



Forest Service  
U.S. DEPARTMENT OF AGRICULTURE

Southwestern Region

Cibola National Forest

MB-R3-03-31

September 2021

# Cibola National Forest Land Management Plan

Bernalillo, Catron, Cibola, Lincoln, McKinley, Sandoval,  
Sierra, Socorro, Torrance, and Valencia Counties,  
New Mexico



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**Cover photo:** The western front range of the Sandia Mountains within the Sandia Ranger District, which is located to the east of the City of Albuquerque jurisdictional boundary. Photo shows craggy cliffs atop sparsely vegetated rocky foothills. Credit: William Stone Photography.

# Cibola National Forest Land Management Plan

Bernalillo, Catron, Cibola, Lincoln, McKinley, Sandoval, Sierra,  
Socorro, Torrance, and Valencia Counties,  
New Mexico

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# Chapter 1. Introduction

This land management plan provides direction and guidance for managing the National Forest System lands of the Cibola National Forest (also referred to in this document as “the Cibola”) and National Grasslands to include the four mountain ranger districts, excluding the national grasslands. The Kiowa, Rita Blanca, Black Kettle, and McClellan Creek National Grasslands of the Cibola National Forest and National Grasslands are addressed separately in the *Land and Resource Management Plan for the Kiowa, Rita Blanca, Black Kettle, and McClellan Creek National Grasslands*, which was completed in 2012.

There are generally three levels of planning for National Forest System lands. The first and broadest level of planning for the Forest Service occurs at the national level through the United States Department of Agriculture’s Forest Service Strategic Plan, a 5-year plan that allows public transparency of the agencies’ goals, objectives, and accomplishments.

The second level of planning occurs at the level of National Forest System administrative units through land management plans. Land management plans are required by the National Forest Management Act of 1976. The current Cibola National Forest land management plan was approved in 1985. Since then, the plan has been amended 16 times to adjust for situations in specific projects or to reflect changes in social, economic, or ecological conditions. The 1985 plan was written following the guidance in the 1982 land management planning regulations. This land management plan uses the 2012 Land and Resource Management Planning Rule<sup>1</sup> and the 2012 Planning Rule directives.<sup>2</sup>

The land management plan guides the Cibola in fulfilling its stewardship responsibilities to best meet the current and future needs of the American people. This plan provides forest-specific guidance and information for project and activity decision making over the plan period, generally considered 10 to 15 years. It provides the overall long-term vision, strategy, and constraints that guide integrated resource management, provide for ecological sustainability, and contribute to social and economic sustainability on the Cibola National Forest and the broader landscape.

A land management plan guides and constrains Forest Service personnel not the public. Any constraint on the public needs to be imposed by law, regulation, or through the issuance of an order by the responsible official as directed by Federal regulations.<sup>3</sup> In addition to land management plans, management of National Forest System lands is also guided and constrained by laws, regulations, policies, practices, and procedures in the Forest Service directives system (manuals and handbooks). These are generally not repeated in land management plans.

The third level of planning is development of on-the-ground projects and activities, which are designed to achieve the desired conditions and objectives of the land management plan. Projects and activities must be consistent with the land management plan. The Cibola sets short-term (1 to 5 years) priorities and develops projects to meet these priorities to achieve the long-term desired conditions and objectives in the land management plan. These priorities are based on the direction set forth in the plan and align with regional and national direction, relevant laws, and policies.

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<sup>1</sup> See Code of Federal Regulations 36 part 219

<sup>2</sup> Forest Service Handbook 1909.12

<sup>3</sup> See 36 Code of Federal Regulations part 261, subpart B

## Description of the Plan Area

The Cibola National Forest is one of five national forests in New Mexico. It includes four mountain ranger districts in central New Mexico (figure 1). This plan references the ranger districts by their geographic location from Albuquerque as west to Mount Taylor Ranger District, south to Magdalena Ranger District, southeast to Mountainair Ranger District, and due east to Sandia Ranger District. The land base of these ranger districts covers more than 1.6 million acres. The districts are located within 10 counties in New Mexico (Bernalillo, Catron, Cibola, McKinley, Sandoval, Torrance, Valencia, Lincoln, Sierra, and Socorro). Some of the counties overlap one or more ranger district boundaries.

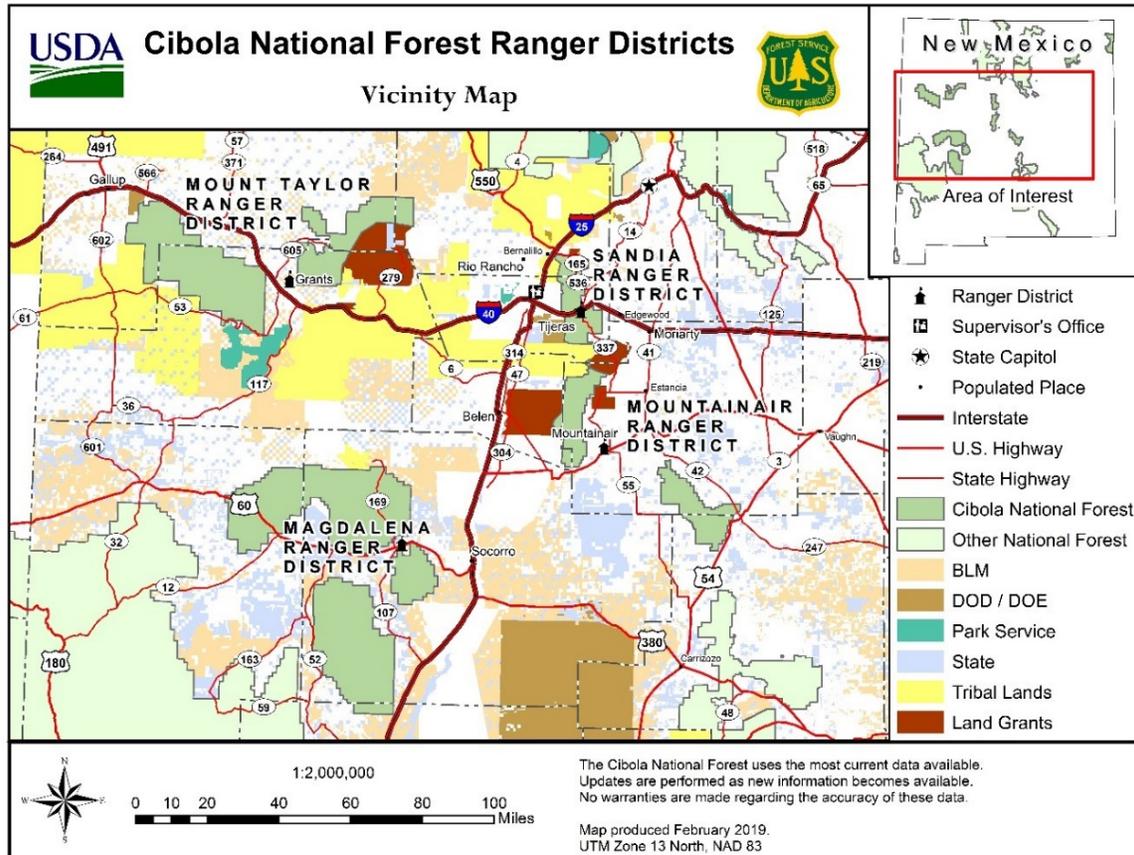


Figure 1. Vicinity map of the Cibola National Forest and ranger districts

The Cibola National Forest shares approximately 102 miles of common boundary with many tribal nations. For the Mount Taylor Ranger District, these are the Navajo Nation, Acoma, Laguna, and Zuni Pueblos. The Mountainair Ranger District shares a boundary with the Pueblo of Isleta, and the Sandia Ranger District shares a boundary with the Pueblo of Sandia. Many other tribal nations have historical areas now managed by the Cibola.

Many Spanish- and Mexican-era land grants-*mercedes*<sup>4</sup> communities organized as subdivisions of New Mexico State government share approximately 72 miles of common boundaries with the Cibola National Forest. These include for the Mount Taylor Ranger District, the Cubero and Cebolleta land grants; for the Mountainair Ranger District, the Chililí, Tajique, Torreón, Manzano on the east and Tomé, Lo de Padilla, and Casa Colorada land grants on the west; and for the Sandia Ranger District, the San Antonio de Las Huertas, Cañón de Carnué, and San Pedro land grants. Additional community land grants with an interest in the Cibola are Sevilleta de la Joya and Atrisco. Some of their common lands are now managed by the Cibola.

From the late-1600s to mid-1800s, Spain and later Mexico made grants or *mercedes* to individuals, groups, and towns to promote development in the frontier lands that today constitute the American Southwest. The two most common types of Spanish and Mexican land grants-*mercedes* made in New Mexico were community land grants and individual land grants. Community land grants were typically common land set aside as part of the grant for use by the entire community. Individual land grants were issued to specific individuals. Forest Service staff maintains relationships with several Spanish- and Mexican-era land grant-*merced* communities with former common lands now administered by Forest Service personnel. Refer to the “Traditional Communities and Uses” section of this plan for more information on land grants-*mercedes*.

## Distinctive Roles and Contributions of the Plan Area

The four Cibola mountain ranger districts, along with the nearby communities (figure 1), have distinctive landscapes and ecological compositions, cultural histories, and social and economic characteristics that contribute to the character of the local area, the State of New Mexico, the southwestern region and the Nation.

Within these four ranger districts are 10 mountain ranges (“sky islands”) scattered throughout central New Mexico: Zuni, Mount Taylor, Magdalena, Bear, Datil, San Mateo, Manzano, Gallinas, Manzanita, and Sandia Mountains. Elevations range from 5,300 feet to over 11,300 feet (figure 1).

The four ranger districts are distinct because they are spread out across central New Mexico as disconnected areas of National Forest System lands. Each ranger district has a distinguishing landscape of sky islands—isolated mountains with high-elevation spruce and fir forests and mid-slope ponderosa pine forests surrounded by pinyon juniper and lowland desert environments. Although there are similarities in the habitat types, each area has a distinctly different set of communities, local history, and contemporary uses, providing unique resources and opportunities.

The Cibola spans four major ecological types resulting in diverse vegetation, elevation, geology, and associated terrestrial and aquatic habitats. These landscapes span low-elevation semi-desert grasslands to high-elevation alpine meadows and provide habitat for a variety of different plant and animal species. Riparian systems are limited across the Cibola, and water is a precious resource for wildlife, livestock, and communities.

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<sup>4</sup> The term *mercedes* means grant in Spanish. This term references the land grants (*mercedes*) that were made to individuals, groups, and towns from Spain and Mexico.

Traditional communities include federally recognized Tribes, land grants, acequia associations, livestock grazing producers, and other rural historic communities that engage with the Cibola to support their unique history and to continue spiritual, cultural, and subsistence practices for current families and future generations.

The Cibola contains significant heritage resources (historic and prehistoric) and paleontological (fossil) resources that provide a valuable cultural heritage for the future. These resources connect descendant communities to their history and help the public learn about this area's rich past, and allow tourism businesses to thrive, including those related to visiting historic, cultural, and paleontological sites.

Recreation opportunities on the Cibola greatly contribute to the quality of life enjoyed by visitors. Outstanding opportunities are easily found for hunting, fishing, camping, hiking, winter sports, viewing wildlife, and appreciating scenic landscape vistas and open spaces. Developed recreation sites of the Cibola provide opportunities and activities for visitors to enjoy that are unique within this region (such as ski areas, a tram, and observatories) and outdoor recreation activities that are important to the local tourism economy.

Restoration-related projects and resulting forest products and services contribute to local economies and provide jobs in local communities. Livestock grazing contributes to local economies and provides an important source of food.

Stewardship opportunities, recreation, and youth-related partnerships are amongst a variety of interests that connect Tribes, Federal and State agencies, soil and water conservation districts, communities, and nongovernmental partners with the Cibola National Forest.

Each ranger district has its own distinct character, role, and contribution based on its ecological settings, historical and current uses, and values as described below.

## **Mount Taylor Ranger District**

Mount Taylor Ranger District is 518,527 acres and is located about 80 miles and an hour's drive west of Albuquerque. It consists of lands north of I-40 in the San Mateo Mountains (Mount Taylor Unit) and lands south of I-40 in the Zuni Mountains (Zuni Mountain Unit). The elevation ranges from 6,500 to 11,300 feet, providing diversity in vegetation and terrain. Mount Taylor, the mountain, is of special religious and cultural significance to several tribal and local communities. The San Mateos and the Zuni Mountains are rich in cultural resources including many historic sawmills and logging communities. Local communities include Grants, Milan, and Ramah.

Both mountain ranges have been managed for multiple resources including recreation, livestock grazing, mining, and logging. Uranium mining has played a significant role in the development of the area, and efforts continue to make this a viable future enterprise. The ranger district is rich in historic and paleontological history and is a gateway to other renowned sites such as the El Morro National Monument and Chaco Culture National Historical Park. The Zuni Mountains are bordered by the Pueblo of Zuni on the southwestern edge of the ranger district, the Navajo Nation on the western edge, and by the Acoma and Laguna Pueblos adjacent to Mount Taylor area. The Cubero and Cebolleta land grants border the eastern edge of the ranger district on the backside of Mount Taylor.

Mount Taylor attracts recreationists from throughout the country and has a segment of the Continental Divide National Scenic Trail, several special use endurance events, and world-class mountain biking. The Zuni Mountain Trail provides an opportunity for long-distance mountain biking with approximately 186 miles of trails for horseback riding, biking, and hiking. Winter recreation activities include snowshoeing, tubing, snowmobiling, and Christmas tree harvesting.

Due to the nature of riparian environments in the Mount Taylor Ranger District, several species occur only in this area including the Zuni bluehead sucker, which is geographically isolated in the upper Rio Nutria drainage. The ranger district offers a full spectrum of hunting options including elk, mule deer, black bear, turkey, and cougar.

## **Magdalena Ranger District**

The 792,585-acre Magdalena Ranger District is located in west-central New Mexico and is composed of four separate and distinct mountain ranges: the Datils, Bears/Gallinas, San Mateos, and Magdalena Mountains. From the peak of South Baldy at 10,700 feet dropping in elevation to under 6,000 feet in the southern portion of the San Mateos, varied topography and ecosystems occur.

The ranger district is over 100 miles from the population centers of Albuquerque and Las Cruces, New Mexico and El Paso, Texas. It offers outstanding natural settings and opportunities for solitude. Local communities include Magdalena, Socorro, Alamo, Datil, and Truth or Consequences. The ranger district's past and recent history includes large remote ranches and small- and large-scale mining. Several Tribes including Acoma, Laguna, and Zuni Pueblos; Ft. Sill and Mescalero Apache; and the Alamo Chapter of the Navajo Nation maintain cultural connections and practices in this area.

The ranger district provides an extensive livestock grazing program connected to the area's historical and current grazing operations. Unlike other areas of the country, many allotments are grazed yearlong, with some grazed seasonally.

Mule and whitetail deer, elk, black bear, mountain lion, turkey, and pronghorn are common game species. Many outfitters and guides host big-game hunts to this area. A variety of small mammals and birds, including small European falcons (kestrels) and golden eagles, can be found throughout most of the ranger district. Sensitive, threatened, and endangered species, including peregrine falcons, Mexican spotted owls, and Mexican wolves are also present.

Water is a limited resource on the Magdalena Ranger District. The ranger district's restoration efforts contribute to maintaining existing water sources, as well as reducing wildfire risks, improving wildlife habitat, and supporting a large firewood program. House logs, posts, poles, and vigas are available on a limited basis. Christmas tree permits are also sold.

The Magdalena and San Mateo Mountains rise to over 10,000 feet with spruce-fir, mixed conifer, and ponderosa pine forests. Elevations drop to less than 6,000 feet along the southeast boundary in mesquite and creosote bush desert. Considered an "undiscovered jewel" because many areas are remote and difficult to access, the ranger district provides an important and valued contribution to the local communities and Tribes. An annual dark skies event has been hosted to allow an opportunity for the public to experience naturally dark night skies, which are an environment important to cultures and ecosystems alike, as well as a limited resource across the country.

The Magdalena Ranger District is home to two designated wilderness areas: Apache Kid at 44,626 acres and Withington at 18,813 acres. A segment of the Continental Divide National Scenic Trail occurs to the west of the ranger district, and there are miles of backcountry trails, offering outstanding opportunities for remote backcountry pursuits, hunting, dispersed recreation, and solitude. The ranger district supports unique permits for globally significant research with the Langmuir Laboratory for Atmospheric Research, which studies atmospheric processes that result in lightning, hail, and rain. The Magdalena Ridge Observatory is permitted site for the study of astronomical events with a 2.4-meter telescope and Interferometer, and it is close to the Very Large Array, one of the world's premier astronomical radio observatories.

## **Mountainair Ranger District**

The Manzano and Gallinas Mountains are situated at the center of the state. Together, at 205,911 acres, they form the Mountainair Ranger District. Elevations on the Mountainair Ranger District range from about 6,000 feet in the lowlands to over 10,000 feet on Manzano Peak. The Manzanos are bordered by the Pueblo of Isleta on the western edge of the ranger district. There are seven Spanish land grants: Chilili, Tajique, Torreon, and Manzano on the east and Tomé, Lo de Padilla, and Casa Colorada on the west. The land grant communities are one of the oldest continuous settlements in the Mountainair District. They are deeply rooted to the land and have a vested interest in the care, management, and use of the surrounding National Forest System lands. The Gallinas Mountains are just west of the town of Corona and are entirely surrounded by private lands within Tarrant, Valencia, Bernalillo, and Lincoln Counties.

The Mountainair Ranger District provides day-use recreation for hunting, hiking, horseback riding, picnicking, bird watching, enjoying scenery, and mountain biking. Several overnight campgrounds are available for longer outings. The district is known for heritage sites including Pueblo Blanco, Pueblo Colorado, and the westernmost Civil War outpost of the Union soldiers. Spectacular fall colors of bigtooth and Rocky Mountain maples in 4<sup>th</sup> of July Canyon attract thousands of visitors from throughout central New Mexico and beyond. The 36,970-acre Manzano Mountain Wilderness offers backcountry opportunities and solitude. Characterized by rugged steep slopes, rocky outcrops, and deep canyons, this area can only be accessed by a well-developed trail system.

The Manzano and Gallinas Mountains provide habitat for a wide variety of wildlife including elk, black bear, cougar, mule deer, turkey, and Rocky Mountain bighorn sheep. The crest of the Manzanos is an important migration corridor in the spring and fall for hawks, falcons, and eagles, as well as many other migratory birds in the daytime and hoary bats in the evening.

Large catastrophic wildfires in the Manzanos have greatly changed the vegetation of the burned areas; what once was mostly ponderosa pine and pinyon-juniper is now mostly scrub oak. The ranger district has a long history of collaboration with the soil and water conservation districts (Claunch-Pinto, East Tarrant, and Edgewood), the Pueblo of Isleta, and other Federal and State partners to promote use of conservation practices and resource management to enhance watershed health and productivity. These efforts are the basis for the model of collaboration applied across the Cibola National Forest.

## **Sandia Ranger District**

The Sandia Ranger District is 99,616 acres directly adjacent to and east of Albuquerque; this includes military withdrawals and special management areas. Given its proximity to Albuquerque, the Sandia Mountains have always been a focus for many outdoor recreation activities. As a result, the mountains have experienced much overuse because they are a quick and easy getaway from the city and the summer heat. This sky island ecosystem is surrounded by an urban interface of forested areas and homes that varies from subdivisions to a more rural interface of 1-acre to 2-acre parcels with houses on them.

The Sandia Ranger District is a neighbor to historic communities like the ancient pueblos, the Town of Bernalillo founded in 1695, the City of Albuquerque officially founded in 1706, and establishment of land grant communities adjacent and within the district boundary (San Antonio de las Huertas, Cañón de Carnué, Elena Gallegos) dating to the 1760s. The establishment of the Atrisco Land Grant near the district dates to 1692. The Sandia Ranger District contains, and is surrounded by, historic and significant traditional cultural properties. Small communities surround the Sandia Mountains including Placitas, San Antonio de Las Huertas, Sandia Park, Cedar Crest, Carnuel, and Tijeras.

Sandia Mountain (Sandias) is regularly visited for ceremonial purposes by members of the Pueblo of Sandia and at least annually by many other pueblos. It includes the T'uf Shur Bien Preservation Management Area, specifically to recognize and protect in perpetuity the rights and interests of the Pueblo of Sandia in the area. It also has direct ties to Spanish land grant communities established by the King of Spain in the 1700s and Mexican land grants from the 1820s. Land grants associated with the Sandias include the San Antonio de Las Huertas, Cañón de Carnué, and San Pedro. They are still active and consider the mountain part of their traditional area. Water sources are sacred to both tribal and land grant communities. Water is critical to sustaining the agricultural bases and water supply to the land grant communities. Several ditch systems still function today, including one actively maintained in Las Huertas Canyon as an “acequia madre” (mother ditch) for a local community's agricultural water. These communities and their uses are important to maintain a traditional way of life.

Due to large-scale tree mortality from various pathogens and drought, the restoration focus across the ranger district is on reducing the threat of large wildfires with the potential for loss of valuable infrastructure on both the federally managed lands and adjacent private lands. Fuels treatments along roadways and subdivision boundaries aim to reduce stocking levels to protect homes in the wildland-urban interface, enhance important wildlife habitats, and protect community water supplies.

The Sandia Mountains serve as a premier open space refuge and “urban wilderness” to a population of almost a million people in the extended metropolitan area. The district contributes highly developed recreation opportunities with the Sandia Peak Tram, the Sandia Ski Area, and spectacular panoramic views along the Sandia Crest National Scenic Byway. The Sandia Crest area also includes special uses such as communications towers, paragliding, and rock climbing.

Over one-third of the New Mexico's school-age population lives within an hour's drive of the Sandia Mountains, and there is a great demand for environmental education programs. The ranger district offers a variety of day-use recreational opportunities including biking, hiking, picnicking, and viewing scenery along the Sandia Crest Highway. Mountain biking is experiencing the biggest growth among all activities. The East Sandia Mountains, south of I-40 near Cedro, are popular for mountain biking. The ranger district hosts several long-standing friend groups that

substantially contribute to the operations and interpretation of the area. Numerous other partners are critical to a variety of projects and needs (mountain biking, skiing, and wildlife habitat maintenance).

The Manzanita Mountains form a low ridge between the Sandia Mountains to the north and the Manzano Mountains to the south. A portion of this area has been withdrawn for military research and training by the Kirtland Air Force Base; public use has been restricted since 1943.

## Need for Changing the 1985 Plan

The current Cibola land management plan was adopted in 1985 and has been revised to respond to current and changing conditions. There is a better understanding of ecological conditions and trends than in 1985 when the land management plan was issued, including the recognition that vegetation conditions are divergent from reference conditions. These forest conditions indicate a substantial departure from the natural fire regime and indicate plant and animal species need further consideration in the planning process.

As required by the 2012 Planning Rule, Cibola National Forest staff assessed ecological, economic, and social conditions, trends, and risks to sustainability within the context of the broader landscape. This evaluation began in 2012 and was published in the 2015 Cibola assessment report based on public comment. The need for change statements paint a picture of strategic changes made to the Cibola land management plan to address issues identified in the assessment and in response to scoping comments made on the notice of intent. Changes to the draft plan were further refined by feedback on the preliminary draft plan shared with the Cibola's public and cooperating agencies in 2016, other public feedback opportunities, and cooperating agency comments. Following are the needs to change the Cibola's 1985 plan: throughout the plan and across multiple resources, ecosystems and species, water resources and watersheds, and multiple uses and human influences.

## Throughout the Plan and Across Multiple Resources

There are multiple needs to address either by plan direction or other plan content throughout the plan and integrated across multiple resource areas. The following are the needs to change the Cibola's 1985 plan to be addressed throughout the plan and across resources:

- all resource management should be prioritized given varying levels of funding
- the management area configuration in the 1985 plan needs to be redone to better address geographic management emphases or compatible resource direction on a landscape basis
- plan components that are redundant with existing law, regulation, or policy need to be removed
- Cibola staff have to better recognize and potentially enhance the role of the national forest in supporting local economies through commodity production and services, such as recreation and tourism
- climate change effects and invasive species plan direction is missing from the 1985 plan and its monitoring program

## **Ecosystems and Species**

Ecological conditions have changed since the 1985 plan, including the recognition that vegetation conditions (structure, composition, and function) are divergent from reference conditions, forest conditions indicate a substantial departure from the natural fire regime, and plant and animal species need further consideration in the planning process. The following are the needs to change the Cibola's 1985 plan associated with ecosystems and species:

- provide plan direction to support sustainability and resiliency of the vegetation community composition and structure and minimize risks to ecosystem integrity
- develop desired conditions, objectives, standards, and guidelines to promote restoration of natural disturbance cycles where appropriate
- update plan direction to promote the maintenance and restoration of soil condition and function (soil hydrology, soil stability, and nutrient cycling)
- add plan direction for an integrated resource approach to the use of planned fire and to address fuel accumulations in the wildland-urban interface
- incorporate plan direction to contribute to the recovery and conservation of federally recognized species, maintain viable populations of species of conservation concern, and maintain common and abundant species within the plan area
- provide plan direction to address habitats for plant and animal species important to Tribes and other traditional communities
- incorporate plan direction toward terrestrial, riparian, and aquatic habitat connectivity for species movement across the landscape

## **Water Resources and Watersheds**

As mentioned earlier in this chapter, water resources are limited across the Cibola National Forest, and water is a precious resource for wildlife, livestock, ecosystem and watershed health, and communities. The following are the needs to change the Cibola's 1985 plan associated with water and watershed condition:

- provide updated plan direction for the protection, maintenance, and restoration of riparian vegetation and channel morphology in the plan area and for restoration of priority watersheds
- add plan direction on the sustainable management of groundwater, springs, wetlands, riparian areas, and perennial waters and their interconnections
- incorporate plan direction on providing a sustainable water supply for multiple uses (wildlife, livestock, and recreation) and public water supplies
- update plan direction pertinent to riparian management zones around all lakes, perennial and intermittent streams, and open water wetlands

## **Multiple Uses and Human Influences**

The Cibola National Forest contains distinctive landscapes, cultural histories, and socioeconomic characteristics that contribute to the surrounding communities. The Cibola contributes resources and uses that are important to federally recognized Tribes and pueblos, land grant communities, acequia associations, and other communities that pre-date the establishment of the national forest, all with historic, cultural, and social connections to the Cibola. Visitors to the Cibola National

Forest come for the varied recreational opportunities found within each of the sky islands. Many area residents have jobs or businesses directly or indirectly dependent on tourism or on the forest products produced from the Cibola. The 1985 plan does not address issues such as recognizing livestock grazing and fuelwood gathering as important uses to be continued on the Cibola and a sustainable recreation program that will be able to adapt to changes in demand, available resources, and opportunities. The following are the needs to change the Cibola's 1985 plan associated with multiple uses and human influences:

- update plan direction for American Indian and non-Indian traditional cultural properties and sacred sites
- provide plan direction to address management of historic and contemporary cultural uses by federally recognized Indian Tribes as well as traditional communities
- identify inventory and management of historic properties and other cultural resources and uses
- update plan direction on the stabilization and preservation of historic properties and address the role of management of historic properties in economic development
- incorporate alignment of management of historic properties and landscapes, sacred sites, contemporary uses, and tribal cultural needs with other resource management objectives (particularly but not limited to ecosystem restoration)
- provide plan direction on the identification and documentation of historic properties at risk of damage or destruction from catastrophic wildland fire
- update plan direction to address consistency of activities with legally mandated trust responsibilities to Tribes
- incorporate plan direction regarding sacred sites, sacred places, natural and cultural resources important to Tribes and requests for reburial of human remains and cultural items
- update plan direction regarding administration of temporary closure orders to ensure privacy for Tribes engaged in cultural and ceremonial activities
- add plan direction on design, location, installation, maintenance, and abandonment of towers, facilities, and alternative infrastructure within communication and energy generation sites, giving due consideration to the value and importance of high places (mountaintops and ridges) that may be sacred sites or important cultural landscapes to Tribes
- provide plan direction for restoration treatments for those geographic areas and vegetation types that are most outside of the natural range of variation while considering capability of local infrastructure, contractors, and markets including for commercial, noncommercial, tribal, land grant use, or a combination of these things
- incorporate adaptive management plan direction toward ecosystem-based desired conditions for the livestock grazing program
- integrate sustainable recreation management with that of other national forest resources and provide guidance for managing a sustainable trails program while addressing use conflicts
- provide management direction on the Continental Divide National Scenic Trail
- add plan guidance for managing recreation activities that occur in areas sensitive to resource degradation or at risk due to high visitation

- update plan direction on managing recreational aviation activities, caves, and recreational activities associated with wildlife, fish, and cultural or historic sites
- incorporate plan direction and guidance for implementing the recreation opportunity spectrum classification system and incorporating scenic integrity objectives for managing scenic resources
- update plan direction for managing designated inventoried roadless areas, eligible wild and scenic rivers, designated research natural areas, and for managing designated wilderness
- add plan direction on management of areas that may be recommended for wilderness, during the interim period while Congress is considering designation
- provide plan direction on the management of infrastructure and for road maintenance in watersheds identified as being impaired or at risk
- update plan direction for obtaining legal access that addresses public, private landowner, tribal, land grant, and management needs and for progress toward a contiguity of the land base and a reduction of small unmanageable tracts
- provide updated plan direction regarding management of recreational mining, mineral exploration and extraction, and the use of common minerals
- add plan direction for managing existing or proposed transmission corridors and renewable energy generation including addressing safety concerns pertinent to maintenance activities associated with existing energy and communication corridors

Public comments at all phases highlighted the recurring linkages to ecological and socioeconomic conditions, and to the values and benefits identified within the “Needs for Changing the 1985 Plan” section. This public input informed the development of four core themes to summarize and synthesize the needs for change. These core themes drove the development of the land management plan. Refer to the “Core Management Themes” section below for further explanation.

## Core Management Themes

### **Respecting Cultural and Traditional Landscapes and Uses**

The land is a life-sustaining resource that shapes cultural identity, helps form individual and community relationships, and strengthens ancestral connections. The Cibola National Forest has a rich history of people connected to this ancient landscape; forest management recognizes American Indians, land grant heirs, acequias, and other rural historic communities.

To respect these cultural and traditional landscapes across the Cibola, the plan direction takes into account their needs and uses. The Cibola’s forest management will serve the needs of present and future generations by acknowledging and honoring the different forest-based cultures, traditions, values, and economic benefits.

### **Valuing Unique Places and Features**

The sky islands of the Cibola National Forest contain a multitude of spectacular geologic features, scenic vistas, distinctive wildlife, landscape contrasts, and stark transitions. These features contribute to a sense of place, creating a setting that draws a wide spectrum of diverse users. These areas contain traditional, cultural, and contemporary significance to local

communities and attract visitors from distant communities. The Cibola is valued by many people in many different ways, and its resources provide for varied multiple uses, such as developed and dispersed recreation, spiritual renewal, artistic inspiration, education, employment, and economic means.

## **Managing Holistically for Watershed and Ecosystem Health**

The potential for uncharacteristic wildfire and effects of climate change impact how the Cibola National Forest manages its watersheds and overall ecosystem health. Managing holistically takes into consideration the regenerative capacity of the land and outputs to restoration economies that emerge from investments in ecological restoration. Focusing management efforts on supporting restoration economies provides for employment, capital, resources, and economic activity that emerge from investments in ecological restoration. Restoration projects can include restoring functional physical landscape processes, growing and planting native plants, supporting springs and pollinators, enhancing habitat, and improving water quality. While investments in restoration benefit the environment, restoration projects also require workers, materials, and services to implement. The marketplace for these goods and services can create employment, spur business and workforce development, and increase activity in local economies. Through holistic management, the land management plan will provide a framework for supporting restoration economies, multiple uses, and benefits for current and future generations.

## **Managing for Sustainable Recreation**

Recreational opportunities that are resilient and relevant for current and future generations; foster social and economic opportunities; and sustain the health, diversity, and productivity of the land are critical for the future. To address these issues, the Cibola National Forest aims to collaborate with local communities and partners and recognize their contributions and connections to the land, as well as the role they share as stewards of the land. Recreational opportunities will be integrated into all resource management decisions in order to support the Cibola's management priorities.

The Cibola recreational program effectively leverages partnerships with local communities and partners that focus on shared leadership, shared funding, and a shared responsibility of land stewardship. Building on this social capital will provide a sustainable recreation program in a time of flat or declining budgets, reduced workforce, increased workload, and changes in public demand for recreational opportunities. The main objectives of managing for sustainable recreation on the Cibola are to reconnect people to the land and increase public stewardship of the Cibola; assure the Cibola's recreation program is relevant to the visiting public; and offer recreational opportunities supported by appropriate facilities, trails, and special uses.

