administrative boundary of the Carson NF. Similar activities occur on tribal lands as the private lands, which may result in effects to lynx within the action area. The effects of these actions most likely affect

lynx prey species habitat through effects from livestock grazing on herbaceous plant cover and the removal of coarse woody debris, snags, and trees from localized development and construction.

The potential cumulative environmental consequences of the proposed plan when combined with the cumulative effects of activities on private lands is a mix of beneficial and adverse effects, with most of the adverse effects being short term and the beneficial effects being long term. The overall effects of the proposed plan are beneficial, as well as the overall effects of other land management agencies in the cumulative effects' analysis area. Therefore, when combined, the net cumulative effect is positive for the lynx.

Summary and Determinations of Lynx Effects

The proposed action is intended to ensure that key habitat characteristics like interlocking canopy and old growth characteristics including large trees are retained and that disturbance is minimized. Overall, actions implemented under the proposed action are expected to retain the range of tree species and would not reduce the range of tree sizes needed to create the diverse forest and multi-layered forest canopy preferred by Canada lynx. Overall, vegetation departure under the proposed action would trend toward reference conditions.

Key conclusions:

- The land management plan provides a programmatic framework for future site-specific projects and actions, but does not prescribe specific projects or assign project locations. Plan components exist to ensure proposed actions avoid, mitigate, or minimize impacts to Canada lynx. All future project-level activities that may affect this species will require project-specific assessments and consultation under section 7 of the Endangered Species Act.
- A combination of ecosystem level plan components and species-specific plan components for lynx provide for the ecological conditions that would contribute to the conservation and recovery of the species.
- The land management plan includes direction to avoid, mitigate, or minimize the loss of key habitat features such as dense canopy, coarse woody debris, and snags during forest restoration activities but cannot eliminate the risk entirely.
- The land management plan includes direction to minimize the risk of habitat loss from uncharacteristic stand-replacing wildfire but cannot eliminate the risk entirely.
- The possibility that effects may diminish snowshoe hare numbers cannot be ruled out; however, such an impact would not adversely affect lynx habitat, as lynx habitat in northern New Mexico and in the Carson National Forest is more to support dispersing individuals not to sustain self-supporting reproduction.

Historically, the Carson did not support a naturally resident lynx population (USDI FWS 2014b), and this species is currently not known to den or breed on the Carson National Forest. Occasionally, an individual lynx may roam out of Colorado onto the Carson. Generally, the desired conditions, objectives, standards, and guidelines in the preferred alternative are positive in maintaining dense canopy cover and coarse woody debris conditions which would be positive for occasional lynx. Recreational use within and near Spruce-fir habitat is primarily within more open canopy cover, and not within dense forest the lynx primarily utilizes. There is the potential for some noise and thus disturbance from transportation and forest access activities and developed winter and summer resort management, but these effects would be insignificant and discountable to the species. Therefore, the conclusion is that the continued

implementation of the Carson land management plan **may affect, but is not likely to adversely affect,** the Canada lynx.

Appendix A – Species with "No Effect Findings"

This section summarizes species that are not known to occur within the action area, are not anticipated to be impacted by framework programmatic actions of the land management plan indirectly or cumulatively, or both. Fish and Wildlife Service concurrence is not being requested for these species. These species are provided for reference purposes only.

Jemez Mountain Salamander, Least Tern, and Piping Plover

The U.S. Fish and Wildlife Service lists the Jemez Mountain salamander, least tern, and piping plover for Rio Arriba and Colfax counties, but their range within these counties does not include the Carson (Degenhardt et al. 1996; Poole 2018; USDI FWS 2012a), and they would therefore not be impacted by off-forest management effects.

No effect findings were made for Jemez Mountain salamander, least tern, and piping plover. USDI Fish and Wildlife concurrence is not being requested for these species.

Western Yellow-Billed Cuckoo

Western yellow-billed cuckoo is federally listed as threatened west of the Rio Grande River for the Carson. No critical habitat has been designated for this species on the national forest. Western yellow-billed cuckoo inhabits dense riparian habitat greater than 200 acres (81 hectares) in size (Poole 2018) and below 7,000 feet elevation (Howe and Hanberg 2000) in the western U.S. Western yellow-billed cuckoo has not been documented on the Carson. Ecosystems that could support the western yellow-billed cuckoo are forest and shrub riparian below 7,000 feet and include narrowleaf cottonwood-shrub and Rio Grande cottonwood-shrub habitat. There is no dense cottonwood habitat that is 200 acres in size on the Carson, which is the key habitat for this species. This species is not present on the national forest and is not likely to become established. However, the preferred alternative contains plan components (Table 30) that could improve riparian habitat in the future, and contribute to the primary needs for this species.

No effect finding was made for western yellow-billed cuckoo. USDI Fish and Wildlife concurrence is not being requested for this species at this time.

Conservation Measures

For any project, the national forest considers needs for the species in project design, analyzes effects of the project, and consults with the Fish and Wildlife Service as needed. Other conservation actions include:

- Surveys and monitoring for Western yellow-billed cuckoo are conducted under applicable permits and in accordance with Fish and Wildlife Service survey protocol when applicable
- Habitat assessment for this species is conducted during site specific NEPA
- Within the plan there are objectives for a 10-year period to restore 200 to 300 acres of riparian areas, aligned with priority watersheds, to restores or enhances 100 to 150 miles of stream habitat, improve or maintains function of 10 to 20 individual springs, and improve or maintain watershed function on a total of 5,000 to 10,000 acres for a 10-year period which improve riparian habitat that may contribute to the recovery of this species.

New Mexico Meadow Jumping Mouse

The New Mexico meadow jumping mouse (*Zapus hudsonius luteus*) was listed as endangered, but no critical habitat was designated for this species within the Carson. There is no recovery plan for the New Mexico meadow jumping mouse, but a recovery outline was completed in June 2014 (USDI FWS 2014c). New Mexico meadow jumping mouse is a subspecies of meadow jumping mice (*Zapus hudsonius*) and is a riparian obligate rodent.

There are historical occurrence records of New Mexico meadow jumping mouse on the Carson near Fort Burgwin, El Rito, and Taos Ski Valley (Frey and Malaney 2009). Surveys targeting confirmed historic and potential jumping mouse localities were conducted throughout the entire Carson in 2012, but no jumping mice were captured (Frey 2012). The Carson is currently not within any of the New Mexico conservation areas for this species. This species is not present on the Carson national forest and is not likely to become established. However as stated in FW-WFP-G, "Management activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from the most recent approved USFWS recovery plan, to maintain the persistence or contribute to the recovery of federally listed species.", which could include habitat suitability assessments and surveys for this species. Alsothe preferred alternative contains plan components (Table 33) that could improve riparian habitat tocontribute to the primary needs for this species.

No effect finding was made for New Mexico meadow jumping mouse. USDI Fish and Wildlife concurrence is not being requested for this species at this time.

Conservation Measures

For any project, the national forest considers needs for the species in project design, analyzes effects of the project, and consults with the Fish and Wildlife Service as needed. Other conservation actions include:

- Surveys and monitoring for New Mexico meadow jumping mouse are conducted under applicable permits and in accordance with Fish and Wildlife Service survey protocol when applicable
- Habitat assessment for this species is conducted during site specific NEPA
- Within the plan there are objectives for a 10-year period to restore 200 to 300 acres of riparian areas, aligned with priority watersheds, to restores or enhances 100 to 150 miles of stream habitat, improve or maintains function of 10 to 20 individual springs, and improve or maintain watershed function on a total of 5,000 to 10,000 acres for a 10-year period which improve riparian habitat that may contribute to the recovery of this species.

Black-footed Ferret

Black-footed ferret is federally listed as endangered, but no critical habitat has been designated on the Carson National Forest. This species relies on Montane Subalpine Grassland vegetation communities, and is highly dependent on the presence of prairie dog colonies of at least 80 to 100 acres in size, depending upon the prairie dog species (USDI FWS 2013). Black-footed ferrets, critical habitat, and habitat for black-footed ferret, do not currently occur on the Carson. There are no prairie dog colonies of at least 80 to 100 acres in size, which is the key habitat requirement for this species. Black-footed ferrets are not present on the Carson and are not likely to become established. However as stated in FW-WFP-G, "Management activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from the most recent approved USFWS recovery plan, to maintain the persistence or contribute to the recovery of federally listed species.", which

could include habitat suitability assessments, surveys for the prey base species of black-footed ferrets, and possible reintroductions. Also, the preferred alternative contains plan components (Table 31) that could improve Montane Subalpine Grassland habitat in the future, and contribute to the primary needs for this species.

No effect finding was made for black-footed ferret. USDI Fish and Wildlife concurrence is not being requested for this species at this time.

Conservation Measures

For any project, the national forest considers needs for the species in project design, analyzes effects of the project, and consults with the Fish and Wildlife Service as needed. Other conservation actions include:

- Surveys and monitoring for Gunnison prairie dogs colonies and habitat assessment is conducted during site specific NEPA
- Within the plan there are several plan components and management approaches for the persistence of Gunnison prairie dog which in turn could contribute to the recovery of this species. These include: Desired conditions (FW-VEG-DC 8, FW-VEG-MSG-DC 4, 7, 10-11, FW-VEG-SAGE-DC 9, AND FW-DC-SL-DC 1-3) which ensures soil condition is satisfactory, and functioning properly as defined by current Forest Service protocols, Management approach 5 within all vegetation (VEG) suggests using methods, such as fencing, aerating soil (decompacting soils), improving livestock grazing strategies, or strategically locating constructed waters or roads to protect and enhance grassland composition, structure, and productivity and soil function, and Management Approach 10 in the Wildlife, Fish, and Plants section suggests coordination with the New Mexico Department of Game and Fish, for “dusting” prairie dog colonies with flea-controlling powder to reduce the spread of sylvatic plague. See appendix C for additional plan components.

Appendix B – Maps

This appendix includes maps referenced in the Biological Assessment.

Figure 1. Vicinity map of the Carson National Forest

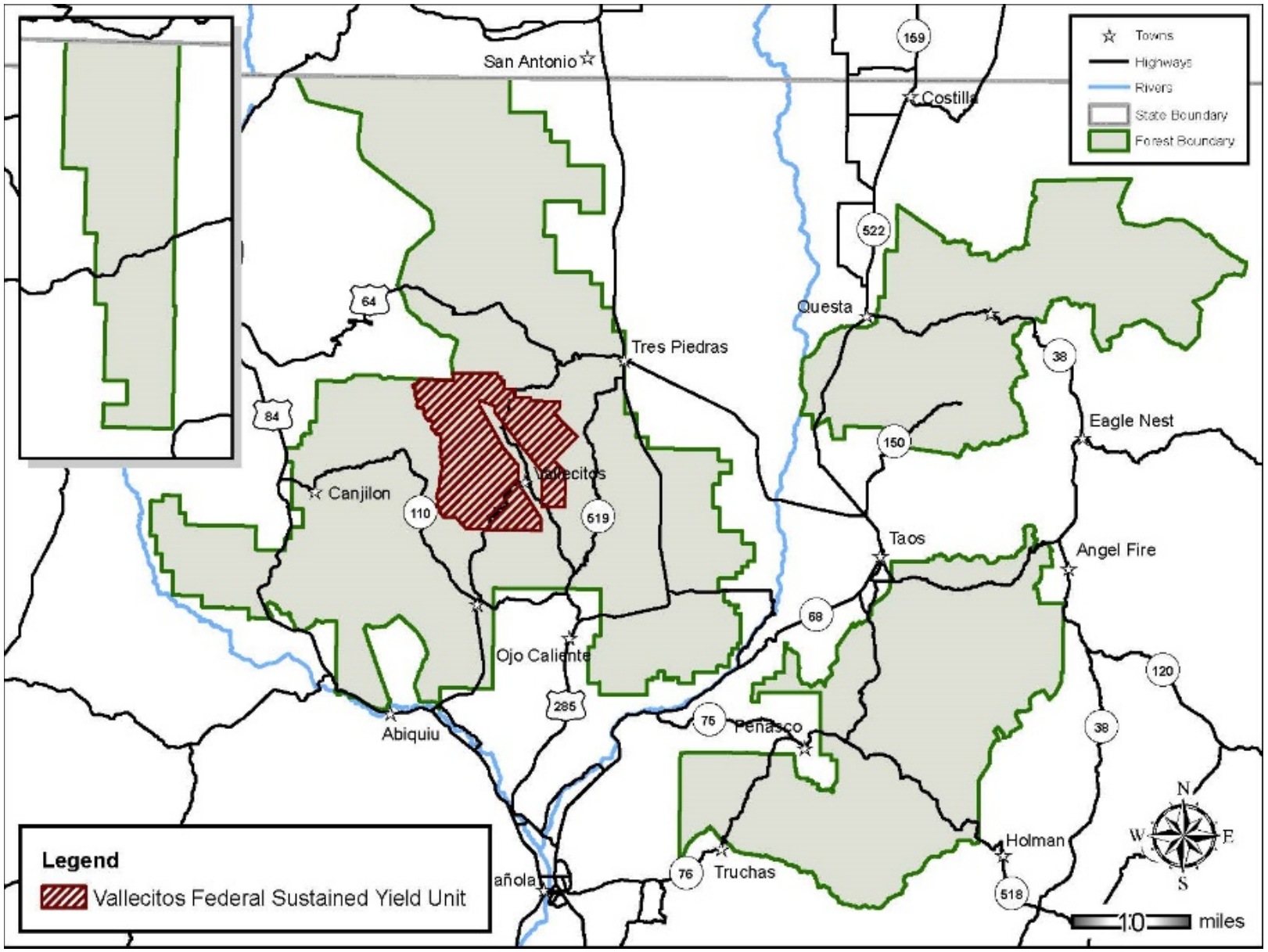

Figure 2. Vallecitos Federal Sustained Yield Unit, El Rito Ranger District

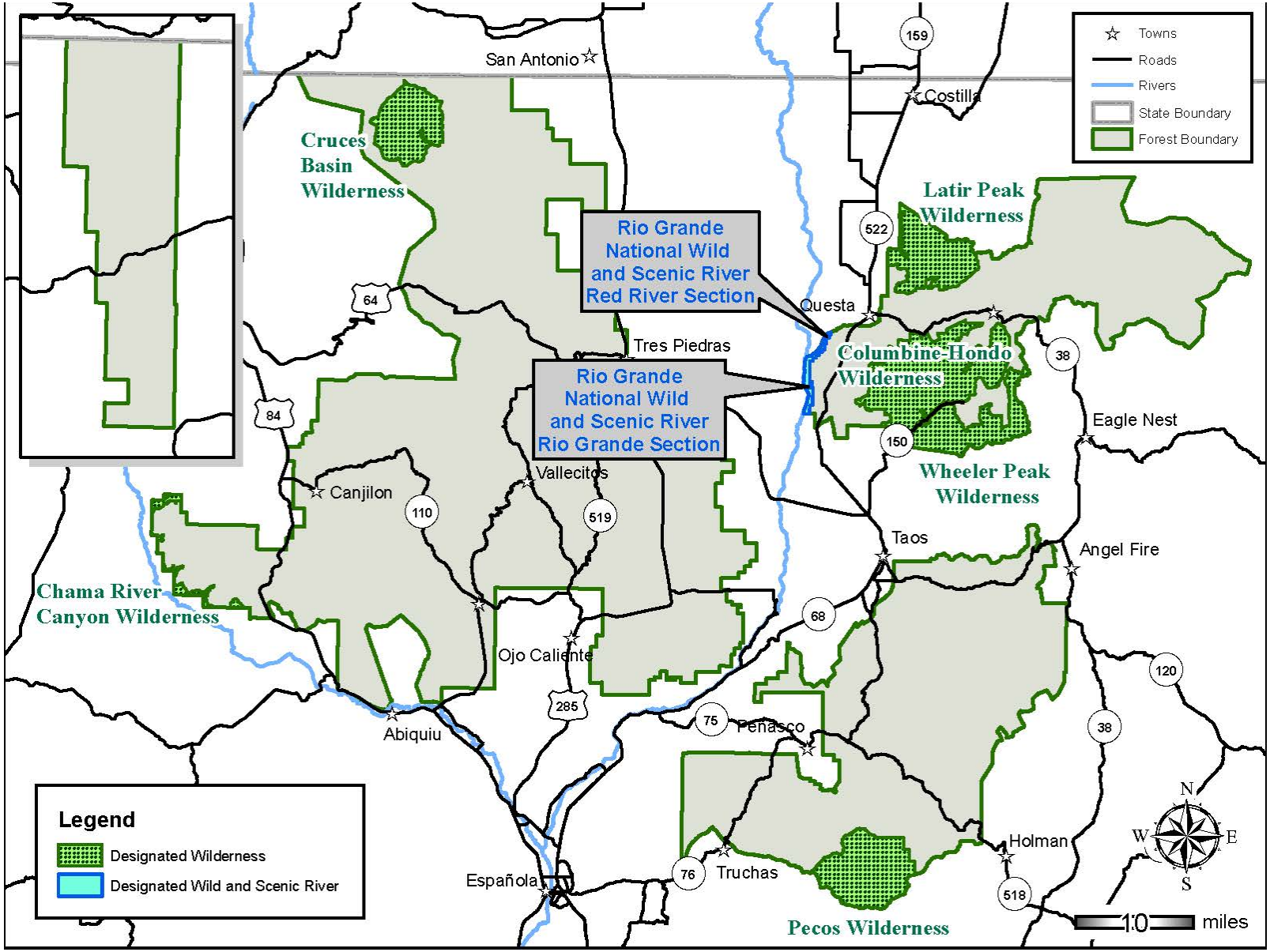

Figure 3. Designated wilderness and designated wild and scenic rivers on the Carson National Forest