## **Contents of a Land Management Plan**

The land management plan must include plan components and other plan content (36 CFR 219.7). As per the 2012 Planning Rule, the required plan components (desired conditions, objectives, standards, guidelines, and suitability of lands) along with the other required plan content (roles and contributions, priority watersheds, monitoring, and proposed and possible actions) must provide for social, economic, and ecological sustainability and multiple uses. The 2012 Planning Rule also requires integrated resource management as "multiple use management that recognizes the interdependence of ecological resources and is based on the need for integrated consideration of ecological, social, and economic factors" (36 CFR 219.19).

## Plan Components

Plan components guide future project and activity decision making and include desired conditions, objectives, standards, guidelines, suitability of lands, and goals. Plan components should (1) provide a strategic and practical framework for managing the Cibola National Forest, (2) be applicable to the resources and issues of the Cibola, and (3) reflect the Cibola's distinctive roles and contributions. Plan components were developed collaboratively with input from a variety of cooperating agencies, external and internal stakeholders, and the general public. Plan components do not need to reiterate existing law, regulation, or policy. Forestwide plan components are found in chapter 2 of this document. Plan components for management areas and designated areas are found in chapter 3, and the suitability (timber suitability) plan components are found in chapter 4. The five plan components are described as follows:

- **Desired conditions** describe the aspirational vision for the Cibola National Forest. They are the ecological, cultural, and socioeconomic aspirations for management of the land. 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 progress toward their achievement may be determined. In some cases, desired conditions may only be achievable over hundreds of years.
- **Objectives** describe how the Cibola 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.
- **Standards** are technical design constraints that must be followed when an action is being taken to make progress toward desired conditions. Standards differ from guidelines in that standards do not allow for any deviation without a plan amendment.
- **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, provided the intent of the guideline is met. Deviation from a guideline must be specified in the site-specific National Environmental Policy Act (NEPA) decision document with the supporting rationale. When deviation from a guideline does not meet the original intent, a plan amendment is required.
- **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 Cibola land management plan only applies suitability to timber. Suitability of other resources is addressed with the standards and guidelines applied to each particular resource area.

**Goals** are a sixth, optional plan component. They 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 like an objective. Plans are not required to include goals, and none have been created in the Cibola land management plan.

## Management and Designated Areas

Every plan must have management areas or geographic areas or both. The plan may identify designated or recommended designated areas as management areas or geographic areas (36 CFR section 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 the Cibola National Forest wants to achieve in specific geographic 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 section 219.19). Refer to the management areas and designated areas direction in chapter 3 for plan components such as the special designations of wilderness, recommended wilderness, eligible wild and scenic rivers, conservation management areas, restoration management areas and other congressionally designated areas.

## Other Required Plan Content

- Distinctive roles and contributions of the Cibola National Forest – Chapter 1  
Describes the Cibola’s distinctive contributions to the local area, region, and nation, and the roles for which the national forest is best suited, considering the agency’s mission and capabilities.
- Priority watersheds – Chapter 2 in the “Water Resources” section  
Priority watersheds have been identified using the Forest Service national Watershed Condition Framework as areas where plan objectives for restoration focus on maintaining or improving watershed condition. These priorities may change over the life of the land management plan to concentrate restoration in other areas.
- Land management plan monitoring – Chapter 5  
Monitoring includes testing assumptions, tracking changes, and measuring management effectiveness and progress toward achieving or maintaining the plan’s desired conditions or objectives.
- Proposed and possible actions – Appendix A  
Possible actions are the types of projects that the Cibola may use in the next 3 to 5 years to move toward achieving desired conditions and objectives.

## Optional Plan Content

A land management plan may also include optional content, such as background information, explanatory narrative, general management principles, management approaches, management challenges, performance history, performance risks, contextual information, or referenced material. Optional content is not labeled or worded in a way that suggests it is a plan component and does not imply or constitute a decision, but it may help clarify plan direction and how it may be applied.

A change to “other required plan content” or “optional content” does not require a plan amendment; instead such changes may be made using an administrative correction process.

The Cibola land management plan utilizes management approaches. These approaches may be used to inform future proposed and possible actions. These techniques and actions provide options for plan implementation and represent possibilities, preferences, or opportunities, rather than obligatory actions. Not all plan components are addressed with management approaches, only those for which additional information is warranted. They may illustrate suggestions as to how desired conditions, objectives, or both could be met, convey a sense of priority among objectives, or indicate possible future course of change to a program.

## Land Management Plan Coding

Desired conditions, standards, guidelines, objectives, and management approaches have been given a unique coding system to reference plan elements more easily using the following three-series pattern: level of direction - type of direction - resource, where:

- The first series of letters indicates the level of direction (forestwide or management area or designated area).
- The second series refers to the type of plan element (desired condition, guideline, etc.).
- The third series refers to the sub-resource area (or resource area if not divided into sub-resources) to which the plan element applies (table 1 and table 2).

For example, the coding for a forestwide desired condition for the “Air” resource would be FW-DC-AIR and the coding for a management-area-specific guideline for recommended wilderness management area would be MA-GDL-RECW.

**Table 1. Coding legend for plan elements**

Code	Level of Direction	Type of Direction
FW	Forestwide	not applicable
MA	Management area	not applicable
DA	Designated area	not applicable
DC	not applicable	Desired condition
STD	not applicable	Standard
GDL	not applicable	Guideline
OBJ	not applicable	Objective
MGAP	not applicable	Management approach

**Table 2. Coding for resources and sub-resources**

<b>Code</b>	<b>Resource</b>	<b>Sub-Resource</b>
WUI	Vegetation	Wildland-urban interface
CC	Vegetation	Climate change
ID	Vegetation	Insects and disease
SPC	Vegetation	Species composition
VEG	Vegetation	All vegetation types
SFF	Vegetation	Spruce-Fir Forest
MCW	Vegetation	Wet Mixed Conifer
MCD	Vegetation	Dry Mixed Conifer
PPF	Vegetation	Ponderosa Pine Forest
PJ	Vegetation	Pinyon-Juniper Woodland
PJC	Vegetation	Pinyon-Juniper Evergreen Shrub
PJO	Vegetation	Pinyon-Juniper (persistent)
MPO	Vegetation	Madrean Pinyon-Oak
MMS	Vegetation	Mountain Mahogany Mixed Shrubland
GAMB	Vegetation	Gambel Oak Shrubland
SAGE	Vegetation	Sagebrush Shrubland
ISS	Vegetation	Intermountain Salt Scrub
CSDS	Vegetation	Chihuahuan Salt Desert Scrub
CDS	Vegetation	Chihuahuan Desert Scrub
SAND	Vegetation	Sandsage
MSG	Vegetation	Montane/Subalpine Grassland
CPGB	Vegetation	Colorado Plateau/Great Basin Grassland
SDG	Vegetation	Semi-Desert Grassland
WTR	Watershed resources	Watersheds
SOIL	Watershed resources	Soil
GWTR	Watershed resources	Groundwater
WRF	Watershed resources	Water resources features and wetland or riparian areas
WU	Watershed resources	Water uses
AQSP	Species	Aquatic species and habitats
TRSP	Species	Terrestrial species and habitats
NIS	Species	Nonnative invasive species
ARS	Species	Threatened and endangered species and species of conservation concern (at-risk species)
AIR	Air	not applicable
FF	Fire and Fuels	not applicable

*Chapter 1. Introduction:  
Land Management Plan Coding*

<b>Code</b>	<b>Resource</b>	<b>Sub-Resource</b>
GR	Sustainable rangelands and livestock grazing	not applicable
FP	Sustainable forestry and forest products	not applicable
FRT	Traditional communities and uses	Federally recognized Tribes
RHC	Traditional communities and uses	Rural historic communities
CHR	Traditional communities and uses	Cultural and historic resources
LND	Land ownership adjustment and boundary management	not applicable
LOC	Minerals and geology	Locatable minerals
SAL	Minerals and geology	Salable minerals or mineral materials
GEO	Minerals and geology	Geology resource management
AML	Minerals and geology	Abandoned mine lands
CAVE	Minerals and geology	Caves
RE	Minerals and geology	Renewable energy
GREC	Recreation	General recreation
DREC	Recreation	Developed recreation
DISP	Recreation	Dispersed recreation
SCE	Scenic resources	not applicable
SU	Special Uses	not applicable
RD	Infrastructure	Roads
FAC	Infrastructure	Facilities
CONS	Management areas	Conservation management area
REST	Management areas	Restoration management area
RECW	Management areas	Recommended wilderness areas
WSR	Management areas	Eligible wild and scenic rivers
WILD	Designated areas	Designated wilderness areas
IRA	Designated areas	Inventoried roadless areas
SB	Designated areas	Scenic byways
CDNST	Designated areas	Continental Divide National Scenic Trail
LANG	Designated areas	Langmuir Research Site and Magdalena Ridge Observatory
RNA	Designated areas	Bernalillo Watershed Research Natural Area
SCNHL	Designated areas	Sandia Cave National Historic Landmark
KAFB	Designated areas	Kirtland Air Force Base Military Withdrawal Area
TUSB	Designated areas	T'uf Shur Bien Preservation Trust Area
CAVE	Designated areas	Significant caves

## Best Available Scientific Information

The best available scientific information was used to inform the planning process. The planning record documents how best available scientific information was determined to be accurate, reliable, and relevant to issues being considered. The best available scientific information includes relevant ecological, social, and economic scientific information. Use of best available scientific information was documented for the assessment, the plan decision, and the monitoring program. The 2012 Planning Rule does not require that the Cibola National Forest develop additional scientific information during the planning process but that planning should be based on scientific information that is already available unless other laws or regulation require otherwise.

In the context of the best available scientific information, “available” means the information currently exists in a form useful for the planning process without further data collection, modification, or validation. Analysis or interpretation of the best available scientific information may be needed to place it in the appropriate context for planning.

## Project Consistency with the Land Management Plan

When Forest Service land managers are planning projects, they consult the desired conditions and objectives in the plan to develop proposals that identify site-specific needs and actions, design features, and project-level monitoring. These proposals are developed locally with input from partners and the public, and in consideration of the most current and relevant best available scientific information. Important considerations during project development include consistency with the plan, higher-level direction, potential effects at multiple scales, and feedback from project- and plan-level monitoring regarding the effectiveness of management strategies.

As required by the National Forest Management Act of 1976, all projects and activities that would be authorized by Forest Service personnel, after record of the decision for the revised plan, must be consistent with the land management plan (16 United States Code (U.S.C.) 1604 (i)) as described at 36 Code of Federal Regulations (CFR) 219.15 (see appendix B). This is accomplished by a project or activity being consistent with applicable plan components. When a proposed project or activity would not be consistent with the applicable plan components, the responsible official shall take one of the following steps, subject to valid existing rights:

- modify the proposed project or activity to make it consistent with the applicable plan components
- reject the proposal or terminate the project or activity
- amend the plan so the project or activity will be consistent with the plan as amended
- amend the plan contemporaneously with the approval of the project or activity so the project or activity will be consistent with the plan as amended (36 CFR 219.15(c))

When using this plan to develop project specifications, it is important to keep in mind desired conditions for all scales are applicable regardless of the size of the project. Smaller projects need to consider the larger scales in terms of how they contribute to the desired conditions within the context of the larger-scale unit, and larger projects need to consider the design features required to ensure the fine scale desired conditions are achieved and maintained across the project area.

Consideration of scale is also important when evaluating progress toward desired conditions because the range of variation and distribution of conditions is affected by the scale at which they are viewed. For example, when desired conditions are articulated at larger scales, they represent an average of fine-scale conditions across broader areas. This may make conditions appear less variable when they are evaluated at large scales, even though variability exists at the smaller scales.

## Transition to Implementation of the Land Management Plan

The land management plan is used as a direction source for future projects, plans, and assessments. It is not expected this new direction be used to re-evaluate or change decisions made under the 1985 plan. A smooth and gradual transition to the new land management plan is anticipated, rather than one that forces an immediate re-examination or modification of all contracts, projects, permits, and other activities that are already in progress. As new project decisions, contracts, permits, renewals, and other activities are considered, conformance to the new plan direction as described in the previous section is expected.

## Plan Monitoring and Evaluation

Plan- and project-level monitoring and evaluation are the tools for gathering information on progress toward desired conditions, the effectiveness of plan implementation, and the appropriateness of plan direction. This information is then used to determine management needs and enable adaptive management. Refer to chapter 5 for more details on the monitoring plan.

## Plan Organization

The plan is organized based on the following chapters, which are briefly described below.

- **Chapter 1. Introduction** introduces the plan area, roles and contributions, summary of conditions, and describes planning concepts.
- **Chapter 2. Forestwide Direction** includes forestwide and district visions, desired conditions, standards and guidelines, management approaches, and objectives.
- **Chapter 3. Management Areas and Designated Areas** contain direction for specific areas that is different from the general forestwide direction in chapter 2. There are two types of areas in this plan: Management Areas (mapped for specific places or purposes); and Designated Areas (designated by Congress or higher levels of administration).
- **Chapter 4. Suitability of Lands** includes the description of timber suitability and areas not suitable for timber production on the Cibola National Forest.
- **Chapter 5. Monitoring and Evaluation** outlines the monitoring and evaluation and progress toward achieving desired conditions. The monitoring strategy provides a framework to inform adaptive management and make modifications or revisions to the plan.

Several appendices provide additional information:

- **Appendix A: Proposed Probable and Possible Future Actions**
- **Appendix B: Project Consistency with the Plan**
- **Appendix C: Common, Latin, and Spanish Plant Names**
- **Appendix D: Relevant Laws, Regulations, and Policy**
- **Appendix E: Climate Change Vulnerability Analysis Synthesis**
- **Appendix F: Desired Scenic Character Descriptions**
- **Appendix G: Map Packet**

# Chapter 2. Forestwide Direction

## Introduction

The mission of the Forest Service is to “sustain the health, diversity, and productivity of the Nation’s forests and grasslands to meet the needs of present and future generations.”

The 2012 Planning Rule sets forth the direction to:

“maintain and restore National Forest System land and water ecosystems while providing for ecosystem services and multiple uses. The planning rule is designed to ensure that plans provide for the sustainability of ecosystems and resources; meet the need for forest restoration and conservation, watershed protection, and species diversity and conservation; and assist the Agency in providing a sustainable flow of benefits, services, and uses of National Forest System lands that provide jobs and contribute to the economic and social sustainability of communities” (36 CFR 219).

Sustainability is the key factor considered for every resource provided by the Cibola National Forest. As part of this approach, the land management plan is written in an interconnected way that considers how management decisions on a specific issue will affect other resources, either directly or indirectly. This plan direction is designed to balance restoring ecosystems; conserving and maintaining native fish, wildlife, and plant species; and contributing important social, cultural, and economic benefits and services while meeting long-term sustainability that includes multiple uses.

This chapter provides the overall long-term vision, core themes that provide a strategic focus for achieving the vision, the set of desired conditions for sustainability (ecological, social, and economic), standards and guidelines that constrain management actions, and an integrated set of objectives that drive integrating projects or activities to achieve the vision in an interrelated way. The combined use of this forestwide direction is to provide for ecological sustainability and contribute to social and economic sustainability on the Cibola and the broader landscape. Refer to chapter 3 for additional direction for specific management areas.

## Vegetation

### Ecosystem Characteristics, Function, and Services

The Cibola National Forest assessment report of ecological conditions (USDA Forest Service 2015a) showed vegetation-related ecosystem characteristics (species composition and structure, fire regime, and patch<sup>5</sup> size) were largely in departure from reference condition. By achieving the desired conditions for these ecosystem characteristics, (1) ecosystem functions (energy flow, and hydrologic and nutrient cycling) will be restored and maintained, (2) vegetation will become more resistant and resilient in the face of climate change, and (3) insect and disease infestations will return to endemic levels.

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<sup>5</sup> A contiguous area of similar vegetation structure and species composition.

Additionally, meeting desired conditions for vegetation may simultaneously ensure the production of:

- supporting ecosystem services like primary production (conversion of sunlight and carbon dioxide into oxygen and carbohydrates);
- regulating ecosystem services like soil formation and stability, thermoregulation (shading and evaporative cooling), nutrient and hydrologic cycling, and energy flow;
- provisioning ecosystem services such as wildlife habitat, forage for grazing and browsing animals, and fiber (lumber, biomass, paper, fuelwood); and
- cultural ecosystem services that vegetation provides to society like Christmas trees, botanical remedies, and aesthetics.

The following paragraphs on ecological classification, scale, range of values, and fire regime describe the context, framework, and terminology used throughout the remainder of the “Vegetation” section. Following that are desired conditions, standards, guidelines, management approaches, and objectives for each of the vegetation types occurring on the Cibola National Forest.

## **Ecological Classification**

The vegetation types for which desired conditions were developed were based on ecological response units.<sup>6</sup> Ecological response units represent an ecosystem stratification based on vegetation characteristics that would occur when natural disturbance regimes and biological processes prevail and combine potential vegetation and historical fire regimes to form ecosystem classes useful for landscape assessment.

Spatial representation of ecological response units<sup>7</sup> is derived from map unit delineation in the Terrestrial Ecological Unit Inventory database; an ecological response unit polygon may encompass multiple map units (USDA Forest Service 1986). A Terrestrial Ecological Unit Inventory map unit (usually less than 1,000 acres; typically, about 200 acres) comprises one or more soil components, with each component having its own potential natural vegetation type.

## **Scale**

Desired conditions for forest and woodland vegetation types are presented at three spatial scales: landscape scale (1,000 acres and more), mid-scale (10 to 1,000 acres), and fine scale (less than 10 acres). The landscape scale describes the big picture of desired conditions. Descriptions at the mid and fine scales provide additional detail necessary for guiding future projects and activities.

The landscape scale is typically composed of variable elevations, slopes, aspects, soils, plant associations, and disturbance processes. A landscape area is comprised of ten or more mid-scale units. The mid-scale is composed of assemblages of fine-scale units, which have similar biophysical conditions. The fine scale is an area in which the species composition, age, structure, and distribution of plants (single, grouped, or aggregates of groups) are described, typically relegated to project-scale focus.

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<sup>6</sup> Vegetation desired conditions are based on USDA Forest Service (2019a) and Wahlberg et al. (2015).

<sup>7</sup> Riparian vegetation types were delineated via the Regional Riparian Mapping Project (Triepke 2013).

Figure 2 shows three spatial scales at which desired conditions may be described. The landscape scale illustrates multiple stands and natural meadows and grasslands. The mid and fine scales illustrate open grass-forb-shrub interspaces and uneven-aged stand conditions consisting of single and grouped trees of different vegetation structural stages, young to old, represented by different shades and sizes (Reynolds et al. 2013).

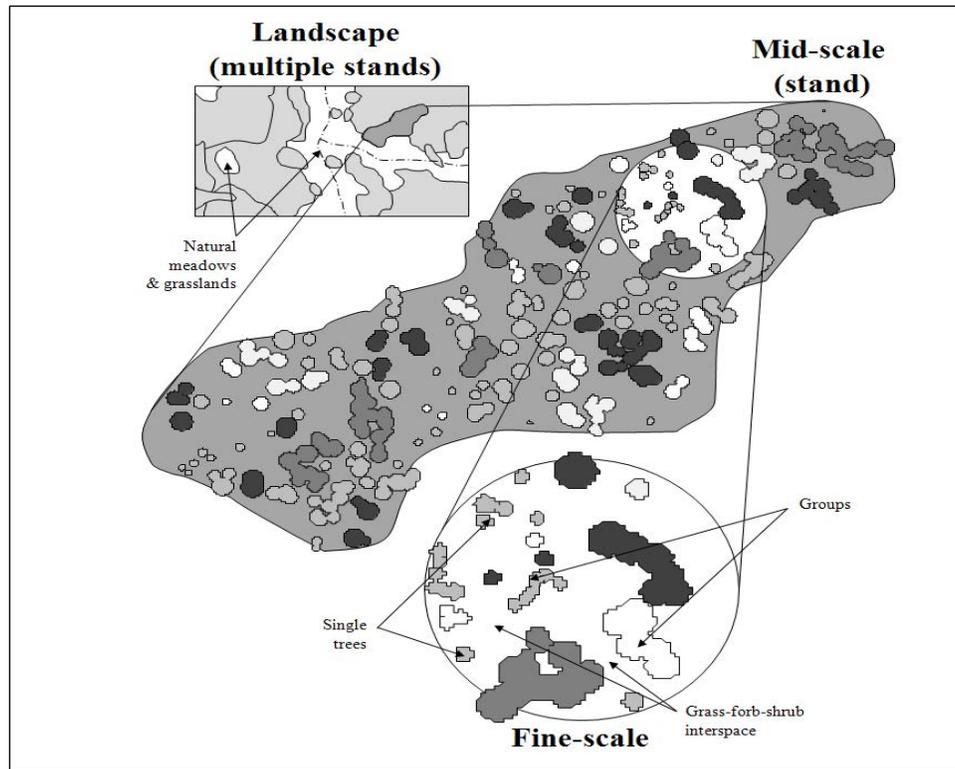


Figure 2. Desired conditions at three spatial scales

## Range of Values

Ranges of values (minimum and maximum) are presented for the desired condition of the vegetation types on the Cibola National Forest. These ranges are based on the natural variation in the composition and structure within a vegetation type; they are also tempered by management experience, as well as a consideration of socioeconomic desires such as producing forest products, providing recreation opportunities, and maintaining wildlife habitat. Desired conditions vary within a vegetation type due to spatial variability in soils, elevation, and aspect.

The ranges represent the characteristic conditions for a given variable (the lowest and highest tree densities in a vegetation type). It is important to recognize the goal is most acres would be managed toward the middle of the range; however, it may be appropriate to have different desired conditions within a vegetation type, such as a lower density of vegetation inside the wildland-urban interface to reduce fire risk to human life and property.

## Fire Regime

Fire frequency and severity are referred to by their fire regime group (table 3).

**Table 3. Fire regime groups and descriptions**

Group	Frequency (years)	Severity	Severity Description
I	0 to 35	Low or mixed	Generally low-severity fires replacing less than 25% of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75% of the overstory
II	0 to 35	Replacement	High-severity fires replacing greater than 75% of the dominant overstory vegetation
III	35 to 200	Mixed or low	Generally mixed severity; can also include low-severity fires
IV	35 to 200	Replacement	High-severity fires
V	More than 200	Replacement or any	Generally replacement severity; can include any severity type in this frequency range

Note: The above definitions use 25 percent and 75 percent as severity thresholds between the low, mixed, and replacement regimes. Source: Adapted from Barrett et al. (2010).

## Management Common to All Vegetation Types

The following sections (“Wildland-Urban Interface,” “Climate Change,” “Insects and Disease,” “Plant Community Species Composition,” and “All Vegetation Types”) describe dominant ecological processes, disturbance regimes, and stressors that have the potential to affect ecosystem integrity across all vegetation types. Plan components provide direction to protect, limit, or mitigate these effects.

### Wildland-Urban Interface

The wildland-urban interface is an area where development (such as a rural neighborhood, ski area, or campground) adjoins or intermingles with an undeveloped natural area. In the wildland-urban interface, management of wildfire risk is a prime concern.

The wildland-urban interface is defined as resident populations at imminent risk from wildfire and human developments having special significance. These areas may include critical communications sites, municipal watersheds, high voltage transmission lines, observatories, church camps, scout camps, research facilities, and other structures that if destroyed by fire would result in hardship to communities. These areas encompass not only the sites themselves but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved. The wildland-urban interface has become a complicating factor related to fire management on the Cibola, as there have been an increased number of people living within and next to the forest. Many urban subdivisions are being situated close to forested areas for their aesthetic and economic values. This translates into demands by the public for increased efforts by the Forest Service to address fuels and fire management and wildfire suppression in these interface areas.

### Desired Conditions for Wildland-Urban Interface

#### FW-DC-WUI

1. Wildland fires sustain characteristic ecosystem function while preserving property and human health and safety.

2. Wildland fires are low-intensity surface fires because ladder fuels are nearly absent.
3. Firefighters are able to suppress wildfires safely and efficiently.
4. In forest vegetation types, the area occupied by grass, forb, or shrub interspace is at or above the range given in the vegetation community desired conditions. Trees within groups may be more widely spaced with less interlocking of crowns than what would be considered desirable outside the wildland-urban interface. Interspaces between tree groups are of sufficient size to discourage isolated group torching from spreading as a crown fire to other groups. The tree basal area is on the lower end of the range given in the vegetation community desired conditions. In vegetation types with a mixed- or high-severity fire regime, such as spruce-fir, characteristic ecosystem function is modified to promote low-intensity surface fires.
5. In the wildland-urban interface, the fuel load (snags and coarse woody material) is present at the lower end of the range given in the appropriate vegetation community desired conditions. Coarse woody material ranges from 1 to 10 tons per acre, depending on vegetation type, with: (1) lower amounts in fire-adapted vegetation types, and (2) higher amounts in infrequent-fire types or where it provides for important fine-scale habitat structure, as long as it meets the overall intent of protecting values at risk.
6. In shrublands, fuel loading is on the lower end of the range given for the vegetation community desired conditions. There is adequate cover to meet the needs of a variety of wildlife species.

## Climate Change

The Cibola assessment report of ecological conditions (USDA Forest Service 2015a) showed most of the national forest is highly vulnerable to climate change projections (Triepke et al. 2014). A changing climate could impact vegetation health and eventually may displace endemic species characteristic of a site. Maintaining ecosystem resistance and resiliency may help mitigate potential negative impacts of climate change. A resistant plant community maintains a similar species composition when stressed by climate change; species composition in a resilient plant community may change temporarily, then return to its pre-stressed composition when, and if, the stress is removed. Alternatively, if the stress is maintained long-term, a plant community may adapt by altering its species composition to one which is appropriate for the new site conditions.

Climate change may increase the frequency and severity of weather or fire events, thereby increasing the need for road reconstruction and maintenance in areas damaged by high winds, increased water flow, or increased wear from firefighting-related traffic. As a result, adaptive management practices may require resources to be diverted from routine maintenance of unaffected roads, resulting in a downward trend in road conditions overall.

## Desired Condition for Climate Change

### FW-DC-CC

1. Vegetation is resistant and resilient to the effects of climate change. In areas of low vulnerability to climate change, plant community composition is similar to site potential for its Terrestrial Ecological Unit Inventory map unit component; in areas of high vulnerability to climate change, changes in plant composition and structure realign gradually to shifting climate and site potential.

## Management Approaches for Climate Change

### FW-MGAP-CC

1. Consider focusing restoration and maintenance activities in order to mitigate water stress in areas with high vulnerability to climate change.
2. Consider specific management recommendations that have been developed for each vegetation type based on their specific vulnerabilities to climate change and ecological needs (see Appendix E: Climate Change Vulnerability Analysis Synthesis).
3. For forests and woodlands in areas of high vulnerability to climate change (based on 100-year climate projections; Triepke et al. 2019), tree basal area may be restored or maintained at levels that mitigate water stress and increase resistance to climate change (Allen et al. 2015, Sun et al. 2015, Vose et al. 2016); often this is the lower half of the range of desired conditions for basal area.<sup>8</sup> In these areas, early- and mid-seral<sup>9</sup> tree species may be allowed to 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 characteristics of lower-elevation life zones (such as Douglas-fir on a spruce-fir forest site) are maintained. Late-seral tree species (especially large specimens) may be maintained primarily in locally cooler (north-facing aspects) and wetter (draws and seeps) areas to maintain diversity, wildlife habitat, and a local seed source.
4. Achievement of desired conditions and climate adaptation can be determined by first identifying the current and anticipated site potential of a given area, and then applying indicators of ecological integrity for resistance or resilience (e.g., forest extent), structure (e.g., seral state diversity), composition (e.g., ecological status, functional group diversity), process (e.g., fire regime), and connectivity (e.g., patch size).

## Insects and Disease

Endemic insects and pathogens (disease-causing agents) are integral components of ecosystems. Often there are numerous positive impacts of insects and disease on the ecosystem including creating small openings, increasing biodiversity, enhancing nutrient cycling, providing food sources for animals, creating wildlife habitat, and many other ecologically significant benefits. However, under severe disease infection levels or episodic outbreaks of insects, the effects are more evident, sometimes negative, and cause greater change. With the exception of white pine blister rust, the insects and diseases often considered pests on the Cibola National Forest are native organisms that have long been part of the ecosystem and have evolved with their plant hosts. For example, treatments for controlling dwarf mistletoe (an endemic plant parasite) are typically aimed at maintaining infection levels rather than eliminating the infection. Maintaining infection levels allows development of a diversity of age classes across the landscape.

## Desired Condition for Insects and Disease

### FW-DC-ID

1. All vegetation types experience endemic infestation levels, patterns, and cycles of native insects and diseases.

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<sup>8</sup> Except in riparian vegetation types; large trees are retained in all vegetation types.

<sup>9</sup> “Seral” refers to the transitory stages that plant communities develop from bare ground to the climax stage.

## Guideline for Insects and Disease

### FW-GDL-ID

1. On single-species-dominated sites, uneven-aged management should be used where less than 20 percent of the host tree species—or less than 25 percent of the area—is infected by dwarf mistletoe. Thinning and prescribed fire should be used to keep dwarf mistletoe levels from increasing. Even-aged management or deferral should be considered when greater than 20 percent of the host species, or 25 percent of the area, is infected with dwarf mistletoe.
2. On mixed-species-dominated sites, even-aged management or deferral should be used instead of uneven-aged management where more than 50 percent of conifer trees (excluding white fir) are infected by dwarf mistletoe.
3. Where a seed-tree or shelterwood treatment is applied for dwarf mistletoe control, it should be followed within 10 years of seedling establishment by a final removal treatment or other effective means to prevent further infection.
4. Genetic diversity among white pines (Conklin et al. 2009) should be maintained and promoted by retaining white pines in harvest and thinning projects to help provide a broad genetic base and promote natural selection for rust-resistant white pines.
5. In stands already impacted by blister rust, rust-free white pines should be retained when harvesting or thinning.

## Management Approach Insects and Disease

### FW-MGAP-ID

1. Planting rust-resistant trees may be the only option to maintain or restore white pines in some locations, such as where no rust-free trees exist on sites that support white pines.

## Plant Community Species Composition

Desired conditions in this plan describe the most characteristic site conditions and plant species for each vegetation type, as more complete descriptions of site conditions and species lists for each vegetation type would be unnecessarily exhaustive for this plan. Land managers should refer to the Terrestrial Ecological Unit Inventory database for more complete, site-specific (soil, climate, production, cover, species composition, etc.) data and refer to the Plant Associations of Arizona and New Mexico (USDA Forest Service 1997a, 1997b) for more complete species lists.

Some plant communities (such as the blue spruce plant community of Little Water Canyon in the Zuni Mountains and the maple plant community of Fourth of July Canyon in the Manzano Mountains) and individual plants (such as “Big Trees” registered with American Forests) may be considered “significant” because they are socially, culturally, or botanically important.

## Desired Conditions for Plant Community Species Composition

### FW-DC-SPC

1. All sites support the potential natural vegetation type best adapted to site conditions.
2. At the plan unit scale, similarity of existing ground cover and overall plant species composition is greater than 66 percent to that of site potential but can vary considerably at finer scales because of a diversity of seral conditions.
3. Significant plant communities (as defined above) and individual plants persist.

## Guideline for Plant Community Species Composition

### FW-GDL-SPC

1. Management activities should be guided by the most site-specific, accurate inventory data for soil, species composition and structure, and site potential. For example, where a woodland now occupies a historical grassland site (such as a soil classification of Mollisol—a signature of grassland ecosystems), grassland desired conditions apply. In other words, the desired condition for vegetation type should be consistent with the site’s soil type with an emphasis on native annual and perennial plant communities.

## Management Approaches for Plant Community Species Composition

### FW-MGAP-SPC

1. Areas surrounding significant individual plants may be periodically cleared of potentially damaging fuel sources.
2. Significant plant communities may be managed to maintain their unique characteristics.
3. Significant plant communities and individual plants may be accompanied by interpretive signs.

## All Vegetation Types

Plan components and management approaches in this section apply to all vegetation types. Some, but not all, vegetation types have their own specific plan components as well: vegetation-type-specific components. Vegetation-type-specific components are more restrictive and take precedence over the more general components listed in this section.