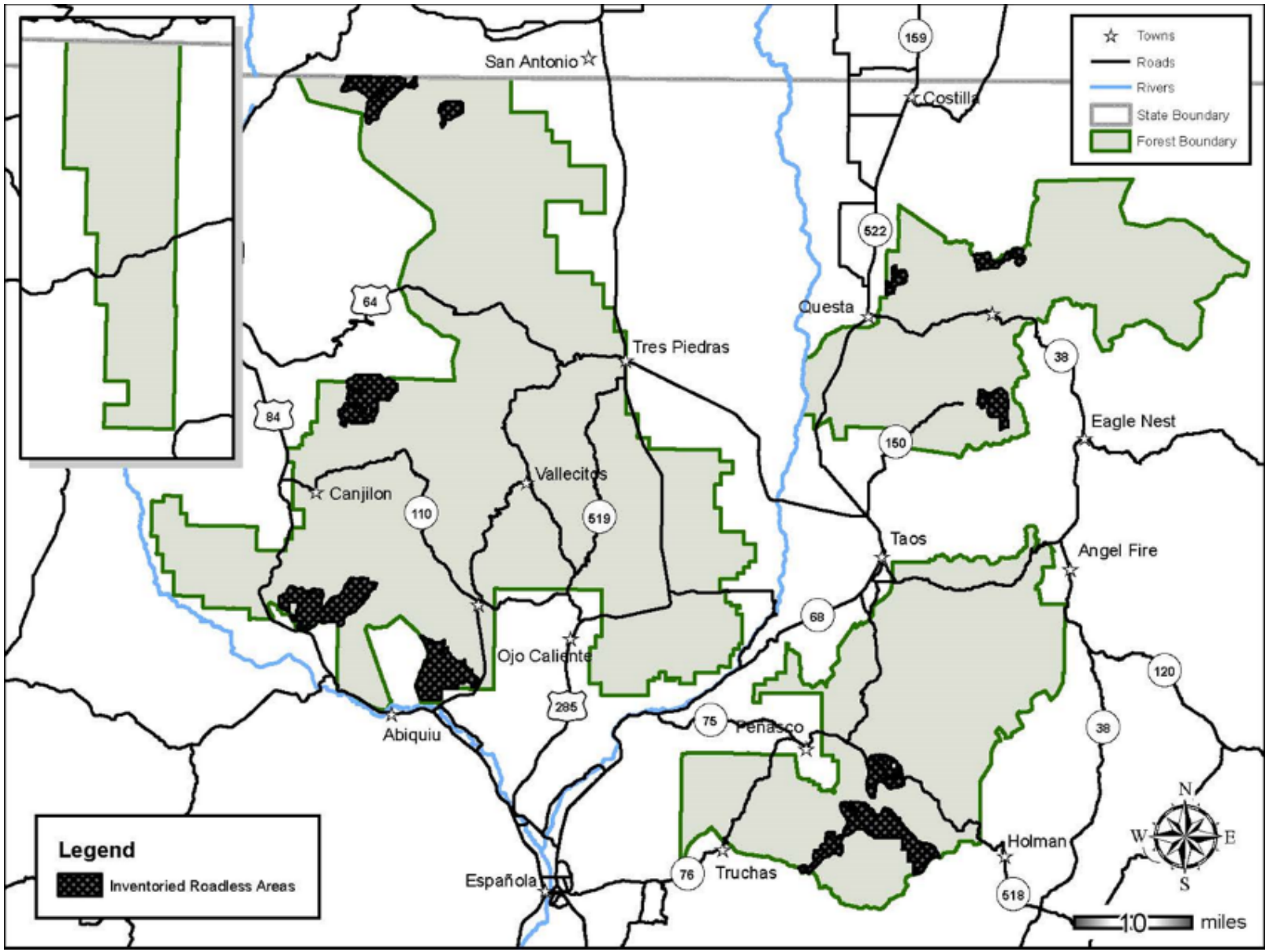

Figure 4. Inventoried roadless areas on the Carson National Forest

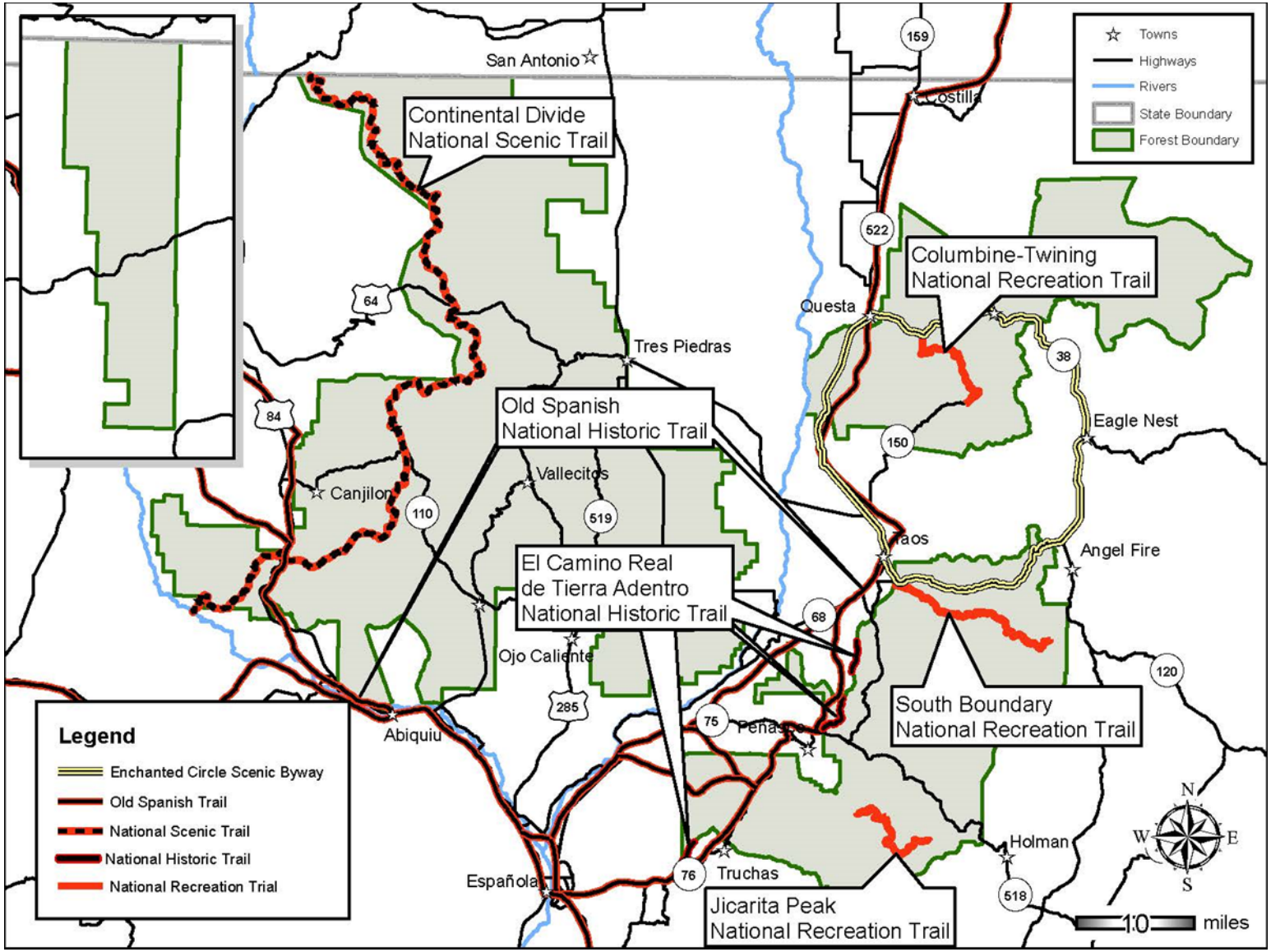

Figure 5. National scenic, historic, and recreation trails and national scenic byways on the Carson National Forest

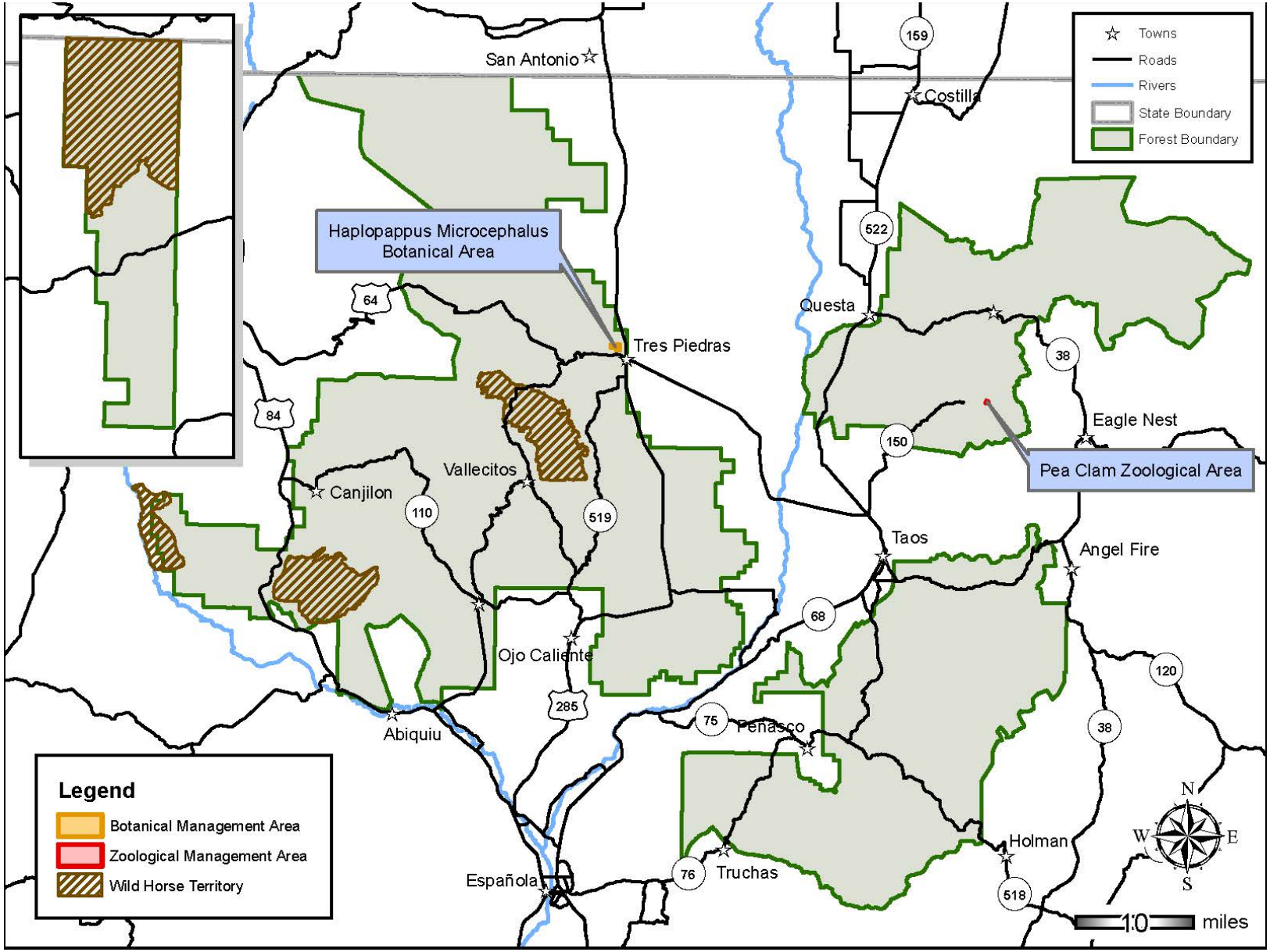

Figure 6. Designated wild horse territories, zoological, and botanical areas on the Carson National Forest

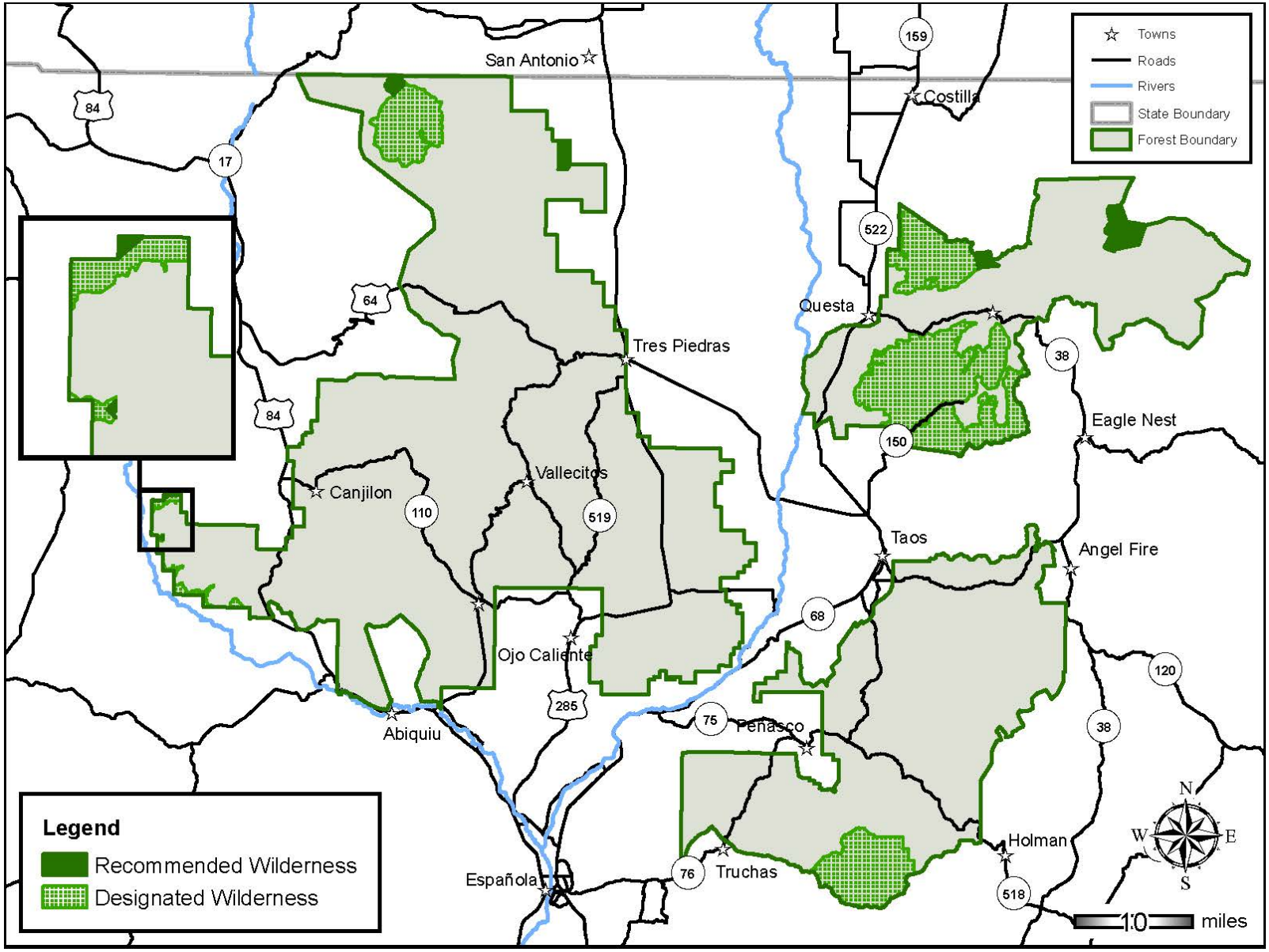

Figure 7. Recommended wilderness management areas on the Carson National Forest

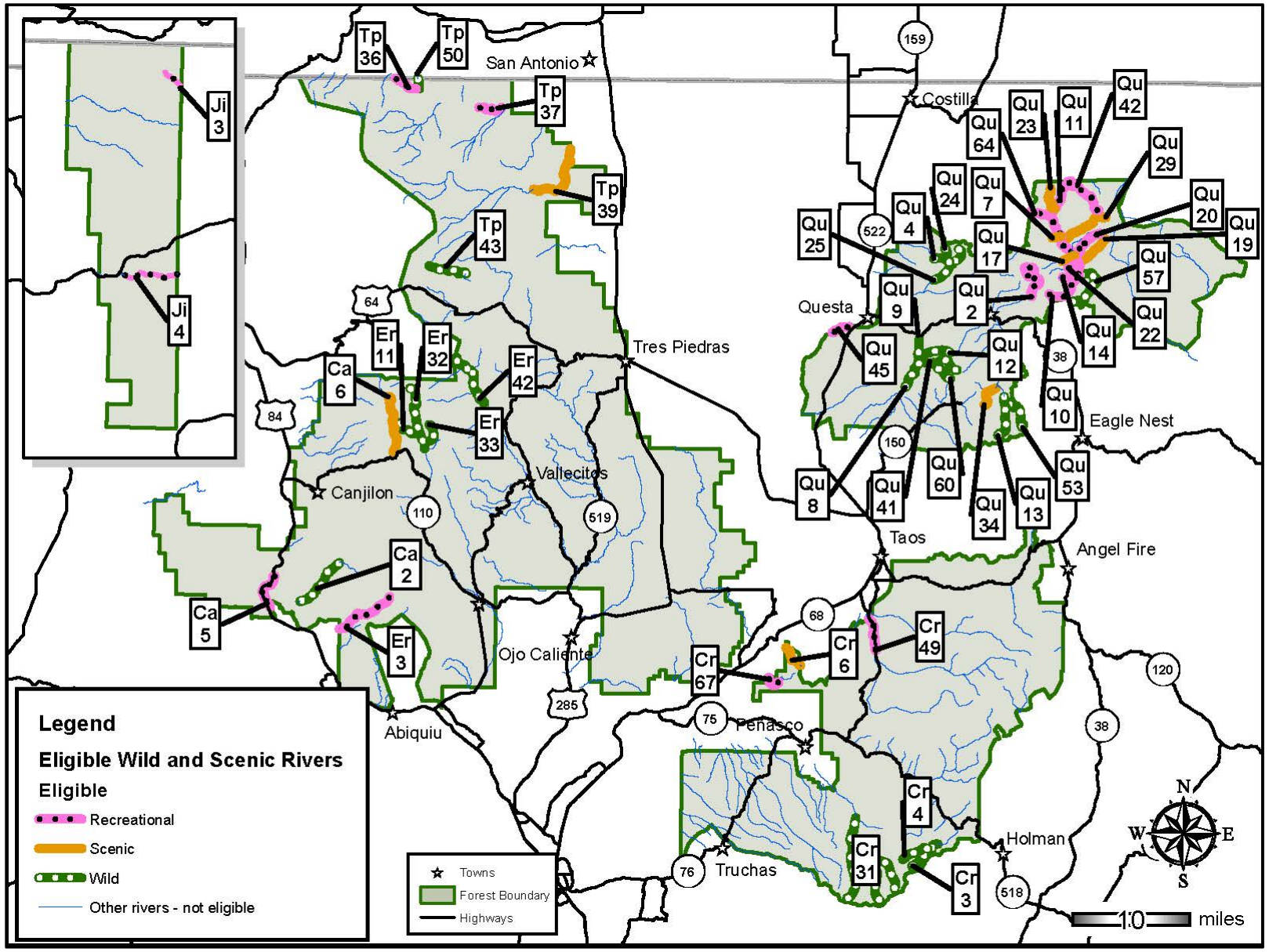

Figure 8. Eligible wild and scenic rivers on the Carson[12] National Forest

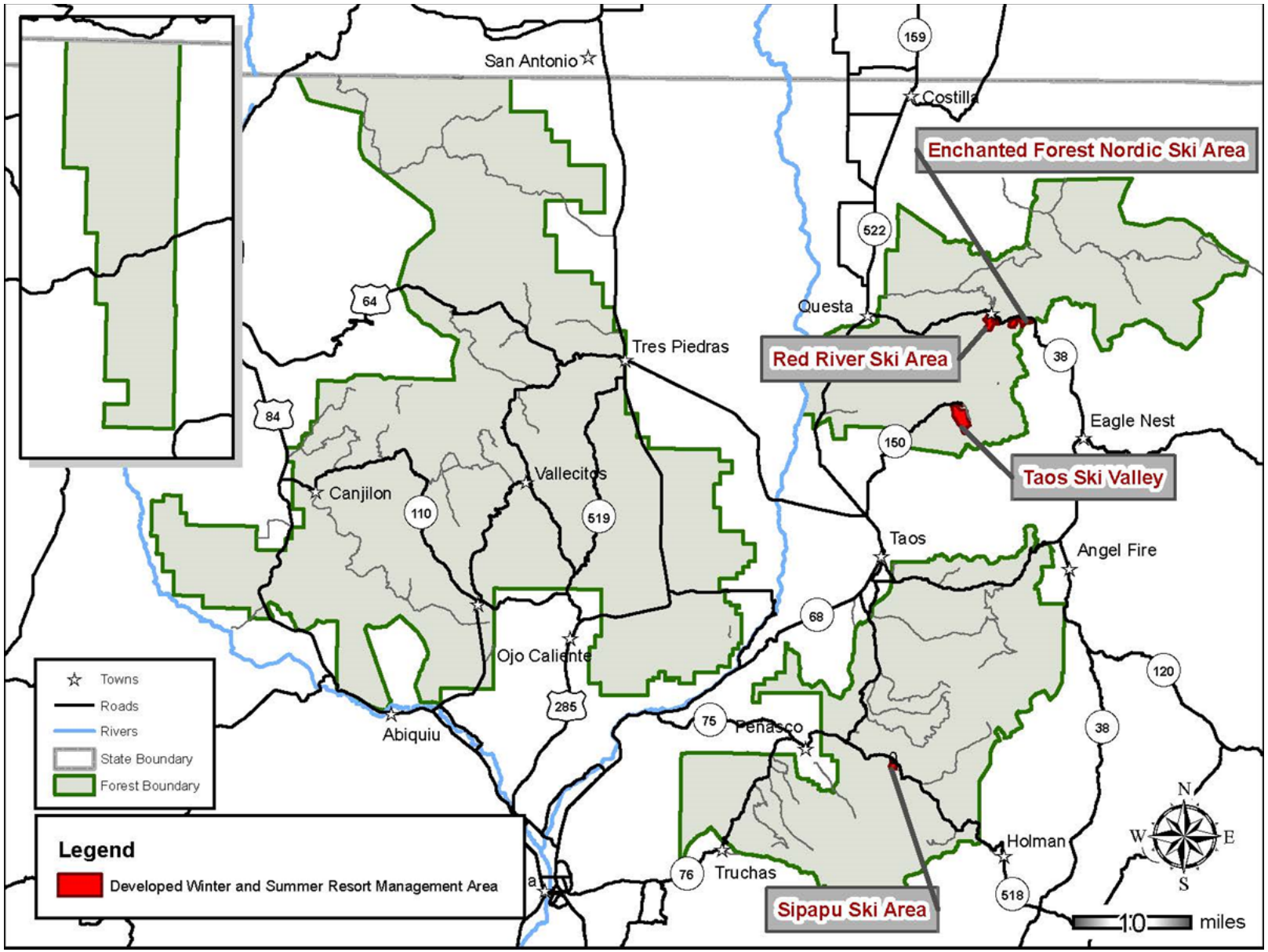

Figure 9. Developed winter and summer resort management areas on the Carson National Forest