## Desired Conditions for All Vegetation Types

### FW-DC-VEG

1. Vegetation structure is in low departure from reference conditions as described in the Cibola assessment (USDA Forest Service 2015a). Desired seral state proportions are applied at the landscape scale where contributions from all seral stages and low overall departure from reference proportions are positive indicators of integrity (see Region 3 Seral State Proportions Supplement).<sup>10</sup>
2. Where healthy, large trees exist in forest and woodland vegetation types, they comprise the majority of the immediate foreground (up to 300 feet) of concern level 1 and 2 travelways (area with the most public concern for scenery). Some younger and mid-aged trees serve as replacement trees and as additional screening.
3. Ecosystems contain a mosaic of vegetation conditions, densities, and structures. This mosaic (as described in vegetation-type-specific desired conditions) occurs at a variety of scales across landscapes and watersheds, reflecting the disturbance regimes that naturally affect the area. Natural ecosystem functions (energy flow, hydrologic and nutrient cycling) facilitate the shifting of plant communities, structure, and ages across the landscape over time.

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<sup>10</sup> Refer to this link for supplement: <http://fsweb.r3.fs.fed.us/eap/nfma/working-group/products/desired-conditions/vddt/r3-vddt-model-states-in-desired-conditions-2011-01-28.docx>.

4. Vegetation is in good or very good conditions, 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.

### Objective for All Vegetation Types

#### FW-OBJ-VEG

1. Mechanically treat 750 to 3,500 acres annually of highly departed areas (including prevalent fire-adapted vegetation types such as ponderosa pine, dry mixed conifer, and pinyon-juniper grass woodland).

### Standards for All Vegetation Types

#### FW-STD-VEG

1. Regulated timber harvest activities shall occur only on those lands classified as suitable for timber production. Management activities (timber harvest, thinning, and prescribed burning) to meet other resource objectives is permitted on lands classified as suitable or unsuitable.<sup>11</sup>
2. Timber harvest will occur only where soil, slope, and watershed conditions will not be irreversibly damaged.
3. Timber will be harvested only where protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water.
4. Timber harvest will be carried out consistent with the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources.
5. For even-aged timber harvest:
  - Clearcutting, seedtree cutting, shelterwood cutting, and other cuts designed to regenerate an even-aged stand of timber will be used only where determined to be necessary to meet desired conditions or to manage severe insects, disease, or other severe damage conditions.
  - Even-aged regeneration cutting will be used only where interdisciplinary review has been completed.
  - Edges of treatment units will be naturally appearing, feathered, and will blend with general surroundings.
  - If even-aged regeneration treatments are proposed that would exceed 40 acres, National Forest Management Act requirements regarding public notification and regional forester approval shall be followed and impacts on other resources will be analyzed and mitigated where necessary. These requirements do not apply to the size of areas harvested in response to natural catastrophic conditions such as, but not limited to, fire, insect and disease attacks, or windstorms.
  - Stands shall generally have reached culmination of mean annual increment prior to even-aged regeneration harvest unless insect or disease conditions make it necessary to rotate the stand at an age prior to culmination of mean annual increment.

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<sup>11</sup> For example, timber harvest may be necessary to enhance habitat for threatened and endangered species or to remove hazard trees in recreation sites.

- The sale of timber shall be limited to a quantity equal to or less than a quantity which can be removed from the national forest annually in perpetuity on a sustained-yield basis and exceptions (departures, decade, salvage, and sanitation harvests).
- 6. On lands suitable for timber production, timber harvest intended to create openings for tree regeneration shall only be used when there is reasonable assurance of restocking within five years after final regeneration harvest (16 U.S.C. 1604).<sup>12</sup>
- 7. Temporary road construction shall mitigate impacts to recreation resource values and facilitate rehabilitation of recreation resources impacted by projects.
- 8. Harvesting systems shall be selected based on their ability to meet desired conditions and not primarily on their ability to provide the greatest dollar return or timber output.
- 9. Clearcutting shall only be used if it is the optimum cutting method.
- 10. Clearcutting shall be used only where it helps achieve desired conditions or mitigate severe forest-stand damage (for example, spruce-fir vegetation type, heavily diseased stands, aspen regeneration) and where desired conditions for other resources are also considered.

## Guidelines for All Vegetation Types

### FW-GDL-VEG

1. Management activities should be guided by the most current, site-specific, accurate mapping data for soil, species composition and structure, and site potential. For example, where a woodland now occupies a historical grassland site (such as a soil classification of Mollisol—a signature of grassland ecosystems), grassland desired conditions apply. In other words, the desired condition for vegetation type should be consistent with the site's soil type with an emphasis on native annual and perennial plant communities.
2. In all timber harvest situations (post-high-severity fire, bug-killed areas, green stands, etc.), an adequate number of trees for snag recruitment and coarse woody material should be left to maintain long-term soil productivity and to meet wildlife needs.
3. Management activities that result in accumulations of green slash should be timed to minimize potential impacts from bark beetles; accumulating green slash (greater than 3 inches in diameter) before overwintering beetles emerge should be avoided (generally April to June).
4. The planning and design of vegetation management projects should incorporate input from multiple resource areas in working towards a comprehensive approach to management and benefit of all resources.
5. Where current forests are lacking old-growth components (large trees, snags, coarse woody material, and canopy layering), such components should be retained or developed within the scope of meeting other desired conditions (for example, reduce impacts from insects and disease and reduce the threat of uncharacteristic wildfire).

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<sup>12</sup> Restocking level is prescribed in a site-specific silvicultural prescription for a project treatment unit and is determined to be adequate depending on the objectives and desired conditions for the plan area. (For general guidance on restocking, see *Silvicultural Practices Handbook* (FSH 2409.17.) In some instances, such as when lands are harvested or prescribed burned to create or maintain openings for firebreaks and vistas, it is appropriate not to restock.

6. To protect old-growth forest components, existing old-growth forest attributes should be protected from uncharacteristic natural disturbances.
7. Visual impacts from vegetation treatments, recreation uses, range developments, and other structures should blend with the overall scenic character along scenic byways. Natural regeneration of disturbed areas should be allowed unless (1) endangered species habitat needs to be restored; (2) the time period of recovery is deemed excessive due to the large size of deforested area, the lack of nearby seed sources, or both; (3) there is concern for loss of site capacity from soils loss or extreme competition with early-seral species; or (4) the risk of noxious weed invasion or the spread of noxious and invasive species would prevent recovery of native species.
8. Effects from prescribed fire should be considered during project planning and implementation. For example, (1) blackened and scorched vegetation may be visible in project areas in the short term following treatments, but scenic integrity objectives should be met in the long term, and (2) efforts should be made to minimize high-intensity fire in riparian areas with high scenic integrity such as along system trails and scenic vistas.
9. Log decks should be removed and rehabilitated, and skid trails should be stabilized and restored so that recovery to satisfactory soil condition can occur.
10. Log landing areas should be located outside of identified sensitive areas (for example, riparian management zones, wetlands, archeological sites, threatened and endangered critical habitat, designated trails, and along scenery management system concern level 1 roads). When landings must be located in these areas, effects to the sensitive resource should be mitigated.
11. For habitat-modifying projects, design features should consider maintaining or improving connectivity between habitat patches across scales.
12. Existing old-growth forests components on the landscape should be protected using a variety of methods, including thinning and prescribed fire.

## Management Approaches for All Vegetation Types

### FW-MGAP-VEG

1. Use a variety of strategies for reestablishing desired conditions such as leaving snags, downed logs, and other woody components that collect drifting seeds, provide shade and cooler temperatures, retain moisture, and provide protection from ungulate herbivory.
2. Move all vegetation types towards desired conditions by monitoring, recovering, and mitigating severe or uncharacteristic disease outbreaks and insect infestations to ensure watershed health and to allow development of a diversity of age classes across the landscape.
3. Manage cultural resources (including species of cultural significance) and historic properties by proactively integrating their consideration into the planning, design, and implementation of vegetation projects.
4. Prioritize vegetation treatment in riparian areas that are important for wildlife, in the wildland-urban interface, along scenery management system concern level 1 and 2 travelways, in recreation sites, and in historically occurring openings.

5. Use uneven-aged management systems as the predominant vegetation management strategy because the majority of the Cibola National Forest consists of frequent-fire vegetation types that have uneven-aged desired conditions (see table 3). Even-aged prescriptions are appropriate where they would help achieve desired conditions such as to regenerate aspen or when stand conditions are unsustainable due to severe damage (for example, insect or disease infestations).
6. Enhance pollinator habitat by using available resources and engaging public and private partnerships to take action for the conservation and management of pollinators and pollinator habitat.
7. Consider working with forest health specialists to prepare test control plans that contain appropriate mitigation measures (such as use of resistant tree species, maintenance of species diversity, removal of damaged trees, or use of pesticides) and monitoring procedures.

## **Spruce-Fir Forest**

The spruce-fir forest vegetation type is often dominated by Engelmann spruce; codominant and subdominant species vary by elevation. Depending on local site conditions, the understory commonly includes currants, maples, honeysuckle, common juniper, huckleberry, alpine clover, and sedges. This vegetation type can be subdivided into lower- and upper-elevation types, with differing fire regimes and subdominant and codominant species composition. The lower spruce-fir type typically occurs between 9,500 and 10,500 feet in elevation; the upper spruce-fir type typically occurs above 10,500 feet.

Lower-elevation spruce-fir resembles wet mixed conifer with a different composition of tree species (due to relatively warmer, drier conditions), and it occupies the ecotone between wet mixed conifer and upper-elevation spruce-fir. In the lower-elevation type, common low- and mid-seral tree species are aspen, Douglas-fir, white fir (absent on Mount Taylor), southwestern white pine, and limber pine. Climax forest is dominated by Engelmann spruce, corkbark fir, white fir, and occasionally blue spruce. Subdominant species may include subalpine fir,<sup>13</sup> white fir, and bristlecone pine. In the upper-elevation type, dominant tree species are Engelmann spruce and corkbark fir; patches of aspen may be present. Disturbances in these types typically occur at two temporal and spatial scales: large-scale infrequent disturbances (mostly fire) and small-scale frequent disturbances (fire, insects, disease, and wind). Lower-elevation spruce-fir typically has uneven-aged structure and a mixed-severity fire regime; upper-elevation spruce-fir typically has even-aged structure and a high-severity fire regime. Both have fire return intervals of 150 to 400 years.

## **Desired Conditions for Spruce-Fir Forest**

FW-DC-SFF

### **Landscape-Scale (1,000 acres and more)**

1. The spruce-fir forest is a mosaic of structural and seral stages ranging from young to old trees. Patch sizes vary, but are mostly in the hundreds of acres, with rare disturbances in the thousands of acres. Tree canopies are generally more closed than in mixed conifer. Native grass, forbs, and shrubs comprise the understory. Seral-stage proportions are applied at the landscape scale (table 4).

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<sup>13</sup> “Subalpine fir” refers to subalpine fir (*Abies lasiocarpa* var. *lasiocarpa*), corkbark fir (*Abies lasiocarpa* var. *arizonica*), or both.

**Table 4. Desired seral-stage proportions for spruce-fir forest**

Seral Stage	Proportion	Description
Early	21%	Grass-forb-seedling-sapling Douglas-fir, spruce fir; tree canopy is open*
Mid	33%	Young forest with regeneration; tree canopy is closed
Late	46%	Mature-old forest with regeneration; tree canopy is closed

\* Seedlings and saplings are trees less than 5 inches diameter (diameter at breast height), small trees are 5 to 9.9 inches diameter, medium trees are 10 to 19.9 inches diameter, and large trees are greater than 20 inches diameter.

The terms “open” and “closed” refer to amount of canopy cover.<sup>14</sup> The terms “tolerant” and “intolerant” refer to species that are tolerant (for example, spruce and fir) or intolerant (for example, ponderosa pine) of shade, respectively; “mixed-tolerant” refers to species intermediate in shade tolerance (for example, Douglas-fir).

Note: Aspen may be present in all seral stages.

2. Old growth generally occurs over large areas and includes old trees, snags, coarse woody material, and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
3. The spruce-fir community is composed predominantly of vigorous trees; older, declining trees provide snags and coarse woody material. The abundance of snags and coarse woody material varies by seral stage.
4. Vegetative conditions (composition, structure, function) are broadly resilient to disturbances of varying frequency, extent, and severity. The forest landscape is a functioning ecosystem that contains all of its components, processes, and conditions that result from endemic levels of disturbances (insects, diseases, fire, windfall) including snags, downed logs, and old trees. Organic ground cover and herbaceous vegetation protect the soil, facilitate water infiltration, and promote plant and animal diversity and ecosystem function. In the lower-elevation type, mixed-severity fire (fire regime group III) occurs infrequently (150 to 400 years); in the upper-elevation type, high-severity fire (fire regime groups IV and V) occurs very infrequently (greater than 400 years). Natural and human-caused disturbances are sufficient to maintain desired overall tree density, age, structure, species composition, coarse woody material, nutrient cycling, and satisfactory soil conditions.
5. Large snags (greater than or equal to 18 inches in diameter at breast height<sup>15</sup>), range from 5 to 30 plus per acre, with the lower end of the range associated with early seral stages and the upper end associated with late-seral stages. Overall snag (greater than 8 inches in diameter at breast height) density ranges from 13 to 30 per acre, averaging 20 per acre. Coarse woody material (dead and downed wood) ranges from 5 to 30 tons per acre for early seral stages, 30 to 40 tons per acre for mid-seral stages, and greater than 40 tons per acre for late-seral stages. An abundance of fungi (including mushrooms) is available for use by small mammals.

<sup>14</sup> Canopy cover classes: sparse (0–9.9 percent); open (10–29.9 percent); moderate (30–59.9 percent); closed (60–100 percent).

<sup>15</sup> Diameter at breast height is measured at 4.5 feet.

6. Dwarf mistletoe infestation size, degree of severity, and amount of mortality vary among infested stands. Witches' brooms may be scattered throughout the infestations providing structural diversity in the stand and improved habitat for wildlife species such as small mammals (such as tree squirrels) and raptors (such as goshawks and spotted owls).

**Mid-Scale (10 to 1,000 acres)**

7. The size and number of tree groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. There may also be small disturbances resulting in groups and patches of tens of acres or less. Grass, forb, and shrub interspaces created by disturbance may involve single trees or comprise up to 100 percent of the mid-scale area following major disturbance. Aspen is occasionally present in large patches.
8. Basal area varies from 20 to 250 plus square feet per acre depending on site productivity, disturbance history, and seral stage.
9. Mixed-severity (fire regime group III) and high-severity (fire regime groups IV and V) fires and other disturbances maintain desired overall tree density, structure, species composition, coarse woody material, nutrient cycling and satisfactory soil conditions. The understory consists of shrubs, perennial grasses, and forbs with plant basal cover ranging from about 5 to 20 percent depending on site conditions.
10. Forest conditions in some areas contain at least 10 percent higher basal area than the general forest (for example, goshawk post-fledging family areas and north-facing slopes). Nest areas have forest conditions that are multi-aged but dominated by large trees with relatively denser canopies than other areas in the spruce-fir type.

**Fine-Scale (less than 10 acres)**

11. Mid-age to old trees grow tightly together with interlocking crowns. Trees are generally of the same height and age in early group or patch development but may be multilayered in late development. Gaps are present as a result of disturbances.
12. Dwarf mistletoe infection severity and amount of mortality vary among infected trees. Witches' brooms may be present with these infestations, providing habitat for wildlife.

**Wet Mixed Conifer (Mixed Conifer with Aspen) Forest**

The wet mixed conifer forest generally occurs at elevations ranging from approximately 6,500 to 10,000 feet. Tree species composition varies depending on seral stage, elevation, and moisture availability. This type can be composed of early and mid-seral species such as aspen, Douglas-fir, New Mexico locust, southwestern white pine, and limber pine; and late-seral species such as maple, white fir, and blue spruce. Ponderosa pine may be present in minor proportions. The absence of Engelmann spruce and subalpine fir plant associations (USDA Forest Service 1997a) distinguishes wet mixed conifer from the spruce-fir forest. Disturbances typically occur at two temporal and spatial scales: large-scale infrequent disturbances (mostly fire), and small-scale frequent disturbances (fire, insects, disease, and wind). The understory includes a wide variety of shrubs, grasses, and forbs; species composition varies with site conditions (soil type, aspect, elevation, and disturbance). Aspen communities have multi-height stems (except in early stages following fire) and adequate recruitment to perpetuate aspen communities, including site-appropriate, native, biodiverse understories.

**Desired Conditions for Wet Mixed Conifer (Mixed Conifer with Aspen) Forest  
FW-DC-MCW**

**Landscape Scale (1,000 acres and more)**

1. The wet mixed conifer forest is a mosaic of structural and seral stages ranging from young trees through old with species composition varying by seral stage. Patch sizes vary but are frequently in the hundreds of acres, with rare disturbances in the thousands of acres. Canopies are generally more closed than in dry mixed conifer. Seral-stage proportions are applied at the landscape scale (table 5).

**Table 5. Desired seral-stage proportions for wet mixed conifer forest**

Seral Stage	Proportion	Description
Early	7%	Grass/forb understory with aspen or oak ramets and suckers ranging in cover from 10 to 40% canopy cover.
Mid (deciduous)	21%	Dominated by aspen or oak species with more than 40% canopy cover. Conifers are often present in the understory.
Mid (small conifer)	18%	Dominated by a mix of conifer species. Tree canopy cover is 20 to more than 60%; primarily seedlings, saplings, and small trees.
Mid (medium conifer)	14%	Dominated by a mix of conifer species. Tree canopy cover is 20 to more than 60%; primarily medium-sized trees.
Late	40%	Dominated by mature, shade-tolerant conifer species. Tree canopy cover is 20 to 60% or more; primarily very large trees.

2. Old growth generally occurs over large areas and includes old trees, snags, coarse woody material, and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
3. The wet mixed conifer forest is composed predominantly of vigorous trees; older, declining trees provide snags and coarse woody material. The abundance of snags and coarse woody material varies by seral stage.
4. Vegetative conditions (composition, structure, function) are broadly resilient to disturbances of varying frequency, extent, and severity. The forest landscape is a functioning ecosystem that contains all of its components, processes, and conditions that result from endemic levels of disturbances (insects, diseases, fire, and windfall) including snags, downed logs, and old trees. Organic ground cover and herbaceous vegetation protect the soil, facilitate water infiltration, and promote plant and animal diversity and ecosystem function. Mixed-severity fire (fire regime group III) is characteristic, especially at lower elevations of this type. High-severity fire (fire regime groups IV and V) is rare and typically limited to higher elevations of this type. Natural and human-caused disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody material, nutrient cycling, and satisfactory soil conditions.

5. Large snags (greater than or equal to 18 inches in diameter at breast height), range from 1 to 5 per acre, with the lower end of the range associated with early seral stages and the upper end associated with late-seral stages. Overall snag (greater than 8 inches in diameter at breast height) density averages 20 per acre. Coarse woody material (dead and downed wood) ranges from 5 to 20 tons per acre for early seral stages, 20 to 40 tons per acre for mid-seral stages, and greater than or equal to 35 tons per acre for late-seral stages.
6. Dwarf mistletoe infestation size, degree of severity, and amount of mortality vary among infested stands. Witches' brooms may be scattered throughout the infestations providing structural diversity in the stand and improved habitat for wildlife species such as small mammals (for example, tree squirrels) and raptors (for example, goshawks and spotted owls).

**Mid-Scale (10 to 1,000 acres)**

7. The size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Groups and patches of tens of acres or less are relatively common. A mosaic of groups and patches of trees are present, primarily even-aged groups<sup>16</sup> and patches<sup>17</sup> that are variable in size, age, and species composition. Openness and prevalence of some species, such as aspen, is dependent on seral stage. Grass, forb, and shrub openings created by disturbance may compose 10 to 100 percent of the mid-scale area, depending on disturbance history. Aspen is occasionally present in large patches.
8. Basal area varies from 20 to 180 plus square foot per acre, depending on site productivity, disturbance history, and seral stage.
9. Mixed-severity (fire regime group III) and high-severity (fire regime groups IV and V) fires and other disturbances maintain desired overall tree density, structure, species composition, coarse woody material, nutrient cycling and satisfactory soil conditions Under moist conditions, smoldering low-intensity surface fires torch single trees and isolated groups; under drier conditions, passive to active crown fires kill up to 100 percent of the conifers in patches (usually less than 1,000 acres). Other smaller disturbances occur more frequently. The understory consists of shrubs, perennial grasses, and forbs with plant basal cover ranging from about 5 to 20 percent depending on site conditions.
10. Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (for example, goshawk post-fledging family areas, Mexican spotted owl nesting and roosting habitats, and north-facing slopes). Interspaces with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area. Goshawk nest areas have forest conditions that are multi-aged but dominated by large trees with relatively denser canopies than other areas in the wet mixed conifer type.

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<sup>16</sup> Groups are clusters of two or more trees with interlocking or nearly interlocking crowns at maturity surrounded by grass-forb-shrub interspaces. Size of tree groups is typically variable depending on forest type and site conditions and can range from fractions of an acre (a two-tree group), such as in ponderosa pine or dry mixed-conifer forests, to many acres, as is common in wet mixed-conifer and spruce-fir forests. Trees within groups are typically not uniformly spaced; some may be tightly clumped (adapted from Reynolds et al. 2013).

<sup>17</sup> Patches are areas larger than tree groups in which the vegetation composition and structure are relatively homogeneous. Patches can be composed of randomly arranged trees or multiple tree groups, and they can be even aged or uneven aged. Patches comprise the mid-scale, ranging in size from 10 to 1,000 acres. Patches and stands are roughly synonymous (adapted from Reynolds et al. 2013).

11. Aspen occurs as a shifting mosaic across its range with new aspen clones establishing over time. Understory vegetation consists of shrubby or herbaceous species, providing forage and cover for wildlife and habitat for invertebrates such as pollinators. Coarse woody material is scattered across the landscape and provides habitat for a variety of wildlife species (for example, small mammals, reptiles, amphibians, and birds) while contributing to efficient nutrient cycling and satisfactory soil conditions.

**Fine-Scale (less than 10 acres)**

12. In mid-aged and older forests, trees are typically variably spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking, occasionally with some single trees spaced apart from clumps. Trees within groups can be of similar or variable species and ages. Disturbances create small openings of varying size.
13. Organic ground cover and herbaceous vegetation provide protection for soil and moisture infiltration and contribute to plant diversity and ecosystem function. Fires usually burn either with low-intensity, smoldering combustion or they transition rapidly into the canopy (via ladder fuels) as passive or active crown fire.
14. Dwarf mistletoe witches' brooms may be present, providing habitat for wildlife.

**Guidelines for Wet Mixed Conifer (Mixed Conifer with Aspen) Forest**

**FW-GDL-MCW**

1. In areas with reasonable assurance of successful regeneration and where managing for early seral states is desired, aspen sprouting should be stimulated in areas that have (or previously had) aspen by clearcutting, conifer removal, or fire, while taking into account desired conditions for other resources.
2. When managing for early-seral states, conifers should be removed from aspen stands when needed to increase aspen longevity and increase diversity of aspen age classes.
3. To preclude concentrated herbivore impacts, new surface water developments should not be constructed near aspen stands (approximately one quarter of a mile) unless this is the only developable area for water in the project area.
4. Where managing for aspen is desired, restoration of aspen clones should occur where aspen is declining and has reasonable assurance of successful regeneration to maintain a sustainable presence of this species at the landscape level.

**Management Approach for Wet Mixed Conifer (Mixed Conifer with Aspen) Forest**

**FW-MGAP-MCW**

1. Work closely with U.S. Fish and Wildlife Service personnel to address the habitat needs of the Mexican spotted owl by minimizing disturbance and providing nesting and roosting habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody material.
2. Use fencing or jackstrawing of downed trees to secure areas of aspen regeneration if browsing or grazing pressure could prevent successful regeneration.

## Dry Mixed Conifer (Mixed Conifer–Frequent Fire) Forest

The dry mixed conifer forest is transitional with increasing elevation between ponderosa pine forest (below) and wet mixed conifer forest (above) and generally occurs at elevations ranging from approximately 6,000 to 9,500 feet. Dry mixed conifer forests are dominated by mainly shade-intolerant trees, such as ponderosa pine, southwestern white pine, limber pine, quaking aspen, and Gambel oak, with a lesser presence of shade-tolerant species such as white fir and blue spruce. Mixed-tolerance species, such as Douglas-fir, are common. Aspen may occur as individual trees or small groups. The understory includes a wide variety of shrubs, grasses, and forbs; species composition varies with site conditions (soil type, aspect, elevation, and disturbance).

### Desired Conditions for Dry Mixed Conifer (Mixed Conifer–Frequent Fire) Forest FW-DC-MCD

#### Landscape Scale (1,000 acres and more)

1. The dry mixed conifer forest is a mosaic of forest conditions composed of structural stages ranging from young to old trees. Forest appearance is variable but generally uneven-aged and open with occasional patches of even-aged structure. The forest arrangement is in small clumps and groups of trees interspersed within variably sized openings of grass/forb/shrub vegetation associations. Size, shape, number of trees per group, and number of groups per area vary across the landscape. Groups of aspen and oak in all structural stages are present. Higher tree densities exist in some locations such as north-facing slopes and canyon bottoms. Seral-stage proportions (table 6) are applied at the landscape scale.

**Table 6. Desired seral-stage proportions for dry mixed conifer forest**

Seral Stage	Proportion	Description
Early*	9%	Trees absent or seedlings and saplings only.
Mid* (open)	3%	Dominated by small, shade-intolerant trees with open canopy structure.
Mid* (closed)	3%	Closed canopy state supporting small shade-tolerant and mixed-tolerance tree species.
Late (open)	60%	Dominated by medium to very large shade-intolerant trees with an open canopy structure.
Late (closed)	25%	Dominated by medium to very large shade-tolerant and mixed-tolerance trees with a closed canopy structure.

\*Based on the necessary level of even-aged management (4 percent per decade) to sustain more than 25 percent mature closed forest condition (at least 10 inches diameter or larger) for Mexican spotted owl habitat.

2. Old growth occurs throughout the landscape, typically in small areas as individual old-growth components or as clumps of old growth. Old-growth components include old trees, dead trees (snags), downed wood (coarse woody material), and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
3. The dry mixed conifer forest is composed predominantly of vigorous trees. Declining trees provide for snags, top-killed, lightning- and fire-scarred trees, and coarse woody material, all well distributed throughout the landscape.

4. Dwarf-mistletoe occurs in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures.
5. Vegetative conditions (composition, structure, function) are broadly resilient to disturbances of varying frequency, extent, and severity. The forest landscape is a functioning ecosystem that contains all of its components, processes, and conditions that result from endemic levels of disturbances (insects, diseases, fire, and windfall) including snags, downed logs, and old trees. Organic ground cover and herbaceous vegetation protect the soil, facilitate water infiltration, and promote plant and animal diversity and ecosystem function. Frequent low-severity fires (fire regime group I) are characteristic throughout this vegetation type (including goshawk home ranges). Natural and human-caused disturbances maintain desired overall tree density, structure, species composition, coarse woody material, and nutrient cycling and satisfactory soil conditions. Grasses, forbs, shrubs, needle cast (fine fuels), and small trees maintain the natural fire regime. The amount of shrub cover depends on the Terrestrial Ecological Unit Inventory map unit.

**Mid-Scale (10 to 1,000 acres)**

6. The dry mixed conifer forest is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The more biologically productive sites contain more trees per group and more groups per area. Openness typically ranges from 50 percent on more productive sites to 90 percent on the less productive sites. Basal area within forested areas ranges from 30 to 125 square foot per acre.
7. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages. Small patches (usually less than 60 acres) of even-aged forest structure are occasionally present. Disturbances sustain the overall age and structural distribution. Where they naturally occur, groups or patches of aspen and all structural stages of oak are 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.
8. The understory consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation cover ranging from about 5 to 20 percent depending on site conditions. Fires burn primarily on the forest floor and do not spread between tree groups as crown fire.
9. Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (for example, goshawk post-fledging family areas, Mexican spotted owl nesting or roosting habitats, and north-facing slopes). Interspaces with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area. Goshawk nest areas have forest conditions that are multi-aged but dominated by large trees with relatively denser canopies than other areas in the dry mixed conifer forest type.
10. Snags are typically 18 inches or greater in diameter at breast height and average 3 per acre. Smaller snags, 8 inches and above in diameter at breast height, average 8 snags per acre. Downed logs (greater than 12-inch diameter at mid-point, greater than 8 feet long) average 3 per acre within forested areas. Coarse woody material, including downed logs, ranges from 5 to 15 tons per acre.

**Fine-Scale (less than 10 acres)**

11. Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees within the mid- to old-age groups are interlocking or nearly interlocking. Interspaces surrounding tree groups are variably shaped and composed of a grass/forb/shrub mix. Some natural openings contain individual trees or snags. Trees within groups are of similar or variable ages and one or more species. Size of tree groups typically is less than 1 acre. Groups at the mid- to old-age stages contain 2 to about 50 trees per group.
12. Dwarf mistletoe infections may be present on ponderosa pine and Douglas-fir, and rarely on other tree species, but the degree of infection severity and rate of mortality varies among infected trees. Witches' brooms may be present with these infestations, providing habitat for wildlife.
13. Fires burn primarily on the forest floor (with isolated group torching) and do not spread between tree groups as crown fire.

**Guidelines for Dry Mixed Conifer (Mixed Conifer–Frequent Fire) Forest**

**FW-GDL-MCD**

1. Where Gambel oak or other native hardwoods are desirable to retain for diversity, treatments should improve vigor and growth and enhance tree-form structure of these species.
2. Where consistent with project or activity objectives, sufficient canopy cover should be retained or distributed across the landscape on the south and southwest sides of small, existing forest openings to enhance cooler and moister conditions. These small (generally 0.1 to 0.25 acre) shaded openings provide habitat conditions needed by small mammals, plants, and insects, and these openings should be maintained where they naturally occur as a result of soil type.
3. In proposed treatment areas where there is little understory, slash treatments (such as lop and scatter or mastication) should be used that improve herbaceous vegetation growth, soil and watershed condition, and increase soil productivity, consistent with scenic integrity objectives and site-specific vegetation structure.

**Management Approaches for Dry Mixed Conifer (Mixed Conifer–Frequent Fire) Forest**

**FW-MGAP-MCD**

1. Work closely with U.S. Fish and Wildlife Service personnel to address the habitat needs of the Mexican spotted owl by minimizing disturbance and providing nesting and roosting habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody material.
2. Consider cutting or burning oaks to stimulate new growth, maintain growth in large-diameter trees, or to stimulate mast production.
3. Engage with partners to educate and enforce activities to reduce illegal wood cutting to ensure sustainability of oak habitat over the long term. Manage fuelwood collection and permits to specify the amount and size of oak that can be collected in areas where live and dead woody oak habitat components are limited.

## Ponderosa Pine Forest

The ponderosa pine forest vegetation type includes two subtypes: ponderosa pine-bunchgrass and ponderosa pine-Gambel oak<sup>18</sup> (desired conditions are the same for both). The ponderosa pine forest generally occurs at elevations ranging from approximately 5,000 to 9,000 feet. This type is dominated by ponderosa pine and commonly includes other species such as oak, juniper, and pinyon. More infrequently, species such as aspen, Douglas-fir, white fir, and blue spruce may also be present, and may occur as individual trees. The understory includes a wide variety of shrubs, grasses, and forbs; species composition varies with site conditions (soil type, aspect, elevation, and disturbance). In pine-oak forests, many individual large Gambel oak trees and thickets have become overtopped with pine trees. Treatments to promote oak regeneration and establishment are fairly effective, because oak sprouts prolifically after release treatments.

### Desired Conditions for Ponderosa Pine Forest

FW-DC-PPF

#### Landscape Scale (1,000 acres and more)

1. The ponderosa pine forest is composed of trees from structural stages ranging from young to old. Forest appearance is variable but generally uneven-aged and open; occasional areas of even-aged structure are present. The forest arrangement is in individual trees, small clumps, and groups of trees interspersed within variably sized openings of grass/forbs/shrubs vegetation associations similar to historical patterns. Size, shape, number of trees per group, and number of groups per area are variable across the landscape. Seral stage proportions are applied at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition (table 7. desired seral-stage proportions for ponderosa pine forest). In the Gambel oak subtype, all sizes and ages of oak trees are present. Denser tree conditions exist in some locations such as north facing slopes and canyon bottoms.