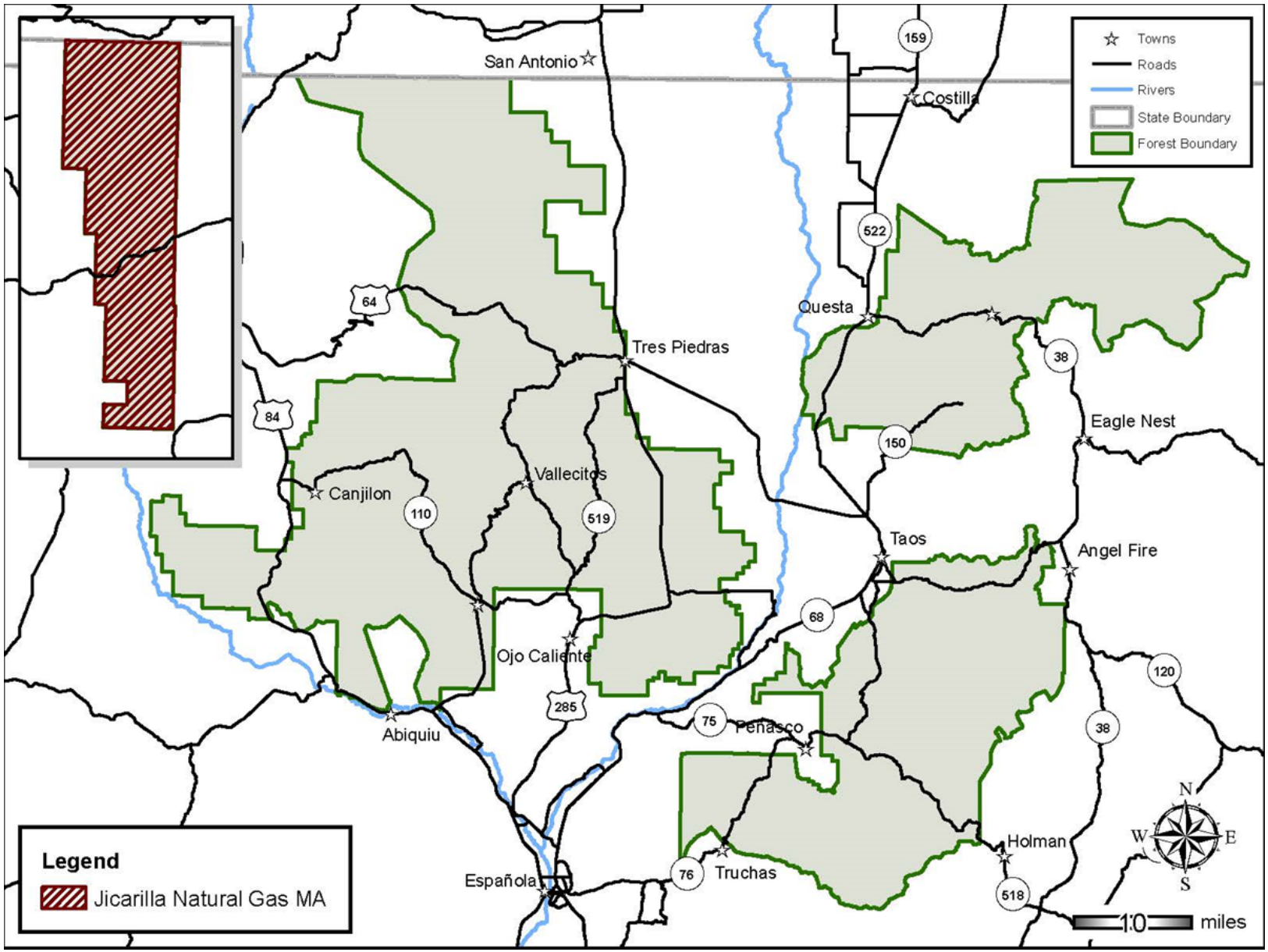

Figure 10. Jicarilla natural gas management of the Carson National Forest

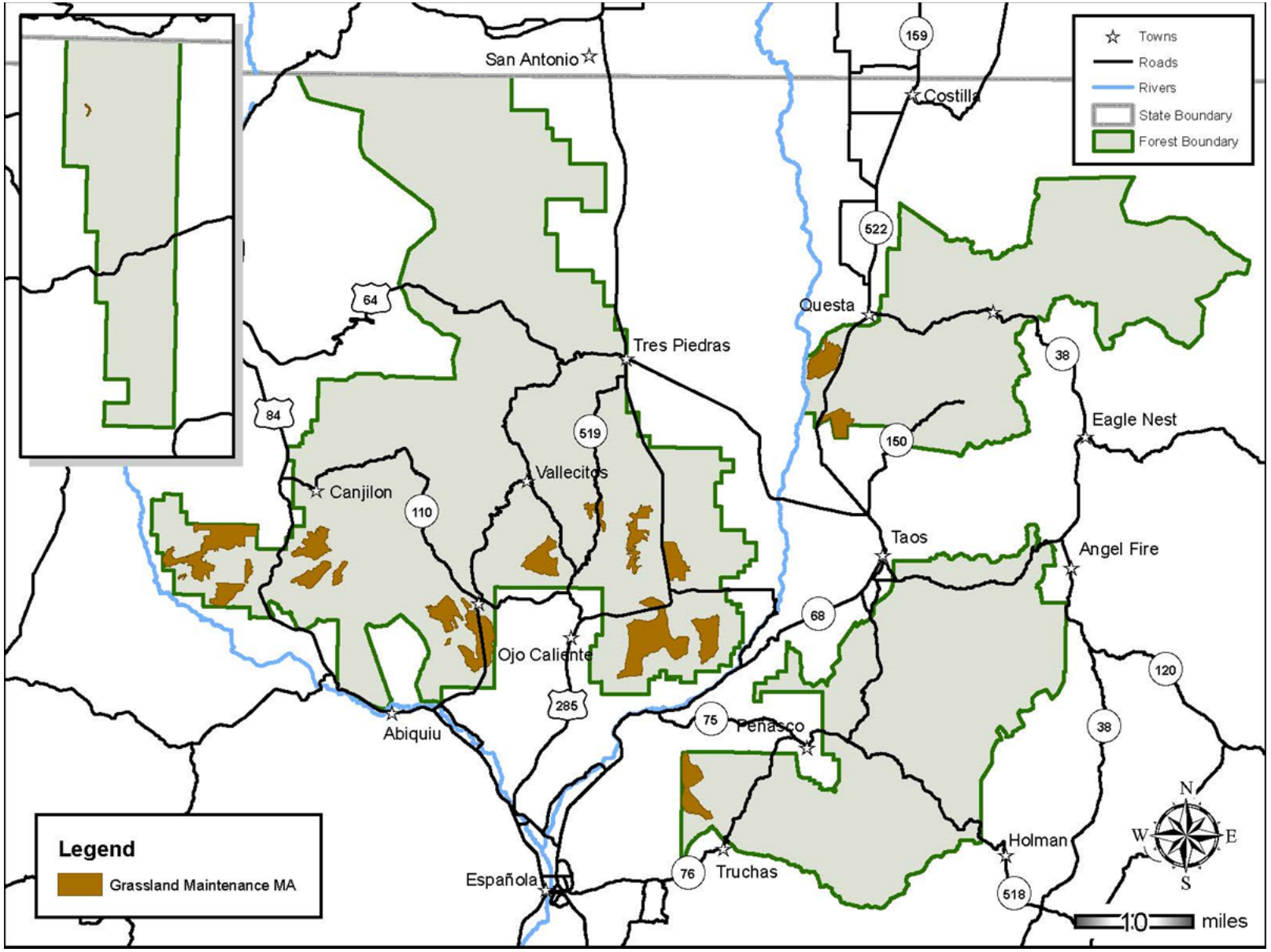

Figure 11. Grassland maintenance management areas on the Carson National Forest

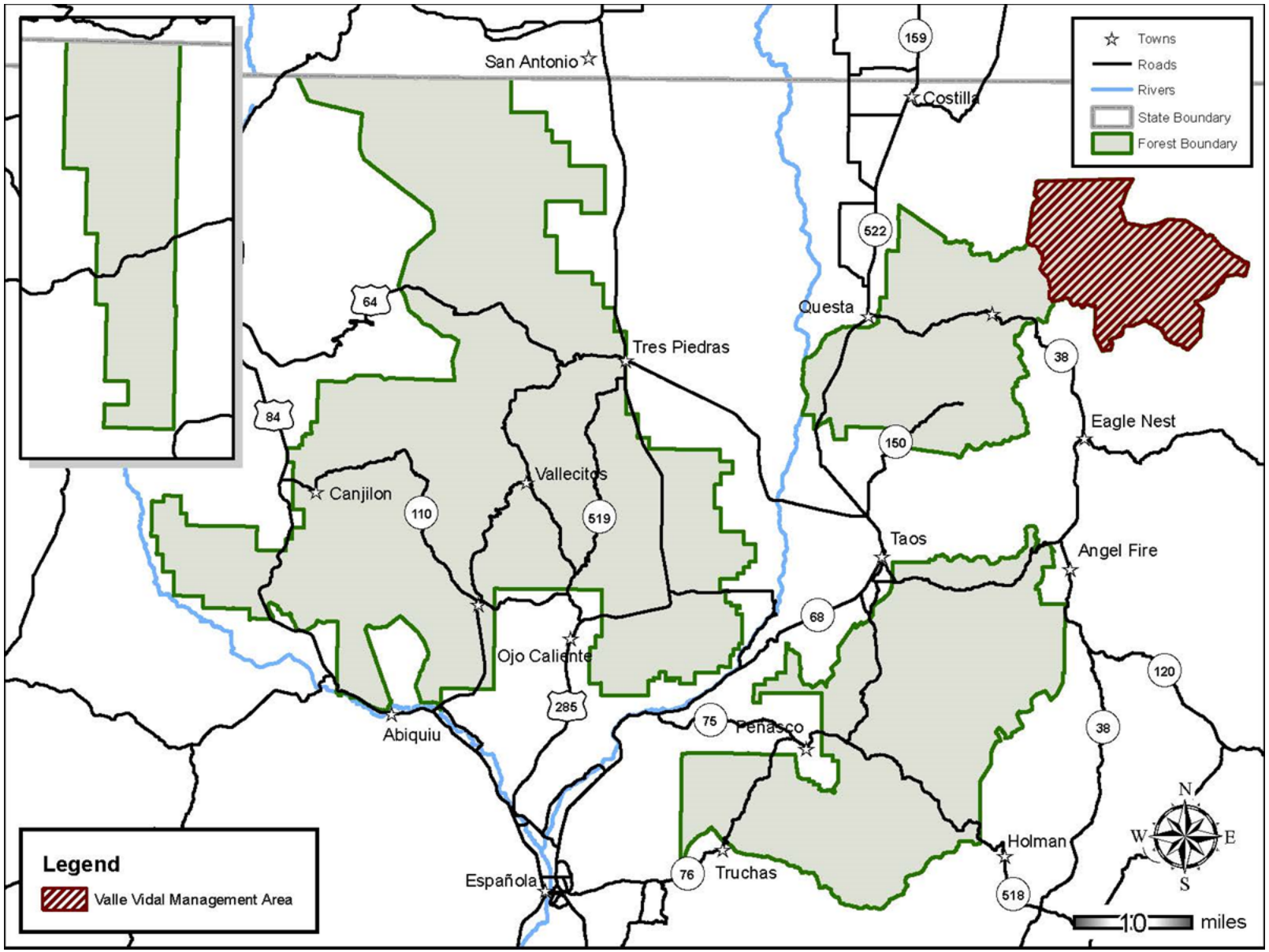

Figure 12. Valle Vidal Management Area on the Carson National Forest

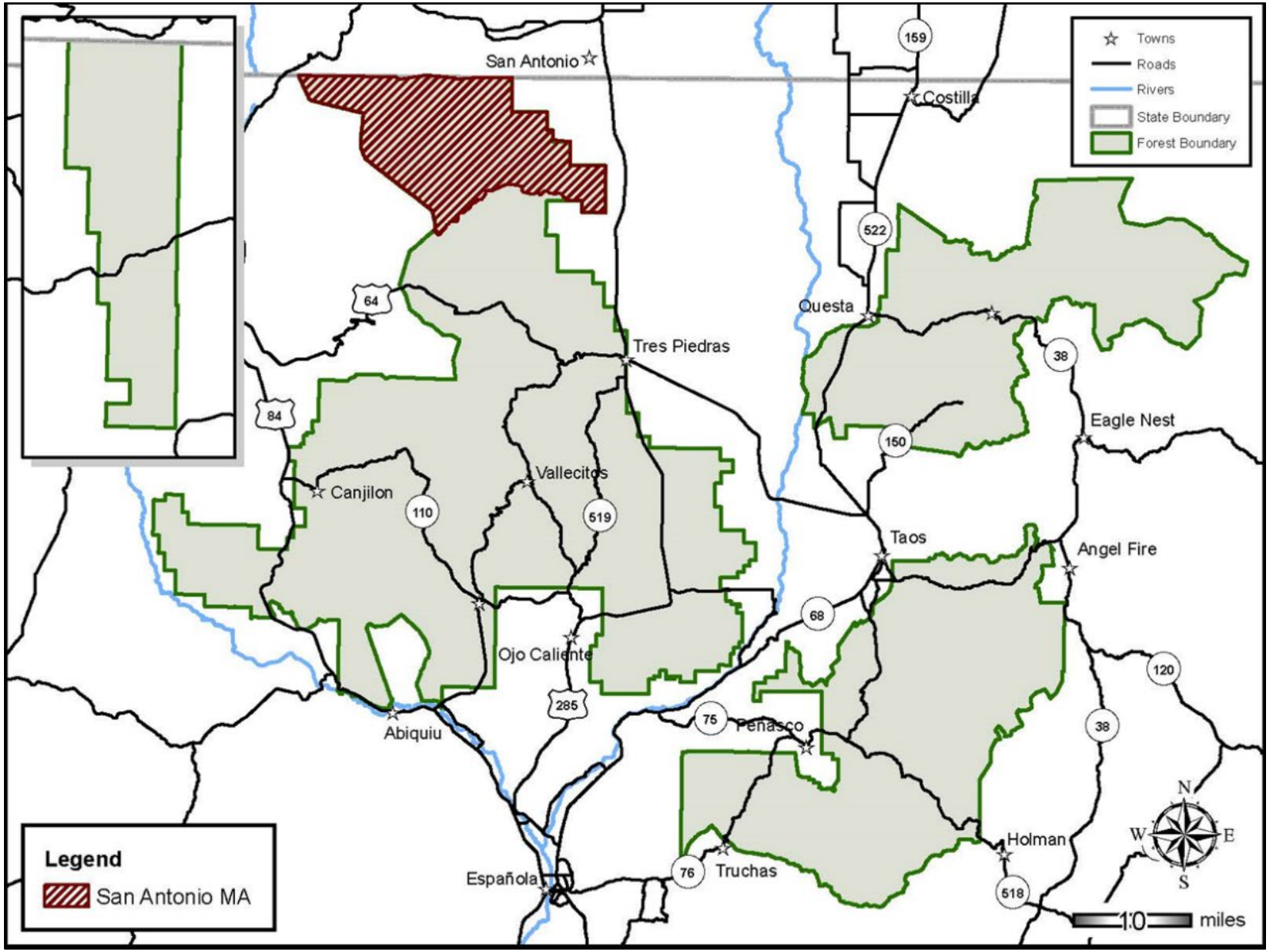

Figure 13. San Antonio Management Area on the Carson National Forest

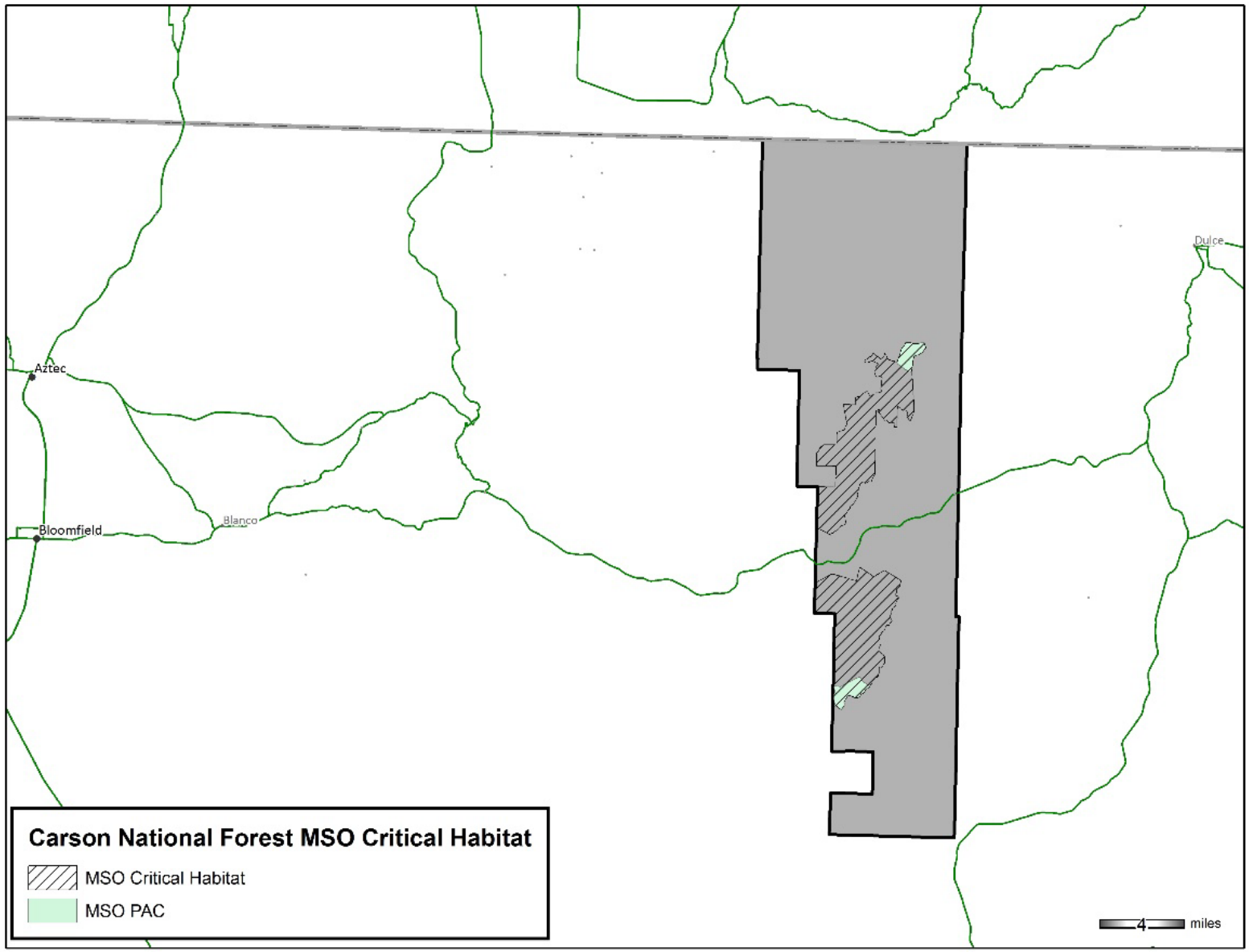

Figure 14. Mexican spotted owl protected activity centers and critical habitat on the Jicarilla Ranger District of the Carson National Forest