**Table 7. Desired seral-stage proportions for ponderosa pine forest**

Seral Stage	Proportion	Description
Early	1%	Post-disturbance state consisting primarily of grass with less than 10% tree cover.
Mid	3%	Conditions* indicative of occasional even-aged stand dynamics and the development of (1) northern goshawk nesting habitat where understory is dominated by grasses or (2) Mexican spotted owl habitat where understory is dominated by shrubs.
Late	96%	Predominance of uneven-aged dynamics and open forest. The large number of stands on low-productivity sites likely to occur as early seral, post-disturbance state consisting primarily of grass with less than 10% tree cover; on high-productivity sites, a mature- to old-growth forest consisting of open canopy stands from very large trees. Regeneration occurs within this state, with multi-aged stands from all size classes; however, the very large size class is the dominant cohort.

\*Reflects percentage of early-mid seral forest necessary to sustain at least 3 percent mature closed forest condition as northern goshawk nesting habitat or Mexican spotted owl habitat.

<sup>18</sup> Throughout the Cibola assessment, ponderosa pine-Gambel oak (PPO) was mistakenly referred to as ponderosa pine-evergreen oak (PPE).

2. Old growth occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Old-growth components include old trees, dead trees (snags), downed wood (coarse woody material), and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
3. The ponderosa pine forest is composed predominantly of vigorous trees, but declining trees are a component and provide for snags, top-killed, lightning- and fire-scarred trees, and coarse woody material (greater than 3 inches diameter), all well-distributed throughout the landscape.
4. Dwarf mistletoe occurs in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures.
5. The composition, structure, and function of vegetative conditions are resilient to the frequency, extent, and severity of disturbances and climate variability. The landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (for example, insects, diseases, fire, and wind), including snags, downed logs, and old trees. Grasses, forbs, shrubs, needle cast (fine fuels), and small trees maintain the natural fire regime. Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Frequent, low-severity fires (fire regime I) are characteristic in this type, including throughout goshawk home ranges. Natural and human-caused disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody material, nutrient cycling, and satisfactory soil conditions. The amount of shrub cover depends on the Terrestrial Ecological Unit Inventory map unit.

**Mid-Scale (10 to 1,000 acres)**

6. The ponderosa pine forest vegetation type is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The more biologically productive sites contain more trees per group and more groups per area, resulting in less space between groups. Openness typically ranges from 52 percent in more productive sites to 90 percent in less productive sites. In areas with high fine-scale aggregation of trees into groups, mid-scale openness ranges between 78 to 90 percent. Tree density within forested areas generally ranges from 22 to 89 square foot basal area per acre. Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values ranging between about 5 and 20 percent.
7. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes present. Occasionally, patches 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 age and structural distribution.
8. Fires burn primarily on the forest floor and do not spread between tree groups as crown fire.
9. Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (for example, goshawk post-fledging family areas, Mexican spotted owl nesting and roosting habitats, drainages, and steep north-facing slopes). Goshawk nest areas have forest conditions that are multi-aged but dominated by large trees with relatively denser canopies than other areas in the ponderosa pine type.

10. Ponderosa pine snags are typically 18 inches or greater in diameter at breast height and average 1 to 2 snags per acre. In the Gambel oak subtype, large oak snags (greater than 10 inches in diameter at breast height) persist in microsites. Downed logs (greater than 12 inches in diameter at mid-point, greater than 8 feet long) average 3 logs per acre within the forested area of the landscape. Coarse woody material, including downed logs, ranges from 3 to 10 tons per acre.

**Fine-Scale (less than 10 acres)**

11. Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees within the mid- to old-age groups are interlocking or nearly interlocking. Interspaces surrounding tree groups are variably shaped and comprised of a grass/forb/shrub mix. Some natural openings contain individual trees. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Size of tree groups typically is less than 1 acre but averages 0.5 acres. Groups at the mid- to old-age stages consist of 2 to approximately 40 trees per group.
12. Where historically occurring, oak trees and thickets are present and provide forage, cover, and habitat for species that depend on them such as small mammals, foliage nesting birds, deer, and elk. Oak mast (acorns) provides food for wildlife species. Large tree-form oaks, snags, and partial snags with hollow boles or limbs are present.
13. Isolated infestations of dwarf mistletoe may occur, but the degree of severity and mortality varies among the infected trees. Witches' brooms may form on infected trees, providing habitat and food for wildlife and invertebrate species.
14. Fires burn primarily on the forest floor (with isolated group torching) and do not spread between tree groups as crown fire.

## Guidelines for Ponderosa Pine Forest

### FW-GDL-PPF

1. Where Gambel oak or other native hardwoods are desirable to retain for diversity, treatments should improve vigor and growth and enhance tree-form structure of these species.
2. Where consistent with project or activity objectives, canopy cover should be retained on the south and southwest sides of small, existing forest openings to enhance cooler and moister conditions. These small (generally 0.1 to 0.25 acre), shaded openings provide habitat conditions needed by small mammals, plants, and insects, and these openings should be maintained where they naturally occur.
3. In proposed treatment areas where there is little understory, slash treatments (for example, lop and scatter, and mastication) should be used that improve herbaceous vegetation growth, soil and watershed condition, and soil productivity, consistent with scenic integrity objectives.

## Management Approaches for Ponderosa Pine Forest

### FW-MGAP-PPF

1. Work closely with U.S. Fish and Wildlife Service personnel to address the habitat needs of the Mexican spotted owl in the pine-oak forest type by minimizing disturbance and providing nest or roost habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody material.

2. Consider cutting or burning oaks to stimulate new growth, maintain growth in large-diameter trees, or to stimulate mast production.
3. Engage with partners to educate and enforce activities to reduce illegal wood cutting to ensure sustainability of oak habitat over the long term. Manage fuelwood collection and permits to specify the amount and size of oak that can be collected in areas where live and dead woody oak habitat components are limited.

## **Pinyon-Juniper Woodlands**

Pinyon-juniper woodlands are collectively composed of the juniper grass, pinyon-juniper grass, pinyon-juniper evergreen shrub, and pinyon-juniper woodland (persistent) vegetation types. These generally occur at elevations between approximately 4,500 and 7,500 feet. They are dominated by two-needle pinyon (hereafter simply referred to as “pinyon”) and one or more species of juniper and can occur with a grass/forb-dominated understory (pinyon-juniper grassland); a shrub-dominated understory (pinyon-juniper evergreen shrub); or a discontinuous understory of some grasses, shrubs, or both (pinyon-juniper woodland). Pinyon and one-seed-, Rocky Mountain, and alligator junipers are common, with a lesser abundance of oaks. Species composition and stand structure vary by location primarily due to precipitation, elevation, temperature, and soil type.

Pinyon-juniper communities provide important winter and spring range for wildlife. Mature pinyon-juniper stands are particularly important for several species of conservation concern (for example, gray vireo and juniper titmouse), many of which rely on the habitat features provided only by mature stands. Such features include large-diameter trunks for nest cavities and greater cone (juniper berry) and seed production. Mast (acorn) production is important forage for wildlife, as are young leaves important as browse.

Plant litter (leaves, needles, etc.) and understory plant cover contribute to soil stabilization, prevent erosion, promote nutrient cycling, improve water retention, and provide cover and forage for small mammals and conditions necessary for pinyon seed germination.

## **Desired Conditions for Pinyon-Juniper Grass and Juniper Grass**

FW-DC-PJ

### **Landscape Scale (1,000 acres and more)**

1. The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (for example, insects, diseases, and fire) and climate variability. Fires are typically frequent and low-severity (fire regime group I). Seral stage proportions are applied at the landscape scale (table 8), where low overall departure from reference proportions is a positive indicator of ecosystem condition.
2. Old growth occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Old-growth components include old trees, dead trees (snags), downed wood (coarse woody material), and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). Overall plant composition similarity to site potential (Forest Service Handbook 2090.11) averages greater than 66 percent but can vary considerably at the fine and mid scales owing to a diversity of seral conditions.

**Table 8. Desired seral-stage proportions for pinyon-juniper grass woodland and juniper grass woodland**

Seral Stage	Proportion	Description
Early	5%	Post-disturbance state supporting primarily herbaceous species with tree and shrub cover each below 10% canopy cover.
Mid (open)	25%	Comprised of seedlings, saplings, and small trees with a predominantly open canopy.
Mid (closed)	10%	Closed tree canopy from small trees.
Late (open)	50%	Open tree canopy dominated by medium to very large trees.
Late (closed)	10%	Closed tree canopy consisting of medium to very large trees.

**Mid-Scale (10 to 1,000 acres)**

3. Snags are scattered, with snags 8 inches and above at diameter at root collar<sup>19</sup> averaging 5 snags per acre, while snags 18 inches and above average 1 snag per acre (Weisz et al. 2011). Coarse woody material increases with succession and averages 1 to 3 tons per acre.
4. Scattered shrubs and a dense herbaceous understory including native grasses, forbs, and annuals are present to support frequent surface fires. Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values averaging between about 10 and 30 percent, depending on the Terrestrial Ecological Unit Inventory map unit. Shrubs average less than 30 percent canopy cover.

**Fine-Scale (less than 10 acres)**

5. Pinyon-juniper grass and juniper grass are generally uneven-aged and open in appearance. Trees occur as individuals, but occasionally in smaller groups, and range from young to old. Patch sizes of woodlands range from individual trees and clumps that are less than 0.1 acre, to tree groups of about 1 acre (Muldavin and Triepke 2020). Occasionally patches of even-aged woodland structure are present, based upon disturbance events and regeneration establishment. A small percentage may be predisposed to larger even-aged patches, based on physical site conditions that favor mixed-severity and stand-replacement fire and other disturbances.

<sup>19</sup> Diameter at root collar (DRC) is the diameter typically measured at the root collar or at the natural ground line, whichever is higher, outside the bark. For a multi-stemmed tree, diameter at root collar is calculated from the diameter measurements of all qualifying stems (at least 1.5 inches in diameter and at least one foot in length).

## Pinyon-Juniper Evergreen Shrub Woodland

### Desired Conditions for Pinyon-Juniper Evergreen Shrub Woodland

FW-DC-PJC

#### Landscape Scale (1,000 acres and more)

1. Pinyon-juniper evergreen shrub is a mix of trees and shrubs that occurs as a series of vegetation states that move from herbaceous-dominated, to shrub-dominated, to tree-dominated over time. Pinyon trees are occasionally absent but one or more juniper species is always present. The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (for example, insects, diseases, and fire), and climate variability. Fires are typically mixed severity with a moderate frequency (fire regime group III). Some evergreen shrub types exhibit occasional high-severity fire (fire regime group IV). Seral-stage proportions are applied at the landscape scale (table 9), where low overall departure from reference proportions is a positive indicator of ecosystem condition.
2. Old growth occurs throughout the landscape, generally in small areas as individual old-growth components or as clumps of old growth. Old-growth components include old trees, dead trees (snags), downed wood (coarse woody material), and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). Overall plant composition similarity to site potential (Forest Service Handbook 2090.11) averages greater than 66 percent but can vary considerably at fine and mid scales owing to a diversity of seral conditions.

**Table 9. Desired seral-stage proportions for the pinyon-juniper evergreen shrub woodland**

Seral Stage	Proportion	Description
Early	5%	Post-disturbance state supporting primarily herbaceous species with tree and shrub cover each below 10% canopy cover.
Mid	55%	Comprised of seedlings, saplings, and small trees with a predominantly open canopy.
Late	40%	Open tree canopy dominated by medium to very large trees. Total cover between trees and shrubs often exceeds 30%.

#### Mid-Scale (10 to 1,000 acres)

3. Snags and old trees with dead limbs/tops are scattered, with snags 8 inches and more in diameter at root collar averaging 3 snags per acre, while snags 18 inches and above in diameter average 1 snag per acre (Weisz et al. 2011). Large dead wood is present, and coarse woody material averages 2 to 4 tons per acre.
4. The understory is dominated by low to moderate density shrubs depending on successional stage, overall averaging greater than 30 percent canopy cover. The shrub component consists of one of, or a mix of, evergreen oak, manzanita, mountain mahogany, sumac, and other shrub species, which are well-distributed. Native perennial grasses and annual and perennial forbs are present in the interspaces. Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about 5 and 15 percent, depending on the Terrestrial Ecological Unit Inventory map unit.

**Fine-Scale (less than 10 acres)**

5. Trees occur as individuals or in smaller groups ranging from young to old. Typically, groups are even-aged in structure with all ages represented across the landscape for an overall uneven-aged grouped appearance. The patch size of woodlands ranges from one to tens of acres, and can include patches of even-aged woodland structure, based upon disturbance events and regeneration establishment.

**Pinyon-Juniper Woodland (Persistent)**

**Desired Conditions for Pinyon-Juniper Woodland (Persistent)**

FW-DC-PJO

**Landscape Scale (1,000 acres and more)**

1. Pinyon-juniper woodland (persistent) is characterized by even-aged patches of pinyons and junipers that form multi-aged woodlands at the landscape level. The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (for example, insects, diseases, and fire), and climate variability. Insects and disease occur at endemic levels. Fire as a disturbance is less frequent and variable due to differences in ground cover, though some sites are capable of carrying surface fire. The fires that do occur are mixed to high severity (fire regime groups III, IV, V). Seral stage proportions are applied at the landscape scale (table 10), where low overall departure from reference proportions is a positive indicator of ecosystem condition.
2. Old growth includes old trees, dead trees (snags), downed wood (coarse woody material) and structural diversity, and is often concentrated in mid- and fine-scale units as patches of old growth. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). Very old trees (over 300 years old) are present, while snags and older trees with dead limbs or tops are scattered across the landscape. Snags 8 inches and above in diameter at root collar average 5 per acre, while snags 18 inches and above average 1 per acre (Weisz et al. 2011). Coarse woody debris increases with succession and averages 2 to 5 tons per acre. Overall plant composition similarity to site potential (Forest Service Handbook 2090.11) averages greater than 66 percent but can vary considerably at fine and mid scales owing to a diversity of seral conditions.

**Table 10. Desired seral-stage proportions for pinyon-juniper woodland (persistent)**

Seral Stage	Proportion	Description
Early	10%	Post-disturbance state supporting primarily herbaceous species with tree and shrub cover each below 10% canopy cover.
Mid (open)	5%	Comprised of seedlings, saplings, and small trees with a predominantly open canopy.
Mid (closed)	15%	Closed tree canopy from small trees.
Late (open)	10%	Open tree canopy dominated by medium to very large trees.
Late (closed)	60%	Closed tree canopy consisting of medium to very large trees.

**Mid-Scale (10 to 1,000 acres)**

3. Tree density and canopy cover are high, shrubs are sparse to moderate, and herbaceous cover is low and discontinuous. The amount of shrub cover depends on the Terrestrial Ecological Unit Inventory map unit. Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about 5 and 15 percent depending on the Terrestrial Ecological Unit Inventory map unit. Trees occur in even-aged patches ranging from young to old, where patch size of these woodlands ranges from tens to hundreds of acres (Muldavin and Triepke 2020).

**Fine-Scale (less than 10 acres)**

Not enough science is available to provide a description of the desired condition at the fine-scale for pinyon-juniper woodland (persistent).

**Guideline for Pinyon-Juniper Woodland (Persistent)**

**FW-GDL-PJO**

1. Where pinyon-juniper obligate species occur (such as the gray vireo and juniper titmouse) project design should retain an average of 6 snags (diameters greater than 8 inches at base) per acre and 1 snag (greater than 18 inches diameter at base) per acre and an average of 4 tons per acre of coarse woody material (as well as partially dead or dying trees) even when this is in conflict with other activities such as fuelwood gathering. In proposed treatment areas where there is uncharacteristically sparse understory, slash treatments (such as lop and scatter and mastication) should be used to improve herbaceous vegetation growth, soil and watershed condition, and soil productivity.

**Madrean Pinyon-Oak Woodland**

The Madrean pinyon-oak woodland generally occurs at elevations between 4,900 and 7,500 feet and can occur with a grass/forb-dominated understory or a shrub-dominated understory. Oaks and pinyon are dominant; juniper may be codominant.

Common oak species include Emory oak and gray oak depending on the location. Juniper species include alligator juniper and one-seed juniper. The understory includes a wide variety of shrubs, grasses, and forbs; species composition varies with site conditions (soil type, aspect, elevation, and disturbance).

**Desired Conditions for Madrean Pinyon-Oak Woodland**

**FW-DC-MPO**

**Landscape Scale (1,000 acres and more)**

1. The composition, structure, and function of vegetative conditions are resilient to the frequency, extent, and severity of disturbances and climate variability. The landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from natural disturbances (such as insects, diseases, fire, and wind), including old growth. Grasses, forbs, shrubs, and needle cast (fine fuels), and small trees help to maintain the natural fire regime. Litter cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Frequent, primarily low-severity fires (fire regime groups I and III) burn on the forest floor and do not typically spread between trees as crown fire. Mixed-severity fires occur less frequently and over smaller spatial extents than low-severity fires. Natural and human-caused disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody material, nutrient cycling, and satisfactory soil conditions.

2. Seral-stage proportions are applied at the landscape scale (table 11), where low overall departure from reference proportions is a positive indicator of ecosystem condition. The woodland is relatively homogenous in structure, generally uneven aged and open, with occasional patches of even-aged structure. Declining trees are a component and provide for snags, top-killed, lightning- and fire-scarred trees, and coarse woody material, all well distributed throughout the landscape. The amount of shrub cover depends on the Terrestrial Ecological Unit Inventory map unit. Overall plant composition similarity to site potential (Forest Service Handbook 2090.11) averages greater than 66 percent but can vary considerably at fine and mid scales owing to a diversity of seral conditions.

**Table 11. Desired seral-stage proportions for Madrean pinyon-oak woodland**

Seral Stage	Proportion	Description
Early	4%	Post-disturbance state dominated by grasses.
Mid (seedlings)	5%	Dominated by resprouting seedlings with both open and closed stands.
Mid (open)	13%	Open tree canopy cover from small trees. Grasses dominate the understory. Conditions indicative of even-aged stand dynamics and the development of Mexican spotted owl habitat.
Mid (closed)	3%	Closed tree canopy cover from small trees. Grasses dominate the understory.
Late (open)	60%	Open tree canopy cover from medium to very large trees. Grasses dominate the understory.
Late (closed)	15%	Mature forest state with closed tree canopy cover from medium to very large trees. Grasses dominate the understory. Conditions indicative of Mexican spotted owl habitat and mature closed-forest conditions.

**Mid-Scale (10 to 1,000 acres)**

3. The majority of woodland is in open condition with tree cover averaging between 10 and 40 percent depending on site productivity and past disturbance, with tree cover in canyons and drainage bottoms nearer the upper end of this range. A lesser amount is in closed canopy condition characteristic of the reference condition. Patch sizes range from under an acre to tens of acres, applicable at both mid and fine scales. Mixed-severity fire and other disturbance occasionally favor the development of even-aged patches at both the mid and fine scales. Snags 8 inches or greater in diameter at root collar average 4 per acre, while snags 18 inches or greater average 1 per acre (Weisz et al. 2011). Large oak snags (over 10 inches in diameter) are a well-distributed component. Coarse woody material increases with forest succession and averages 2 to 3 tons per acre.
4. Shrubs occur in low to moderate densities which does not inhibit tree regeneration. The size, shape, and number of trees per group, and number of groups per mid-scale unit are variable. All structural stages of oak are present with old trees occurring as dominant individuals, and small groups occurring typically within openings. Denser overall tree conditions exist in some locations such as north-facing slopes and canyon bottoms. Ground cover consists of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values between about 1 and 20 percent depending on the Terrestrial Ecological Unit Inventory map unit.

**Fine-Scale (less than 10 acres)**

5. At the fine-scale, forest arrangement is in individual trees, small clumps, and groups of trees interspersed within variably sized openings of grass, forb, and shrub vegetation associations similar to historical patterns. Tree groups vary in size and number depending on climate, soil type, and past disturbance. The more biologically productive sites contain more trees per group and more groups per acre, as a result patch sizes can vary from under one acre to tens of acres. Trees typically occur in small groups in which they are variably-spaced with some tight clumps. Crowns of trees within the mid- to old-age groups are interlocking or nearly interlocking. Interspaces between tree groups are variably shaped and comprised of a grass, forb, and shrub mix. Some natural openings contain individual trees, including large, open-grown oaks. Trees within groups are of similar or variable ages and may contain species other than oak, juniper, and pinyon. The size of tree groups is typically one acre or less. Groups at the mid- to old-age stages consist of 2 to about 40 trees.

**Guideline Madrean Pinyon-Oak Woodland**

FW-GDL-MPO

1. Clusters of trees, and shrubs, and snags should be maintained in treatment areas to benefit species that require these structures for breeding, feeding, shelter, and other needs.
2. In proposed treatment areas where there is uncharacteristically sparse understory, slash treatments (such as lop and scatter and mastication) should be used to improve herbaceous vegetation growth, soil and watershed condition, and soil productivity.

**Management Approaches Madrean Pinyon-Oak Woodland**

FW-MGAP-MPO

1. Work closely with U.S. Fish and Wildlife Service personnel to address the habitat needs of the Mexican spotted owl by minimizing disturbance and providing nesting and roosting habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody material.
2. Manage fuelwood collection and permits to specify the amount and size of wood that can be collected in areas where live and dead woody oak habitat components are limited.

**Mountain Mahogany Mixed Shrubland**

Mountain mahogany mixed shrubland vegetation type occurs in the foothills, canyon slopes, and lower mountain slopes of the Rocky Mountains and on outcrops and canyon slopes in the western Great Plains. It is often associated with exposed sites, rocky substrates, dry conditions, and recurrent fire that limits tree growth. Scattered trees or inclusions of grassland patches or steppe may be present, but a variety of shrubs including mountain mahogany and skunkbush sumac typically dominate. Historically, tree canopy cover was less than 10 percent.

**Desired Conditions for Mountain Mahogany Mixed Shrubland**

FW-DC-MMS

1. Average percent cover of bare soil, litter, plant basal area, and rock is 9, 12, 12, and 67, respectively.
2. Seral-stage proportions are applied at the landscape scale (table 12).

3. The mountain mahogany mixed shrubland vegetation type is characterized by fire regime group IV, with an average fire-return interval of 35 to 200 years from stand-replacing fire.
4. The mountain mahogany mixed shrubland patch sizes are similar to characteristic patch patterns represented by Terrestrial Ecological Unit Inventory site potential mapping (Triepke et al. 2016, USDA Forest Service 1986).

**Table 12. Desired seral-stage proportions for mountain mahogany mixed shrubland**

Seral Stage	Description	Proportion (percent)	Cover (percent)	Total (live + dead) Aboveground Biomass (tons/acre)
Early	Grass-Forb	5	Tree <10 Shrub <10	2.6
Mid	Shrub (open)	50	Tree <10 Shrub = 10 to 30	14.5
Late (open)	Shrub (open)	15	Tree <10 Shrub >30	14.5
Late (closed)	Shrub (closed)	30	Tree >10 Shrub >30	26.8

## Gambel Oak Shrubland

Gambel oak shrubland<sup>20</sup> vegetation type is dominated by long-lived Gambel oak clones that form largely monotypic overstories. It occurs between 6,500 and 9,500 feet on all aspects, and at higher elevations it occurs more predominantly on southern exposures. Gambel oak occurs as the dominant species ranging from dense thickets to clumps associated with other shrub species such as serviceberry or big sagebrush. Older, more developed Gambel oak can have a well-developed understory comprised of snowberry, elk sedge, Letterman’s needlegrass, Sandberg bluegrass, yarrow, lupine, and goldenrod. Ponderosa pine, juniper, and pinyon may encroach older plant communities. The primary disturbance mechanism is mixed-severity to stand-replacement fire resulting in top kill and rare mortality. Gambel oak responds to fire with vigorous sprouting from the base. Larger forms may survive low-intensity surface fire. Not enough science is available to provide descriptions at multiple scales for this vegetation type.

### Desired Conditions for Gambel Oak Shrubland

#### FW-DC-GAMB

1. Average percent cover of bare soil, litter, plant basal area, and rock is 11, 45, 14, and 29, respectively.
2. Seral-stage proportions are applied at the landscape scale (table 13).
3. The Gambel oak shrubland vegetation type is characterized by fire regime group IV, with an average fire-return interval of 35 to 200 years from stand-replacing fire (see table 3).

<sup>20</sup> Adapted from the description of Rocky Mountain Gambel oak-mixed montane shrubland (LANDFIRE 2010).

**Table 13. Desired seral-stage proportions for Gambel oak shrubland**

Seral Stage	Description	Proportion (percent)	Cover (percent)	Total (live + dead) Aboveground Biomass (tons/acre)
Early	Grass-forb	5	Tree <10 Shrub <10	2.6
Mid	Shrub (open)	50	Tree <10 Shrub = 10 to 30	14.5
Late (open)	Shrub (open)	15	Tree <10 Shrub >30	14.5
Late (closed)	Shrub (closed)	30	Tree >10 Shrub >30	26.8

- Where historically occurring, Gambel oak thickets with various diameter stems and low growing, shrubby oak are present. These thickets provide forage, cover, and habitat for species such as small mammals, foliage nesting birds, deer, and elk. Gambel oak mast (acorns) provides food for wildlife species.
- The Gambel oak shrubland patch sizes are similar to characteristic patch patterns represented by Terrestrial Ecological Unit Inventory site potential mapping (Triepke et al. 2016, USDA Forest Service 1986).

## Sagebrush Shrubland

This vegetation type is dominated by big sagebrush. Sagebrush shrubland primarily occurs adjacent to Great Basin grassland and pinyon-juniper woodland vegetation types. While big sagebrush is the dominant species, other shrubs such as broom snakeweed and shadscale are common, as are grassland species such as blue grama, junegrass, and western wheatgrass. Historically, this vegetation type had less than 10 percent tree canopy cover. Sagebrush shrubland sites are usually found on deep, well-drained valley bottom soils between 4,800 and 5,800 feet elevation with precipitation ranging between 10 to 18 inches per year. Not enough science is available to provide descriptions at multiple scales for this vegetation type.

Sagebrush provides valuable year-round habitat that can include a mix of shrublands and grasslands. This diversity supports an abundance of birds, animals, and native plants, some of which are specially adapted to the system. Overall, wildlife species diversity may be lower in sagebrush systems than in habitat types with greater vertical complexity, but the species that occur in sagebrush systems often occur nowhere else. Sagebrush shrublands provide important habitat for several migratory bird species. Populations of many bird species that depend on these ecosystems are in decline, and many have special conservation status.

## Desired Conditions for Sagebrush Shrubland

### FW-DC-SAGE

- Average percent cover of bare soil, litter, plant basal area, and rock is 10, 40, 45, and 5, respectively.
- Seral-stage proportions are applied at the landscape scale (table 14. desired seral-stage proportions for sagebrush shrubland).

**Table 14. Desired seral-stage proportions for sagebrush shrubland**

Seral Stage	Description	Proportion (percent)	Cover (percent)	Total (live + dead) Aboveground Biomass (tons/acre)
Early	Grass-forb	5	Tree = 0 Shrub <10	0.6
Mid	Shrub (open)	65	Tree = 0 Shrub = 10 to 30	3.1
Late (open)	Shrub (closed)		Tree = 0 Shrub >30	10.5
Late (closed)	Tree encroached	30	Tree >10 Shrub >30	7.6

- Enough shrub cover exists to meet the needs of a variety of sagebrush obligate wildlife species.
- The sagebrush shrubland vegetation type is characterized by fire regime group III, with an average fire-return interval of 35 to 200 years from mixed-severity fire.
- The sagebrush shrubland patch sizes are similar to characteristic patch patterns represented by Terrestrial Ecological Unit Inventory site potential mapping (Triepeke et al. 2016, USDA Forest Service 1986).

## Intermountain Salt Scrub

The intermountain salt scrub vegetation type is found in cold climate gradients and the Great Plains and is not often found on National Forest System lands of the Southwest. Soils associated with this vegetation type are typically sodic, saline, or saline-sodic. The vegetation is characterized by a typically open to moderately dense shrubland composed of four-wing saltbush, yellow rabbitbrush, jointfir (Mormon tea), greasewood, and winterfat. Associated grasses include Indian ricegrass, bottlebrush squirreltail, Sandberg bluegrass, galleta, alkali sacaton, and sand dropseed. Not enough science is available to provide descriptions at multiple scales for this vegetation type.

### Desired Conditions for Intermountain Salt Scrub

#### FW-DC-ISS

- Average percent cover of bare soil, litter, plant basal area, and rock is 35, 15, 50, and 0, respectively.
- Seral-stage proportions are applied at the landscape scale (table 15).
- The Intermountain salt scrub vegetation type is characterized by fire regime group III, with an average fire-return interval of 35 to 200 plus years from mixed-severity fire.
- The intermountain salt scrub patch sizes are similar to characteristic patch patterns represented by Terrestrial Ecological Unit Inventory site potential mapping (Triepeke et al. 2016, USDA Forest Service 1986).

**Table 15. Desired seral stage proportions for Intermountain salt scrub**

Seral Stage	Description	Proportion (percent)	Cover (percent)	Total (live + dead) Aboveground Biomass (tons/acre)
Early	Herbaceous species dominate with only widely scattered shrubs.	25	Tree = 0 Shrub <10	0.1
Mid	Open canopy shrub cover and discontinuous grasses.	45	Tree = 0 Shrub = 10 to 30	1.3
Late	Dominated by shrubs and lacking an herbaceous component.	30	Tree = 0 Shrub >30	2.1

## Chihuahuan Salt Desert Scrub

This vegetation type occurs in the high sun and mild climate gradient and includes extensive open-canopied shrublands of typically saline basins (saline, sodic, or saline-sodic soils) in the Chihuahuan desert. Stands often occur on alluvial flats and around playas. Substrates are generally fine-textured, saline soils. Vegetation is typically composed of saltbush, honey mesquite, ocotillo, prickly pear, dropseed, tobosagrass, saltgrass, and other halophytic plants. Not enough science is available to provide descriptions at multiple scales for this vegetation type.

### Desired Conditions for Chihuahuan Salt Desert Scrub

#### FW-DC-CSDS

1. Average percent cover of bare soil, litter, plant basal area, and rock is 63, 6, 6, and 25, respectively.
2. Seral-stage proportions are applied at the landscape scale (table 16).
3. The Chihuahuan salt desert scrub vegetation type is characterized by fire regime group III, with an average fire-return interval of 100 to 200 years from mixed-severity fire.

**Table 16. Desired seral-stage proportions for Chihuahuan salt desert scrub**

Seral Stage	Description	Proportion (percent)	Total (live + dead) Aboveground Biomass (tons/acre)
Early	Sparsely vegetated and dominated by herbaceous species.	25	0.2
Mid	Open canopy shrub cover and discontinuous grasses.	35	0.2
Late	Closed canopy and dominated by shrubs.	40	1.3

## Chihuahuan Desert Scrub

The Chihuahuan desert scrub vegetation type ranges from the edges of basin floors, up alluvial fan piedmonts, to foothills of desert mountains and mesas. The major dominant plant species is creosote bush, often mixed with honey mesquite, catclaw acacia, whitethorn acacia, and ocotillo. Sub-shrubs are also abundant and often codominant. These include agave, prickly pear, and Wright's beebrush. Herbaceous cover can be sparse or grassy with fluffgrass and bush muhly as key indicators. Black grama, tobosagrass, and burrograss may also occur.<sup>21</sup> Not enough science is available to provide descriptions at multiple scales for this vegetation type.

### Desired Conditions for Chihuahuan Desert Scrub

#### FW-DC-CDS

1. Average percent cover of bare soil, litter, plant basal area, and rock is 61, 3, 6, and 30, respectively.
2. Seral-stage proportions are applied at the landscape scale (table 17).

**Table 17. Desired seral-stage proportions for Chihuahuan desert scrub**

Seral Stage	Description	Proportion (percent)	Total (live + dead) Aboveground Biomass (tons/acre)
Early	Sparsely vegetated and dominated by herbaceous species.	5	0.03
Mid	Open canopy shrub cover and discontinuous grasses.	20	1.1
Late	Closed canopy and dominated by shrubs.	75	1.1

3. The Chihuahuan desert scrub vegetation type is characterized by fire regime group III, with an average fire-return interval of 200 plus years from mixed-severity fire. The sparse nature of this vegetation type indicates that fires likely would have been limited in size to small areas of continuous fuels.
4. The Chihuahuan desert scrub patch sizes are similar to characteristic patch patterns represented by Terrestrial Ecological Unit Inventory site potential mapping (Triepeke et al. 2016, USDA Forest Service 1986).

## Sandsage

The sandsage shrubland occurs mainly on sand dunes and areas that were overblown with a thicker, sandier soil surface during disturbances. Characteristic plant species for the sandsage vegetation type are sand sagebrush, blue grama, sideoats grama, big bluestem, little bluestem, needle and thread, and Indiagrass. Not enough science is available to provide descriptions at multiple scales for this vegetation type.

<sup>21</sup> Excerpted from Integrated Landscape Assessment Project (2012).

## Desired Conditions for Sandsage

### FW-DC-SAND

1. Average percent cover of bare soil, litter, plant basal area, and rock is 80, 10, 10, and 0, respectively.
2. Seral-stage proportions are applied at the landscape scale (table 18).
3. The sandsage vegetation type is characterized by fire regime group III, with an average fire return interval of 35 to 200 plus years from mixed-severity fire.
4. The sandsage shrubland patch sizes are similar to characteristic patch patterns represented by Terrestrial Ecological Unit Inventory site potential mapping (Triepke et al. 2016, USDA Forest Service 1986).

**Table 18. Desired seral-stage proportions for sandsage shrubland**

Seral Stage	Description	Proportion (percent)	Total (live + dead) Aboveground Biomass (tons/acre)
Early	Herbaceous species dominate with open shrub canopy	30	0.9
Late	Closed shrub cover	70	1.4

## Montane/Subalpine Grassland

Also referred to as montane grasslands, this system occurs at elevations ranging from 8,000 to 11,000 feet, and often harbors several plant associations with varying dominant grasses and herbaceous species. Such dominant species may include Parry's oatgrass, Arizona fescue, Thurber's fescue, pine dropseed, sedges, rushes, shooting star, Rocky Mountain iris, Parry's bellflower, cinquefoil, and Woods' rose. Trees may occur along the periphery of the meadows and may include Engelmann spruce, blue spruce, Douglas-fir, white fir (except on Mount Taylor), limber pine, and subalpine fir. Some shrubs may also be present. These meadows are seasonally wet, which is closely tied to snowmelt, though they typically do not experience flooding events. Tree and shrub canopy cover is less than 10 percent each. The montane/subalpine grassland is often interspersed with the herbaceous riparian vegetation type. Not enough science is available to provide descriptions at multiple scales for this vegetation type.

## Desired Conditions for Montane/Subalpine Grassland

### FW-DC-MSG

1. Average percent cover of bare soil, litter, plant basal area, and rock is 16, 32, 32, and 20, respectively.
2. Seral-stage proportions are applied at the landscape scale (table 19. desired seral-stage proportions for montane/subalpine grassland).
3. The fire return interval is 0 to 35 years from stand-replacing fire (fire regime group II).
4. The montane/subalpine grassland patch sizes are similar to characteristic patch patterns represented by Terrestrial Ecological Unit Inventory site potential mapping (Triepke et al. 2016, USDA Forest Service 1986).

**Table 19. Desired seral-stage proportions for montane/subalpine grassland**

Seral Stage*	Description	Proportion (percent)	Cover (percent)	Total (live + dead) Aboveground Biomass (tons/acre)
Early seral. High ecological status	Recently disturbed. Low seral	20	Tree <10 Shrub <10 Grass <10	0.5
Early seral. Low and moderate ecological status	Recently disturbed. Low seral		Tree <10 Shrub <10 Grass <10	
Late seral. Low and moderate ecological status*	Mature grassland, grass is dominant lifeform	35	Tree <10 Shrub <10 Grass >10	2.2
Late seral. High ecological status	Mature grassland, grass is dominant lifeform	45	Tree <10 Shrub <10 Grass >10	6.1

\*Climax vegetation is identified as either (1) a “primary” climax (high ecological status), where vegetation structure at potential reflects the macroclimate, unique microclimates, and restricted edaphic conditions associated with topography or is influenced by a sustained fire regime or (2) a “disclimax” (low and moderate ecological status) where prolonged departures of vegetation from the primary climax condition are maintained by episodic fire, prolonged disturbances from grazing animals, unique soils, or local relief anomalies.

## Colorado Plateau/Great Basin Grassland

The Colorado Plateau/Great Basin grassland vegetation type is typically found along elevational and temperature gradients above semi-desert grasslands and below montane-subalpine grasslands. It occupies cooler and wetter sites than semi-desert grasslands and is common above the Mogollon Rim. The Colorado Plateau/Great Basin grassland vegetation type is typically associated with the pinyon-juniper grass vegetation type along the grassland-woodland ecotone in cool climates. Vegetation coverage consists of mostly grasses and interspersed shrubs. Grass species may include Indian ricegrass, blue grama, Arizona fescue, needle and thread, mountain muhly, and junegrass. Shrub species may include big sagebrush, Apache plume, Stansbury cliffrose, saltbush, jointfir (Mormon tea), winterfat, and wax currant. Shrub cover may occasionally exceed 10 percent; tree cover is less than 10 percent. Not enough science is available to provide descriptions at multiple scales for this vegetation type.

### Desired Conditions for Colorado Plateau/Great Basin Grassland

#### FW-DC-CPGB

1. Average percent cover of bare soil, litter, plant basal area, and rock is 38, 18, 33, and 11, respectively.
2. Seral-stage proportions are applied at the landscape scale (table 20. desired seral-stage proportions for colorado plateau/great basin grassland).
3. The Colorado Plateau/Great Basin grassland vegetation type is characterized by fire regime group II, with an average fire-return interval of 0 to 35 years from stand-replacing fire. Mixed-severity fire has been reported in this vegetation type to have occurred with a mean return interval of 37 years primarily top-killing herbaceous species. Stand-replacing fire occurs less frequently (about every 75 years) and consumes both shrub and herbaceous life forms.

**Table 20. Desired seral-stage proportions for Colorado Plateau/Great Basin grassland**

Seral Stage	Description	Proportion (percent)	Cover (percent)	Total (live + dead) Aboveground Biomass (tons/acre)
Early seral. Low and moderate ecological status	Recently burned-sparsely vegetated	5	Tree <10 Shrub <10 Grass <10	0.7
Grassland. High ecological status	Dominated by grasses and forbs	70	Tree <10 Shrub <10 Grass >10	3.4
Grassland. Low and moderate ecological status	Dominated by grasses and forbs	25	Tree <10 Shrub = 10 to 30 Grass >10	2.0

- The Colorado Plateau/Great Basin grassland patch sizes are similar to characteristic patch patterns represented by Terrestrial Ecological Unit Inventory site potential mapping (Triepeke et al. 2016, USDA Forest Service 1986).

## Semi-Desert Grassland

The semi-desert grassland vegetation type occurs throughout southern New Mexico at elevations ranging from 3,000 to 4,500 feet. It is bounded by Sonoran or Chihuahuan Desert at the lowest elevations and woodlands at the higher elevations. The boundary between semi-desert grasslands and desert communities is sometimes hard to distinguish because desert shrub species can be common in this vegetation type.

Species composition and dominance varies across the broad range of soils and topography where it occurs. Dominant grassland associations or types are black grama grassland, blue grama grassland, curly mesquite grassland, tobosa grassland, giant sacaton grassland, and mixed native perennial grassland. Shrubs also occupy these grasslands and their abundance and species composition also vary. Shrub cover may occasionally exceed 10 percent; tree cover is less than 10 percent. Not enough science is available to provide descriptions at multiple scales for this vegetation type.

Two subclasses of the semi-desert grassland vegetation type occur on the Cibola National Forest:

### Piedmont Grassland<sup>22</sup>

This grassland vegetation is typical of coalesced alluvial fan piedmonts along mountain fronts and characterized the dominance of black grama and bush muhly. Other grasses that are prevalent and may dominate or codominate are tobosagrass, New Mexico feathergrass, sideoats grama, hairy grama, and blue grama. While shrubs and subshrubs are clearly subordinate in these grasslands, they are always common and sometimes abundant, forming a shrub-steppe. The most diagnostic tall shrubs are jointfir (Mormon tea) and soap tree yucca along with the agave and broom snakeweed.

<sup>22</sup> Adapted from Integrated Landscape Assessment Project (2012).

**Sandy Plains Grassland<sup>23</sup>**

This grassland vegetation is typical of sandy plains (sandsheets) and dominated by black grama, sand dropseed, mesa dropseed, spike dropseed, and sand muhly. In addition to the dominant grasses, blue grama, bush muhly, sandhill muhly, and giant dropseed can be common associates. On gypsum substrates, gyp dropseed and New Mexico bluestem dominate.

While shrubs and subshrubs are clearly subordinate in these grasslands, they are always common and sometimes abundant, forming a shrub-steppe. Typical indicators include jointfir (Mormon tea) and soap tree yucca.

**Desired Conditions for Semi-Desert Grassland**

**FW-DC-SDG**

1. Average percent cover of bare soil, litter, plant basal area, and rock is 29, 10, 18, and 43, respectively.
2. Seral-stage proportions are applied at the landscape scale (table 21).
3. The semi-desert grassland vegetation type is characterized by fire regime group II, with an average fire-return interval of 0 to 35 years from stand-replacing fire. Recurring fire is important in this type to maintain open conditions, prevent shrub and tree invasion, and retain species diversity. Large-scale fire events occur every 2.5 to 10 years and typically occur in the early summer (Schussman 2006).<sup>24</sup>
4. The semi-desert grassland patch sizes are similar to characteristic patch patterns represented by Terrestrial Ecological Unit Inventory site potential mapping (Triepke et al. 2016, USDA Forest Service 1986).

**Table 21. Desired seral-stage proportions for semi-desert grassland**

Seral Stage	Description	Proportion (percent)	Cover (percent)	Total (live + dead) Aboveground Biomass (tons/acre)
Early seral. Low and moderate ecological status.	Recently burned-sparsely vegetated	20 to 25	Tree <10 Shrub <10 Grass <10	0.4
Grassland. High ecological status.	Dominated by grasses and forbs	70 to 75	Tree <10 Shrub <10 Grass >10	3.8
Grassland. Low and moderate ecological status.	Dominated by grasses and forbs	0 to 5	Tree <10 Shrub <10 Grass >10	1.3
Encroached by woody species. Low and moderate ecological status.	Shrub dominated	0 to 5	Tree <10 Shrub = 10 to 30	3.6

<sup>23</sup> Adapted from Integrated Landscape Assessment Project (2012).

<sup>24</sup> This coincides with pre-monsoon lightning activity in the region and contemporary fire behavior suggests that historical ignitions would likely have burned until they ran out of contiguous fuel or were rained out.

Seral Stage	Description	Proportion (percent)	Cover (percent)	Total (live + dead) Aboveground Biomass (tons/acre)
Encroached by woody species. Low and moderate ecological status.	Tree dominated	0 to 5	Tree = 10 to 30	3.6

## Riparian Vegetation Types

For riparian plan components, desired conditions, and management approaches, see the “Watersheds” section.

## Water Resources

This section includes watersheds and water resources features. Watersheds are areas of land that drain to a single point. Watersheds collect, store, and discharge water while providing diverse sites and pathway for chemical reactions, and provide habitat for diverse species. Watersheds support water resources features such as streams, springs, wetlands, acequias, riparian areas, and groundwater. This section provides land management plan components for each of these features.

### Watersheds

A watershed is a region or land area drained by a single stream, river, or drainage network. Watersheds encompass all of 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, which is defined by a number code called the hydrologic unit code. Each two digits in the number system represent a drainage basin, with successive numbers referring to smaller watersheds nested within the larger one. On the Cibola, the plan area is located within portions of sixty 5<sup>th</sup>-level (10-digit hydrologic unit code) watersheds. Nested within these larger watersheds, there are 208 individual 6<sup>th</sup>-level (12-digit hydrologic unit code) subwatersheds that intersect the plan area.

Water resources on the Cibola provide many ecosystem services from which society derives enjoyment or benefit. Watersheds and riparian areas, and water from streams, springs, and seeps provide *supporting* ecosystem services to society in that they contribute to nutrient cycling and primary production, and water is a catalyst in soil formation. Watersheds and riparian areas also provide *regulating* ecosystem services as they contribute to erosion control, flood regulation, and water purification. Watersheds and their component streams, springs, seeps, and groundwater resources, are considered *provisioning* ecosystem services because they provide fresh water for people and all other life forms, satisfying thirst for all, and water is critical in production of forage, livestock, fruits and nuts, and game animals taken for meat and other animal products. Mining and other industries related to fuel and energy also depend on water as a provisioning service for their operations. Finally, watersheds and their component parts provide *cultural* ecosystem services to society in a multitude of ways, like providing research opportunities, educational study areas, and recreational opportunities (such as fishing, wildlife viewing, boating, and swimming) to the public.

The Forest Service National Watershed Condition Framework was developed to assess the condition of watersheds that intersect National Forest System lands (Potyondy and Geier 2011). Watershed condition is the state of the physical and biological characteristics and processes within a watershed that affect the soil and hydrologic functions supporting aquatic ecosystems. Watersheds that are functioning properly have the terrestrial, riparian, and aquatic ecosystem that capture, store, and release water, sediment, wood, and nutrients within their range of natural variability for these processes. When watersheds function properly, they are considered in satisfactory condition and healthy. There are 119 subwatersheds within the plan area rated as functioning properly, 46 watersheds rated as functioning at risk, and 1 watershed rated as impaired. Forty-two watersheds were not rated because they had less than 10 percent of their area within the plan area. The condition rating only applies to the National Forest System lands within each watershed.

### Priority Watersheds

Priority watersheds (table 22) have been identified using the Watershed Condition Framework to focus on maintaining or improving watershed condition. These priorities may change over the life of the plan and are reevaluated every 5 years or sooner if needed to concentrate restoration in other areas, based on:

- broadscale restoration strategies;
- the importance of water and watersheds;
- the urgency and ability of management action to address threats;
- alignment with other objectives and priorities of the Forest Service and other agencies and organizations;
- ecological values; and
- impaired ecosystems, including those where improvement or restoration are necessary to meet regulatory requirements.

**Table 22. Priority watersheds identified in the plan area**

Watershed Name	12-digit Hydrologic Unit Code	Rating	Watershed Restoration Action Plan Status
Upper Tijeras Arroyo	130202030201	Functioning at risk	None
Las Huertas Creek	130202010610	Impaired	Draft
Arroyo de Tajique	130500011102	Functioning at risk	None
Big Pigeon Canyon – Alamosa Creek	130202110602	Functioning at risk	None
Bluewater Lake – Bluewater Creek	130202070206	Functioning at risk	Yes – 2011

Healthy watersheds provide many important ecosystem services including, but not limited to nutrient cycling, carbon storage, erosion or sedimentation control, soil formation, water storage, water filtration, flood control, and reduced vulnerability to natural disasters such as drought. These goods and services are essential to our social, environmental, and economic well-being. Where watersheds are functioning properly, these ecosystem services can be assumed to be

stable; but where watersheds are at risk or impaired, these services are missing or reduced. Water use is an additional ecosystem service provided by watersheds in the plan area. The benefits associated with water are exemplified by their uses. Drinking water for people, wildlife, and livestock is crucial. Water supports vegetation as well.

### Desired Conditions for Watersheds

#### FW-DC-WTR

1. Watersheds are functioning properly and all indicators are rated as good according to the Watershed Condition Framework (Potyondy and Geier 2011) or similar protocol.
2. Most watersheds support multiple uses (such as timber, cultural uses, traditional uses, human subsistence, recreation, and grazing) with no long-term decline in ecological conditions, although some watersheds are reserved to preserve ecological functions.
3. Public water supplies are protected and water quality is maintained to provide a clean supply of water.

### Standard for Watersheds

#### FW-STD-WTR

1. Cost-effective, reasonable, and effective best management practices will be prescribed for projects to mitigate potential effect on watershed condition, including water quality.

### Management Approaches for Watersheds

#### FW-MGAP-WTR

1. Develop prescriptions and plans for improvement of priority watersheds through the Watershed Condition Framework or other similar processes.
2. Monitor best management practices using a current protocol, such as the national best management practices for water quality management on National Forest Systems lands (USDA Forest Service 2012).
3. Work with local, State, and Tribal governments, land grants, and other stakeholders to identify watershed improvements and priorities for protection and management thereby increasing collaboration across boundaries.
4. Plan watershed condition improvement projects with other project activities (such as vegetation, recreation, and range management projects) to support the natural variability of ecological characteristics to support satisfactory watershed condition while considering the effects of climate change.
5. Consider long-term objectives of watershed health in post-fire management actions for watershed recovery and include practices such as the use of native seed sources and weed-free mulch.

## Water Resources Features

Water resources features include streams (perennial, intermittent, and ephemeral), springs, wetlands, riparian areas, and groundwater. Many of these features within the plan area are groundwater dependent such as springs, perennial flows, and wetlands. Where there is enough water to support obligate or facultative wetland vegetation, a riparian or wetland area is often present. Unlike wetlands, riparian areas lack the amount or duration of water usually associated with wetlands, yet their connection to surface or subsurface water distinguishes them from adjacent uplands.

Riparian habitats and other water resources features are among the most critical elements of biodiversity within the landscape. Riparian areas 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, and water to acequias and community water systems
- regulating services such as carbon storage, water and flood regulation, water quality, and erosion control
- cultural services such as recreation, scientific discovery and education, intellectual and spiritual inspiration

Where riparian areas are intact and functioning, these ecosystem services can be assumed to be stable; but where riparian areas have degraded or been lost, these services are missing or at risk. Riparian areas are three-dimensional ecotones of interaction that include terrestrial and aquatic ecosystems. Riparian areas 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 watercourse at variable widths. Generally, riparian areas are those locations that support or have the potential to support obligate or facultative wetland species. Riparian areas occur within all vegetation types. Riparian areas are usually linear landscape elements associated with stream channels but can also occur as patches when associated with isolated springs or wetlands. Riparian areas within the plan area include many community types as mapped by the regional riparian mapping project and described in the Cibola assessment report (USDA Forest Service 2015a).

Riparian areas have many attributes and processes that support healthy functions of these important systems. These include hydrogeomorphic features, erosion and deposition, soils, water quality and vegetation. Hydrogeomorphic features include floodplains, groundwater discharge and recharge, gradient, sinuosity, flow regimes, and blockages (natural and human-caused). Erosion and deposition refers to stream stability and sedimentation. Soil characteristics are important for nutrients, erodibility, and water holding capacity. Temperature, dissolved oxygen, and sediment are all important aspects of water quality that contribute to healthy riparian areas. Vegetation found within riparian areas depends on all of these factors. Attributes of vegetation in riparian areas include community types and distribution, canopy, age class distribution, vigor, recruitment and reproduction, and root density. There is a dynamic relationship between these attributes and processes resulting structures, functions, compositions, and connectivity unique to each riparian area. Plan components address each of these aspects. There is not specific information for the each of these aspects, so plan components were developed using the proper functioning condition concept. In this way, managers can achieve desired conditions for each riparian area according to its potential or capability, which supports higher ecological functions such as habitat.

Vegetation supported within riparian areas varies with watershed size, geology, slope, elevation, and aspect. Processes in riparian areas are distinctly different from upland areas. Natural disturbances (including flooding, scouring, and desiccation) result in changes that promote a diverse community structure necessary for recruitment of riparian species. In turn, a healthy plant community helps maintain a stable and functioning riparian physical environment. Riparian areas are especially important to wildlife, including many federally listed species and species of conservation concern on the Cibola, such as Mexican spotted owl, southwestern willow flycatcher, Lewis's woodpecker, Chiricahua leopard frog, Zuni Bluehead Sucker, and Arizona myotis (see the "Aquatic Species and Habitats" section).

Based on future climate projections, vegetation in riparian areas will experience higher temperatures, an increase in extreme precipitation events, and changes to the hydrologic cycle. Further, it is likely that riparian areas dependent on spring flows will experience a decrease in available water as springs dry up. These changes can create corresponding shifts in plant composition, diversity, and abundance.

The Southwestern Region's Riparian and Aquatic Ecosystem Strategy (USDA Forest Service 2019b) provides information regarding existing and desired conditions which have been incorporated into land management plan direction, including desired conditions, standards and guidelines, and management approaches.

Groundwater is a vital component of water resources on the Cibola National Forest. Much of the water on the national forest comes from groundwater resources. Because of this, groundwater pumping has the potential to impact surface water sources by removing water, which recharges these features. Land management plan components support the many important ecosystem services provided by groundwater. Groundwater provides water where surface waters are not available or lacking. Groundwater regulates water flow through storage and improved water quality through infiltration. Groundwater supports water dependent ecosystems such as riparian areas, springs, and wetlands. These goods and services are essential to our social, environmental, and economic well-being by providing water and its benefits.

## Desired Conditions for Water Resources Features

### FW-DC-WRF

1. Riparian areas are in proper functioning condition (all indicators rated as satisfactory) and support other ecological values such as wildlife habitat.
2. The riparian and aquatic ecosystems associated with water resources features have the characteristics at the landscape-scale, mid-scale, and fine-scale levels as described in the Existing and Desired Conditions for Riparian and Aquatic Systems (USDA Forest Service 2019c) supplement to the Riparian and Aquatic Ecosystem Strategy (USDA Forest Service 2019b) or subsequent updated document.
3. Riparian areas around all lakes, perennial and intermittent streams, springs, and open water wetlands contribute to healthy watersheds while providing for multiple uses (including, but not limited to, grazing, recreation, vegetation management, and traditional uses).
4. Stream ecosystems, including ephemeral watercourses, are not fragmented by infrastructure or development. Streams provide connectivity important for dispersal, access to new habitats, perpetuation of genetic diversity as well as nesting and foraging for special status species. Exception may occur where protection is needed for native aquatic species.

5. Stream alterations (such as culverts and water crossings) do not exclude aquatic species from their historical habitat or restrict seasonal and opportunistic movements. Barriers to movement may exist to protect native aquatic species from nonnative aquatic species or for agricultural benefit.
6. Riparian, stream, wetland, and spring ecosystems are not fragmented by infrastructure or development, consistent with valid existing water rights. Springs developments allow flows that support the associated ecosystem consistent with valid existing water rights.
7. The ecological integrity of water resources features, such as riparian areas, is maintained or restored. Ecological integrity includes structure, function, composition, connectivity, water quality, sediment, aquatic and terrestrial habitats, and floodplain values as measured by current best available science and traditional ecological knowledge.
8. Groundwater-dependent ecosystems are in satisfactory condition and provide benefits to dependent species.
9. Quantity and timing of flows provide for channel and floodplain maintenance, recharge of riparian aquifers, water quality, and minimal temperature fluctuations.
10. Surface water resources in the plan area are not impacted by Forest Service surface or groundwater withdrawals.
11. Channels are vertically stable, with isolated locations of aggradation or degradation that would be expected in near natural conditions.
12. Water resources features are resilient or adaptive to natural or human-caused disturbances and projected warmer and drier climatic conditions. Ephemeral channels provide support to downstream subsurface flows, riparian vegetation, groundwater recharge, and do not contribute to downstream water quality degradation outside the natural range of variation.
13. Groundwater quality is within the range of natural variability.
14. Natural processes of groundwater recharge and discharge support the long-term sustainability of aquifers throughout climate fluctuations to support groundwater-dependent ecosystems such as wetlands and riparian areas.
15. Wetland and riparian areas consist of native obligate wetland species and a diversity of riparian plant communities consistent with site potential and relative to riparian desired conditions.

### Objective for Water Resources Features

#### FW-OBJ-WRF

1. Improve water resources features (such as riparian areas, springs, and streams) or soils by implementation of at least two to five projects annually.

### Standards for Water Resources Features

#### FW-STD-WRF

1. A riparian management zone will be established for riparian areas, including all lakes, perennial and intermittent streams, springs, and open water wetlands. This zone is at least 100 feet from the edges of all perennial streams and lakes unless site-specific conditions determine other effective widths.

2. Subject to valid existing rights, new infrastructure, facilities, roads, trails, or other constructed features will be located outside of the riparian management zones, unless to provide resource protection or where other locations are not possible (such as at crossings, sustainably designed access points, or interpretive trails) to avoid long-term adverse impacts to riparian areas.

## Guidelines for Water Resources Features

### FW-GDL-WRF

1. To protect riparian management zones, the use of motorized equipment should be avoided in riparian management zones, except when there is a designated stream crossing, when short-term uses are required to improve resource conditions and maintain infrastructure, or where valid existing rights occur.
2. Native riparian plants and associated wildlife habitat should be retained.
3. Management activities should maintain or improve the age class distribution and diversity of native riparian plant species as needed for proper functioning condition, thereby providing habitat for wildlife in wetland and riparian areas.
4. Where water is a focus of the recreation use, new or redesigned developed recreation sites and trails near riparian areas should be designed to provide sustainable access to water to prevent erosion, trampling, and inadvertent introduction of nonnative and undesirable biota and disease to protect associated values such as riparian habitat and clean water.
5. Management activities should retain trees, snags, and downed logs in and near stream channels and riparian areas to provide stream stability, wildlife habitat, and recruitment of large woody material as appropriate to the stream type.
6. When new or existing groundwater wells require replacement through new well drilling, these wells should be relocated far enough away from groundwater-dependent resources and riparian management zones to mitigate impacts, consistent with valid existing rights.
7. Within riparian management zones, recreation activities; permitted uses; structural developments such as livestock water gaps, pipelines, or other infrastructure; and management activities should occur at levels or scales that move toward desired conditions for healthy water, soils, and vegetation while aligning with the most current regional riparian strategy.<sup>25</sup>
8. New points of surface water diversions should be located to minimize impacts to water-dependent ecosystems, including instream flows, consistent with special use processes, existing water rights, approved permits, and declarations.
9. Subject to valid existing rights, developed surface waters should only be allowed where there is enough water to support the associated ecosystem and the proposed use.
10. To maintain stream function, stream channels should not be straightened by new management actions.

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<sup>25</sup> The current regional strategy is the Riparian and Aquatic Ecosystem Strategy: Southwestern Region of the Forest Service and its supplement, Existing and Desired Conditions for Riparian and Aquatic Ecosystems (USDA Forest Service 2019b and USDA Forest Service 2019c).

11. To maintain bank stability on perennial and intermittent streams, new or redesigned stream crossings (such as bridges and culverts) should be wide enough to pass the bankfull width unimpeded to protect stability and function of streams.
12. The number of newly designated stream crossings should be limited to avoid impacts to stream stability, reduce fragmentation, and prevent erosion and sedimentation.
13. When temporary roads are necessary, designated stream crossings should be constructed to mitigate sedimentation and gradient changes and maintain bank stability. These crossings should be removed after use.
14. Refueling, equipment maintenance, fuels storage, and other activities involving hazardous chemicals should be located outside of water resources features to protect soil, riparian management zones, and water quality.
15. Mineral materials, such as gravel, should not be removed within riparian management zones to ensure properly functioning conditions.
16. Groundwater sources should be used preferentially over surface water sources for new or redesigned uses, such as livestock, recreation, and other forest uses to protect surface water sources which are at risk due to drought while providing for long-term management uses.

## Management Approaches for Water Resources Features

### FW-MGAP-WRF

1. Monitor best management practices using a current protocol, such as the national best management practices for water quality management on National Forest Systems lands.
2. Emphasize natural channel design principles and native wetland and riparian plants over construction involving artificial materials during restoration of water resources features such as areas of poor riparian vegetation recruitment.
3. Collaborate with Federal, Tribal, State, and local governments, universities, and industry partners to identify, inventory, assess, and develop plans, and monitor water resources features and groundwater resources on National Forest System lands. Provide public education opportunities to improve understanding of water resources and water rights.
4. Identify and inventory groundwater-dependent resources and aquifers within the plan area, including important recharge areas. Manage watershed conditions to support groundwater recharge processes such as snowpack management and improved soil condition.
5. Within stream channels, consider removal of structures that are no longer necessary or functional, along with rehabilitation and stabilization such as improving low-water crossings on roads or trails.
6. Within riparian management zones, consider closing or relocating unneeded roads, restoring drainage, and reestablishing native vegetation to move these areas toward their desired condition.

## Soil

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. Soils also provide habitat for many organisms, store carbon, and act as a filtration and storage system for water. Without soil, there are no plants. Soils have unique physical, chemical, and biological properties important to their 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.

Soils are inventoried in the plan area using the Terrestrial Ecological Unit Inventory protocols, an ecological mapping method (Strenger et al. 2007). This method maps and classifies ecosystems based on biotic and abiotic factors that make up the physical environment. This includes soil type, site characteristics, and vegetation. Using gradient analysis, these data are grouped into land type units with similar potential natural vegetation and site responses. These units are used for planning and implementing projects across the landscape.

Soil condition is an evaluation of soil quality based on an interpretation of factors that affect vital soil functions. Soil quality is the capacity of the soil to function within ecosystem boundaries to sustain biological productivity, maintain environmental quality, and promote plant and animal health. The interrelated functions of soil hydrology, soil stability, and nutrient cycling are evaluated to assess soil condition. The characteristics of hydrology and stability include surface structure, bulk density, infiltration, erosion, and surface horizon. Impacts to these characteristics include compaction, erosion, rutting, and loss of the surface horizon. Impacts to nutrient cycling come from changes in vegetative community composition, litter loss, and lack of downed woody material.

Soil condition categories reflect soil disturbances resulting from both planned and unplanned events. Satisfactory soils are functioning properly and the ability of soil to maintain resource values and sustain outputs is high. Impaired soils have a reduction of soil function. The ability of soil to function properly has been reduced or there exists an increased vulnerability to degradation. An impaired rating should signal to land managers that there is a need to further investigate the ecosystem to determine causes and degrees of decline in soil functions. Unsatisfactory soils are degraded to the point where a loss of vital soil functions results in an inability of soil to maintain resource values, sustain outputs, and recover from impacts. Soils with an unsatisfactory rating are candidates for improved management practices or restoration designed to recover soil functions.

Soil is one the most important elements within the landscape since vegetation is dependent on healthy soil. Soils provide key ecosystem services. This includes ecosystem-supporting services such as growth medium for vegetation, provisioning services such as forage and habitat for animals; regulating services such as carbon storage, infiltration, and recharge, and cultural services such as scientific discovery. Where soils are intact and functioning, these ecosystem services can be assumed to be stable, but where soils have degraded or been lost, these services are lacking.

## Desired Conditions for Soil

### FW-DC-SOIL

1. Soil condition is satisfactory, soil functions are sustained, and soil is functioning properly as defined by current Forest Service protocols. The ability of soil to maintain resource values and maintain outputs is sustainable.
2. Vegetation contributes to soil condition, nutrient cycling, and hydrologic regimes at natural levels.
3. Downed woody material occurs at levels (size, decay, and amount) sufficient to support soil productivity through nutrient cycling.
4. Biological soil crusts are present at sustainable levels where expected (desert grasslands, desert, pinyon-juniper, and sagebrush).
5. Soils are free from pollutants that could alter ecosystem integrity or affect public health.
6. Soils do not exhibit accelerated rill, sheet, or gully erosion.
7. Soils have minimal evidence of pedestaling and are within the range of natural or threshold amounts of litter with little exposure of roots.

## Standards for Soil

### FW-STD-SOIL

1. High-risk soils will be identified prior to ground-disturbing activities, including burning, and the appropriate best management practices will be used to protect them. This may include avoidance and timing restrictions.
2. Appropriate best management practices will be applied to all ground-disturbing activities, including burning, to minimize effects to soils and maintain satisfactory soil condition.
3. Sites disturbed during management activities or actions will be stabilized and restored to satisfactory conditions. Drainage and erosion control measures will be implemented and maintained.
4. Spill prevention and containment plans will be in place when hazardous substances are used in or associated with forest management activities. This includes petroleum products, fuels, and pesticides.

## Guidelines for Soil

### FW-GDL-SOIL

1. Ground-disturbing activities that cause compaction, bare soils, loss of litter, or erosion resulting in a long-term decrease in soil condition should be limited to 15 percent or less of a project area outside of dedicated use areas (such as designated trails, roads, and recreation facilities) and administrative sites.
2. Poorly drained or saturated soils should not have mechanized equipment operating on them.
3. When soil condition is less than satisfactory as the result of management activities, restoration of soil function should occur to restore soil condition to satisfactory.