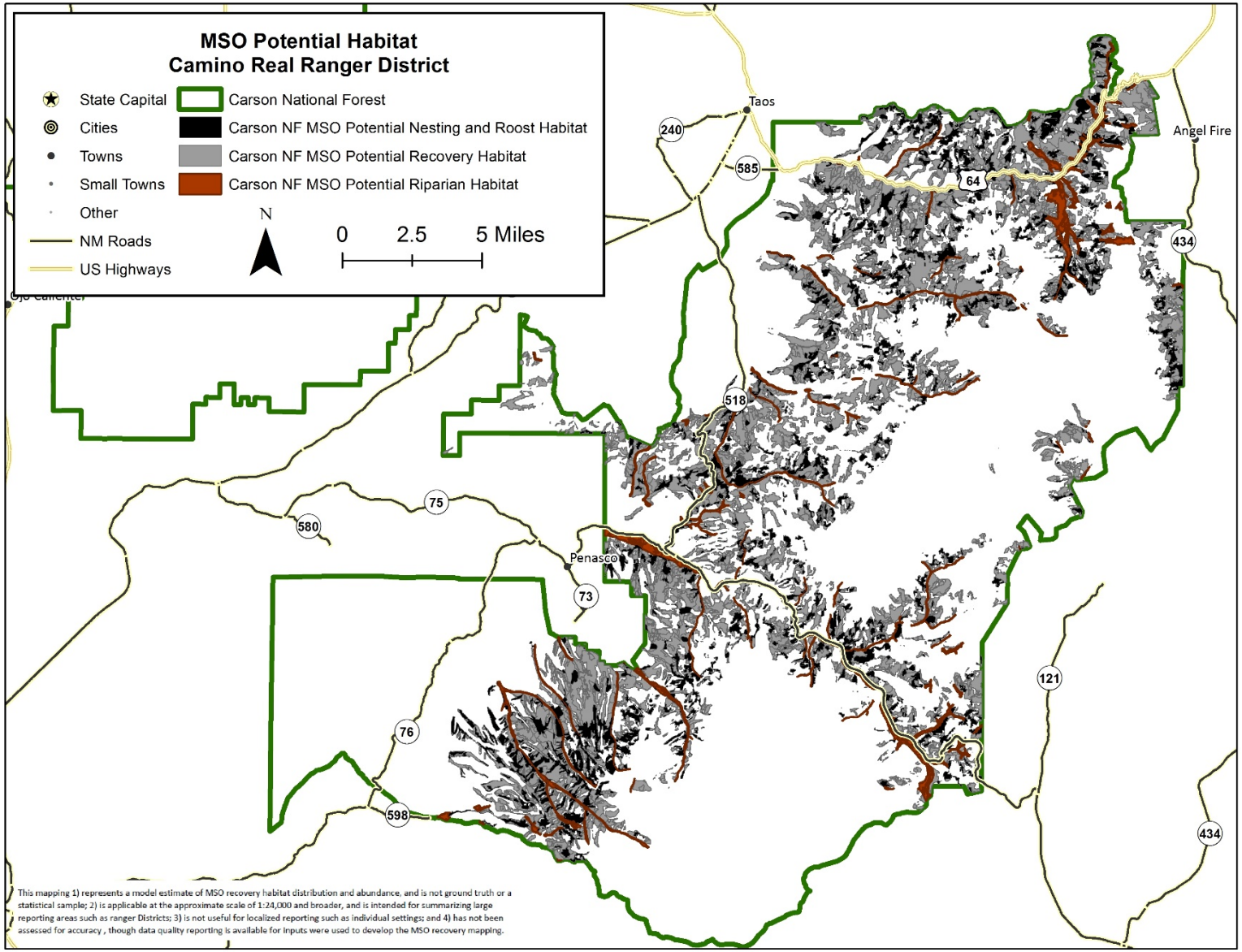

Figure 15. Camino Real Ranger District potential Mexican spotted owl recovery habitat

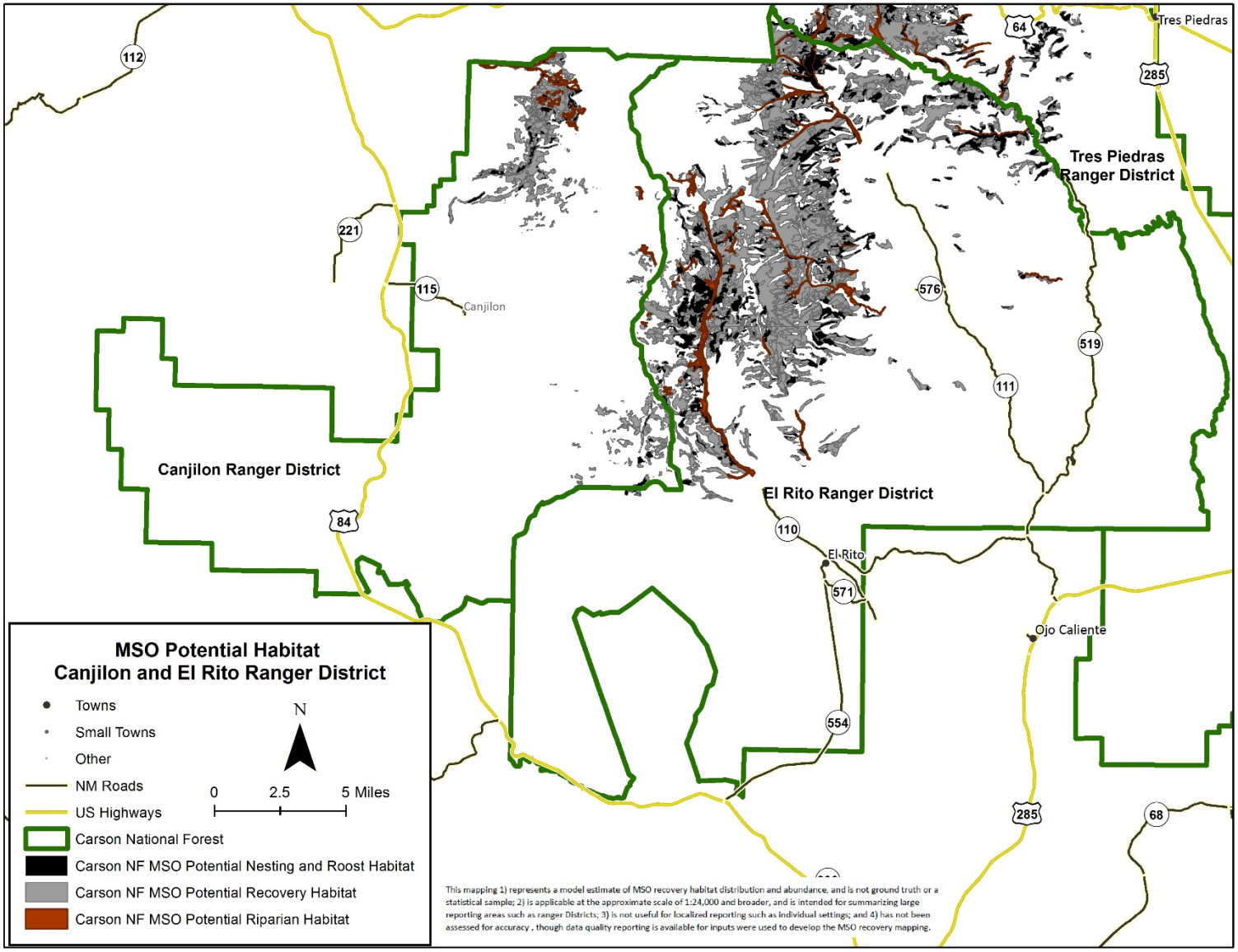

Figure 16. Canjilon and El Rito Ranger Districts potential Mexican spotted owl recovery habitat

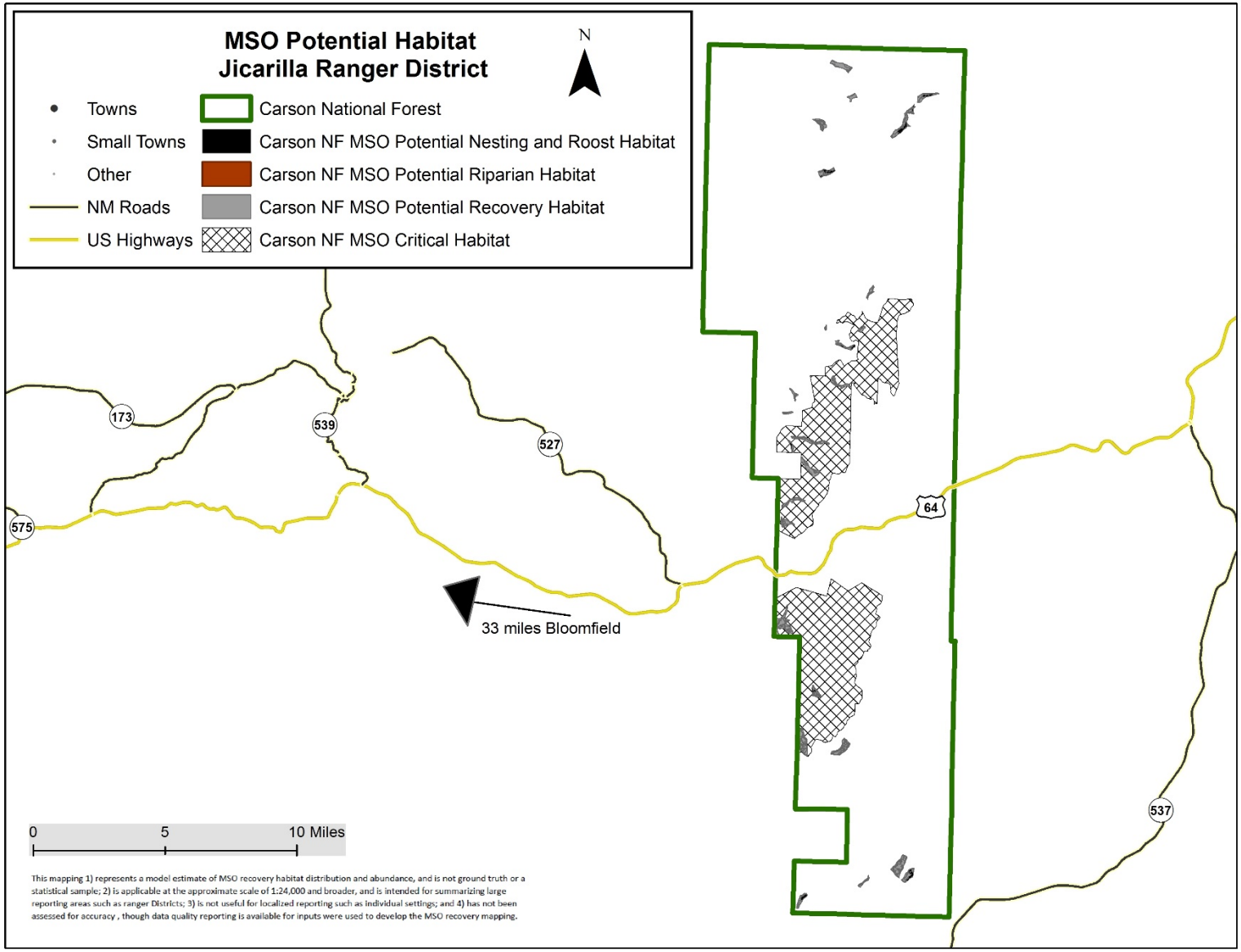

Figure 17. Jicarilla Ranger District potential Mexican spotted owl recovery habitat

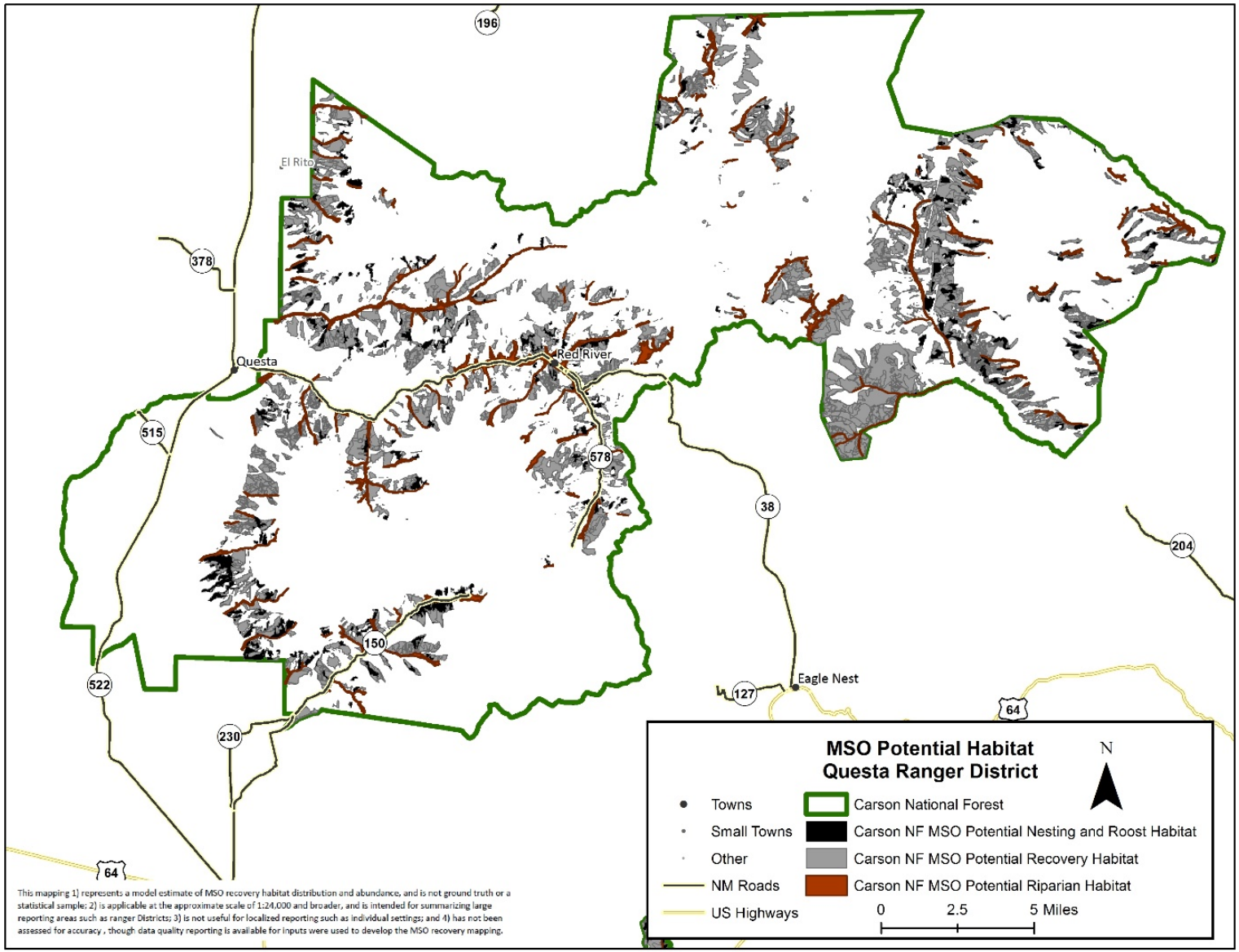

Figure 18. Questa Ranger District potential Mexican spotted owl recovery habitat

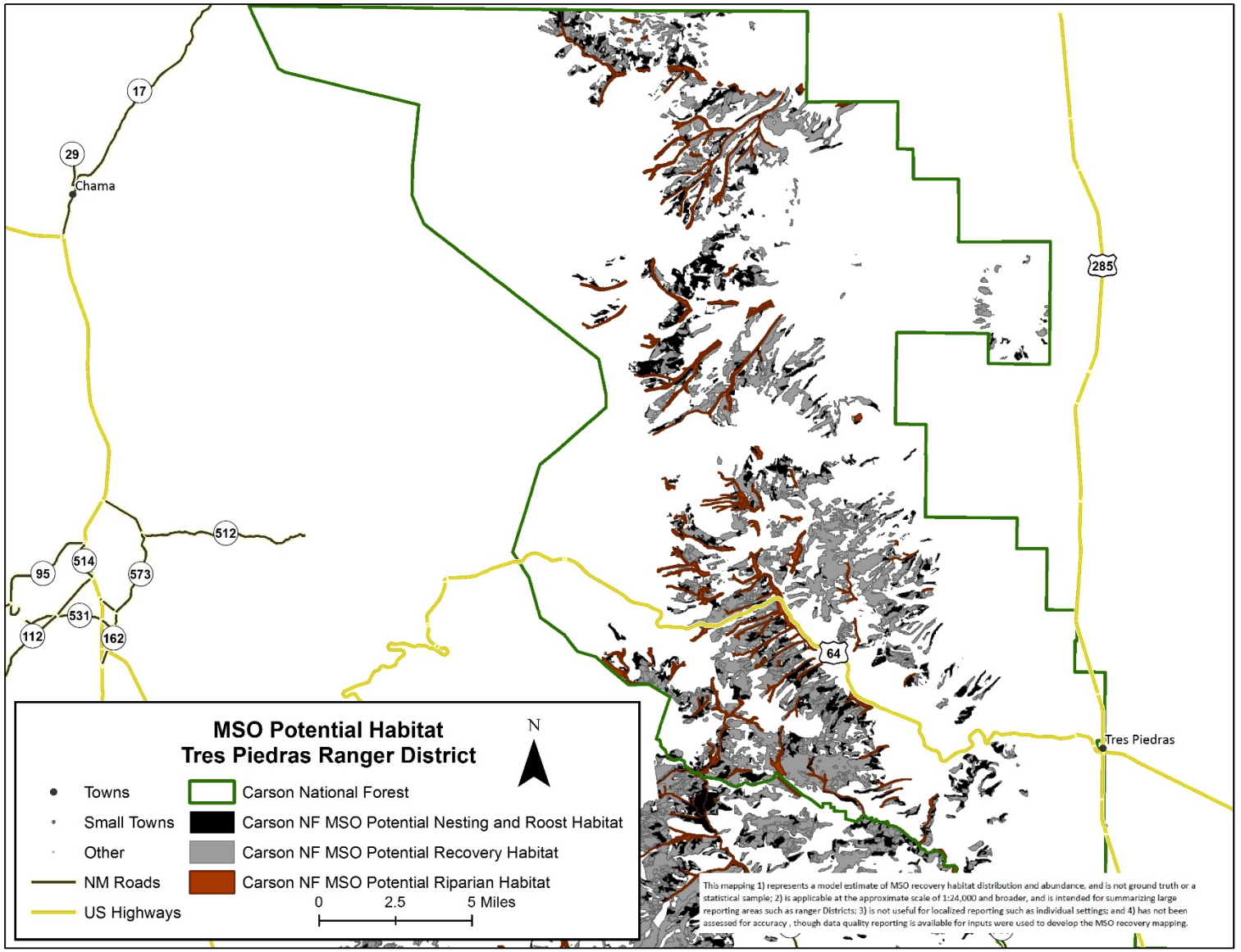

Figure 19. Tres Piedras Ranger District potential Mexican spotted owl recovery habitat

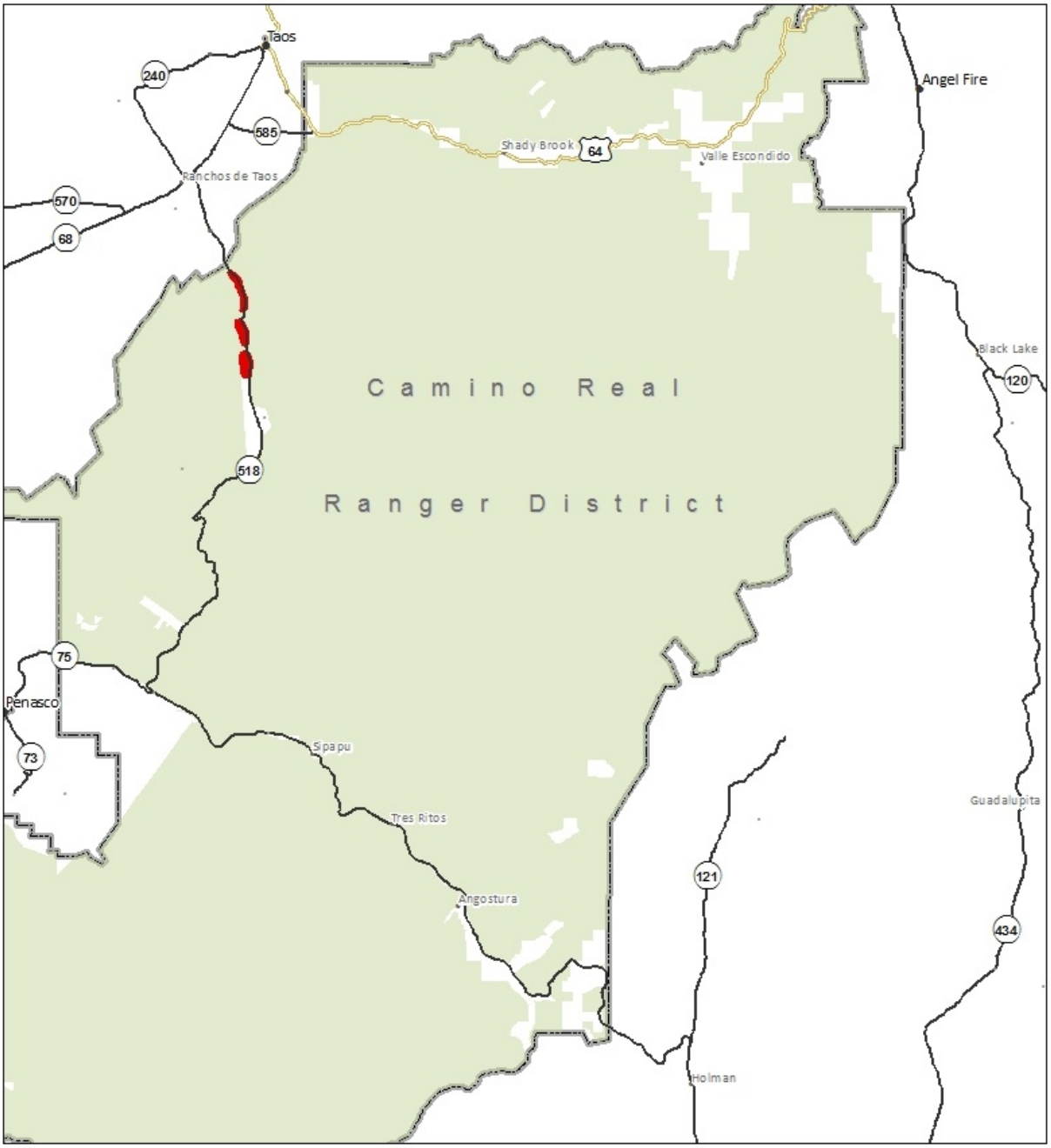

Figure 20. Southwestern willow flycatcher critical habitat on the Camino Real Ranger District of the Carson National Forest

Appendix C – Species Crosswalk: Plan Components for Threatened and Endangered Wildlife Species

Please see attachment which includes plan components written out for this appendix. These crosswalks compile land management plan guidance intended to increase persistence of threaten and endangered species. Plan components consist of coarse-filter and fine-filter approaches and demonstrate the widespread but detailed attention the land management plan provides for managing ecosystems for the persistence of each at-risk species (Section 1). Plan components that address the issues and threats that are impacting Threaten and Endangered species are also compiled (Section 2). Several comments and requests from the public were made concerning how lynx is covered in the Carson land management plan and that the Southern Rockies management direction be included in the plan. The Mexican spotted owl 2012 recovery plan crosswalk (Section 3) shows how the proposed land management plan and the revised recovery plan (USDI FWS 2012b) compare. Finally, wildlife habitat connectivity is addressed through a variety of coarse- and fine-filter plan components in multiple resource areas (Section 4).