4. Management activities that involve heavy equipment such as mastication and skidding should occur along the contour except where necessary to change direction.
5. Burn piles should not be larger than 10 feet by 10 feet to protect soil condition. Where soil under burned piles does not return to pre-burn condition within 5 years, burn scars should be restored with methods such as scarification and revegetation to restore condition. Piles should contain a mix of fuel sizes and no more than 50 percent large wood to reduce soil heating.
6. Prescribed fire should occur when soil conditions are favorable to limit heat penetration and protect soil condition.
7. Depth of masticated material should not exceed an average of 4 inches and material should be discontinuous at the 0.25-acre scale to ensure soil productivity is maintained.
8. Vegetation, including ground cover, should be maintained or improved to conditions as indicated by the Terrestrial Ecological Unit Inventory as verified on the ground to support soil functions.
9. Repeated use of fire (less than 10-year interval) should be avoided on sites with low fertility soils with low site potential. Other methods to reduce fuels on these sites should be considered to maintain soil productivity.
10. Woody material should be retained at levels sufficient to maintain nutrients during forest management activities such as thinning and prescribed fire. Large decaying woody material should be retained to support nutrient cycling.
11. Whole-tree harvesting should only occur on productive sites unless slash is redistributed across treatment area to support nutrient cycling and satisfactory soil condition.
12. Whole-tree harvesting should not occur on aspen sites to protect soil condition unless necessary for aspen regeneration.
13. Soils with severe erosion hazard should be protected from ground-disturbing activities.
14. Mechanized, ground-based vegetation management activities such as skidding and mastication should be limited to slopes less than 40 percent.
15. Ground-disturbing activities should only occur when soils are sufficiently dry, frozen, or protected by an adequate snowpack to maintain productive soils.
16. In ecosystems where biological crusts are a natural component, selected areas with existing biological crusts should be identified and protected from ground disturbance. These areas should allow for crusts to repopulate after project activities are completed. The size of these areas should be of sufficient size to allow for restoration and can vary depending on the type of biological crust.
17. Areas of concentrated mechanized activities such as landings, areas where cattle are concentrated (such as watering points, mineral blocks, and collection areas), and other sites where ground disturbance is continual, should not be located on areas where soils have a severe erosion hazard rating or are poorly drained or saturated. Erosion control measures should be implemented on these sites to mitigate soil loss.

## Management Approaches for Soil

### FW-MGAP-SOIL

1. Assess the extent to which soil condition is being maintained. Evaluate the effectiveness of soil condition practices and monitor changes in soil properties to maintain satisfactory soil condition.
2. Consider soil condition and appropriate prevention or mitigation practices when forestwide and project-level activities are planned.
3. Use the Terrestrial Ecological Unit Inventory as the basis for planning project activities where soil condition may be affected, including vegetation management, grazing, and transportation projects. Verify at the project level to confirm accurate site-specificity.
4. Manage forest and rangelands in a manner that will improve soil productivity.
5. Collaborate with local, State, Tribal, and Federal governments to ensure policies and actions of soil resource protection are fully considered to the benefits of the resource.

## Aquatic and Terrestrial Species

Aquatic and terrestrial species depend on the health of their habitats. Species viability is addressed in the plan by providing guidance to maintain and enhance habitat elements that are important for species found on the Cibola National Forest, in addition to addressing species-specific threats.

All species found on the Cibola (aquatic, terrestrial, at-risk) provide the biotic foundation of the ecological landscape and are important to local communities. These plant and animal species often provide food, fiber, medicine, and forest products for multiple users. Traditional plants provide essential cultural services to the Cibola's traditional communities. Species also provide opportunities for scientific discovery and education. The continued existence of all native species is of the highest significance for the overall health of the forest and its users.

The following sections provide direction for aquatic species and habitats, terrestrial species and habitats, nonnative and invasive species, threatened and endangered species, and species of conservation concerns (at-risk species). Collectively, guidance to address species viability is found in this and other sections of this plan that relate to their habitats (such as "Vegetation" and "Water Resources").

### Aquatic Species and Habitats

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 semi-aquatic species on the Cibola are sometimes entirely dependent on these limited and scattered water sources. Collectively, these resources contribute to connecting habitat for wildlife across the landscape. Aquatic species and habitats are managed in conjunction with other resources according to the Multiple Use Sustained Yield Act of 1960. For federally endangered and threatened species on the Cibola, habitat management and compatible multiple uses are determined in accordance with section 7 of the Endangered Species Act as amended. For species of conservation concern, habitat management and compatible multiple uses will be accomplished in such a way that ensures those species' persistence on the Cibola, per the 2012 Planning Rule.

Springs are highly productive habitats in otherwise low-productivity, semi-arid environments. Springs are frequently more stable hydrologically than surrounding upland ecosystems in arid regions and may offer biological refugia for some species, particularly those that are narrowly endemic. They also often have important traditional, cultural significance to people inhabiting arid landscapes and often provide many cultural and recreational opportunities. Contemporary uses include contributions to potable local and urban water supplies and agricultural uses such as livestock watering. These uses are vital to domestic and commercial interests in and around the Cibola National Forest.

Natural and constructed waters provide water and food resources that are especially vital to wildlife, particularly fish, amphibians, birds, bats, and invertebrates. Various water impoundments have been constructed on the Cibola for a variety of purposes including reservoirs, constructed lakes, stock tanks, and wildlife drinkers. Some constructed waters provide unique riparian habitats and recreational opportunities.

Climate change is an important consideration when managing habitat for aquatic species. While climate change has the potential to affect all wildlife species, some are inherently more vulnerable than others, particularly species with specialized niches, limited mobility, and limited physiological adaptability. Certain habitats are more vulnerable to a changing climate. For example, springs and seeps are a valuable natural water source for a variety of fish, amphibians, birds, and mammals, particularly in semi-arid environments. These areas may offer critical refugia for rare species and species with narrow endemic species. However, springs are especially sensitive to variable precipitation and likely to dry up during prolonged drought. As such, the unreliability of natural water resources would make it harder for wildlife species to persist, pushing the limits of their natural range.

## Desired Conditions for Aquatic Species and Habitats

### FW-DC-AQSP

1. Habitat conditions, as described in the “Watersheds” and “Water Resources Features” sections, are capable of supporting self-sustaining native aquatic species populations. These habitat conditions include stream characteristics (riffles, runs, pools, and channel meandering) that allow for natural processes to occur (such as floodplain connectivity and sediment transport). Quality aquatic habitat is provided by overhanging banks, woody and herbaceous overstory, and instream large woody debris to regulate stream temperatures, maintain soil moisture, and provide cover for riparian species along streams.
2. Ecological conditions (see desired conditions for vegetation and water resources) 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.
3. Streams, springs, and wetlands with the potential to support native fish, other aquatic species, or both provide habitats that are resilient or adaptive to natural or human-caused disturbances and projected warmer and drier climatic conditions.
4. Habitat conditions and compatible multiple uses contribute to the recovery of federally listed species and the persistence of species of conservation concern.

5. Stream flows, habitat, and water quality support native aquatic and riparian-dependent species and habitat both on the Cibola and downstream. Habitats and refugia for rare, endemic, and culturally important species are intact, functioning, and sufficient for species persistence and recovery.
6. Aquatic habitats are connected and free from alterations (such as temperature regime changes, lack of adequate streamflow, barriers to aquatic organism passage) to allow for species migration, connectivity of fragmented populations and genetic exchange. Barriers to movement are located where necessary to protect native fish from nonnative species.
7. All aquatic species populations are free from or minimally impacted (populations remain self-sustaining) by nonnative plants, animals, disease, and pathogens.
8. Desirable nonnative fish species provide recreational fishing in waters where those opportunities are not in conflict with the recovery of native species.
9. Aquatic species habitat conditions provide the resiliency and redundancy necessary to maintain species biodiversity and metapopulations.
10. Riparian areas and wetlands are in properly functioning condition and subsequently managed to achieve an advanced ecological status, providing the widest variety of vegetation and habitat diversity for wildlife, fish, and rare plant protection.

### Guidelines for Aquatic Species and Habitats

#### FW-GDL-AQSP

1. Activities in and around waters should use decontamination procedures to prevent the spread of chytrid fungus, other pathogens, and nonnative species that are harmful to aquatic wildlife.
2. Streams, streambanks, shorelines, lakes, wetlands, seeps, springs and other bodies of water should be protected from detrimental changes (as described in species-specific literature including recovery plans, listing and critical habitat designations, and conservation strategies) to protect water quality, aquatic species diversity and quantity, riparian and aquatic habitat quality, and riparian and aquatic habitat connectivity.
3. Heavy equipment and vehicles used for instream restoration management activities should be free of petroleum-based fluid residue and leaks.
4. To conserve aquatic habitat connectivity, constructed features (such as exclosures, wildlife drinkers, range improvements, fences, and culverts) should be maintained to support the purpose(s) for which they were built. Constructed features should be removed when no longer needed, to restore natural hydrologic function and maintain habitat connectivity.
5. Streambeds should contain less than 20 percent fines (sand, silt, and clay) in fish spawning habitat.
6. Where adequate groundwater or surface hydrology exists, and if natural recruitment is not sufficient, managers may supplement natural recruitment with planting to reestablish native riparian vegetation to provide shading, bank cover, and streambank stability.

## Management Approaches for Aquatic Species and Habitats

### FW-MGAP-AQSP

1. Work collaboratively with New Mexico Department of Game and Fish personnel to coordinate on management of sport and native fishes, including reintroductions, habitat improvements, control or eradication of nonnative species, and the identification of refugia for native fish.
2. Explore reintroduction of native fish assemblages to appropriate perennial stream reaches (such as Las Huertas Creek on the Sandia Ranger District near Placitas).
3. Pursue partnership potential for collaborative management of aquatic resources with State, county and local government entities. Work with partners and through collaborative efforts to increase the frequency of restoration efforts benefitting aquatic species.

## Terrestrial Species and Habitats

The Cibola National Forest provides habitat for a wide variety of terrestrial wildlife and plant species. Topographical and geological conditions of the wide-ranging sky island ecosystems provide for variation in wildlife distribution and habitat use. The spatially disjunct nature of the four districts influences movement patterns of wide-ranging mammals, such as elk, mule deer, black bear, wild turkey, cougar, and pronghorn.

The Cibola is primarily responsible for providing habitat to maintain species diversity on National Forest System lands. The New Mexico Department of Game and Fish and the U.S. Fish and Wildlife Service are the lead agencies responsible for managing wildlife populations in New Mexico. The U.S. Fish and Wildlife Service is responsible for managing federally endangered and federally threatened species and migratory birds while the New Mexico Department of Game and Fish is responsible for managing all other wildlife species.

Terrestrial species and habitats are managed in conjunction with other resources according to the Multiple Use Sustained Yield Act of 1960. For federally endangered and threatened species on the Cibola National Forest, habitat management and compatible multiple uses are determined in accordance with section 7 of the Endangered Species Act as amended. For species of conservation concern, habitat management and compatible multiple uses will be accomplished in such a way that ensures those species' persistence on the Cibola, per the 2012 Planning Rule.

The needs of individual or groups of wildlife species include food, water, and shelter. Adequate habitat connectivity is also crucial to daily and seasonal movements, finding mates, and being able to use available habitat across the landscape. Land management plan direction can only address habitat connectivity on National Forest System lands within the boundaries of the Cibola. Because of the disjunct nature of the four mountain districts, it is not possible to address connectivity between these ranger districts within this land management plan. Healthy, diverse vegetation 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, wildlife quiet areas and unroaded areas) are necessary to sustain other species.

## Desired Conditions for Terrestrial Species and Habitats

### FW-DC-TRSP

1. Native ecosystems are within reference conditions, are distributed throughout their potential range, and are sustainable across the Cibola and able to support a full complement of native species.
2. There is a natural and nearly complete assemblage of native plants and animals, including important game species, which provides recreational opportunity and socioeconomic benefits to communities, distributed across the Cibola.
3. Ecological conditions (see desired conditions for vegetation and water resources) provide habitat that contributes to the survival, recovery, and delisting of species under the Endangered Species Act; precludes the need for listing new species; improve conditions for species of conservation concern; and sustains both common and uncommon native species.
4. Hunting, fishing, plant gathering and other species-based recreation and traditional use opportunities exist but do not compromise species, populations, or habitat.
5. Habitats allow the maintenance and promotion of interspecific relationships (such as predator-prey relationships and keystone species relationships).
6. Desirable nonnative species provide recreational opportunities where those opportunities are not in conflict with the recovery of native species.
7. Natural processes occur within the vegetative communities that enhance species richness and diversity. Terrestrial ecosystems are resilient to disturbance and tolerate the effects of, and therefore benefit from, wildland fire in a near natural fire regime as well as other naturally occurring disturbances.
8. Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species.
9. Nonvegetative habitat features required for some species (such as cliffs, caves, and cavities) are maintained with limited disturbance. Vegetative habitat features (such as snags, grasses, forbs, and shrubs) provide forage, cover, fawning, and nesting sites for species with these requirements.
10. Species are free from harassment and human disturbance at a scale that impacts vital functions (such as breeding, feeding, and rearing young) that could affect persistence of the species.
11. Habitat configuration, connectivity, and availability allow wildlife populations to adjust their movements in response to major disturbances (such as effects of changing climate and uncharacteristic fire) and promote genetic flow between wildlife populations. These interconnected habitats allow seasonal migrations, breeding, dispersal, foraging, and other movement patterns to support life-history characteristics. Habitat loss and fragmentation is reduced, and permeability is enhanced through habitat linkages within and between the national forests and other public and privately conserved lands.
12. Habitats and refugia for rare, endemic, and culturally important species are intact, functioning, and sufficient for species persistence and recovery.

13. Key features (talus slopes, cliffs, canyon slopes, caves, fens, bogs, sinkholes, maars, and playas) necessary to support the life histories of at-risk species are well distributed and undisturbed within the capacity of the vegetation community.

### Guidelines for Terrestrial Species and Habitats

#### FW-GDL-TRSP

1. Design features, mitigation measures, or both should be incorporated into site-specific project plans to avoid or reduce negative impacts to wildlife and to provide for species habitat needs, consistent with the project or activity objectives.
2. Known active raptor nests, including those on cliff faces, should be protected from management activities and disturbance during the nesting season to maintain the persistence of or contribute to the recovery of at-risk species. Protection measures can include timing restrictions, adaptive percent utilizations, distance buffers, or other means of avoiding disturbance based on best available information and site-specific factors, such as topography, available habitat, and location.
3. To conserve wildlife habitat connectivity, constructed features (such as exclosures, wildlife drinkers, range improvements, fences, roads, and culverts) should be maintained to support the purpose(s) for which they were built. When no longer needed, constructed features should be removed to restore natural hydrologic function and maintain habitat connectivity.
4. Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of wildlife, particularly for at-risk species.
5. The natural ecosystems upon which pollinators depend should be sustained through the use of reclamation work that includes native forb and wildflower plantings and the application of localized seed mixes.
6. Where the need is demonstrated, seasonal road restrictions and area closures may be used to provide refuge in small and large blocks of terrestrial habitat for a wide range of species.

### Management Approaches for Terrestrial Species and Habitats

#### FW-MGAP-TRSP

1. Strive to create and maintain natural communities and habitats in the amounts, arrangements, and conditions capable of supporting viable populations of existing native and desired nonnative plant, aquatic, and wildlife species within the planning area while contributing to broader landscape-scale initiatives where appropriate.
2. Work collaboratively with New Mexico Department of Game and Fish personnel to plan and implement projects that make progress towards the Cibola's desired conditions and help achieve conservation actions specified in the New Mexico State Wildlife Action Plan or equivalent.
3. Consider potential climate change, drought, El Niño Southern Oscillation, and the resulting potential effects of management activities during project planning.
4. Develop partnerships with interested individuals and groups to help implement the wildlife program, including wildlife survey and habitat assessment.

## Nonnative, Invasive Species

Executive Order 13112 defines an invasive species as any plant or animal species that is nonnative (or alien) to the ecosystem under consideration and which introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species generally possess one or more of the following characteristics: aggressive and difficult to manage; poisonous; toxic; parasitic; a carrier or host of serious insect or disease; and being nonnative, new, or not common to the United States or parts thereof. Invasive species pose an increasing threat to the integrity of ecosystems by decreasing native plant and animal diversity, increasing soil erosion and sedimentation, and interfering with natural fire regimes.

Some native species have invasive tendencies and threaten other native species, ecosystem function, and the quantity and quality of forest goods and services. Reducing the threat of aquatic and terrestrial invasive plant and animal species will allow Cibola National Forest personnel to better manage resilient landscapes and species populations that have a greater capacity to survive natural disturbances and uncertain future environmental conditions, such as those driven by changes in climate patterns and increasing human uses.

The Cibola also has known populations of invasive animal species and diseases. Similar to invasive plants, invasive animals and diseases have the potential to adversely affect native species and ecosystem function. For example, the chytrid fungus has been linked to infectious disease and dramatic die-offs in amphibians and trout worldwide, and white-nose syndrome has been decimating bat populations and moving westward in North America. Feral animals, including unauthorized livestock, may be an issue in the future on the Cibola. These animals are managed by other agencies, such as the New Mexico Livestock Board and the USDA Animal and Plant Health Inspection Service.

## Desired Conditions for Nonnative, Invasive Species

### FW-DC-NIS

1. Invasive species do not disrupt the structure or function of ecosystems, species life cycles, or populations, and minimize impacts to native wildlife or plant species.
2. Desirable nonnative species do not conflict with the recovery of native species or existing multiple uses; for example, stocking nonnative sport fish.

## Standards for Nonnative, Invasive Species

### FW-STD-NIS

1. Forest management activities must apply best management practices<sup>26</sup> 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.
2. Projects, authorized activities, and special uses shall be designed (for example, weed hay, off-highway vehicle washing, waders) to reduce the potential for introduction of new species or spread of existing invasive or undesirable aquatic or terrestrial nonnative populations.
3. Maintain a 100-foot buffer free of aquatic weeds around boat launches and docks.

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<sup>26</sup> Best management practices as defined in the Region 3 Soil and Water Conservation Practices Handbook or other most current regional best management practices guidance.

4. Clean hides, legs, and hooves of pack animals by brushing prior to moving them into a fire-disturbed area. Ensure the pack animals have previously cleared their digestive system of invasive weed seed over a period of 3 to 5 days while being fed weed-free forage.
5. Incorporate weed prevention into all new mining operation permits, plans, and reclamation projects. Mining reclamation must consider reclamation requirements established by the New Mexico Mining and Minerals Division for invasive species.

### Guidelines for Nonnative, Invasive Species

#### FW-GDL-NIS

1. All ground-disturbing projects (including vegetation, roads, and fire, etc.) should assess the risk of noxious weed invasion and incorporate measures to minimize the potential for the spread of noxious and invasive species.
2. Treatment approaches should use integrated pest management practices to treat noxious and nonnative, invasive species. These practices include mechanical or physical, cultural, biological, and chemical control.
3. Chemical type and application rate should be considered when using pesticides and herbicides to treat invasive species, and should be applied in a manner that avoids or reduces impacts to nontarget species. Population buffers may also be applied to avoid unintentional treatment of nontarget species.
4. The application of biological control agents should be informed by the best available science, incorporate measures for avoidance of adverse impacts to nontarget species, and be coordinated with other State and Federal wildlife agencies such as the New Mexico Department of Game and Fish, as well as adjacent land owners who may be impacted.
5. Preventive measures, such as requiring pre- and post-work cleaning of equipment and using certified weed-free seed, should be implemented through contracting, permitting, and other administrative processes. Weed-free plant material should be selected for all seeding and mulching projects, to restore natural species composition and ecosystem function to the disturbed area. Plant or seed materials should be used, which are appropriate to the site, capable of becoming established, and are not invasive.
6. Wildland and prescribed fire activities should follow the most current version of invasive best management practices and best available science.
7. Clean fill material from a weed-free source should be utilized rather than borrowing fill from a weed-infested stockpile, road shoulder, or ditch line. Material sources should be inspected on site before use or transport and stockpiled materials should be in a weed-free condition.

### Management Approaches for Nonnative, Invasive Species

#### FW-MGAP-NIS

1. Coordinate with other Federal and State agencies, Tribal governments, counties, local governments, Cooperative Extension Service, grazing permittees, and adjacent landowners in efforts for prevention, control, and eradication of invasive species populations incorporating the best available scientific information.

2. Use strategies and best management practices to minimize and prevent the spread of invasive species and nonnative exotics including aquatic systems, such as education, inventory, and control guidelines.
3. Focus treatments on those species that have the potential to permanently alter historical fire regimes or pose the greatest threat to biological diversity and watershed condition.
4. Work with the New Mexico Department of Agriculture personnel to ensure special management consideration are given to all species on the State noxious weed list to limit, and eradicate, any noxious weeds on the Cibola National Forest.
5. Coordinate public education and outreach, and aquatic invasive species inspection and decontamination efforts, with ongoing state-level efforts.
6. Encourage public land users to inspect and clean motorized and mechanized trail vehicles of weeds and their seeds before recreating on public lands. If practical, provide facilities for cleaning contaminated vehicles and equipment.

### **Threatened and Endangered Species and Species of Conservation Concern (At-Risk Species)**

Threatened and endangered species are those listed under the Endangered Species Act of 1973. There are five federally endangered species (two are experimental populations) and four threatened species relevant to the plan area and to the planning process. Although many of these species are well documented on the Cibola National Forest (for example, Mexican spotted owl, Zuni fleabane, and Zuni bluehead sucker), additional species have been included that do not occur within the national forest boundary. For example, the Chiricahua leopard frog and the Alamosa springsnail have been documented in habitat directly adjacent to the Cibola's boundaries. These species were included because they occur within the same watershed as the Cibola National Forest and have the potential to be affected by management activities.

Species such as the southwestern willow flycatcher was included as it was documented on the Cibola but does not currently occupy any territories. Other species, such as the western yellow-billed cuckoo, could potentially use the Cibola only as migratory habitat but have not been documented on the national forest. The Mexican wolf has been documented foraging on the Cibola; however, it does not currently den or breed on the national forest. Similarly, the Aplomado falcon has been documented foraging on the Cibola but is not presently known to nest on the national forest. 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 those species, other than federally recognized threatened, endangered, proposed, or candidate species, 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 the species' capability to persist over the long term in the plan area.

Species of conservation concern on the Cibola National Forest are:

- pale Townsend’s big-eared bat
- Arizona myotis
- Gunnison’s prairie dog
- Rocky Mountain bighorn sheep
- northern goshawk
- burrowing owl
- juniper titmouse
- red-faced warbler
- Grace’s warbler
- American peregrine falcon
- loggerhead shrike
- Lewis’s woodpecker
- Bendire’s thrasher
- gray vireo
- northern leopard frog
- Rio Grande Sucker
- Rio Grande Chub
- Dumont’s fairy shrimp
- Zuni milkvetch
- villous groundcover milkvetch
- Sivinski’s fleabane
- Sandia mountain alumroot

For many species of conservation concern, 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 persistence.

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 (below).

### Desired Conditions for At-Risk Species

#### FW-DC-ARS

1. Threatened and endangered species have the necessary ecological conditions to contribute to their recovery and maintain or restore critical habitats.
2. Ecological conditions are present that conserve populations of proposed and candidate species and maintain or restore habitats in the plan area to contribute to preventing them from becoming federally listed.
3. Habitat conditions provide the resiliency and redundancy necessary to maintain species diversity and metapopulations.
4. Ecological conditions (see the vegetation and water resources desired conditions) provide habitat that contributes to the survival, recovery, and delisting of species under the Endangered Species Act; precludes the need for listing new species; improve conditions for species of conservation concern; and sustains both common and uncommon native species.
5. Key features (talus slopes, cliffs, canyon slopes, caves, fens, bogs, sinkholes, maars, and playas) necessary to support the life histories of at-risk species are well distributed, properly functioning, and undisturbed within the capacity of the vegetation community.

## Guidelines for At-Risk Species

### FW-GDL-ARS

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. Deviation from recovery plans may occur through consultation with U.S. Fish and Wildlife Service personnel.
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 Cibola National Forest personnel, 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. Known active raptor nests, including those on cliff faces, should be protected from management activities and disturbance during the nesting season to maintain the persistence of or contribute to the recovery of at-risk species. Protection measures can include timing restrictions, adaptive percent utilizations, distance buffers, or other means of avoiding disturbance based on best available information and site-specific factors, such as topography, available habitat, and location.
4. Management actions that may affect nesting conditions for northern goshawks should incorporate the most current ecological guidelines to retain or improve habitat for this species. These guidelines include:
  - A minimum of 6 nest areas (known and replacement) should be located per territory. Goshawk nests and replacement nest areas should generally be located in drainages, at the base of slopes, and on northerly (northwest to northeast) aspects. Nest areas should generally be 25 to 30 acres in size.
  - Goshawk post-fledging areas of approximately 420 acres in size should be designated surrounding nest sites.
  - Human presence should be minimized in occupied northern goshawk nest areas during the nesting season from March 1 through September 30.
  - Activities occurring within federally listed species habitat should apply habitat management objectives and species protection measures from approved recovery plans.
5. Measures to maintain at-risk bat habitat and reduce disturbance by human or management activities should be used where known bat use and concentrations of at-risk bat species occur (maternity colonies, hibernacula, seasonal roosts, or foraging habitats). In general, these habitats include caves, abandoned mines, bridges, or structures. Measures such as seasonal or permanent access restrictions should be considered, especially during critical life history periods in occupied habitat within high public use areas. When designing or maintaining bridges, project coordinators should consider incorporating design elements that allow for the use of structures by bats or improve the potential for roost habitat.
6. Riparian areas should retain or improve the condition of standing dead trees, down woody material, and large mature cottonwood trees as habitat for at-risk species. Projects occurring in these areas should incorporate design features to ensure persistence and function of this habitat type and these specific habitat features.

7. Site-specific information should be used to determine if management activities may potentially impact species of conservation concern. Species-specific mitigation and protective measures should be incorporated into project design to ensure persistence of species (for example, retention of both abiotic and biotic features required for essential life history characteristics, such as breeding and foraging).
8. Known populations of at-risk plant species should be protected from management activities that may degrade habitat conditions.
9. All authorized activities should be designed and implemented to address threats to critical life cycle needs for at-risk wildlife species, such as creation or removal of obstructions that may alter natural migration or directly cause mortality, signage in sensitive areas, seasonal restrictions, or other appropriate measures.
10. Management actions within water resources features (such as cleaning of water developments, stock tanks, etc.) that support known populations of at-risk species should consider mitigations to reduce the effects to the overall species population. Examples of these mitigations include repair and maintenance on a single feature at a time during a given year to maintain populations across water features, conducting refueling or herbicide applications to minimize contaminants within the water feature, and ensuring proper water levels or habitat is maintained or improved during activities to prevent entire population loss.

## Management Approaches for At-Risk Species

### FW-MGAP-ARS

1. Maintain strong partnerships between State and Federal agencies, Tribal governments, academia, and nongovernment organizations to provide and promote education about at-risk species.
2. Emphasize the protection and replacement of key habitats that contain threatened species, endangered species, species of conservation concern plants and animals, or a combination of these species.
3. Work with the U.S. Fish and Wildlife Service and other partners to develop conservation measures (for example, public education to reduce human impacts) to prevent listing and to aid in the recovery and delisting of federally listed species. For 10(j) species, such as the Mexican wolf, this applies inside and outside the designated experimental range.
4. Coordinate with other stakeholders, including county, Tribal, and local governments, permitted entities, and adjacent landowners, in efforts for management and recovery of at-risk species and populations.
5. At-risk species management approach should take into account activities occurring simultaneously within at-risk species habitat as well as activities occurring on adjacent land that may impact species.
6. In coordination with New Mexico Game and Fish personnel, consider dusting prairie dog colonies with flea-controlling powder to reduce the spread of sylvatic plague. When possible, identify and potentially avoid burrows occupied with burrowing owls prior to application.

## Air

Air quality and its effects on the Cibola National Forest can be described in three questions:

- Does ambient air quality on and near the Cibola meet State and Federal regulations?
- Is visibility at scenic vistas impaired by human-caused pollution sources?
- Does atmospheric deposition of pollutants, such as nitrogen, sulfur, and mercury compounds, contribute to impaired ecosystem structure or function?

Air provides many ecosystem services on which life depends. Air provides supporting ecosystem services by supplying oxygen for respiration by plants and animals, carbon dioxide for photosynthesis, and nitrogen for plant nutrition. Air also provides regulating ecosystem services, as it is key to global redistribution of biological and physical by-products. Air contributes to provisioning ecosystem services by enabling transportation (wind for sails, lift for airplanes) and providing energy (wind turbines). Especially important to humans are the cultural ecosystem services that air provides to society (benefits of clean air for scenic viewing and visibility).

While there are no air quality monitoring stations on the Cibola National Forest, nearby monitors indicate ambient measurements of criteria pollutants are in attainment. However, there is some concern in the future regarding particle pollution (particulate matter: PM<sub>10</sub> and PM<sub>2.5</sub>) which is expected to increase from windblown dust and fires. Fugitive dust emanating from off the Cibola, as a result of land use practices and travel on county roads, occasionally occurs and may worsen during droughts or changes in climate conditions. However, fugitive dust generally does not emanate from the national forest, except for dust that occasionally emanates from vehicles driving on unpaved National Forest System roads during dry conditions.

Ozone may become an issue as regulatory standards are tightened, particularly on the Sandia District outside Albuquerque. In addition, nearby visibility monitoring, while not measured on the Cibola, indicates that while there is some impairment overall, the trend is improving and remains on track to meet regulatory guidelines set by the Environmental Protection Agency and the State of New Mexico. In regard to atmospheric deposition, modeled data suggests nitrogen deposition exceeds the critical loads for lichens on much of the mountain ranger districts. However, the trend in nitrogen pollution is improving. Where data is available, air quality on the national forest is generally good, and the overall trend is improving for most pollutants. The greatest concern in the future is particulate pollution from fire and fugitive dust forestwide and possibly ozone on the Sandia Ranger District.

### Desired Conditions for Air

#### FW-DC-AIR

1. Air quality meets or surpasses State and Federal ambient air quality standards.
2. There are no measurable exceedances to water chemistry or biotic components due to atmospheric deposition of pollutants.
3. Visibility at sensitive Class II areas is maintained or improved within the planning areas.
4. Sensitive areas and receptors are not negatively impacted by smoke.

## Guidelines for Air

### FW-GDL-AIR

1. Authorizing documents for wildfires and prescribed burns should identify smoke sensitive areas and include management prescriptions and courses of action to mitigate impacts to air quality in those areas.
2. Dust abatement should occur, using non-potable water where feasible, during construction and road projects where dust is a potential effect.

## Management Approaches for Air

### FW-MGAP-AIR

1. Work with agencies, organizations, Tribes, and other entities, such as New Mexico Environmental Department, to actively pursue actions designed to reduce the impacts of pollutants from sources both within and outside the Cibola National Forest.
2. Manage smoke in conjunction with State of New Mexico and Bernalillo County personnel through compliance with their respective smoke management programs.
3. Document evidence of initial and continued compliance with local, State, and Federal air quality permits for projects. Maintain the files for the duration of the activity. Provide resources for meaningful enforcement of permit compliance documentation.

## Fire and Fuels

Cibola National Forest's current vegetation species composition and fuel densities greatly differ from historical conditions due to wildfire suppression; livestock grazing; regeneration; and encroachment of early successional species, late successional species, or both. 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; cause higher tree mortality; degrade watersheds; sterilize soils; and threaten adjacent communities, forest infrastructure, and wildlife habitat. Examples of uncharacteristic wildfires on the Cibola include the Ojo Peak, Trigo, Big Springs, and Doghead Fires. Ojo Peak, Trigo, and Big Springs occurred within six months of each other on the same ranger district in 2007 and 2008 and burned a total of 26,156 acres. Doghead occurred on the Mountainair Ranger District in 2016 and burned a total of 17,911 acres.

Wildland fire describes any nonstructural fire that occurs in the wildland.<sup>27</sup> Wildland fires are categorized into two distinct types:<sup>28</sup>

- **Wildfires:** Unplanned ignitions including human and naturally caused fires. These include prescribed fires that have been declared escaped wildfires.
- **Prescribed fire:** Planned ignitions.

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<sup>27</sup> An area in which development is essentially nonexistent except for roads, railroads, powerlines, and similar transportation facilities; structures, if any, are widely scattered.

<sup>28</sup> The National Interagency Fire Center (2009) "Guidance for the Implementation of Federal Wildland Fire Management Policy" provides much of the current direction for managing wildland fire on Federal lands, including wilderness areas.

Most of the Cibola's vegetation is adapted to recurring wildfires started by lightning from spring and summer thunderstorms. Frequent, low-severity fire plays a vital role in maintaining the health of much of the pinyon-juniper, ponderosa pine, and frequent-fire mixed-conifer vegetation types. These three vegetation types cover a large portion of the Cibola. Grasslands are also adapted to frequent wildfire. Other vegetation types, such as wet mixed conifer and spruce-fir, are also fire dependent but have a historical fire regime of less frequent, mixed-severity fires.