The Carson has identified six of these species are federally listed threatened or endangered (Section 1). Through analysis of known data and scientific literature, eight (8) issues and six (6) threats have been identified as negatively impacting the persistence of threaten and endangered species on the national forest (Section 2).

If someone is interested in what the Carson is doing for any particular at-risk species, it would be difficult to find that individual species in one place in the land management plan. Rather, the Carson National Forest is managing the ecological conditions that may negatively be impacting each at-risk species. This, in turn, improves conditions not just for threaten and endangered species but for a myriad of other species dependent upon those same ecological conditions. In addition, since wildlife can be impacted by numerous resources and activities (for example, vegetation, water, roads, recreation, range, etc.) wildlife plan components are integrated throughout multiple resource sections within the land management plan and the full scope of plan components for any species is not evident in only the wildlife section. These crosswalks pull together all the plan components and management approaches in one location to better demonstrate how the Carson will manage for the persistence of each threaten and endangered species.

Section 1. Threaten and Endangered species Crosswalk by Species

The Carson has identified six of these species are federally listed threatened or endangered. These include Mexican spotted owl, southwestern willow flycatcher, black-footed ferret, western yellow-billed cuckoo, New Mexico meadow jumping mouse, and Canada lynx. Only Mexican spotted owl, southwestern willow flycatcher, and Canada lynx are known to occur on the Carson National Forest. However, in this crosswalk plan component that benefit species not known to occur on the Carson at this time have been included. The plan components (coarse and fine filter) that maintain or improve ecological conditions and minimize threats for these species are listed in the table below.

Table 29. Plan components (coarse and fine filter) and management approaches that maintain or improve ecological condition and minimize threats for Mexican spotted owl

Ecological Conditions	Issues and Threats	Desired Conditions (Coarse Filter)	Objectives, Standards, and Guidelines (Coarse Filter)	Desired Conditions, Objectives, Standards, and Guidelines, and Management Approaches (Fine Filter)
Mixed-conifer with frequent fire Mixed-conifer with Aspen Riparian areas	Seral state departure Snag density departure Stand-replacing fire Specific ecological features	FW-VEG-DC-1-3, FW-VEG-DC-5, FW-VEG-DC-10-12, FW-VEG-DC-19-20, FW-VEG-MCW-DC-1-9, FW-VEG-MCW-DC-12, FW-VEG-MCD-DC-1-6, FW-VEG-MCD-DC-8-11, FW-VEG-MCD-DC-19-20, FW-WSW-DC-1-3, FW-WSW-RMZ-DC-1-5, FW-WSW-RMZ-DC-7, FW-WSW-RMZ-DC-9, FW-WSW-RMZ-WR-DC-1,FW-WSW-RMZ-WR-DC-3, FW-WSW-RMZ-FSR-DC1-3, FW-WSW-RMZ-FSR-DC-5-6, FW-CRF-DC-1-2, FW-WFP-DC-1-2, FW-WFP-DC-6, FW-FIRE-DC-1-2 FW-FIRE-DC-4-5, FW-FPP-DC-1, FW-FPP-DC-4, FW-FPP-DC-5,FW-TFA-DC-5, FW-MM-DC-1, DA-WILD-DC-2-4, MA-JICMA-DC-1, MA-RWMA-DC-1-4 MA-VVMA-DC-1-3, MA-SAMA-DC-1-2	FW-VEG-G-3, FW-VEG-MCD-O-1-2, FW-WSW-O-1, FW-WSW-RMZ-O-1, FW-WSW-RMZ-G-2-3, FW-WSW-RMZ-STM-G-2,FW-CRF-G-1, FW-WFP-O-1-2, FW-FFP-S-1-2, FW-FFP-S-5, FW-FFP-G-1, FW-TFA-O-1, FW-TFA-S-3, DA-WSR-S-1-2, MA-VVMA-G-1-2, MA-SAMA-S-1-2	FW-VEG-DC-14, FW-VEG-DC-21, FW-VEG-G-1-2, FW-WSW-DC-5, FW-WSW-RMZ-FSR-G-3, FW-WFP-DC-1-3, FW-WFP-G-1-2, WFP MANAGEMENT APPROACH 1, WFP MANAGEMENT APPROACH 2, WFP MANAGEMENT APPROACH 6,

Table 30. Plan components (coarse and fine-filter) and management approaches that maintain or improve ecological condition and minimize threats for southwestern willow flycatcher and western yellow-billed cuckoo

Ecological Conditions	Issues and Threats	Desired Conditions (Coarse Filter)	Objectives, Standards, and Guidelines (Coarse Filter)	Desired Conditions, Objectives, Standards, and Guidelines, and Management Approaches (Fine Filter)
Riparian areas Forest and Shrub Riparian	Seral state departure Stand-replacing fire Invasive vegetative encroachment Disconnected floodplains Fragmented Riparians Specific ecological features Intrusive human activities	FW-VEG-DC-1-3, FW-VEG-DC-5, FW-VEG-DC-10-11, FW-VEG-DC-20, FW-WSW-DC-1-2, FW-WSW-DC-6, FW-WSW-RMZ-DC-1-8, FW-WSW-RMZ-FSR-DC-1-5, FW-WSW-RMZ-FSR-DC-8, FW-WFP-DC-4-10, FW-NIS-DC-1, FW-GRZ-DC-3-6, FW-TFA-DC-4-5, FW-FIRE-DC-1-5, FW-MM-DC-1, FW-WILD-DC-1, DA-WHT-DC-1, MA-RWMA-DC-1, MA-VVMA-DC-1-3, MA-SAMA-DC-1-2	FW-VEG-G-1-3, FW-WSW-O-1, FW-WSW-G-1-2, FW-WSW-RMZ-O-1, FW-WSW-RMZ-G-2-3, FW-WFP-O-1, FW-WFP-O-5, FW-NIS-O-1, FW-NIS-S-1, FW-NIS-G-1-3, FW-GRZ- S 1, FW-GRZ-G-2-5, FW-FFP-S-2, FW-REC-G-1, FW-REC-G-3, FW-REC-G-5, FW-TFA-S-3, FW-TFA-G-1-2, FW-TFA-G-6, FW-FIRE-G-3, FW-FIRE-G-5, DA-WSR-S-2, FW-MM-G-1, DA-WILD-S-1, MA-EWSR-S-1, MA-EWSR-G-1, MA-VVMA-G-1-2, MA-SAMA-S-1-2	FW-VEG-DC-14, FW-VEG-DC-21, FW-VEG-G-1-3, FW-WSW-DC-5, FW-WSW-RMZ-FSR-DC-12, FW-WSW-RMZ-FSR-G-1-3, FW-WFP-DC-1-3, FW-WFP-G-1-2, FW-FIRE-G-4, FW-FIRE-G-8-9, WFP MANAGEMENT APPROACH 1, WFP MANAGEMENT APPROACH 2, WFP MANAGEMENT APPROACH 6

Table 31. Plan components (coarse and fine filter) and management approaches that maintain or improve ecological condition and minimize threats for black-footed ferret

Ecological Conditions	Issues and Threats	Desired Conditions (Coarse Filter)	Objectives, Standards, and Guidelines (Coarse Filter)	Desired Conditions, Objectives, Standards, Guidelines and Management Approaches (Fine Filter)
Montane Subalpine Grassland Sagebrush shrubland	Intrusive human disturbance Unnatural disease spread Human-made features	FW-VEG-DC-1-3, FW-VEG-DC-5, FW-VEG-DC-10-11, FW-VEG-DC-19-20, FW-VEG-MSG-DC-1-4,FW-VEG-MSG-DC-10, FW-VEG-MSG-DC-14, FW-VEG-SAGE-DC-1-4, FW-NIS-DC-1, FW-GRZ-DC-4, FW-TFA-DC5, FW-SU-DC-7, MA-G-MMA-DC-1-3	FW-VEG-G-1-3, FW-WFP-O-1, FW-WFP-O-4, FW-WFP-G-1-2, FW-WFP-G-6, FW-NIS-O-1, FW-NIS-S-1, FW-NIS-G-1-3, FW-GRZ-S-3, FW-REC-G-3, FW-FAC-G-2, MA-VVMA-G-1-2, MA-SAMA-S-1-2	FW-VEG-DC-14, FW-VEG-DC-21, FW-VEG-G-1-3, FW-WFP-DC-1-3, FW-WFP-DC-7, FW-WFP-G-1-2, WFP MANAGEMENT APPROACH 1, WFP MANAGEMENT APPROACH 2, WFP MANAGEMENT APPROACH 6, WFP MANAGEMENT APPROACH 10

Table 32. Plan components (coarse and fine filter) and management approaches that maintain or improve ecological condition and minimize threats for Canada lynx

Ecological Conditions	Issues and Threats	Desired Conditions (Coarse Filter)	Objectives, Standards, and Guidelines (Coarse Filter)	Desired Conditions, Objectives, Standards, and Guidelines, and Management Approaches (Fine Filter)
Spruce fir forests Riparian areas Coarse woody debris	Seral State Departure Coarse woody debris departure Stand-replacing fire Intrusive human disturbance	FW-VEG-DC-1-3, FW-VEG-DC-5, FW-VEG-DC-10-12, FW-VEG-DC-20, FW-VEG-SFF-DC-1-4, FW-VEG-SFF-DC-7-10, FW-VEG-SFF-DC-12, FW-VEG-SFF-DC-15, FW-VEG-ASP-DC-2, FW-VEG-ASP-DC-4,FW-WSW-DC-1-3, FW-WSW-RMZ-DC-1-5, FW-WSW-RMZ-DC-7, FW-WSW-RMZ-DC-9, FW-WFP-DC-5, FW-WFP-DC-9, FW-FIRE-DC-1-2 FW-FIRE-DC-4-5, FW-FPP-DC-1, FW-FPP-DC-4, FW-FPP-DC-5,FW-TFA-DC-4-5, FW-SU-DC-7, FW-MM-DC-1, DA-WILD-DC-2-4, MA-RWMA-DC-1-4, MA-VVMA-DC-1-3, MA-SAMA-DC-1-2	FW-VEG-G-3, FW-WSW-O-1, FW-WSW-RMZ-O-1, FW-WSW-RMZ-G-2-3, FW-WFP-O-1-2, FW-VEG-ASP-G-1, FW-WFP-O-4, FW-WFP-O-5, FW-WFP-G-6, FW-WFP-G-8, FW-REC-S-1-2, FW-REC-G-2-3, FW-FFP-S-1-2, FW-FFP-S-5, FW-FFP-G-1, FW-TFA-O-1, FW-TFA-S-1-3, FW-TFA-G-1-2, FW-FIRE-S-1, FW-FIRE-G-1, FW-FIRE-G-8-9, DA-WSR-S-1-2, MA-VVMA-G-1-2, MA-SAMA-S-1-2	FW-VEG-DC-14, FW-VEG-DC-21, FW-VEG-G-1-2, FW- FW-WSW-DC-5, FW-WFP-DC-1-3, FW-WFP-DC-7, FW-WFP-G-1-2, WFP MANAGEMENT APPROACH 1-6

Table 33. Plan components (coarse and fine filter) and management approaches that maintain or improve ecological condition and minimize threats for New Mexico meadow jumping mouse

Ecological Conditions	Issues and Threats	Desired Conditions (Coarse Filter)	Objectives, Standards, and Guidelines (Coarse Filter)	Desired Conditions, Objectives, Standards, and Guidelines, and Management Approaches (Fine Filter)
Riparian areas Wetland Riparian Forest and Shrub Riparian	Seral state departure Stand-replacing fire Invasive vegetative encroachment Disconnected floodplains Specific ecological features Intrusive human activity	FW-VEG-DC-1-3, FW-VEG-DC-5, FW-VEG-DC-10-11, FW-VEG-DC-20, FW-SL-DC-1, FW-WSW-DC-1-2, FW-WSW-DC-5, FW-WSW-RMZ-DC-1-8, FW-WSW-RMZ-DC-7-8, FW-WSW-RMZ-STM-DC-1, FW-WSW-RMZ-STM-DC-4, FW-WSW-RMZ-STM-DC-6, FW-WSW-RMZ-STM-DC-9, FW-WSW-RMZ-STM-DC-11, FW-WSW-RMZ-SNS-DC-1, FW-WSW-RMZ-WR-DC-1, FW-WSW-RMZ-WR-DC-3, FW-WSW-RMZ-FSR-DC-1-5, FW-WSW-RMZ-FSR-DC-8, FW-WSW-RMZ-FSR-DC-12, FW-WFP-DC-3- 10, FW-NIS-DC-1, FW-GRZ-DC-3-6, FW-TFA-DC-4-5, FW-FIRE-DC-1-5, FW-MM-DC-1, FW-WILD-DC-1, DA-WHT-DC-1, MA-RWMA-DC-1, MA-VVMA-DC-1-3, MA-SAMA-DC-1-2	FW-VEG-G-1-3, FW-WSW-O-1, FW-WSW-G-1-2, FW-WSW-RMZ-O-1, FW-WSW-RMZ-G-2-3, FW-WSW-RMZ-STM-O-1, FW-WSW-RMZ-STM-S-1, FW-WSW-RMZ-STM-G-1, FW-WSW-RMZ-SNS-S-1, FW-WSW-RMZ-SNS-G-1, FW-WSW-RMZ-FSSR-G-2 FW-WFP-O-1, FW-WFP-O-5, FW-NIS-O-1, FW-NIS-S-1, FW-NIS-G-1-3, FW-GRZ- S 1, FW-GRZ-G-2-5, FW-FFP-S-2, FW-REC-G-1, FW-REC-G-3, FW-REC-G-5, FW-TFA-S-3, FW-TFA-G-1-2, FW-TFA-G-6, FW-FIRE-G-4, FW-FIRE-G-6, DA-WSR-S-2, FW-MM-G-1, DA-WILD-S-1, MA-EWSR-S-1, MA-EWSR-G-1, MA-VVMA-G-1-2, MA-SAMA-S-1-2	FW-VEG-DC-14, FW-VEG-DC-21, FW-VEG-G-1-3, FW-WSW-DC-5, FW-WSW-RMZ-FSR-G-1-3, FW-WFP-DC-1-3, FW-WFP-G-1-2, FW-FIRE-G-4, FW-FIRE-G-8-9, WFP MANAGEMENT APPROACH 1, WFP MANAGEMENT APPROACH 2, WFP MANAGEMENT APPROACH 6

Section 2. Threatened and Endangered species Crosswalk – Issues and Threats

These crosswalks reference all plan components within the Carson land management plan that address issues and minimize threats for threaten and endangered species. Issues have been identified as habitat that is out-of-reference and in need of restoration (coarse filter approaches) while threats have been identified as anthropomorphic (human-based) activities that are negatively impacting threatened and endangered species. These are usually addressed through fine filter approaches and may be very species specific. Managing for threatened and endangered species is often a combination of coarse and fine filter plan components.

Issues

Seral State Departure

Over 84 percent of all threaten and endangered species on the Carson are impacted by highly departed seral state. Seral state is a complex issue that deals with the ecological succession of vegetation as it progresses toward a climax community. It looks at how vegetative systems age over time and what the

average range of age classes of vegetation exist within the system. For example, a healthy and productive (in-reference condition) forest will consist of a mix of young, middle-aged, and old trees as well as the herbaceous understory. A complete description of vegetation types and their seral state composition is found in the assessment (USDA FS Carson NF 2015). The variability in vegetative structure also contributes to other ecological conditions necessary for some species such as snag density (amount of standing dead trees) or the amount of coarse woody debris (amount of dead tree material on the ground). These components may be critical for the persistence of some species and are indirectly tied to seral state condition since seral state impacts the recruitment, retention, and size classes of these features. Departure from reference conditions can negatively impact the habitat associated with these ecosystems. For example, a spruce-fir forest that consists of 80 percent early successional trees (young trees) may lack the structure and snags provided by old and dying trees. This can negatively impact the wildlife species dependent upon the seral states within healthy spruce-fir forests.

Another issue caused by out-of-reference seral state is the potential for stand-replacing fires. In both forested and non-forested ecosystems, fuel loads can build to levels that increase the potential for stand-replacing fires. Besides devastating the vegetative conditions within and vegetation types, uncharacteristic fires can also potentially wipe out threatened and endangered species that reside in those systems, especially if they are rare or endemic. The cause of seral state departure can usually be traced back to long-term man-made actions such as fire-suppression. Vegetative conditions, including how they naturally transition over time and with disturbances, are the foundation of most wildlife habitat. Therefore, vegetation that closely mirrors appropriate distributions of these natural vegetative transitional states, or seral states, makes better wildlife habitat than vegetation that is departed from the appropriate seral state distributions (as defined by historic or reference conditions). Some threatened and endangered depend upon in-reference seral state condition in one, or multiple, vegetation types for persistence on the forest.

Plan components that would maintain or improve seral state are listed in table 34.

Table 34. Seral state plan components

Plan Component Code	Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-DC-1-9	FW-VEG-SFF-DC-12	FW-VEG-PPF-O-1-2	FW-WSW-RMZ-FSR-DC-1-3
FW-VEG-DC-11-12	FW-VEG-SFF-DC-15	FW-VEG-PPF-G-1-2	FW-WSW-RMZ-FSR-DC-5-7
FW-VEG-DC-14-17	FW-VEG-ASP-DC-1-8	FW-VEG-PJO-DC-1-10	FW-WSW-RMZ-FSR-G-3
FW-VEG-DC-20-21	FW-VEG-MCW-DC-1-5	FW-VEG-PJO-G-1-3	FW-WFP-DC-1-6
FW-VEG-G-1-2	FW-VEG-MCW-DC-7-13	FW-VEG-PJS-DC-1-10	FW-WFP-DC-8-10
FW-VEG-G-3-4	FW-VEG-MCW-DC-14-15	FW-VEG-PJS-DC-13-15	FW-WFP-O-1
FW-VEG-ALP-DC-1-5	FW-VEG-MCD-DC-1-5	FW-VEG-PJS-G-1	FW-WFP-G-1-2
FW-VEG-MSG-DC-1-4	FW-VEG-MCD-DC-8-12	FW-VEG-SAGE-DC-1-9	FW-NIS-DC-1
FW-VEG-MSG-DC-6-9	FW-VEG-MCD-DC-16-20	FW-SL-DC-3	FW-NIS-O-1
FW-VEG-MSG-DC-11-14	FW-VEG-MCD-O-1-2	FW-WSW-DC-2	FW-GRZ-DC-4-6
FW-VEG-BP-DC-1	FW-VEG-PPF-DC-1-6	FW-WSW-G-1	FW-GRZ-S-1
FW-VEG-BP-DC-3-7	FW-VEG-PPF-DC-8-10	FW-WSW-RMZ-DC-1-4	FW-FFP-S-1-2
FW-VEG-BP-G-1	FW-VEG-PPF-DC-12	FW-WSW-RMZ-O-1	FW-FIRE-DC-1-2
FW-VEG-SFF-DC-1-10	FW-VEG-PPF-DC-15-18	FW-WSW-RMZ-WR-DC-1-3	FW-MM-DC-1

Snag Density Departure

When a tree dies but remains standing it becomes a snag and provides habitat for and array of animals, especially birds. Ecologically, a dead tree is as important to the forest ecosystem as a live one and provides several key ecological functions that influence the ecosystem. Snags provide homes for birds and foraging opportunities for insectivorous animals. If snags are not in adequate supply or below desired conditions identified as snags per acre, it may result in lack of nesting locations or foraging areas insectivorous birds or mammals. Conversely, large-scale fire often results in too many snags per acre and not enough live trees. Snag densities in reference condition should provide optimum habitat for threatened and endangered species, therefore, departed snag densities may result in significant negative impacts to threatened and endangered species. Currently, only one of threatened and endangered species isimpacted by departed snag densities on the forest, these occur in three terrestrial forested vegetation types: piñon-juniper woodland (PJW), piñon-juniper sagebrush (PJS), and ponderosa pine forest (PPF). Plan components that maintain or improve snag density departure are listed in table 35.

Table 35. Snag density departure

Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-DC-1-5	FW-VEG-MCD-DC-11	FW-VEG-PJS-G-4
FW-VEG-DC-20-21	FW-VEG-MCD-O-1-2	FW-WSW-RMZ-O-1
FW-VEG-G-1-4	FW-VEG-PPF-DC-1	FW-WSW-RMZ-FSR-DC-1-3
FW-VEG-BP-DC-1	FW-VEG-PPF-DC-5-6	FW-WSW-RMZ-FSR-G-2
FW-VEG-SFF-DC-1	FW-VEG-PPF-DC-10	FW-WFP-DC-1-6
FW-VEG-SFF-DC-3-4	FW-VEG-PPF-O-1-2	FW-WFP-DC-8-10
FW-VEG-ASP-DC-4	FW-VEG-PPF-G-1-2	FW-WFP-O-1
FW-VEG-ASP-G-1	FW-VEG-PJO-DC-1	FW-WFP-G-1-2
FW-VEG-MCW-DC-1	FW-VEG-PJO-DC-7-8	FW-FFP-DC-4
FW-VEG-MCW-DC-4-5	FW-VEG-PJO-G-1	FW-FFP-S-1-2
FW-VEG-MCD-DC-1	FW-VEG-PJS-DC-1	FW-FFP-G-1-2
FW-VEG-MCD-DC-4-5	FW-VEG-PJS-DC-7-9	FW-FIRE-DC-1-2

Coarse Woody Debris Departure

When a large tree falls it becomes coarse woody debris and provides habitat for small animals and insects. When these logs rot, they store water and provide nutrients for the continued growth of the forest. Dead wood rotting on the forest floor eventually gets incorporated into the soil. This deteriorating wood feeds many insects and bacteria that provide nitrogen to feed the trees and other plants in the forest. Coarse woody debris is not only limited to upland habitats, it has significant impact on riparian areas as well and many aquatic species depend on downed woody material. Coarse woody debris not only provides foraging and escape cover for fish, but it contributes to the creation of optimum aquatic habitat by slowing down water and contributing to pool development. Out of reference conditions of coarse woody debris may result in significant negative impacts to threatened and endangered species. If coarse woody debris is not in adequate supply or below desired conditions identified as tons per acre (coarse woody debris load), it may result in lack of prey items for carnivorous birds or mammals. On the other hand, if coarse woody debris is in excess or above desired conditions it may create unfavorable soil conditions, especially for at-risk plant species by prohibiting growth or germination or resulting in more intense fires that negatively impact soil conditions. This is also a key factor in proper functioning aquatic habitats. Thus, coarse woody debris loads in reference condition should provide optimum habitat for terrestrial and

aquatic animal species as well as soil conditions for plant species. Currently, 13 percent of threatened and endangered species may be impacted by improper coarse woody debris loads on the forest, these occur in three terrestrial forested vegetation types: ponderosa pine forest (PPF), mixed conifer with frequent fire (MCD), and piñon-juniper sagebrush (PJS). Five species also utilize riparian areas (riparian management zones) where coarse woody debris is a key component not only for creating habitat but for maintaining stream function as well by trapping sediment and influencing channel formation.

The cause of departed coarse woody debris loads can usually be traced back to long-term human-caused actions such as fire suppression resulting in excess coarse woody debris in many of the forested vegetation types. Riparian areas, on the other hand, tend to lack enough coarse woody debris. The popularity of riparian areas for people, cattle, and wildlife often results in the suppression of woody recruitment because of increased trampling or grazing. In-reference coarse woody debris loads in both upland and riparian areas would provide the ecological conditions required for some threatened and endangered species. Plan components that maintain or improve coarse woody debris departure are listed in table 36.

Table 36. Coarse woody debris plan components

Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-DC-1-3	FW-VEG-MCD-O-1-2	FW-WSW-RMZ-STM-O-1
FW-VEG-DC-5	FW-VEG-PPF-DC-1	FW-WSW-RMZ-STM-G-2
FW-VEG-DC-20-21	FW-VEG-PPF-DC-6	FW-WSW-RMZ-FSR-DC-1-3
FW-VEG-G-1-3	FW-VEG-PPF-DC-10	FW-WSW-RMZ-FSR-DC-6
FW-VEG-BP-DC-1	FW-VEG-PPF-O-1-2	FW-WSW-RMZ-FSR-G-2
FW-VEG-SFF-DC-1	FW-VEG-PJO-DC-1	FW-WFP-DC-1-6
FW-VEG-SFF-DC-4	FW-VEG-PJO-DC-8	FW-WFP-DC-8-10
FW-VEG-ASP-DC-4	FW-VEG-PJO-G-1	FW-WFP-O-1
FW-VEG-MCW-DC-1	FW-VEG-PJS-DC-1	FW-WFP-G-1-2
FW-VEG-MCW-DC-5	FW-VEG-PJS-DC-8-9	FW-FFP-DC-4
FW-VEG-MCD-DC-1	FW-VEG-PJS-G-4	FW-FFP-S-1-2
FW-VEG-MCD-DC-5	FW-WSW-RMZ-O-1	FW-FFP-G-1-2
FW-VEG-MCD-DC-11	FW-WSW-RMZ-STM-DC-9-10	FW-FIRE-DC-1-2

Risk of Stand-Replacing Fire

Fire plays a critical role in maintaining the health of an ecosystem. Many vegetation types within the Carson are classified as frequent-fire systems and depend on certain fire return intervals to maintain reference conditions for numerous vegetative characteristics (examples are seral state, coarse woody debris, etc.). Long-term, historic fire suppression policies on the forest has resulted in an excess of fuel in many frequent fire systems (see vegetation analysis). This excess fuel load often creates conditions for uncharacteristic fire which is usually defined as fire that burns at higher-intensity or longer duration than what would typically occur under reference conditions.

Uncharacteristic fire often creates unfavorable forest conditions for threatened and endangered species. It also can potentially wipe out isolated or small populations of threatened and endangered species. Currently, 59 percent of threatened and endangered species may be impacted by uncharacteristic fire but are impacted in different ways. Table 37 lists plan components to reduce the risk of stand-replacing fire.

Table 37. Stand-replacing fire plan components

Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-DC-1-3	FW-VEG-MCD-DC-1	FW-WSW-DC-1-2
FW-VEG-DC-5	FW-VEG-MCD-DC-3	FW-WSW-RMZ-DC-1
FW-VEG-DC-15-16	FW-VEG-MCD-DC-7	FW-WSW-RMZ-DC-7
FW-VEG-DC-20-21	FW-VEG-MCD-DC-20	FW-WSW-RMZ-O-1
FW-VEG-G-1-3	FW-VEG-MCD-O-1-2	FW-WSW-RMZ-WR-DC-1
FW-VEG-G-5	FW-VEG-PPF-DC-1-4	FW-WSW-RMZ-FSR-DC-1-3
FW-VEG-MSG-DC-1	FW-VEG-PPF-DC-18	FW-WSW-RMZ-FSR-DC-6
FW-VEG-MSG-DC-6	FW-VEG-PPF-O-1-2	FW-WFP-DC-1-4
FW-VEG-BP-DC-1	FW-VEG-PJO-DC-1	FW-WFP-O-1
FW-VEG-BP-DC-5	FW-VEG-PJO-DC-6	FW-WFP-G-1-2
FW-VEG-SFF-DC-1	FW-VEG-PJO-DC-13	FW-GRZ-DC-3-4
FW-VEG-SFF-DC-7	FW-VEG-PJS-DC-1	FW-FIRE-DC-1-6
FW-VEG-ASP-DC-1-2	FW-VEG-PJS-DC-6	FW-FIRE-S-1-6
FW-VEG-MCW-DC-1	FW-VEG-PJS-DC-15	FW-FIRE-G-1
FW-VEG-MCW-DC-3	FW-VEG-SAGE-DC-1	FW-FFP-DC-4
FW-VEG-MCW-DC-12	FW-VEG-SAGE-DC-8	MA-DEVRES-DC-2

Invasive Vegetation Encroachment

When nonnative plant species appear on the landscape native species must compete for available resources. A naturally aggressive plant may be especially invasive when it is introduced to a new habitat. Increased resource availability and altered disturbance regimes associated with human activities often differentially increase the performance of invaders over that of natives, this places undue stressors on native populations, especially at-risk plant species. Invasive vegetative encroachment can also impact animal species as well. Small mammals and even fish are dependent upon certain vegetation types and can be impacted if invasive plants alter the composition of their native habitats.

Currently, 56 percent of threatened and endangered species may be impacted by invasive vegetation encroachment on the forest, these occur in all vegetation types including riparian areas. Plan components to reduce the risk of invasive vegetation encroachment are in table 38.

Table 38. Invasive vegetation encroachment plan components

Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-DC-1-3	FW-VEG-PPF-O-1-2	FW-WFP-DC-8
FW-VEG-DC-5	FW-VEG-PJO-DC-1	FW-WFP-O-1
FW-VEG-DC-17	FW-VEG-PJO-DC-5	FW-WFP-G-1-2
FW-VEG-DC-20-21	FW-VEG-PJS-DC-1	FW-WFP-G-5
FW-VEG-G-1-3	FW-VEG-PJS-DC-3	FW-NIS-DC-1
FW-VEG-ALP-DC-1-2	FW-VEG-PJS-DC-5	FW-NIS-O-1
FW-VEG-MSG-DC-1-3	FW-VEG-SAGE-DC-1-2	FW-NIS-S-1-2
FW-VEG-MSG-DC-8	FW-VEG-SAGE-DC-4	FW-NIS-G-1-7
FW-VEG-BP-DC-1	FW-WSW-DC-1-2	FW-GRZ-DC-5-6
FW-VEG-BP-DC-4	FW-WSW-O-1	FW-TFA-O-1
FW-VEG-SFF-DC-1	FW-WSW-G-1	FW-TFA-S-1
FW-VEG-ASP-DC-1	FW-WSW-RMZ-DC-1-3	FW-FIRE-G-4
FW-VEG-ASP-DC-7	FW-WSW-RMZ-DC-9	FW-FIRE-G-9
FW-VEG-MCW-DC-1-2	FW-WSW-RMZ-STM-S-1	FW-MM-G-1
FW-VEG-MCW-DC-7	FW-WSW-RMZ-WB-DC-1-2	DA-WILD-DC-1
FW-VEG-MCD-DC-1-2	FW-WSW-RMZ-WB-S-1	DA-WILD-S-4
FW-VEG-MCD-DC-7	FW-WSW-RMZ-SNS-DC-1-2	DA-IRA-DC-1
FW-VEG-MCD-DC-17	FW-WSW-RMZ-SNS-S-1	MA-RWMA-DC-2
FW-VEG-MCD-O-1-2	FW-WSW-RMZ-WR-DC-3	MA-G-MMA-S-2
FW-VEG-PPF-DC-1-3	FW-WSW-RMZ-FSR-DC-1-3	MA-VVMA-DC-1
FW-VEG-PPF-DC-17	FW-WFP-DC-1-4	MA-SAMA-DC-1

Disconnected Floodplains

Floodplains are a key component in riparian areas that are adjacent to river and stream systems. They are generally characterized by gradual slopes which results in the water spreading out over large areas (floodplains), thus, dispersing its energy minimizing it erosive nature. The conditions created by these events have resulted in vegetative communities specifically designed for wet-soil conditions. Due to changing vegetative conditions in riparian areas from excessive human uses (for example, recreation and grazing) native vegetation is often diminished causing more severe erosion problems during high water events. This oftentimes causes the stream channel to downcut and directs more water through the channel resulting in even greater erosion. This results in streams and rivers with deep incised channels and steep banks where water cannot escape and disconnects the floodplains from the existing stream as well as fragments riparian areas. This often causes impacts to terrestrial species dependent upon wet soil conditions and vegetation, as well as aquatic species within the stream and river systems. Currently, 34 percent of threatened and endangered species may be impacted by disconnected floodplains and fragmented riparian on the national forest, these occur in all vegetation types with riparian areas. Plan components that improve disconnected floodplains and fragmented riparian can be found in table 39.

Table 39. Disconnected floodplains plan components

Plan Component Code	Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-DC-1-3	FW-SL-G-1-3	FW-WFP-DC-1-6	FW-FIRE-G-8-9
FW-VEG-DC-5-9	FW-WSW-DC-1-3	FW-WFP-DC-8-10	FW-MM-DC-1
FW-VEG-DC-14	FW-WSW-DC-7	FW-WFP-O-1	FW-MM-S-1-2
FW-VEG-DC-20	FW-WSW-O-1	FW-WFP-O-5	FW-MM-G-1-2
FW-VEG-G-1-3	FW-WSW-G-1-4	FW-WFP-G-1-2	DA-WILD-DC-1-3
FW-VEG-ALP-DC-6	FW-WSW-RMZ-DC-1-9	FW-WFP-G-5-6	DA-WILD-S-4
FW-VEG-MSG-DC-1-5	FW-WSW-RMZ-O-1	FW-NIS-DC-1	DA-WSR-DC-1
FW-VEG-MSG-DC-9	FW-WSW-RMZ-G-1-4	FW-NIS-O-1	DA-WSR-S-1-3
FW-VEG-SFF-DC-1-2	FW-WSW-RMZ-STM-DC-1-2	FW-GRZ-DC-4-6	DA-IRA-DC-1
FW-VEG-SFF-G-1	FW-WSW-RMZ-STM-DC-4-11	FW-GRZ-S-1	DA-IRA-S-1-2
FW-VEG-MCW-DC-1-2	FW-WSW-RMZ-STM-O-1-2	FW-GRZ-G-2-5	DA-IRA-G-1-2
FW-VEG-MCD-DC-1-2	FW-WSW-RMZ-STM-S-1	FW-FPP-DC-1	MA-RWMA-DC-1-2
FW-VEG-MCD-O-1-2	FW-WSW-RMZ-STM-G-1-4	FW-FFP-S-1-2	MA-EWSR-DC-1-3
FW-VEG-PPF-DC-1-3	FW-WSW-RMZ-WB-DC-1-6	FW-FFP-G-1-3	MA-EWSR-S-1-8
FW-VEG-PPF-O-1-2	FW-WSW-RMZ-WB-S-1	FW-REC-S-1-2	MA-EWSR-G-1
FW-VEG-PJO-DC-1	FW-WSW-RMZ-SNS-DC-1-7	FW-REC-G-1	MA-G-MMA-DC-3
FW-VEG-PJO-DC-5	FW-WSW-RMZ-SNS-O-1	FW-REC-G-5	MA-G-MMA-S-1-3
FW-VEG-PJO-G-3	FW-WSW-RMZ-SNS-S-1	FW-TFA-DC-4-5	MA-JICMA-DC-1-2
FW-VEG-PJS-DC-1	FW-WSW-RMZ-SNS-G-1	FW-TFA-O-1-3	MA-JICMA-S-3-11
FW-VEG-PJS-DC-3	FW-WSW-RMZ-WR-DC-1-3	FW-TFA-S-1	MA-JICMA-G-1-2
FW-VEG-PJS-DC-5	FW-WSW-RMZ-WR-S-1-3	FW-TFA-G-1-4	MA-JICAMA-G-5
FW-VEG-SAGE-DC-1-2	FW-WSW-RMZ-FSR-DC-1-3	FW-TFA-G-6	MA-VVMA-DC-1
FW-VEG-SAGE-DC-4	FW-WSW-RMZ-FSR-DC-5-8	FW-FIRE-DC-1-3	MA-VVMA-G-1-2
FW-VEG-SAGE-DC-9	FW-WSW-RMZ-FSR-DC-12-13	FW-FIRE-S-1-7	MA-SAMA-DC-1
FW-SL-DC-1-3	FW-WSW-RMZ-FSR-G-1-3	FW-FIRE-G-1-4	MA-SAMA-S-1-3

Limited or Specific Soil Conditions

Soils are complex and dynamic system that consists of a mineral component, organic matter, air, water, and various soil organisms resulting from interaction between parent material, climate, topography, and organisms throughout time and space. Soils store water, supply nutrients for plants, and provide a medium for plant growth. Soils also provide habitat for a diverse number of invertebrates and belowground organisms. Due to their slow rate of formation, soils are essentially a non-renewable resource. Unfavorable soil conditions often decrease viability of threatened and endangered dependent upon specific soil type or condition. Most Threatened and Endangered species reliant upon soil conditions are plants, however, some vertebrates and invertebrates also have an affinity for certain soil types.

Soil condition is based on three soil functions: (1) the ability of the soil to resist erosion, (2) the ability of the soil to infiltrate water, and (3) the ability of the soil to recycle nutrients. The loss of soil productivity through a reduction in soil function is due to a lack of effective vegetative ground cover and organic matter. This has resulted in unstable soils with reduced nutrient cycling. Soils in reference condition (satisfactory rating) provide the necessary ecological conditions for species dependent upon them. Soils

that are out of reference are classified as impaired, unsatisfactory, or unsuited depending upon the degree in which they are impacted. Currently, 19 percent of threatened and endangered species may be impacted by impaired, unsatisfactory, or unsuited soil conditions, or may need very specific soil type to grow on the forest. Plan components to maintain or improve limited or specific soil conditions plan components are found in table 40.