The Cibola contains uncharacteristically dense forests with many more young trees than were present historically. Tree seedlings have invaded forest openings, grasslands, and savannahs. The forest and woodlands are deficient in grasses, forbs, and shrubs due to tree competition and are at high risk for insect and disease outbreaks. Combined with drought, hotter and dryer weather conditions, continuous canopy cover and accumulations of live and dead woody material, the ecosystem becomes primed for large, high-severity wildfires. These wildfires burn with more intensity, have higher tree and seed mortality, degrade watersheds, change soil chemistry and structure, and threaten homes and community infrastructure.

Fire is an important disturbance to most Southwest ecosystems and indirectly aids in the production of many ecosystem services. Fire is also important in that it can act as an inhibitor or stressor to many of these services when its regime has been disrupted or changed. This is especially evident with the cessation of fire in many of our frequent-fire systems that experience uncharacteristic high-severity fires, which pose a threat to many of the ecosystem services provided by other resources such as recreation, vegetation, wildlife, and traditional and cultural uses.

Many of the vegetation communities on the Cibola National Forest are fire dependent, meaning fire is necessary to the process by which the structure of a biological community evolves over time (secondary succession). These changes include aiding the nutrient cycling process by burning organic material (such as dead and live plants, logs, twigs, litter, and duff), which may be returned back into the soil profile providing nutrients to residual or newly established plants. Species diversity and wildlife habitat are also indirectly affected by fire through the creation of diverse vegetation structure and conditions including different vegetation types in various stages of existence and new exposed soil for early successional plants. These early successional grasses and shrubs provide shelter and cover for small mammals while dead standing snags provide habitat for cavity-nesting birds, and decomposing trees on the ground support insects and nematodes.

The use of low- and moderate-severity wildfire and prescribed fire are the most cost-effective ways to reduce the likelihood of a catastrophic high-severity wildfire. To achieve a forest that is resilient to fire disturbances even during dry and windy conditions, forest structure and composition need to resemble desired conditions. In addition to the use of wildfire and prescribed fire, thinning and tree harvesting can reduce tree density and canopy cover and promote the natural fire regime. The goal is to improve fire-adapted ecosystem health by restoring wildland fire to the wildlands in the form of planned and unplanned ignitions.

## Desired Conditions for Fire and Fuels

### FW-DC-FF

1. Wildfires burn within the range of severity and frequency of historical fire regimes for the affected vegetation communities. High-severity fires rarely occur where they were not historically part of the fire regime.
2. Wildland fires protect, maintain, and enhance resources and move ecosystems toward desired conditions on a landscape scale. Wildland 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 use of fire mitigates high-severity disturbances and protects social, economic, and ecological values at risk.
3. Naturally ignited wildfires predominate; human-caused wildfires (such as those from abandoned campfires or downed powerlines) are rare.
4. Wildland fires do not result in the loss of life, property, or cultural resources, or create irreparable harm to ecological resources.
5. Wildland fires in the wildland-urban interface are predominantly of low to moderate intensity. Residents living within and adjacent to the national forest are knowledgeable about wildfire protection of their homes and property, including providing defensible space as a result of successful public education about wildfire risk.
6. Wildland fire is understood, both internally and by the public, as a necessary disturbance process integral to the function and sustainability of ecosystems.
7. All restoration and fuel treatments result in ecological resources that are adaptable to the effects of changing climate conditions.

## Objective for Fire and Fuels

### FW-OBJ-FF

1. Prescribe burn 8,900 to 13,000 acres annually to reduce wildfire risk and restore conditions.

## Standards for Fire and Fuels

### FW-STD-FF

1. Human safety shall be the highest priority in all wildfire response actions.
2. The response to wildfire shall be dynamic, contingent on environmental conditions, and based on a risk-management approach while accomplishing integrated resource objectives.
3. Managers shall use a decision support process to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risk, define implementation actions, and document decisions and rationale for those decisions.
4. Agency administrators must consider firefighter exposure, risk, values, cost, and likelihood of success on all wildfires.
5. Wildfires that threaten life, investments, and valuable resources (such as cultural resources or the wildland-urban interface) must be suppressed at the lowest cost with the fewest negative consequences with respect to fire responder and public safety.

## Guidelines for Fire and Fuels

### FW-GDL-FF

1. Naturally ignited wildfires should be allowed to perform their natural ecological role to meet multiple resource objectives and facilitate progress toward desired conditions. Naturally ignited wildfires should only be suppressed when not expected to achieve desired conditions or where necessary to protect life, investments, and valuable resources.
2. Response to wildfires that cross jurisdictional boundaries should be coordinated and managed to meet the responsible agency's objectives.
3. Measures should be taken to prevent entrapment of fish and aquatic organisms and the spread of parasites or disease, when drafting (withdrawing) water from streams or other waterbodies during fire management activities.
4. Measures should be taken to prevent the spread of invasive plant species by equipment and personnel during fire management and rehabilitation operations.
5. Ground-disturbing activities should be avoided in threatened and endangered critical habitat.
6. Post-fire restoration and recovery should be provided where critical resource concerns merit rehabilitation for controlling the spread of invasive species and, protection of areas of cultural concern, critical or endangered species habitat, or other highly valued resources such as drinking water.
7. Higher fire severities should be acceptable at the fine scale in frequent-fire ecosystems that are moderately to highly departed from desired conditions. Multiple small patches of high severity are preferable to a single large, high-severity area.

## Management Approaches for Fire and Fuels

### FW-MGAP-FF

1. Collaborate with stakeholders and partnering agencies (such as Federal, State, county, local, and Tribal governments, and land grants-*mercedes*) early and often to successfully meet incident objectives. Educate internally and externally about the potential challenges and tradeoffs of using wildland fire to meet resource objectives. This includes water sources, access, and land use agreements. This is done with the understanding that fire-adapted ecosystems and communities transcend jurisdictional boundaries.
2. Collaborate with scientists (universities, Forest Service Research and Development, U.S. Geological Survey, Ecological Restoration Institute) to conduct research on areas impacted by uncharacteristic wildfire to understand how fire has altered the ecological conditions outside of the natural range of variation and develop strategies to better manage these areas.
3. Collaboratively plan and implement fuels projects and wildfire response with Federal, State, and local governments, and private landowners. Promote public safety and reduce the risk of wildfire on lands outside the national forest by supporting the development and implementation of community wildfire protection plans or similar assessments and management plans in order to mitigate negative impacts of wildfire. Community wildfire protection plans are also important tools for mitigation efforts such as wildfire preparedness, evacuation planning, and other mitigations that will aid in wildfire response.

4. Base wildfire objectives on interdisciplinary assessment of site-specific values such as desired conditions, existing fuel conditions, current and expected weather, fire location, resource availability, and social and economic considerations; consider courses of action to protect or enhance those values.
5. Implement treatments where they provide the most benefit, are logistically feasible, and improve or maintain ecological integrity (by addressing vegetative departure). This includes, when appropriate, combining prescribed fire with mechanical treatments to improve forest structure and function in areas departed or trending away from the desired conditions. When mechanical treatments are not feasible due to steep and rugged terrain in remote areas, consider the use of naturally ignited wildfires and prescribed fires to meet protection and resource objectives when conditions facilitate safe progress towards desired conditions. These objectives can change as fire spreads across the landscape.
6. Increase resiliency in areas of high vulnerability to the effects of changing climate by using a diversity of treatments to facilitate natural adaptation to changing conditions, such as managing in favor of early- to mid-seral species over late-seral species in ecotones, as species characteristic of lower life zones are adapted for warmer and drier conditions. Manage tree basal area at the low end of the range of desired conditions to mitigate water stress. Seed native vegetation or implement other site rehabilitation practices in areas burned by wildfire and not expected to reseed naturally.
7. Develop practices and protocols to reduce unplanned human-caused ignitions by providing timely and widely distributed fire danger and fire restriction information. Educate the public on their responsibility to help reduce human-caused wildfires by providing information (signs, public contacts, and fire restrictions). Post the information in areas such as trailheads and other developed recreation areas.

## Sustainable Rangelands and Livestock Grazing

Livestock grazing contributes to the livelihood of the permittees and to the economy of local communities and counties. Owing to the history of land use and ownership in the region, many contemporary ranchers rely to a considerable degree on public land to graze their animals (Raish and McSweeney 2003).

Livestock grazing today plays an essential role in providing ecosystem services. Continuing this way of life on lands grazed for generations enhances the culture and heritage of ranching families. Many people living in traditional communities participate in or have connections to ranching and identify with the associated values (a cultural ecosystem service). Livestock grazing contributes to the livelihood of permit holders and to the economy of traditional communities and counties (a provisioning ecosystem service). Some ecological benefits from livestock grazing include soil aeration through hoof action, invasive plant control, fine fuels reduction (of decadent grasses and forbs), maintenance of open space off-forest, increased water developments in uplands, and an important source of food and fiber (a cultural and provisional ecosystem services).

There is congressional mandate to allow grazing on suitable lands through the Multiple Use and Sustained Yield Act of 1960, the Forest and Rangeland Renewable Resource Planning Act of 1974, the Federal Land Policy and Management Act of 1976, and the National Forest Management Act of 1976.

Forage-producing National Forest System lands will be managed for livestock grazing and the allotment management plans will be prepared consistent with land management plans.<sup>29</sup> Unless otherwise specified by the Chief of the Forest Service, all grazing and livestock use on National Forest System lands and on other lands under Forest Service control must be authorized by a grazing or livestock use permit.<sup>30</sup>

At the time of plan approval, the Cibola National Forest administers 86 active grazing allotments on the Mount Taylor, Magdalena, and Mountainair Ranger Districts. There are no allotments on the Sandia Ranger District. 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 2006, the number of authorized livestock has averaged about 85 percent of the number permitted due to drought-related issues such as reduced forage production or lack of livestock water. Over the last decade, Cibola range personnel have worked with partners and permit holders to manage grazing pressure on sensitive areas (such as critical areas and riparian areas).

### Desired Conditions for Livestock Grazing

#### FW-DC-GR

1. Sustainable rangelands provide forage for livestock grazing opportunities that contribute to the agricultural business, local employment, traditional lifestyles, and generational ties to the land.
2. Livestock grazing contributes to the long-term socioeconomic diversity, stability, and cultural identity of local communities.
3. Rangelands are resilient to disturbances and variations in the natural environment (such as fire, flood, and climate variability).
4. Livestock grazing is compatible with ecological functions and processes (such as water infiltration, wildlife habitat, soil stability, and natural fire regimes). Livestock grazing is also compatible with social resources of the national forest included designated areas (like wilderness).
5. Native plant communities support diverse age classes of shrubs, and vigorous, diverse, self-sustaining understories of grasses and forbs relative to site potential, while providing forage for livestock and wildlife.
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 riparian desired conditions.

### Objective for Livestock Grazing

#### FW-OBJ-GR

1. Remove, improve, or reconstruct at least 15 to 20 improvements annually (such as fences, water developments, and cattle guards) that are no longer necessary or in poor condition, or to move toward desired conditions.

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<sup>29</sup> 36 Code of Federal Regulations 222.2

<sup>30</sup> 36 Code of Federal Regulations 222.3

## Standards for Livestock Grazing

### FW-STD-GR

1. 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.<sup>31</sup>
2. New or reconstructed fencing shall allow wildlife passage, except where specifically intended to exclude wildlife (like an elk enclosure fence) or to protect human health and safety.
3. New and reconstructed range improvements must be designed to prevent wildlife entrapment and provide safe egress for wildlife (for example, escape ramps in water troughs and cattle guards).
4. Grazing of domestic sheep or goats shall not be authorized in areas occupied by bighorn sheep to mitigate the potential transfer of disease from domestic sheep to bighorn sheep.

## Guidelines for Livestock Grazing

### FW-GDL-GR

1. Forage use should be based on current and desired ecological conditions as determined by temporally and spatially appropriate scientific data during planning cycles (such as annual operating instructions and permit renewal) to sustain livestock grazing and maintain ecological function and processes.
2. Livestock grazing within riparian management zones should be managed to sustain proper stream channel morphology, floodplain function, and riparian vegetation desired conditions.
3. New livestock troughs, tanks, and holding facilities should be located away from riparian management zones to protect riparian ecological resources and to minimize long-term detrimental impacts, unless necessary for resource enhancement or protection.
4. New range infrastructure (such as troughs and tanks) should be designed to avoid long-term negative impacts to soil resources (like soil compaction and soil loss) to maintain hydrological function outside the structure's footprint.
5. Salting or mineral supplementation should not occur on or adjacent to areas that are especially sensitive to salt (such as at-risk plant species habitat, riparian areas, wetlands, or archeological sites) and where there is increased traffic from ungulates to protect these sites.
6. Restocking and management of grazing allotments following a major disturbance (such as fire or flood) should occur on a case-by-case basis after consideration of site-specific resource conditions.
7. Vacant or understocked allotments should be considered for livestock use with permitted livestock during times or events when other active allotments are unavailable or require ecosystem recovery as a result of natural disturbances like wildfire or management activities such as vegetation restoration treatments.

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<sup>31</sup> Guidance can be found in the most current Grazing Permit Administration Handbook and Regional Supplements or best available scientific information. Guidance for cooperating with permittees when establishing capacity can be found in the most current Grazing Permit Administration Handbook (2209.13\_90).

8. Historically closed allotments (such as those near the Cañón de Carnue and San Antonio de Las Huertas Land Grant communities on Sandia Ranger District and the Manzano, Torreón, Tajique, and Tomé Land Grant communities on the Mountainair Ranger District) should be considered for new grazing authorization to support rural historic community grazing allotments.
9. New grazing infrastructure should be designed to meet the scenic integrity objectives of the area.

## Management Approaches for Livestock Grazing

### FW-MGAP-GR

1. Cooperate, collaborate, and coordinate with permit holders to respond to changing resource conditions. Cooperation, collaboration, and coordination among Cibola managers and permit holders is key to improving rangeland and forest conditions for multiple uses, moving towards desired conditions, and contributing to the socioeconomic well-being of local communities. In addition, collaboration among stakeholders is important, including local communities; permit holders; and Federal, State, county, and local government entities.
2. Acknowledge the importance of livestock grazing as a traditional and cultural practice that helps support the socioeconomic well-being of individual families within local communities.
3. Emphasize large-scale landscape approaches and treatments for restoring rangelands and the use and perpetuation of a diversity of native plant species, with an emphasis on grass, forb, and shrub communities.
4. Implement adaptive management strategies to manage livestock grazing in a manner that promotes ecosystem resiliency, sustainability, species diversity, and the improvement of groundwater sources and riparian areas, based on changes in range conditions, climate, and other resource conditions. The adaptive management strategy is to provide more flexibility to grazing management while improving or maintaining the health of rangelands.
5. Consider accessible pass-through sections for recreationists (such as walk-through gates or self-closing gates) where designated trails intersect with allotment fences, unless they interfere with range management and resource protection.
6. Facilitate dialogue between New Mexico Department of Game and Fish personnel and permit holders about ungulates (elk, deer, and livestock) and other wildlife species, and the cumulative impacts on national forest resources.
7. Adapt management strategies to promote cost effective use of range infrastructure that is balanced with forage values provided.

## Sustainable Forestry and Forest Products

There is congressional intent to allow forest products to be removed from National Forest System lands as described in the 1897 Organic Act, the Multiple Use and Sustained Yield Act of 1960, the Federal Land Policy and Management Act of 1976, and the National Forest Management Act of 1976. Forest Service Manual 2460 provides direction on removal and disposal of forest products. Forest Service Manual 2404.2 describes the delegation of authority and limitation to sell and dispose of timber and forest products.

On the Cibola National Forest, forest products include posts, poles, latillas, vigas, fuelwood, pellets, and rough-cut dimensional lumber (typically used for pallet production). This material contributes to local subsistence and the livelihood of rural communities, with small quantities sold across state lines and a portion of the dimensional lumber sold to Mexico for pallet production. Forest products provide many ecosystem services on which other life forms (including people) depend. They provide supporting ecosystem services by converting sunlight and carbon dioxide into oxygen and carbohydrates (primary production); regulating ecosystem services, through soil formation and stability; provisioning ecosystem services by providing wildlife habitat (cover, nest sites), food (piñon nuts for people and other animal species, browse for wildlife), and fiber (lumber, paper, fuel); and cultural ecosystem services that timber provides to society (Christmas trees, botanical remedies, and aesthetics).

### Desired Conditions for Forest Products

#### FW-DC-FP

1. Forest products (such as fuelwood, latillas, vigas, Christmas trees, herbs, medicinal plants, and piñon nuts) are available to businesses and individuals in a sustainable manner (forest products recover between collections) where consistent with other resource needs that also effectively contributes to watershed health and the restoration and maintenance of desired vegetation conditions.
2. Forest products are available for traditional communities and culturally important activities and contribute to the long-term socioeconomic diversity and stability of local communities.
3. Forest products that are a by-product of management activities (such as fuelwood) are available for personal use by the public where consistent with other resource needs.
4. Noncommercial and commercial timber harvest supplements other restoration and maintenance treatments at a scale that achieves landscape-level desired conditions and contributes to watershed restoration, function, and resilience; enhances wildlife habitat; creates opportunities for small and large businesses and employment in balance with other resource needs and concerns; and provides wood products.
5. 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.
6. Unauthorized collection (such as unpermitted removal or collection) of permitted forest products does not occur.
7. Site-adapted seed stock is available for supplying reforestation needs.

## Objective for Forest Products

### FW-OBJ-FP

1. On average, provide 11,000 to 13,000 cords of fuelwood annually through the issuance of fuelwood permits.

## Guidelines for Forest Products

### FW-GDL-FP

1. Silvicultural prescriptions should consider the potential impacts to piñon nut crops as well as other resources.
2. During the planning of forest restoration projects, discussions with federally recognized Tribes and land grants-*mercedes* that collect plants for traditional, cultural, and ceremonial purposes should take place to promote the plants' persistence.

## Management Approaches for Forest Products

### FW-MGAP-FP

1. Work collaboratively with Federal, State, and local governments, federally recognized Tribes, and private landowners when planning and implementing projects, to promote integrated ecological and social-economic goals of harvesting forest products using mechanisms such as collaborative forest restoration projects, Tribal Forest Protection Act, youth programs, and stewardship contracting authorities to support a sustainable and appropriately scaled industry.
2. Design small timber projects and contracts to accommodate small operations based in New Mexico communities.
3. Provide public opportunities for gathering woody material that results from management activities, prior to on-site burning and chipping.
4. Make fuelwood more available through public access within a project area, consistent with scenic integrity objectives providing some decked woody material along roads, or allowing collection within utility or road corridors that are being thinned or cleared.
5. Consider public education effort about the negative effects of illegal woodcutting such as reducing the quantity and quality of woodland habitat, especially pinyon pine and juniper.
6. Manage fuelwood collection within dry soils by specifying the location, amount, and size of wood that can be collected in areas where live and dead woody habitat components are limited to protect slopes and roads (soil type, soil condition, erosion hazard). Use post-fuelwood-collection rehabilitation measures to restore soil stability and watershed function.

## Traditional Communities and Uses

A traditional community refers to a land-based rural community that has a long-standing history in and around the Cibola National Forest. There are many communities within the plan area of influence. The Cibola is a community-based national forest and each of these communities is geographically and historically rooted to a particular landscape.

The Cibola manages the natural resources and landscapes that sustain central New Mexico traditional communities, their cultures, and traditions. Local heritage, culture, traditions, and values have been handed down over generations and predate the establishment of the United States. Long-standing use of the forest and its natural resources are fundamental to the economic,

social, and cultural vitality of many current New Mexico inhabitants, including federally recognized Tribes and pueblos, Spanish and Mexican land grants-*mercedes* and acequia associations, grazing permittees, and other rural historic communities.

When managing National Forest System lands, it is important to allow opportunities for these communities to engage with Cibola personnel so continual use of the national forest for cultural and subsistence needs are supported. These important uses or traditional uses include:

- use of common waters (acequias and irrigation ditches) for drinking, irrigating crops, and watering livestock
- use of common pasture for grazing livestock
- wood gathering for fuelwood, building material, and ceremonial uses
- gathering of soil (such as sand, adobe, or micaceous clay) and rocks for building materials, and other purposes (such as production of crafts and ceremonial uses)
- gathering of plants for various purposes (religious, medicinal, consumption, and other applications)
- hunting and fishing for food and ceremonial purposes
- religious and ceremonial uses of lands and waters, including for cemeteries, pilgrimages, calvarios, and shrines
- recreational uses for weddings, family reunions, and dispersed camping

Desire for the recognition and preservation of central New Mexico traditional uses has been an integral part of managing the Cibola and is reflected through various documents including the Hassel report (Hassell 1968) and the Hurst regional forester memorandum (Hurst 1972). This plan seeks to build or improve upon past initiatives and continues to recognize and support the traditional uses associated with the Cibola National Forest.

The Cibola continues to have strong cultural and historic significance to the many diverse peoples and communities who have called central New Mexico home for many generations. The national forest contributes resources and uses that are important to federally recognized Tribes and pueblos, land grant communities, acequia associations, and other communities that pre-date the establishment of the national forests. These traditional communities have historic, cultural, and social connections to the forest. To this day, they retain a strong connection to the land and rely upon the forest and its natural resources to sustain their cultural, spiritual, and economic way of life.

Forest management supports this traditional way of life, which defines the cultural identity of these traditional communities, and in light of the changes brought about by public demand from development, tourism, recreation, and extractive use. Successful management of the Cibola National Forest depends on the sustained success of northern New Mexico's traditional communities. The people of central New Mexico, their culture, and their traditions must be recognized and treated as unique resources in and of themselves. When these unique resources are recognized, they become an asset to the agency, and Forest Service staff can serve as a viable, helpful, and productive force in maintaining and improving the many positive values inherent in central New Mexico and its people.

People continue to benefit directly and indirectly from a variety of ecosystem services that they obtain from the land. In addition to providing the necessary resources to sustain life, these landscapes also form an anchor for those communities, providing people a sense of identity and their place in the world. Generations of families have formed these communities, adapted to their environment, and developed a way of life dependent upon and complimentary of the mountain upland and lowland resources at hand.

## **Federally Recognized Tribes**

Native Americans have occupied and used the lands that encompass the Cibola since time immemorial. Their use of these lands and the surrounding area began with the earliest human occupation of the Western Hemisphere and persists to the present day. The land-based cultures that exist today in central New Mexico have relied on the forests, valleys, and water of these public lands spanning many generations.

The Federal Government has a trust responsibility to federally recognized Tribes that arises from the United States' unique legal and political relationship with Tribes. It is a legally enforceable fiduciary obligation on the part of the United States to protect tribal treaty rights, lands, assets, and resources, as well as a duty to carry out the mandates of Federal law with respect to all federally recognized American Indian Tribes. This responsibility requires the Federal Government to consider the best interests of the Tribes in its dealings with them and when taking actions that may affect them. In meeting these responsibilities, forest managers consult with federally recognized Tribes and pueblos when proposed policies or management actions may affect their interests.

The government-to-government relationship between the Forest Service and federally recognized Tribes is distinct from that of other interests and constituencies under a variety of Federal authorities. These authorities direct Forest Service personnel to administer forest activities and uses in a manner that is sensitive to traditional American Indian beliefs and cultural practices, and are integral in our relationship with federally recognized Tribes. The plan components in this section are based upon agency policy and Federal authorities (including the American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, 2008 Farm Bill, Tribal Forest Protection Act, and Executive Order 13007 Indian Sacred Sites).

Forest Service personnel manage a great diversity of landscapes and sites that are culturally important and held sacred by federally recognized Tribes. Specific locations on the Cibola National Forest are often held in confidence to protect these important values.

Trust responsibilities are maintained through consultation and engagement between the Tribes and Cibola National Forest personnel. This consultation is critical when proposed activities have a potential to affect tribal interests, including natural or cultural resources of importance. For the mountain ranger districts, Cibola personnel consult with federally recognized Tribes and pueblos that have aboriginal territories within and traditional ties to the land now administered by Forest Service staff. Cibola staff maintain government-to-government relationships with many of these federally recognized Tribes and employ 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 Cibola shares approximately 102 miles of common boundary with the Navajo Nation, the Pueblo of Zuni, the Pueblo of Isleta, the Pueblo of Sandia, the Pueblo of Laguna, and the Pueblo of Acoma, and is close to numerous other pueblos and tribal communities. Tribes derive many

benefits from the Cibola. Places, properties, and resources valued and used by Tribes for personal, commercial, and traditional cultural purposes have been identified on every unit of the Cibola.

The primary ecosystem services that directly benefit Tribes include water for domestic, agricultural, and ceremonial uses; fuel wood and other forest products for personal, commercial, and ceremonial use; and opportunities for visitation and use of resource collection areas and other locations with long-standing cultural use. Tribal members visit the Cibola to gather forest products and for other traditional and cultural purposes. The Cibola personnel recognize the importance of maintaining these traditions to area Tribes, and accommodates traditional use on lands managed by the national forest staff.

The land is a common thread that binds all people. The mountain landscapes of the Cibola are a life-sustaining resource and they help form individual and community relationships, provide for continuity of cultural identity, and strengthen ancestral connections. Beyond what the mountains can provide to people with respect to life-sustaining resources, it is understood by many that the mountains have intrinsic value. These traditional communities have a deep connection to the land, and are reflective of a diverse and rich history of people and uses connected to the mountains.

Places valued and used by Tribes have been identified on every management unit of the Cibola National Forest. Some of these places include locations with long-standing cultural uses; locations that figure prominently in oral traditions regarding origin, place of emergence, and migration; locations that play a vital role in cosmology; locations of buried human remains repatriated under the Native American Graves Protection and Repatriation Act; locations where ceremonial objects have been retired; locations of contemporary ceremonies; and locations where specific forest products are gathered for ceremonial use and subsistence. Places of value range from specific, noted locations, to broader, cultural landscapes. A few of these places have been formally documented as traditional cultural properties, sacred sites, and other cultural resources. Refer to the “Cultural and Historic Resources” section and chapter 3, “Management Areas” for a complete description.

## Desired Conditions for Federally Recognized Tribes

### FW-DC-FRT

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.
2. The long history of tribal communities’ ties to, and uses of, National Forest System lands and resources (such as livestock grazing, fuelwood gathering, acequias, and hunting) is understood and appreciated.
3. Forest resources important for cultural and traditional needs, as well as for subsistence practices and economic support of tribal communities, are available and sustainable.
4. Federally recognized Tribes have access to sacred sites, traditional cultural properties, and collection areas for traditional and ceremonial use.
5. There are opportunities for solitude and privacy for tribal traditional and cultural activities.
6. Traditional cultural properties, sacred sites, and other locations of traditional and cultural use identified as important to federally recognized Tribes are unimpaired.
7. The Cibola National Forest provides a setting for educating tribal youth in culture, history, and land stewardship and for exchanging information between tribal elders and youth.

## Standard for Federally Recognized Tribes

### FW-STD-FRT

1. Confidentiality of tribal information and resources collected during consultation shall be maintained as allowed by law, unless permission to share information is given.

## Guidelines for Federally Recognized Tribes

### FW-GDL-FRT

1. To honor tribal privacy, requests for temporary closure orders for cultural and traditional purposes should be accommodated.
2. Consultation with federally recognized Tribes should occur at the early stages of project planning and design, to incorporate tribal perspectives, needs, and concerns, as well as traditional knowledge into project design and decisions.
3. Management activities and uses should be planned and administered to prevent or minimize impacts to the physical and scenic integrity of places that the federally recognized Tribes regard as sacred sites, traditional cultural properties, or as part of an important cultural landscape.
4. Human remains and cultural items disinterred from National Forest System lands or adjacent sites should be reburied in accordance with the requests of affiliated Tribes.

## Management Approaches for Federally Recognized Tribes

### FW-MGAP-FRT

1. Formalize working agreements (such as memoranda of understanding and stewardship contracts) with federally recognized Tribes to understand their needs and build respectful, collaborative relationships; to develop ways of accomplishing mutually desired conditions and objectives; to promote internships or partnerships that provide employment training opportunities; and to collaborate in ecosystem restoration efforts.
2. Coordinate with federally recognized Tribes to develop collaborative proposals and implement projects through partnerships of mutual benefit that support economic development across shared boundaries, and use available federally authorized or advocated programs (such as the Tribal Forest Protection Act of 2004 and Collaborative Forest Restoration Program).
3. Foster relationships between the program managers (for example, forestry, range, water, wildlife, cultural resources, etc.) at the Cibola and within tribal administrations.
4. Work with Tribes to identify opportunities where locations on the Cibola can provide a setting for educating tribal youth in culture, history, land stewardship, and the health benefits of outdoor activities and for exchanging information between tribal elders and youth.
5. Work with Tribes to manage traditional cultural properties, sacred sites, and other locations of traditional and cultural use through shared stewardship by developing programmatic agreements, memoranda of understanding, management plans, or other management tools.
6. Consider cross-training and employment opportunities with federally recognized Tribes to increase shared learning and to achieve mutually desired conditions.
7. Incorporate native languages into signs, interpretive materials, and place names to highlight the American Indian culture as part of the national forest landscape and its surrounding areas.

## Rural Historic Communities

A rural historic community refers to the nontribal traditional communities of central New Mexico whose families have strong historical ties to the land. Rural historic communities evolved on a specific landscape within or adjacent to lands now managed as the Cibola National Forest. The forest and use of its resources are integral to the subsistence, cultural, and social values that help define the people and communities. The founding of the community generally predates the establishment of National Forest System lands. The community has a significant concentration of human activity, linkage, and continuity of land use on the national forest and immediately adjacent to the national forest. The day-to-day occupational activities of rural historic communities are rooted in the pragmatic need to make a living.

Occupational, subsistence, and cultural-based activities associated with rural historic communities may include livestock grazing, fuelwood gathering, logging, Christmas tree harvesting, piñon picking, medicinal plant collection, agriculture, and mining. Acknowledging the importance of these activities and concerns to area families and communities is crucial for understanding their way of life and resolving disputes over public land and resource use.

The Cibola National Forest provides opportunities for community interaction and maintenance of traditional culture. Some rural historic communities have evolved to accommodate tourism and the increasing demand for outdoor recreation as an element of their identity, but most rural historic communities and families continue to look to the national forest for economic opportunity and vitality through traditional uses.

Due to the geographic extent and disconnected sky islands and landscapes that represent the mountain ranger districts on the Cibola, many people may call one “place” home and yet rely upon or enjoy a number of resources and uses across the national forest. Some people may identify with several rural historic communities. Regardless, what they have in common is a strong cultural and social tie to the lands in and surrounding the Cibola.

Rural historic communities are divided into two categories. The first category includes land grants-*mercedes* and acequia (community ditch) associations. These communities are associated with corporate entities that predate the establishment of the national forests and are subdivisions of New Mexico State government or are recognized by the State of New Mexico. These entities for the most part were established prior to the acquisition of New Mexico by the United States.

The second category are central New Mexico historic communities. These rural communities were founded after the transfer of New Mexico to the United States but before the establishment of National Forest System lands. Central New Mexico historic communities are distinguished by their cultural diversity, which mirrors that of New Mexico as a whole. While central New Mexico historic communities are not corporate entities, their residents are represented by county and in some cases village, town, and city governments.

### Land Grants-*Mercedes* Communities and Acequias

Between 1689 and 1846, Spain and later Mexico issued grants of land to individuals, groups, and towns to establish the ownership rights of existing settlers and to promote development on the frontiers of the Spanish Empire and Mexican state that are today part of the American Southwest. The two most common types of Spanish and Mexican land grants-*mercedes* made in New Mexico were community land grants and individual land grants. Community land grants were typically organized around a central plaza and a tract of land to farm, and “common land” was set aside as part of the grant for use by the entire community. Individual land grants, as their name suggests, were issued to specific individuals.

A few Hispanic communities have ties to lands on the Cibola that were once claimed as common lands by community land grants-*mercedes*. In the late 19th century, claims for common lands made by holders of the San Mateo (Santiago Duran y Chaves) Grant, San Antonio de las Huertas Grant, and Cañón de Carnué Grant were denied by U.S. courts. Following the denial of these claims, these lands were returned to the public domain and portions were later included in the Cibola National Forest when forest reserves were created by proclamation in 1906.

Common lands provided land grant-*merced* communities access to grazing land, stone and clay, wood, game, fish, medicinal plants, water for agriculture and consumption, and other forest products—uses that continue today. Many land grants-*mercedes* are actively involved in the management and preservation of adjacent National Forest System lands for traditional and cultural use. Land grants-*mercedes* are governed by boards of trustees to fulfill this mission through a variety of activities, including managing, protecting, and regulating uses of common lands; preserving cultural and historic resources; and partnering with the Cibola to plan and propose forest restoration projects on National Forest System lands.