Table 40. Limited or specific soil conditions plan components

Plan Component Code	Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-DC-1-3	FW-VEG-PPF-DC-1-3	FW-WSW-RMZ-WR-DC-1-4	FW-TFA-O-1
FW-VEG-DC-5	FW-VEG-PPF-DC-19	FW-WSW-RMZ-FSR-DC-1-3	FW-TFA-S-1
FW-VEG-DC-9	FW-VEG-PPF-O-1-2	FW-WSW-RMZ-FSR-DC-9	FW-TFA-G-1-4
FW-VEG-DC-14	FW-VEG-PJO-DC-1	FW-WSW-RMZ-FSR-DC-11	FW-SU-S-1-2
FW-VEG-DC-18-20	FW-VEG-PJO-DC-4-5	FW-CRF-DC-3	FW-SU-G-1-2
FW-VEG-G-1-3	FW-VEG-PJO-DC-14	FW-WFP-DC-1-3	FW-FIRE-DC-1-3
FW-VEG-MSG-DC-1-4	FW-VEG-PJS-DC-1	FW-WFP-DC-10	FW-FIRE-G-1
FW-VEG-MSG-DC-7	FW-VEG-PJS-DC-4-5	FW-WFP-O-1	FW-FIRE-G-8-9
FW-VEG-BP-DC-1	FW-VEG-PJS-DC-16	FW-WFP-O-4	FW-MM-DC-1
FW-VEG-BP-DC-8	FW-VEG-SAGE-DC-1-2	FW-WFP-G-1-2	FW-MM-G-1-2
FW-VEG-SFF-DC-1	FW-VEG-SAGE-DC-4-5	FW-WFP-G-5	DA-WILD-DC-1
FW-VEG-SFF-DC-16	FW-VEG-SAGE-DC-9	FW-NIS-DC-1	DA-WILD-S-4
FW-VEG-SFF-G-1	FW-SL-DC-1-7	FW-NIS-O-1	DA-IRA-DC-1
FW-VEG-ASP-DC-1	FW-SL-G-1-3	FW-NIS-S-1-2	MA-RWMA-DC-1
FW-VEG-ASP-DC-9	FW-WSW-DC-1-3	FW-NIS-G-1-7	MA-JICMA-DC-1
FW-VEG-MCW-DC-1-2	FW-WSW-O-1	FW-GRZ-DC-4-6	MA-JICMA-S-3-11
FW-VEG-MCW-DC-17	FW-WSW-G-1	FW-FFP-S-1	MA-JICMA-G-1-2
FW-VEG-MCD-DC-1-2	FW-WSW-RMZ-DC-1-3	FW-REC-S-1-2	MA-G-MMA-DC-3
FW-VEG-MCD-DC-21	FW-WSW-RMZ-DC-9	FW-REC-G-1	MA-G-MMA-S-2-3
FW-VEG-MCD-O-1-2	FW-WSW-RMZ-O-1	FW-REC-G-5	MA-VVMA-DC-1
FW-CAM-DC-1	FW-CRF-DC-1	FW-TFA-DC-4-5	MA-SAMA-DC-1

Specific Ecological Features or Conditions

Specific ecological features sometimes limit the distribution and viability of threatened and endangered species, especially if a species requires certain geophysical features (for example, rock formations). For example, some bird species require specific rock or cliff formations for nesting, some plants require certain soil characteristics from specific geologic formations, and some fish and amphibians require specific water conditions (for example, temperature, flow, etc.). Currently, 69 percent of threatened and endangered species require specific ecological conditions that are not otherwise addressed by general habitat conditions related to vegetation. Plan components to maintain or improve specific ecological features plan components are found in table 41.

Table 41. Specific ecological features plan components

Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-DC-5	FW-SL-DC-7	FW-GRZ-DC-4-6
FW-VEG-DC-14	FW-SL-G-1-3	FW-GRZ-S-1-4
FW-VEG-DC-18-20	FW-WSW-DC-1-2	FW-GRZ-G-2-5
FW-VEG-S-1	FW-WSW-DC-4-5	FW-GRZ-G-8
FW-VEG-G-1-3	FW-WSW-O-1	FW-FFP-DC-1
FW-VEG-ALP-DC-6-7	FW-WSW-G-1	FW-FFP-S-1
FW-VEG-ALP-G-1-2	FW-WSW-RMZ-DC-1-3	FW-REC-G-3
FW-VEG-MSG-DC-1	FW-WSW-RMZ-O-1	FW-REC-G-5
FW-VEG-MSG-DC-10	FW-WSW-RMZ-STM-DC-1-3	FW-TFA-DC-5
FW-VEG-MSG-DC-12	FW-WSW-RMZ-STM-DC-6-11	FW-TFA-O-1
FW-VEG-MSG-DC-10	FW-WSW-RMZ-STM-O-1-2	FW-TFA-S-1-3
FW-VEG-BP-DC-1	FW-WSW-RMZ-STM-G-1-4	FW-TFA-G-1-10
FW-VEG-BP-DC-8	FW-WSW-RMZ-WB-DC-1-3	FW-FAC-G-2
FW-VEG-SFF-DC-1	FW-WSW-RMZ-SNS-DC-1-3	FW-SU-S-1-2
FW-VEG-SFF-DC-16	FW-WSW-RMZ-SNS-DC-8-9	FW-SU-G-1-6
FW-VEG-SFF-G-2-5	FW-WSW-RMZ-SNS-O-1	FW-FIRE-DC-1-3
FW-VEG-ASP-DC-1	FW-WSW-RMZ-WR-DC-1-4	FW-FIRE-S-6-7
FW-VEG-ASP-DC-9	FW-WSW-RMZ-FSR-DC-1-3	FW-FIRE-G-1-4
FW-VEG-ASP-G-1-4	FW-WSW-RMZ-FSR-DC-9	FW-FIRE-G-8-9
FW-VEG-MCW-DC-1-2	FW-WSW-RMZ-FSR-DC-11	FW-MM-DC-1
FW-VEG-MCW-DC-17	FW-WSW-RMZ-WR-DC-1	FW-MM-G-1-2
FW-VEG-MCW-G-2-6	FW-WSW-RMZ-WR-DC-4-5	DA-WILD-DC-1
FW-VEG-MCD-DC-1-2	FW-WSW-RMZ-FSR-DC-1-3	DA-WILD-S-4
FW-VEG-MCD-DC-21	FW-WSW-RMZ-FSR-DC-8-13	DA-IRA-DC-1
FW-VEG-MCD-G-3-6	FW-WSW-RMZ-FSR-G-3	DA-WHT-DC-1
FW-VEG-PPF-DC-1-2	FW-CAM-DC-1-4	DA-ZOO-DC-1-2
FW-VEG-PPF-DC-19	FW-CAM-G-1-3	DA-ZOO-S-1
FW-VEG-PPF-G-1-2	FW-CRF-DC-1-3	DA-BOT-DC-1-2
FW-VEG-PPF-G-5-8	FW-CRF-G-1-4	DA-BOT-G-1-2
FW-VEG-PJO-DC-1	FW-WFP-DC-1-3	MA-RWMA-DC-1
FW-VEG-PJO-G-1-2	FW-WFP-DC-10-11	MA-JICMA-DC-1
FW-VEG-PJO-DC-14	FW-WFP-O-1-3	MA-JICMA-S-3-11
FW-VEG-PJS-DC-1	FW-WFP-G-1-8	MA-JICMA-G-1-2
FW-VEG-PJS-DC-16	FW-WFP-G-5	MA-G-MMA-DC-3
FW-VEG-PJS-G-3-4	FW-NIS-DC-1	MA-G-MMA-S-2-3
FW-VEG-SAGE-DC-1-2	FW-NIS-O-1	MA-VVMA-DC-1
FW-VEG-SAGE-DC-9	FW-NIS-S-1-2	MA-SAMA-DC-1

Threats

Invasive Predation (Aquatic)

Negative impacts to Threatened and Endangered species may occur when nonnative invasive species are introduced, intentionally or unintentionally, into aquatic systems where threatened and endangered species exist and competition and prey behavior results in population declines of the native populations. Nonnative invasive species on the Carson include but are not limited to American bullfrogs, white sucker, German brown trout, and rainbow trout. It is well known that rainbow and German brown trout often outcompete native Rio Grande cutthroat trout in areas where they were introduced but there is also the risk of predation on the at-risk Rio Grande sucker and chub. These nonnative fish, in particular the German brown and rainbow trout, were introduced in waters of the Carson National Forest for socioeconomic benefit. Similarly, nonnative American bullfrog were known to out-compete northern leopard frogs and western boreal toad. These are just examples of the types of negative consequences associated with invasive species that were introduced into aquatic systems. Plan components to reduce invasive predation are listed in table 42.

Table 42. Invasive predation plan components

Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-DC-1-3	FW-WSW-RMZ-STM-O-1	FW-NIS-DC-1
FW-VEG-DC-5	FW-WSW-RMZ-STM-S-1	FW-NIS-O-1
FW-VEG-DC-11	FW-WSW-RMZ-WB-DC-1-2	FW-NIS-S-1-2
FW-VEG-DC-14	FW-WSW-RMZ-WB-S-1	FW-NIS-G-1-7
FW-VEG-DC-20	FW-WSW-RMZ-SNS-DC-1-3	FW-GRZ-DC-4-6
FW-VEG-G-1-3	FW-WSW-RMZ-SNS-S-1	FW-FIRE-G-2-3
FW-VEG-MSG-DC-10	FW-WSW-RMZ-WR-DC-1	FW-FIRE-G-9
FW-SL-DC-5	FW-WSW-RMZ-WR-DC-3	DA-WILD-DC-1
FW-WSW-DC-4	FW-WSW-RMZ-FSR-DC-1-3	DA-WILD-S-4
FW-WSW-O-1	FW-WFP-DC-1-3	DA-IRA-DC-1
FW-WSW-G-1	FW-WFP-DC-5-6	MA-RWMA-DC-2
FW-WSW-RMZ-DC-1-3	FW-WFP-O-1	MA-RWMA-S-8
FW-WSW-RMZ-DC-9	FW-WFP-O-3	MA-VVMA-DC-1
FW-WSW-RMZ-O-1	FW-WFP-G-1-2	MA-VVMA-DC-3
FW-WSW-RMZ-STM-DC-1-3	FW-WFP-G-5	MA-SAMA-DC-1

Ground and Soil Disturbance (Roads and Trails)

Ground or soil disturbance can impact threatened and endangered species in a multitude of ways. Soil compaction can crush plant species or alter soil characteristic necessary for at-risk plants, thus inhibiting their potential for spread. Invertebrates and amphibians can also be impacted by this issue when soil characteristics are altered, or soil is compacted. Compaction mostly occurs when roads or trails are created, especially non-system roads or trails that may enter into areas where threatened and endangered species exist. Other activities that increase ground and soil disturbance may include log landings for forestry activities as well as recreational and range improvements (for example, campgrounds, picnic areas, mineral, and feed sites for livestock). Since some at-risk populations may be isolated and small, even the smallest of footprints may impact their viability if it occurs in a highly sensitive area.

Another means by which ground, and soil disturbance can impact threatened and endangered species is through erosion and subsequent siltation of waterways. When soil is disturbed the likelihood of erosion increases, especially if there is uncharacteristic weather events such as high wind or excessive rains. If ground disturbance occurs near a waterway, this can ultimately lead to excessive siltation when the exposed soils are carried into the water. This increased siltation reduces the amount of available oxygen and may impair the ability of aquatic species to forage, ultimately leading to direct mortality. Plan components to reduce the risk of ground and soil disturbance are listed in table 43.

Table 43. Ground and soil disturbance plan components

Plan Component Code	Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-DC-1-3	FW-SL-DC-1	FW-NIS-O-1	DA-IRA-DC-1
FW-VEG-DC-5	FW-SL-G-1-2	FW-NIS-G-5-6	MA-RWMA-DC-2
FW-VEG-DC-14	FW-WSW-DC-1-3	FW-GRZ-DC-4-6	MA-EWSR-S-5
FW-VEG-DC-20	FW-WSW-O-1	FW-GRZ-S-1	MA-EWSR-G-1
FW-VEG-G-1-3	FW-WSW-G-1-4	FW-GRZ-G-2-5	MA-JICMA-DC-1-2
FW-VEG-ALP-DC-7	FW-WSW-RMZ-G-2-3	FW-FFP-S-2	MA-JICMA-S-7-8
FW-VEG-ALP-G-1	FW-WSW-RMZ-STM-DC-4-5	FW-FFP-G-1-3	MA-JICMA-S-10-11
FW-VEG-MSG-DC-3	FW-WSW-RMZ-STM-DC-11	FW-REC-S-1-2	MA-JICMA-G-4
FW-VEG-MSG-DC-5	FW-WSW-RMZ-STM-G-4	FW-REC-G-1	MA-G-MMA-DC-3
FW-VEG-MSG-DC-10	FW-WSW-RMZ-WB-DC-6	FW-TFA-DC-4-5	MA-VVMA-DC-1-2
FW-VEG-MSG-G-1	FW-CAM-DC-2-3	FW-TFA-S-1-3	MA-VVMA-S-3-19
FW-VEG-BP-DC-3	FW-CAM-G-3	FW-TFA-G-6	MA-VVMA-G-2
FW-VEG-SFF-G-1	FW-CRF-G-1	FW-SU-G-1-3	MA-SAMA-DC-1-2
FW-VEG-PJO-DC-4-5	FW-WFP-DC-1-3	FW-FIRE-G-8-9	MA-SAMA-S-1
FW-VEG-PJS-DC-4-5	FW-WFP-O-1	FW-MM-DC-1	MA-SAMA-S-5
FW-VEG-SAGE-DC-5	FW-WFP-G-1-7	FW-MM-G-1-2	MA-SAMA-S-6
FW-VEG-SAGE-DC-9	FW-NIS-DC-1	DA-WILD-DC-1	MA-SAMA-G-1

Intrusive Human Activity (Recreational Disturbance)

Intrusive human activity often creates issues for threatened and endangered species where recreational activities impact biological function. It consists primarily of anthropomorphic activities that disrupt critical life stages of threatened and endangered species such as reproduction, nesting/calving, or even feeding, especially during times of high stress (for example, breeding season, winter). Harassing activities include but are not limited to human presence, indiscriminate shooting, harassment from people and domestic dogs, and picking or digging of plants. Threatened and endangered species on the Carson are known to be negatively impacted by these activities. See table 44 for plan components that address intrusive human activity.

Table 44. Intrusive human activity plan components

Plan Component Code	Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-DC-2	FW-VEG-MCD-G-6	FW-WFP-G-1-4	DA-BOT-G-1-2
FW-VEG-DC-14	FW-VEG-PPF-G-8	FW-WFP-G-7	MA-RWMA-DC-2
FW-VEG-DC-20	FW-WSW-DC-2	FW-REC-G-1	MA-VVMA-DC-1-2
FW-VEG-G-1-3	FW-CAM-G-1	FW-TFA-S-3	MA-VVMA-S-1-3
FW-VEG-ALP-G-2	FW-CRF-DC-1	FW-TFA-G-6	MA-VVMA-G-2
FW-VEG-SFF-G-5	FW-CRF-G-2-3	FW-SU-DC-8	MA-SAMA-DC-1-2
FW-VEG-ASP-G-4	FW-WFP-DC-1-3	FW-FIRE-G-7	MA-SAMA-S-1-2
FW-VEG-MCW-G-6	FW-WFP-DC-7	DA-WILD-DC-1	MA-SAMA-G-1

Pesticides or Chemical Retardant

Some chemical applications pose a concern to threatened and endangered species populations. It is well known that many bird species are highly susceptible to pesticides. Pesticides were shown to cause reproductive failure in peregrine falcons as well as many other species. Pesticides can also have beneficial impacts to threatened and endangered species, when pesticides are used to manage nonnative species population. Excessive nonnative species population can have detrimental effect to native threatened and endangered populations. Pesticide use is highly regulated on the Carson; impacts from off the national forest may still be an issue.

A greater risk from direct chemical impact on the forest may come from the use of chemical fire retardant used to fight forest fires. Impacts from chemical fire-retardant application have been analyzed in a separate analysis for all national forests within region 3. Threatened and endangered species on the Carson are known to be impacted by certain chemical applications. Plan components related to pesticides or chemical application can be found in table 45.

Table 45. Pesticides or chemical application plan components

Plan Component Code	Plan Component Code	Plan Component Code
FW-SL-DC-6	FW-WSW-RMZ-STM-DC-5	FW-NIS-G-3-4
FW-WSW-RMZ-G-3-4	FW-WSW-RMZ-STM-S-2	FW-AIR-DC-4
FW-WSW-DC-2	FW-WSW-RMZ-SNS-DC-7	FW-FIRE-S-2
FW-WSW-DC-7	FW-WSW-RMZ-WB-S-2	FW-FIRE-S-6
FW-WSW-G-2	FW-WFP-DC-1-3	FW-FIRE-G-4
FW-WSW-RMZ-G-4	FW-WFP-G-1-2	DA-ZOO-S-1

Introduced Disease or Unnatural Spread:

Unnatural mortality in wildlife may occur when pathogens are introduced and resultant disease causes population declines of native populations, especially threatened and endangered species. Disease creates a characteristic set of signs and symptoms that may affect the whole body or any part of a plant or animal. It usually results in mortality or decreased vigor in species that are impacted by disease outbreaks. Historically, many populations were widespread and redundant (many scattered small populations) which made them more resilient to disease. If a disease event were to occur, nearby populations could then move in to bolster surviving individuals to quickly restore the population. Populations that have now become more isolated cannot respond as quickly and may ultimately suffer from reduced gene flow.

Another factor associated with disease is unnatural spread. This can occur when human activities move pathogens faster and over greater distances than what naturally occurs. For example, pathogens found in one water body, may take a long time to, or may never, impact another water body that is a significant distance away. Currently, with increased human travels from one location to another, the likelihood of infecting other areas increases significantly. It is well documented that many pathogens were introduced into new areas through human activities such as boating, spelunking, and other recreational activities. Some of the diseases that were known to occur on the Carson include, but are not limited to, chytrid fungus, sylvatic plague, whirling disease, and West Nile virus. Plan Components to reduce introduced disease or unnatural spread are found in table 46.

Table 46. Introduced disease or unnatural spread plan components

Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-G-1-3	FW-WFP-DC-11	FW-FIRE-G-9
FW-VEG-ALP-DC-5	FW-WFP-G-1-2	FW-SU-S-3
FW-VEG-BP-G-1	FW-NIS-DC-1	DA-WILD-DC-1
FW-WSW-DC-2	FW-NIS-S-1-3	DA-WILD-S-5
FW-WSW-RMZ-STM-S-1	FW-NIS-G-1	DA-WSR-S-4
FW-WSW-RMZ-WB-DC-1-2	FW-NIS-G-3	DA-IRA-DC-1
FW-WSW-RMZ-WB-S-1	FW-GRZ-DC-4	MA-RWMA-DC-2
FW-WSW-RMZ-SNS-DC-1-2	FW-GRZ-S-4	MA-G-MMA-S-2
FW-CAM-G-2	FW-GRZ-G-8	MA-VVMA-DC-1
FW-WFP-DC-1-4	FW-FIRE-G-3-4	MA-SAMA-DC-1

Human-Made Features (Mortality or Altered Behavior):

Impacts to threatened and endangered species may occur when manmade structures result in direct mortality of threatened and endangered species either by entrapment or collision. Obstructions may consist of obstacles or barriers that may prevent animals from moving from one place to another to fulfill basic life cycle needs or may actually cause direct mortality due to collision and forceful striking (for example, wind turbines, cell towers, facilities, or fences), prolonged entanglement (for example, barbed wire), or entrapment (for example, water troughs). Species that are known to be at-risk on the Carson are occasionally known to be impacted by manmade features that cause direct mortality. Plan components that address human-made features (mortality/altered behavior) are listed in table 47.

Table 47. Human-made features plan components

Plan Component Code	Plan Component Code	Plan Component Code
FW-VEG-DC-5	FW-WFP-G-6	FW-SU-G-1-5
FW-VEG-DC-14	FW-WFP-G-8	FW-LAND-G-1
FW-VEG-DC-20	FW-GRZ-DC-7	DA-WILD-DC-3
FW-VEG-G-1-3	FW-GRZ-G-3-4	DA-IRA-S-1
FW-WSW-DC-4	FW-GRZ-S-2-3	DA-NTRL-G-12
FW-WSW-G-2	FW-REC-S-1-2	MA-RWMA-DC-3
FW-WSW-G-4	FW-REC-G-1	MA-RWMA-S-3
FW-WSW-RMZ-DC-5	FW-REC-G-3-5	MA-RWMA-S-5
FW-WSW-RMZ-G-2	FW-TFA-DC-4-5	MA-RWMA-G-4
FW-WSW-RMZ-STM-DC-2-3	FW-TFA-O1	MA-EWSR-G-1
FW-WSW-RMZ-SNS-DC-6	FW-TFA-S-1-3	MA-DEVRES-G-3
FW-WSW-RMZ-WR-S-2	FW-TFA-G-1-9	MA-JICMA-S-7
FW-WFP-DC-2-5	FW-FAC-G-1-2	MA-VVMA-S-4-6
FW-WFP-O-4-5	FW-SCEN-G-1	MA-VVMA-G-1-2
FW-WFP-G-1-2	FW-SU-DC-5	MA-SAMA-S-1-6

Section 3. Mexican Spotted Owl 2012 Revised Recovery Plan Crosswalk

The following tables are a crosswalk between the 2012 Revised Recovery Plan (USDI FWS 2012b) and the proposed land management plan to show how the two compare. In general, the Carson will follow the intent of the recovery plan and directions from the proposed land management plan. Most the owl habitat components will be met at the fine scale. For any management activities that occur within protected activity centers, core areas, and within recovery habitat, the Carson would follow plan components to integrate habitat management objectives and species protection measures from approved recovery plans and conservation agreement (FW-VEG-G-1-2 and FW-WFP-G-1-2).

Table 48. Crosswalk between 2012 owl recovery plan Table C.2 and Carson proposed land management plan

Recovery Plan for nesting and roosting habitat (pages 275-277)	Preferred Proposed land management plan[13]	Comments
Strive for a diversity of patch sizes with minimum contiguous patch size of 1 hectare (2.5 acres) with larger patches near activity center; mix of sizes toward periphery. Forest type may dictate patch size. Strive for between patch heterogeneity.	**FW-VEG-MCW-DC-1, FW-VEG-MCD-DC-1,** **FW-VEG-MCW-DC-8** At the mid-scale, the distribution of groups and patches varies in the mixed conifer with aspen vegetation community, depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary, but are frequently in the hundreds of acres, with rare disturbances in the thousands of acres. Groups and patches of tens of acres or less are relatively common. A mosaic of groups and patches of trees, primarily even-aged, and variable in size, species composition, and age is present. Disturbance-created grass, forb, shrub openings may compose 10 to 100 percent of the mid-scale area, depending on the local disturbance history. **FW-VEG-MCD-DC-8** At the mid-scale, appearance is variable, but generally uneven-aged and open. Openness typically ranges from 50 percent in more productive sites to 90 percent in less productive sites. Depending on past disturbance events and subsequent regeneration establishment, small patches (generally less than 60 acres) of even-aged forest structure are occasionally present. A small percentage of the landscape may be predisposed to larger even-aged patches, based on physical site conditions that favor mixed-severity and stand replacement fire and other disturbances. Disturbances sustain the overall variation in age and structural distribution. **FW-VEG-MCW-DC-13** Uneven-aged groups and patches, comprising about 20 percent of the mixed conifer with aspen vegetation community, provide habitat for species (e.g., black bear and bobcat) that need multi-storied canopies with dense low- to mid-canopy layers. **FW-VEG-MCW-DC-15** In mid-aged and older forests, trees are typically variably spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages.	While the fine scale desired conditions for ponderosa pine and frequent fire mixed conifer note group, sizes are typically less than one acre, this does not prevent the creation or maintaining of patches that are 2.5 or more acres within owl nesting/roosting habitat or the creations of this habitat.

[13] If plan component is repeated in another row, will only include plan component code. Please review previous rows for entire plan component text or see the Carson land management plan.

Recovery Plan for nesting and roosting habitat (pages 275-277)	Preferred Proposed land management plan[13]	Comments
Strive for a diversity of patch sizes with minimum contiguous patch size of 1 hectares (2.5 acres) with larger patches near activity center; mix of sizes toward periphery. Forest type may dictate patch size. Strive for between patch heterogeneity. (continued)	**FW-VEG-MCD-DC-10** Trees are arranged in small clumps and groups interspersed within variably sized openings of grass/forb/shrub vegetation associations similar to historic patterns. Size, shape, number of trees per group and number of groups per area are variable across the landscape, depending on elevation, soil type, aspect, and site productivity. More biologically productive forested sites contain more trees per group and more groups per area. **FW-VEG-MCD-DC-16** Tree groups are typically less than 1 acre and consist of 2 to 50 trees per group, but are sometimes larger, such as on north-facing slopes. Regeneration openings occur as a mosaic and are similar in size to nearby groups. **FW-VEG-MCD-DC-18** Trees typically occur in irregularly-shaped groups and are variably spaced with some tight clumps. Trees within groups are of similar or variable ages, often containing more than one species. Crowns of trees within mid-aged and old groups are interlocking or nearly interlocking.	
Horizontal and vertical habitat heterogeneity within patches, including tree species composition. Patches are contiguous and consist of trees of all sizes, unevenly spaced, with interlocking crowns and high canopy cover.	**FW-VEG-MCW-DC-8, FW-VEG-MCD-DC-8, FW-VEG-MCW-DC-15 FW-VEG-MCD-DC-18,**	The proposed land management plan desired conditions covers all mixed conifer forest vegetation types on the Carson; not just the owl nesting/roosting habitat. The areas that are managed for nesting/roosting habitat would use the higher end of the ranges, such as having interlocking crowns.
Tree species diversity, especially with a mixture of hardwoods and shade-tolerant species	**FW-VEG-MCW-DC-2** The mixed conifer with aspen vegetation community comprises variable species of varying differing ages in a mosaic of seral stages and structures. Its arrangement on the landscape is similar to historic patterns, with groups and patches of variably-sized and -aged trees and other vegetation. A range of seral states, each characterized by distinct dominant species composition and biophysical conditions, are distributed across the landscape, such that each state adequately supplies the subsequent states progressively through time. Canopies in older seral stages are generally more closed than in dry mixed conifer. **FW-VEG-MCW-DC-8, FW-VEG-MCD-DC-8,** **FW-VEG-MCW-DC 11** The prevalence of aspen is dependent on seral stage, but it is occasionally present in large patches, providing habitat for organisms (e.g., cavity-nesting birds, fungi, and microorganisms) that depend on it. Where they naturally occur, all age classes of aspen are present in even-aged groups or patches and are regenerating and vigorous. A diverse understory of native herbaceous and shrub species has a variety of seral and age classes and is vigorous and regenerating.	The intent of these desired conditions and guidelines are to provide for a variety of tree species diversity that historically existed on the Carson.

Recovery Plan for nesting and roosting habitat (pages 275-277)	Preferred Proposed land management plan[13]	Comments
Tree species diversity, especially with a mixture of hardwoods and shade-tolerant species (continued)	**FW-VEG-MCW-DC-15, FW-VEG-MCD-DC-18,** **FW-VEG-MCD-DC-13** Groups of aspen are present in the mixed conifer with frequent fire vegetation community, where they naturally occur. **FW-VEG-ASP-DC-1** The aspen vegetation community occurs as a slowly shifting mosaic and in natural patterns of abundance and distribution across its range, with new aspen clones establishing over time. New openings provide adequate regeneration and old, declining stands transition to conifer dominance. **FW-VEG-G-1 and FW-WFP-G-1** Management activities and special uses occurring within federally listed species' habitat should integrate habitat management objectives and species protection measures from the most recent approved USFWS recovery plan, to maintain the persistence or contribute to the recovery of federally listed species. **FW-VEG-G-2 and FW-WFP-G-2** Where the Forest Service has entered into a signed conservation agreement that provides guidance on activities or actions to be carried out by the Carson, those activities or actions should be undertaken consistent with the guidance found within the Conservation Agreement, to maintain the persistence or contribute to the recovery of at-risk species. **FW-VEG-G-3** Vegetation should provide for at-risk species' habitats, by minimizing disturbance, providing recovery strategies, and managing for desired levels of key structural elements for at-risk species (for example, large old trees and snags, downed woody debris, denser vegetation structure, and soil structure) important for nesting, rearing, breeding, foraging, dispersal, and other life history needs, to maintain the persistence or contribute to the recovery of at-risk species.	
Diverse composition of vigorous native herbaceous and shrub species	**FW-VEG-MCW-DC-1, FW-VEG-MCD-DC-1,** **FW-VEG-MCW-DC-7** An understory consisting of native grass, forbs, and shrubs is present. Mosses and lichens are prevalent and function to recycle soil nutrients. **FW-VEG-MCD-DC-17** Interspaces between groups are variably shaped, composed of a native grass-forb-shrub mix, and may contain individual trees or snags.	Most of the vigorous native herbaceous and shrub species will occur in areas outside of the tree patches. Since owl nesting/roosting habitat is fairly dense with higher canopy closures this will limit the herbaceous and shrubs within the tree groups. The larger tree groups and smaller openings will limit the number of openings within an area and would tend to be on the lower end of the area available for interspaces openings at the midscale.

Recovery Plan for nesting and roosting habitat (pages 275-277)	**Preferred Proposed land management plan[13]**	**Comments**
Opening sizes between 0.04 - 1 hectare (0.1 - 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 and roost patches, may be larger in rest of protected activity center.	**FW-VEG-MCW-DC-1, FW-VEG-MCD-DC-1,** **FW-VEG-MCW-DC-16** Small openings (gaps) are present as a result of disturbances and provide wildlife and plant species habitat. **FW-VEG-MCD-DC-17, FW-VEG-G-1, FW-WFP-G-1, FW-VEG-G-2, and FW-WFP-G-2**	There is no opening size shown in the desired conditions. During project design in nesting/roosting or to create this habitat, the opening size in the recovery plan would be the range the interdisciplinary team would use to design treatments in these areas. At the midscale the openings would be at the mid to lower end of the range of the area. The interspaces and opening in the proposed land management plan are the same as the opening discusses in the Recovery Plan.
Minimum canopy cover of 60% in Mixed Conifer	**FW-VEG-MCW-DC-1 FW-VEG-MCD-DC-1,** **FW-VEG-MCW-DC-9** Tree density ranges from 20 to 180 square feet of basal area per acre, depending on disturbance history and site productivity. **FW-VEG-MCD-DC-9** Tree density ranges from 30 to 125 square feet of basal area per acre, with the majority coming from larger trees. **FW-VEG-MCD-DC-19** Density is variable, with canopy cover ranging from very open to closed. **FW-VEG-G-3**	The proposed land management plan desired condition covers all ponderosa pine and mixed conifer stands on the Carson not just the owl nesting/roosting habitat. The areas that are managed for nesting/roosting habitat would use the higher end of the ranges, such as having interlocking crowns. The Recovery Plan would provide the recommendation on percentage of canopy cover.

Recovery Plan for nesting and roosting habitat (pages 275-277)	Preferred Proposed land management plan[13]	Comments
Diversity of tree sizes with goal of having trees ≥16" DBH contributing ≥50% of the stand biological assessment	**FW-VEG-MCM-DC-1, FW-VEG-MCD-DC-1, FW-VEG-MCM-DC-9, FW-VEG-MCD-DC-9, FW-VEG-MCW-DC 15, FW-VEG-MCD-DC-10,** **FW-VEG-MCW-DC-10** In certain places, basal area is 10 to 20 percent higher than in the general forest. Examples include mid- to old-age tree groups in goshawk post- fledging family areas and north-facing slopes. Goshawk nest areas have forest conditions that are multi-aged, but are dominated by large trees with relatively denser canopies than other areas in the wet mixed conifer type. **FW-VEG-MCD-DC-12** In certain places, basal area is 10 to 20 percent higher than in the general forest. Examples include goshawk post-fledging family areas, north-facing slopes, and canyon bottoms. Goshawk nest areas have forest conditions that are multi-aged, but are dominated by large trees with relatively denser canopies than other areas in the dry mixed conifer type.	The proposed land management plan desired condition covers all ponderosa pine and mixed conifer stands on the Carson not just the owl nesting/roosting habitat. The areas that are managed for nesting/roosting habitat would use the higher end of the ranges for basal area. There is nothing that prevents the Carson for managing for >50% of trees >16 in dbh. Mid-scale would average the basal area across the mid-scale area. In other words, this allows for stands within the fine scale with higher basal area than shown for the mid-scale range.

Table 49. Crosswalk between 2012 Mexican spotted owl Recovery Plan Table C.1 and Carson proposed land management plan

Recovery Plan for Recovery foraging/ non-breeding habitat and Recovery nesting and roosting habitat (page 275)	Preferred Proposed land management plan	Comments
Emphasize Large Hardwoods. Within mixed conifer and other forest types where hardwoods are a component of owl habitat, emphasis should be placed on management that retains, and promotes the growth of additional, large hardwoods.	**FW-VEG-DC-8** All age classes of deciduous trees (e.g., aspen, cottonwood, and Gambel oak) are well-represented in appropriate ecological settings and provide habitat for wildlife and rare plants. **All of the Mixed Conifer with Aspen DC, FW-VEG-MCD-DC-13, FW-VEG-MCD-DC-14** Where the potential exists, Gambel oak thickets with various diameter stems and low growing, shrubby oak are present. These thickets provide forage, cover, and nesting habitat for species (e.g., small mammals, birds, deer, and elk). Gambel oak mast (acorns) provides food for wildlife species (e.g., black bear). The distribution and abundance of oak balances wildfire hazard fuels reduction and tree regeneration with wildlife habitat, grazing conditions, age class diversity, and soil condition.	These desired conditions all promote the retention and development of large hardwoods. The most common hardwoods on the Carson are Gambel oak and aspen.
Retain Large Trees. Strive to retain (do not cut) all trees >61 cm (> 24 in) dbh, the average diameter of nest trees, unless overriding management situations require their removal to protect human safety, property, or both or in situations where leaving large trees precludes reducing threats to owl habitat.	**FW-VEG-DC-4** Old growth is well distributed, dynamic in nature, and shifts on the landscape over time, as a result of succession and disturbance. Old growth attributes (e.g., multistory structure, large old trees, large trees with sloughing, exfoliating bark, snags, large downed logs, and other indicators of decadence) are present in all forest and woodland vegetation communities and provide habitat for associated species. **FW-VEG-MCW-DC-4** Old growth structure generally occurs over large areas as stands or patches. **FW-VEG-MCD-DC-4** Old growth structure occurs throughout the landscape, generally in small areas as individual old growth components or as clumps of old growth. Old growth may be intermixed with groups of younger trees or may occur in discrete groups of mostly old trees. **FW-VEG-G-1, FW-VEG-G-2**, **FW-VEG-G-3, FW-WFP-G-1, FW-WFP-G-2,** and **FW-WFP-G-3**	The Carson would use the recovery plan recommendation on retention of trees > 24 in dbh. This is not in conflict with the guidelines in vegetation management.

Recovery Plan for Recovery foraging/ non-breeding habitat and Recovery nesting and roosting habitat (page 275)	**Preferred Proposed land management plan**	**Comments**
Retain Key Owl Habitat Elements. Design and implement management treatments so that most hardwoods, large snags (>46 centimeters [18 inches] dbh), large downed logs (>46 centimeters [18 inches] diameter at any point), trees (>46 centimeters [18 inches] dbh) are retained, unless this conflicts with forest restoration and/or owl habitat enhancement goals.	**Hardwoods discussed above.** **FW-VEG-G-1, FW-VEG-G-2, FW-VEG-G-3, FW-VEG-MCW-DC-4, FW-VEG-MCD-DC-4,** **FW-VEG-MCW-DC-5** Vigorous trees dominate, but older, declining, top-killed, lightning-scarred, and fire-scarred trees are a component. Declining trees are well-distributed throughout the landscape and provide for snags and coarse woody debris. Generally, there are an average of 20 snags greater than 8 inches in diameter per acre and 1 to 5 of those snags are 18" or greater in diameter. Lower snag densities are associated with early seral stages and higher densities are associated with late seral stages. Coarse woody debris, including downed logs, ranges from 5 to 20 tons per acre for early-seral stages; 20 to 40 tons per acre for mid-seral stages; and 35 tons per acre or greater for late-seral stages. **FW-VEG-MCD-DC-5** Vigorous trees dominate, but older declining, top-killed, lightning-scarred, and fire-scarred trees are a component that provide for snags and coarse woody debris and are well distributed throughout the landscape. **FW-VEG-MCD-DC-11** Snags are typically 18-inch diameter (DBH) or larger, and average 3 per acre. Smaller snags, 8 inches and larger at DBH, average 8 snags per acre. Downed logs (>12-inch diameter at mid-point, >8 feet long) average 3 per acre in forested areas. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre.	As noted on page 269 of the recovery plan for recovery foraging and non-breeding habitat, treatments adequate to meet fuels and restoration management objectives in Recovery Habitats may result in the short-term loss of some habitat components in areas that could be occupied by spotted owls. When working in recovery nesting/roosting habitat the intent would be to retain these habitat features. There is no plan component that would prevent the Carson from retaining these features in nesting/roosting habitat. Snags and downed logs are averaged over the mid-scale. This does not mean that they would be removed if more are located in one location. Snags are not usually removed unless they pose a safety hazard.

Section 4. Habitat Connectivity Plan Components

Habitat connectivity for wildlife is the premise that terrestrial, riparian, and aquatic animals are able to move freely about their environment in order to access necessary resources or seek other individuals within their species for the purpose of fulfilling basic life-cycle needs. Connectivity may be negatively impacted by two primary issues: impaired ecological conditions and physical obstructions.

Below is a list of the plan components and management approaches related to habitat connectivity found within the land management plan.

Table 50. Habitat connectivity plan components

Plan Component Code	Plan Component Code	Plan Component Code and Management Approaches
FW-VEG-DC 1-6	FW-VEG-PJO-DC 2-3	FW-WFP-O 4-5
FW-VEG-DC 9	FW-VEG-PJO-DC 9	FW-WFP-G 3-4
FW-VEG-DC 12	FW-VEG-PJO-G 1-5	FW-WFP-G 6-8
FW-VEG-MSG-DC 2-3	FW-VEG-PJS-DC 2-3	WFP Management Approach 3-4
FW-VEG-MSG-DC 5	FW-VEG-PJS-G 1-4	WFP Management Approach 6
FW-VEG-MSG-DC 8	FW-WSW-DC 1-4	FW-NIS-DC 1
FW-VEG-MSG-DC 10-11	FW-WSW-O 1	FW-NIS-O 1
FW-VEG-MSG-DC 14	FW-WSW-G 1	FW-GRZ-S 2-3
FW-VEG-MSG-G 1	FW-WSW-RMZ-DC 1-6	FW-GRZ-G 2
FW-VEG-SFF-DC 2	FW-WSW-RMZ-O 1	FW-REC-S 1-2
FW-VEG-SFF-DC 6	FW-WSW-RMZ-G 2-3	FW-REC-G 3
FW-VEG-SFF-DC 9	FW-WSW-RMZ-STM-DC 1-2	FW-TFA-DC 5
FW-VEG-SFF-DC 16	FW-WSW-RMZ-STM-DC 4	FW-TFA-O 1
FW-VEG-ASP-DC 1	FW-WSW-RMZ-STM-DC 6-9	FW-TFA-S 1-2
FW-VEG-ASP-DC 4	FW-WSW-RMZ-STM-O 1-2	FW-TFA-G 1-3
FW-VEG-ASP-DC 8	FW-WSW-RMZ-STM-G 1	FW-TFA-G 5
FW-VEG-ASP-G 1	FW-WSW-RMZ-WB-DC 1-3	FW-TFA-G 7
FW-VEG-MCW-DC 2	FW-WSW-RMZ-SNS-DC 1-2	FW-FAC-G 2
FW-VEG-MCW-DC 8	FW-WSW-RMZ-SNS-DC 6	FW-SU-S 2
FW-VEG-MCW-DC 15-16	FW-WSW-RMZ-SNS-O 1	FW-SU-G 1-5
FW-VEG-MCW-G 1-2	FW-WSW-RMZ-WR-DC 1	FW-LAND-DC 1
FW-VEG-MCD-DC 2	FW-WSW-RMZ-WR-DC 3	FW-LAND-G 1
FW-VEG-MCD-DC 10	FW-WSW-RMZ-FSSR-DC 5	MA-VVMA-DC 2
FW-VEG-MCD-G 1-2	FW-WSW-RMZ-FSSR-DC 7	MA-SAMA-DC 1-2
FW-VEG-PPF-DC 2	FW-WSW-RMZ-FSSR-G 1-3	MA-SAMA-DC 4
FW-VEG-PPF-DC 9	FW-WFP-DC 1-7	MA-SAMA-S 1-6
FW-VEG-PPF-G 1-4	FW-WFP-DC 9-10	MA-SAMA-G 1

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