Most land grants-*mercedes* are organized as political subdivisions of the State of New Mexico (New Mexico Statutes Annotated 49-1-1 and 49-1-4). Those that are not political subdivisions participate through the New Mexico Land Grant Council, a State agency that serves as a liaison between land grants-*mercedes* and the Federal, State, and local governments. The following is a list of all community land grants-*mercedes* adjacent to the Cibola:

- Mount Taylor Ranger District – the Cubero and Cebolleta land grants-*mercedes*
- Mountainair Ranger District – the Chililí, Tajique, Torreón, Manzano and Tomé land grants-*mercedes*
- Sandia Ranger District – the San Antonio de Las Huertas, Cañón de Carnué, and San Pedro land grants-*mercedes*.

These land grants share approximately 72 miles of common boundary with the national forest. Additional community land grants-*mercedes* in the Cibola’s area of influence include Sevilleta de la Joya and Atrisco. Some have former common lands now managed by Forest Service personnel. All land grants-*mercedes* have expressed an interest in adjacent National Forest System lands.

Acequias are community operated and organized water irrigation systems. Many of the New Mexico’s acequia associations have been in existence since the Spanish Colonial period in the 17th and 18th centuries and were historically associated with land grants-*mercedes*. Acequia and community ditch associations are political subdivisions of the State of New Mexico and occupy a unique place in forest management (New Mexico Statutes Annotated 1978, section 73-2-28). Acequias that existed on unreserved public lands for use in connection with a valid water right, prior to the withdrawal of public lands to create the national forests, are afforded valid rights and status under National Forest System management, including the right codified in Federal law (R.S. 2339). On July 2, 2019, the U.S. Forest Service Southwest Region issued an acequia guidance document acknowledging these rights and providing a “clear framework for efficient and effective administrative determinations concerning proposals for the maintenance, operation, access to, construction and reconstruction of acequia infrastructure on National Forest System lands.”

Much of the water diverted by acequias comes from National Forest System lands and can be affected by forest management activities upstream. Acequias are still relevant and vital to water delivery and community organizing systems today. They modify the hydrology and riparian distribution across irrigated floodplain valleys, recharging groundwater and delaying return flow

to streams. They serve as important water infrastructure for communities, and their associations are important community organizations throughout New Mexico.

There are many areas of importance to land grant-*merced* communities and acequia associations on the Cibola National Forest. One documented area of importance is the Las Huertas Canyon Historic District traditional cultural property. Additional management direction for areas with traditional cultural properties is found in chapter 3, “Management Areas.”

### **Central New Mexico Historic Communities**

Central New Mexico historic communities are those that arose during the territorial era (A.D. 1848 to 1912), after the acquisition of New Mexico by the United States. These communities were founded prior to the establishment of the forest reserves that would later be consolidated into the Cibola National Forest. The founding of these was based in part on the U.S. Government’s policies to encourage homesteading and ranching and the drive for resources to meet the demands of the economy of a growing nation. Each community has a significant concentration of human activity, linkage, and continuity of land use on the national forest, immediately adjacent to the national forest, or both. These forces led to communities that were diverse in their composition, having been founded by people from both existing New Mexico communities and from other parts of the United States and the world. This diversity persists to this day and is a hallmark of central New Mexico rural historic communities.

Central New Mexico historic communities are those whose day-to-day occupational activities are rooted in the pragmatic need to make a living and that evolved in-place on a specific landscape on or adjacent to the lands now managed as the Cibola. Corporations and special interest groups are not included in this category. Examples include the Village of Magdalena, founded as a center for mining and ranching in 1884 and located in the area of influence for the Magdalena Ranger District; and the community of Ramah, founded as a farming settlement in 1882 and located in the area of influence for the Mount Taylor Ranger District. Examples of central New Mexico historic communities include Corona (1899), Datil (1884), Grants (1882), Monticello (1881), Mountainair (1901), and Tijeras (1888); there are over two dozen of these communities in addition to the examples listed here. Communities such as these are located throughout the area of influence for the Cibola. Occupational and subsistence-based activities associated with rural historic communities have included agriculture, grazing, mining, logging, and transportation (railroads, stage lines, and U.S. highway networks).

The following plan components and management approaches apply to all rural historic communities, including land grants-*mercedes*, acequias, and other central New Mexico historic communities, when the term “rural historic community” is used. For plan components and management approaches specific to one type of community, the specific term for that community or community governing body is used.

### **Desired Conditions for Rural Historic Communities**

#### **FW-DC-RHC**

1. The uniqueness and values of rural historic communities and the traditional uses important for maintaining these cultures are recognized and valued as important.
2. The long history and ties of rural historic communities and traditional uses and resources (such as livestock grazing, fuelwood gathering, acequias, and hunting) to National Forest System lands is understood and appreciated.

3. Forest resources important for cultural and traditional needs (such as osha, piñon nuts, ocote (pitch wood), and micaceous clay), as well as for subsistence practices and economic support (such as livestock grazing, acequias, firewood, vigas, latillas, gravel, soils, and forest products), of rural historic communities are available and sustainable.
4. Rural historic communities have access to places of traditional use (including spiritual places, individual and group ceremonies, traditional activities, and the collection of forest products) that are important to them.
5. Acequia systems on National Forest System lands are accessible for operation, maintenance, repair, and improvement.
6. The national forest provides a setting for educating youth in culture, history, and land stewardship, and for exchanging information between elders and youth.

### Guidelines for Rural Historic Communities

#### FW-GDL-RHC

1. Traditionally used products (such as fuelwood, latillas, vigas, piñon, osha, and clay) should be available on the national forest to rural historic communities, except in areas with resource concerns or in designated areas where such uses are not allowed or otherwise restricted by standards or guidelines set forth in other sections of this plan.
2. Management activities should be analyzed and mitigated to prevent or minimize negative impacts to the physical and scenic integrity of places that rural historic communities regard as spiritually or culturally important.
3. Acequia associations should be provided access to repair, maintain, and improve acequia infrastructure located on National Forest System lands.
4. Coordination with land grant and acequia governing bodies should occur at the early stages of planning and project design to include local perspectives, needs, concerns, and traditional knowledge.

### Management Approaches for Rural Historic Communities

#### FW-MGAP-RHC

1. Work with representatives of historic communities, governing bodies for land grants-*mercedes*, and acequia associations to understand their needs and build respectful, collaborative relationships; develop collaborative proposals and implement projects of mutual benefit across shared boundaries and with shared infrastructure (such as boundary fences and roads); develop ways of accomplishing mutually desired conditions and objectives; and collaborate in ecosystem restoration efforts.
2. Work with rural historic communities to identify opportunities where locations on the Cibola can provide a setting for educating rural youth in culture, history, and land stewardship (including internships or partnerships that provide employment training opportunities), and for exchanging information between elders and youth and promoting the health benefits of outdoor activities.
3. Work with rural historic communities to identify, acknowledge, and manage areas of historic importance with an emphasis on the resilience and protection of natural and cultural resources.

4. Provide training opportunities for Forest Service employees and the public to gain a broader understanding of the unique customs, traditions, and values of rural historic communities.
5. Provide cross-training and employment opportunities with rural historic communities to increase shared learning and to achieve mutually desired conditions.
6. Incorporate Spanish language interpretive materials into signage to highlight Hispanic culture as part of the landscape and surrounding areas.
7. Consider traditional perspectives and knowledge during project planning, and incorporate traditional perspectives and knowledge into relevant project design elements, including project purpose and need, implementation methods, and mitigations to significant impacts.
8. Coordinate with the land grant and acequia association governing bodies to provide and accommodate access for their constituent communities to engage in activities such as the collection of forest products for traditional uses, and for other traditional uses. Develop sustainable approaches (sensitive to environmental and other cultural concerns) for members of historic communities to continue to practice occupational and subsistence-based activities.
9. Work directly with the governing bodies of adjacent land grants to implement mutually beneficial projects and to provide the authority to remove forest products where the Cibola National Forest is landlocked and only accessible via the land grant or where alternative access through the Cibola is difficult.

## Cultural and Historic Resources

Cultural and historic resources are objects or definite locations of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence. Cultural and historic resources are prehistoric, historic, archaeological, or architectural sites, structures, places, or objects and traditional cultural properties.

Cultural and historic resources include the entire spectrum of resources for which Forest Service personnel are responsible, from artifacts to cultural landscapes. They can include, but are not limited to, objects, buildings, structures, sites, and districts eligible or listed on the National Register of Historic Places, and national historic landmarks. Cultural and historic resources provide cultural services to a diverse spectrum of the public. Cultural tourism is a significant component of the economy of the plan area. Tourists are attracted by the nature and significance of historic properties, and by the character of traditional communities, a character maintained by resources and uses of the plan area. Cultural and historic resources within the plan area are a record of past processes and events that are important in maintaining the identities of the traditional communities identified in the “Traditional Communities and Uses” section. These resources are nonrenewable and, depending on the nature of the resource, can be particularly sensitive to management practices and natural and human-induced environmental degradation.

Many cultural and historic resources on the Cibola are significant to the history and current communities within the plan area, the State of New Mexico, the Southwestern Region, and the United States. These cultural and historic resources are also areas of tribal importance. Significant cultural and historic resources, including those designated as national historic landmarks or listed on the National Register of Historic Places, are shown in table 23. Additional management direction for areas containing significant cultural and historic resources is also found in chapter 3 for specific management areas and designated areas.

**Table 23. Significant cultural and historic resources**

Resource Name	Type	Ranger District	Management Area (MA) or Designated Area (DA)
Big Bead Mesa	National historic landmark	Mount Taylor	Big Bead Mesa National Historic Landmark (DA)
Sandia Cave	National historic landmark	Sandia	Sandia Cave National Historic Landmark (DA)
Fort Wingate/Southwestern Sheep-Breeding Laboratory (Sheep Lab Historic District)	National Register of Historic Places	Mount Taylor	None
Gallinas Springs Pueblo	National Register of Historic Places	Magdalena	None
Tijeras Pueblo	National Register of Historic Places	Sandia	None
Mount Taylor	Significant cultural or historic resource	Mount Taylor	None
Lion Mountain Ancestral Pueblo Sites	Significant cultural or historic resource	Magdalena	None
West Red Canyon Ancestral Pueblo Sites	Significant cultural or historic resource	Magdalena	West Red Canyon Eligible Wild and Scenic River (MA)
Mesa de los Jumanos Ancestral Pueblo Sites	Significant cultural or historic resource	Mountainair	None
Cement Spring Historic Site	Significant cultural or historic resource	Mountainair	None
Las Huertas Canyon	Significant cultural or historic resource	Sandia	Las Huertas Creek Eligible Wild and Scenic River (MA)

Note: Significant cultural or historic resources are eligible for listing, but not currently listed, on the National Register of Historic Places.

## Desired Conditions for Cultural and Historic Resources

### FW-DC-CHR

1. Cultural and historic resources (including archeological sites, historic buildings and structures, and traditional cultural properties) are stable and are not significantly impacted by natural processes and human activity.
2. Cultural and historic resources retain their visual and aesthetic integrity and physical association with culturally significant landscapes.
3. Ecosystem conditions are consistent with the long-term stability of cultural and historic resources and afford them protection from destructive natural forces.
4. Recreation and subsistence uses are harmonious with the long-term stability of cultural and historic resources and do not result in vandalism, looting, or other human impacts.
5. Knowledge about cultural and historic resources contributes to the appreciation of our Nation's past and is available to the public. Knowledge regarding the past occupation and use of landscapes contributes to the understanding of contemporary natural ecosystems and cultural landscapes.

6. The public has opportunities for learning about and appreciating cultural and historic resources; knowledge about the past is available to the public. The public participates in the identification, protection, and preservation of cultural and historic resources, and public understanding about cultural resources and historic preservation issues contribute to their protection.
7. Historic buildings and infrastructure maintain their historic integrity while also serving as administrative and recreational facilities, and other infrastructure functions.
8. Public users of historic recreation facilities and historic infrastructure learn about and enjoy their historic qualities.
9. Historic recreation residences and residence tracts maintain their historic integrity.

### Standards for Cultural and Historic Resources

#### FW-STD-CHR

1. Cultural and historic resources will be protected during projects through mitigation measures and design criteria. In cases where the protection of cultural and historic resources is not possible or when the benefits of a project are deemed by administrative decision to be greater than the adverse effects to the cultural and historic resources, adverse effects to those resources will be resolved or mitigated.
2. Cultural and historic resources that may be affected will be considered during the early stages of project planning and design, employing current available knowledge of the types and existing conditions of resources within the project area. Management (including protection) of cultural and historic resources should be included in all resource management decisions.
3. For historic recreation residences, the operation and maintenance plan for the special use authorization shall stipulate that the maintenance and upkeep must maintain historic characteristics of the residence lot.
4. Contracts, permits, or leases that have the potential to affect cultural and historic resources shall include appropriate clauses specifying site protection responsibilities and liabilities for damage.

### Guidelines for Cultural and Historic Resources

#### FW-GDL-CHR

1. Opportunities for promoting the sustainability of cultural and historic resources should be sought during project planning and, if identified, should be incorporated into project design.
2. The collection of artifacts is discouraged, except where necessary to prevent their imminent loss. Collected artifacts should be curated as soon as practicable after collection.
3. Historic documents, including photographs and maps, should be properly preserved and made available for research and interpretation by the Forest Service, contractors, other agencies, universities, American Indian Tribes, rural historic communities, and the public.

### Management Approaches for Cultural and Historic Resources

#### FW-MGAP-CHR

1. Work collaboratively to develop public participation and partnerships that allow the diversity of interests to identify, manage, preserve, protect, and interpret historic properties.

2. Develop appropriate measures for historic properties to prevent deterioration due to natural forces, visitor use, vandalism, looting, and other impacts. Protective measures may include vegetation treatment in and adjacent to site boundaries (provided appropriate protection measures are in place), signing, fencing, administrative closure, patrols, interpretive signs, stabilization, or data recovery.
3. When resolving adverse effects to historic properties of importance to descendant communities (American Indian Tribes, land grants, acequia associations, rural historic communities, and others), involve communities members in the resolution process through visits to the sites to be adversely affected and in the development of specific mitigation measures.
4. Consider managing buildings and structures listed on or eligible for the National Register of Historic Places in accordance with the Secretary of the Interior's standards and guidelines for treatment of historic properties when considering maintenance, rehabilitation, and reuse.
5. Where undertakings are anticipated to be widespread within in a geographic area, consider conducting inventories (including ethnographic inventories) across the geographic area to identify cultural resources (such as traditional cultural properties, traditional use areas, or sacred sites) with the potential to be significantly impacted by the undertakings in advance of the initiation of any individual undertaking.
6. Use emerging information and communication technologies when developing opportunities for public participation, and in plans for the protection, preservation, and interpretation of historic properties.

## Land Ownership Adjustment and Boundary Management

The Cibola National Forest mountain districts encompass more than 2.1 million acres, with 1.6 acres administered by the Forest Service and over 491,000 acres in other ownership within its boundaries. Other ownership areas are small towns and communities, but a large number are small parcels of privately owned lands. In addition, much of the national forest boundary adjoins state, Bureau of Land Management, land grants, and tribal lands.

Ecological processes are seldom confined by administrative and jurisdictional boundaries; therefore, the impacts of management policies on adjacent lands are part of the consideration of overall management and sustainability. An all-lands approach to land management brings landowners and stakeholders together across boundaries to decide on common goals for the landscapes they share. It brings them together to achieve long-term outcomes. Our collective responsibility is to work through landscape-scale conservation to meet public expectations for all the services people get from forests and grasslands.

The boundary management program is the identification and maintenance of boundary line locations between National Forest System lands (which include, but are not limited to, public domain lands or those lands that were acquired by the United States from another sovereign and have never left Federal ownership) and lands of other ownership. Boundary identification is important to provide legally defensible property lines and clear title for land. This is also important to prevent encroachment onto National Forest System lands. Land adjustments consolidate and improve management efficiency of resources through real estate transactions including purchases, exchanges, interchanges, conveyances, donations, and acquisitions of rights-of-way within the proclaimed Cibola National Forest boundaries.

## Desired Conditions for Lands

### FW-DC-LND

1. National Forest System lands exist in a mostly contiguous pattern that promotes well organized management of various lands in and around the Cibola and provides for efficient and effective resource management within and across National Forest System lands.
2. Access to private lands is authorized so as to minimize natural resource damage and encumbrances on National Forest System lands, while at the same time ensuring that access to private lands provided by the Alaska National Interest Lands Conservation Act (ANILCA) of December 2, 1980 is respected.
3. The acquisition, management, and defense of publicly owned road and trail rights-of-way ensures access to National Forest System lands.
4. National forest boundaries are identified and appropriately marked.
5. Acquisition of lands facilitates efficient management strategies for the Cibola National Forest.
6. The trespass and encroachment of user-created roads, private fences, gates, structures, signs, or other private property no longer occurs on National Forest System lands.
7. Land exchanges foster an improved land landownership pattern, sound community development, and more effective management of National Forest System lands.
8. Landscapes that meet vegetation desired conditions are interconnected throughout the Cibola and across all landownerships to provide mutually beneficial wildlife habitat, watershed health, and recreational opportunities.

## Guidelines for Lands

### FW-GDL-LND

1. National Forest System landownership patterns should be consolidated through exchange, purchase, or donation, and through landownership adjustment authorities.
2. Federal lands offered by the United States in a proposed land exchange should meet one or more of the following criteria:
  - lands needed to meet the needs of communities and the public
  - lands that provide improved public land management
  - lands that will improve management, benefit specific resources, or increase management efficiency
  - lands that have lost their wildland characteristics
  - lands with long-term land occupancy commitments and high management and operating costs, which do not contribute significantly to achieving management objectives and have minimal benefit to the public, and would not create an isolated non-Federal parcel surrounded by National Forest System lands such as, but not limited to, recreation residence areas and administrative sites.
3. Boundary management surveys should be prioritized by the following criteria:

- where known litigation is pending, a title claim has been asserted, encroachments are suspected, or the probability of encroachment can be reduced
  - where significant resource values exist and use or manipulation of resources is planned (this includes the location, by survey, of rights-of-way easements necessary for resource management)
  - to ensure any land, resource, or restoration project that occurs near or adjacent to any Forest Service boundary line does not proceed until the legal National Forest System boundary lines are properly located and physically marked in the field prior to any management action
  - to provide an accurate delineation and location of National Forest System boundary lines to help prevent boundary disputes, loss of valued National Forest System land and its resources, or both
  - to survey all remaining property boundary lines that have not been previously surveyed
  - where there is a threat to public health, welfare, and safety.
  - when legislation is enacted and surveying is required
4. Bureau of Land Management resurveys should be used where there has been an extensive loss or obliteration of original corner monuments, where the potential for future litigation regarding the dispute of property boundaries is high, or when there is a large project involving cadastral surveys where there are mineral surveys.

## Management Approaches for Lands

### FW-MGAP-LND

1. Consider working with Federal, State, tribal, county, municipal, land grant-*merced*, and adjacent landowners and partners to prioritize and cooperate on boundary issues, right-of-way needs, and land adjustments and joint surveys to resolve encroachments, to provide habitat connectivity, and improve all-lands management.
2. Collaborate with rural historic communities that are dependent on the Cibola to ensure traditional and cultural uses are incorporated into the management of any newly acquired lands.

## Minerals and Geology

The Cibola National Forest mountain districts provide a source of important mineral<sup>32</sup> resources. Minerals are important as a raw materials source: they are useful in a native or refined state. As economic and political conditions fluctuate, certain mineral commodities can become more valuable, prompting new or renewed interest in prospecting, exploration, and mining of these minerals. Energy and mineral resources provide ecosystem services that are important to people in both a local, and in some cases, regional or even global scale. They are important provisioning and cultural ecosystem services provided by the National Forest System lands. Management of mineral activities on the Cibola facilitates the development of mineral resources and contributes to local, national, and global markets for valuable commodities.

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<sup>32</sup> Minerals refers to extractive mineral operations, while geology refers to geologic features and the enjoyment and scientific study of these features.

The purpose of the Cibola minerals and geology program is to provide appropriate access to mineral resources in accordance with the mining laws, while facilitating mineral development in a manner that minimizes adverse impacts to surface resources. This follows law and Forest Service policy to support responsible, environmentally sound energy and mineral development and reclamation.<sup>33</sup> Valuable mineral resources on the Cibola range from soil for making adobes and limestone for cement to rare-earth minerals used in high tech applications such as battery-operated cars and aerospace components to uranium as an energy fuel. How minerals may be searched for or acquired on National Forest System lands is prescribed by Federal law and mineral type.

### **Locatable, Leasable, and Salable Minerals**

There are three categories of minerals, known as locatable, leasable, and salable minerals; each is subject to different Federal laws and implementing Forest Service regulations. Most importantly, this affects whether Forest Service personnel have the discretion to refuse some types of proposed mineral operations. To some extent, this also affects how operations can be administered by Forest Service personnel. For this reason, the three categories of mineral resources are described separately below and the plan components for each are addressed separately.

### **Locatable Minerals**

Locatable minerals are administered under the U.S. mining laws. For locatable minerals, the 1872 Mining Law, as amended, requires that the claimant must be allowed reasonable access to those minerals. Mining can involve anything from a little to no-impact operation to major alteration of landscape features, depending on many factors. Pursuant to Federal mining laws, Forest Service personnel are required to respond to proposals for conducting exploration and mining operations for locatable minerals. They must determine whether to approve a preliminary plan of operations as submitted, or to require changes or additions deemed necessary to meet the requirement of the regulations for environmental protection.

Forest Service personnel do not have the authority to outright deny locatable mineral activities providing the activities follow applicable Federal laws and regulations. The agency role in managing such resources is to provide reasonable protection of surface resources.

Locatable minerals are defined as types of minerals that fall under legal mandates requiring Forest Service personnel to provide reasonable access for prospecting, mining, and processing activities. Minerals subject to the 1872 Mining Law, as amended, are obtained by locating a mining claim. These locatable minerals include metals such as gold, copper, or uranium. For locatable minerals, Federal mining laws require Forest Service staff to respond to proposals for prospecting, mining, or processing operations for locatable minerals. The agency role in managing such resources is to provide reasonable protection of surface resources, and to lessen any adverse impacts of mineral extraction and processing. All proposals must comply with Federal laws and regulations and should be managed to reduce adverse environmental impacts to the extent practicable on National Forest System lands.

The potential for locatable minerals within the boundaries of the Cibola is high because the geology of the area is conducive to their presence, and the mountain ranges expose mineralized zones in a number of places. The Mount Taylor Ranger District includes an area of world-class uranium deposits which were widely explored and mined from the 1950s through the late 1970s.

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<sup>33</sup> 30 U.S.C. 21a

In an area of known deposits, interest for exploration and mining of uranium is expected to continue. There are also uranium deposits on the Magdalena Ranger District.

Areas of historic gold and silver mining exist on all of the ranger districts. Interest in these mineral areas continues as gold prospecting has been increasingly popular. It is expected the “small miner” will continue to operate in these areas. Whether it is considered recreational by some or subsistence mining by others, it is important to note all of these operations are locatable minerals whether small or large, and they are regulated by the same regulations<sup>34</sup> and the U.S. mining laws.

Reclamation on the Cibola goes hand-in-hand with locatable mineral activities and operations. Each operation has a reclamation component, which is site-specific and tied to that single operation. Appropriate reclamation is discussed with operators for small sluicing operations, and it is required in plans of operation for mining. In locatable minerals mining, full reclamation may not always be possible. For example, when ore or waste rock material is removed from a mine site, there may be resulting pits or piles of material formed. If this cannot be avoided to mine the site, the operator may not be required to return the site to its original contours if that is not possible. Forest Service staff can accept a reclamation plan which will return the site to natural appearance to the nearest extent possible. It is the responsibility of the operator to reclaim mineral activity sites as authorized in their plan of operation. In addition to plans of operation, bonds collected by Forest Service personnel ensure money is available for site reclamation should the operator default on the work. Should the operator default on the obligations, the bond is used to complete the reclamation work. Otherwise, the bond is held until the work is completed by the operator. It is returned once satisfactory reclamation is completed.

### Desired Condition for Locatable Minerals

#### FW-DC-LOC

1. Reclamation of energy, mining, and mineral activity sites provides for public safety and the protection of forest resources and is conducted to return sites to a natural condition as nearly as possible.

### Standards for Locatable Minerals

#### FW-STD-LOC

1. Bonds are collected for minerals operations requiring a plan of operation to insure appropriate closure for operations of all sizes.
2. Reclamation will be carried out concurrently with mining; restoration of the environment takes place at the earliest opportunity for each area on a mine site.
3. Soil disturbance will be kept to a minimum. Where removal of soil is necessary, soil will be stockpiled and stabilized for use in later reclamation.
4. Plans of operation will address interim reclamation requirements for unforeseen shutdown and temporary cessation.
5. Suitable interim and post-project surface water and groundwater monitoring will be implemented where needed to detect adverse changes at the earliest practicable time.

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<sup>34</sup> 36 Code of Federal Regulation 228.4

6. On site disturbances where radionuclides may exist, reclamation will address potential for radionuclide exposure to people and the environment. Readings for radionuclide levels will be taken after reclamation to ensure remediation to background levels or other level approved by the appropriate regulatory agency.
7. Reclamation plans will be site specific and appropriate for the setting; for example, plans may address soils, vegetation, climate, and slope.
8. Apply certified weed-free seed when replacing soils or roughening surface growth media to increase revegetation success.

### Guidelines for Locatable Minerals

#### FW-GDL-LOC

1. Mine reclamation should use a geomorphic approach that results in landforms similar to adjacent natural terrain and hydrologic functions similar to natural systems to minimize long-term monitoring and maintenance requirements.
2. Mining activities should incorporate reclamation measures that reduce visual contrasts with the surrounding landscapes. Mitigation measures, including recontouring topography and revegetating bare sites where necessary, should be used to move areas impacted by mining activities toward the long-term scenic integrity objectives of that area.
3. Areas and landforms where past mineral development or exploration has occurred should be stable and vegetated where possible.
4. Post-mining restoration areas should be designed to allow the sustainability of other forest resources.
5. Plans of operation should address avoiding or minimizing the alteration of natural features that provide habitat for wildlife or at-risk plants.
6. Streambed and floodplain alteration or removal of material should not prevent attainment of riparian, channel morphology, or streambank desired conditions.
7. Only native or nonpersistent (certified weed-free) seed and plant materials should be used when revegetating disturbed sites.
8. Mining and mineral activities of all sizes should minimize the disturbance footprint of the operations site.
9. Mining and mineral operations should be logically planned, opened, and operated in order to optimize resource values and to meet final reclamation objectives.
10. Where possible, talus slopes should not be altered or material removed from them. In areas that harbor talus snails, reclamation and revegetation treatments should be designed to retain microhabitat characteristics for endemic snails and other talus-dependent species unless as needed to meet statutory requirements (mining law or as needed to protect public health and safety).

11. On sites that may contain radionuclides, remediation of soil radiation levels should follow the “Joint Guidance for the Cleanup and Reclamation of Existing Uranium Mining Operations in New Mexico” (developed by the New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division and the New Mexico Environment Department, Mining Environmental Compliance Section) or current Federal standards as dictated by the appropriate Forest Service hazardous materials on-scene coordinator.
12. Locatable mineral operations should accommodate desired conditions of other resources where possible.
13. Certified weed-free seed should be applied the same day as soil replacement or soil roughening.

### Management Approach for Locatable Minerals

#### FW-MGAP-LOC

1. Plan mining operations to use by-products (such as timber or gravel) as part of construction or maintenance. Collaborate with other resource specialists to identify these possibilities.

### Leasable Minerals

Leasable minerals are a category of mineral resources sold by lease. Leasable minerals are the hydrocarbon-based resources, including oil, gas, and coal, and certain other solid minerals such as phosphate, potassium, and sodium. Minerals usually locatable may also be a leasable mineral on some acquired lands.

The Cibola National Forest does not have the geologic environment in the mountain ranger districts to host conventional oil and gas resources or solid leasable minerals. Geologically, oil shale or tar sand deposits could potentially occur in the southern San Juan Basin on the Mount Taylor Ranger District. If deposits were to exist, favorable economic and geologic conditions and future technological advances would all be required to economically extract a hydrocarbon resource. Small coal deposits occur and are exposed in many locations in the mountain ranger districts. These deposits are really no more than coal exposures and occur in such small volume that they are not of economic interest. At the time of publication of this document, there were no leases or proposals on acquired or other lands and there are no indications that resources are present.

For these reasons, the potential for leasable minerals is low, and no management of leasable minerals is anticipated for the plan area. However, should mineral leasing be proposed, the Forest Service role in managing leasable 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 specify any surface resource protections that may be needed. Stipulations to protect surface resources would be made for exploration, well production, or mining.

### Salable Minerals or Mineral Materials

Salable minerals or mineral materials are common minerals sold at the discretion of Forest Service staff. Salable minerals apply to lower value, common variety materials such as rock, gravel, and soil. The term salable minerals is synonymous with “mineral materials” and can also be called “common varieties.” Forest Service personnel have total discretion (control) whether to manage and sell these mineral materials.

Mineral materials, obtained by personal-use permit or contract, provide a number of products that are valuable and often used or sold locally. Clay and sand or “borrow” is used for traditional adobe construction, as well as rock rubble for foundations and wall construction. Moss rock for landscaping is very popular on the Cibola mountain ranger districts.

Personal-use permits may be obtained to gather minerals such as rock, boulders, borrow, or sand in designated areas. Just as for other forest products, the areas must have been cleared; that is, the areas must have been surveyed and determined not to contain cultural, historic, or important biological resources that would be disturbed by common rock removal.

Salable minerals for personal use are sold on a mineral materials permit system. Commercial rock sales are sold by mineral material contract and may require a bid-sale to offer an area to multiple bidders. Mineral material permits and contracts are available at the discretion of the local district ranger and only in designated and cleared areas as described above.

Requirements for reclamation of salable minerals on the Cibola is similar to that identified for locatable minerals; however, because the activity is discretionary, many proposed operations may not be approved in the first place. When evaluating a plan, if an area cannot be reclaimed satisfactorily, if resource values might be harmed by the activity, or where the mineral material removal is not desirable, Forest Service staff has the discretion to deny the proposed mining operations. For contracts issued, each authorized operation has a reclamation component which is site-specific and tied to that single operation. It is the responsibility of the operator or individual to reclaim mineral activity sites as authorized in their mineral material permit. For commercial or potentially surface-disturbing operations, bonds are collected.

### Desired Condition for Salable Minerals

#### FW-DC-SAL

1. Mineral material mining activities are conducted in a manner that avoids negative impacts to surface resources, including groundwater, while allowing reasonable access to minerals.

### Standards for Salable Minerals

#### FW-STD-SAL

1. Talus slopes will not be used as a common variety mineral materials source where disturbance would destabilize the talus slopes and alter any endemic or rare species habitat or presence.
2. Mining activities for mineral materials will incorporate mitigation and reclamation measures that reduce visual contrasts with the surrounding landscapes.
3. Mineral materials such as gravel will not be removed within water resources features.
4. Areas of mineral material removal will be reclaimed, including any impacts due to related construction areas and access.
5. Bonds will be collected for commercial mineral materials operating plans to insure appropriate closure for operations.
6. Salable minerals shall not be extracted from within designated areas (such as designated wilderness or the Continental Divide National Scenic Trail), areas of high scenic integrity, or administratively recommended areas (such as recommended wilderness areas and eligible wild and scenic river corridors).

7. Make mineral materials available to the public for landscape rock, soil and other uses by permits if compatible through clearances with other resource concerns.
8. Use piled materials from roadsides, previously cleared areas (for other projects) and other suitable materials left over from construction or maintenance for rock sales, if the disposal of these materials is desirable.

### Guidelines for Salable Minerals

#### FW-GDL-SAL

1. Mineral material sales should be considered so long as all laws and regulations are complied with and other forest resources are protected.
2. Where appropriate with other resource concerns, mineral materials (such as moss rock, boulders, and borrow material) should be made available for personal use through rock permits.
3. Requests for commercial mineral material sales should be considered where appropriate with other resource desired conditions.
4. Mineral materials such as gravel and borrow from areas identified for this use should be made available for construction and maintenance of the national forest road system and should be issued as free use on a mineral material permit to other Federal, State, county and local agencies for use in public projects.<sup>35</sup>
5. Mineral materials should be made available to support internal resource management needs, such as erosion control features, rock dams, and recreation site materials (barriers and landscaping) where in balance with other resources.
6. Personal-use mineral material sites should be monitored to prevent resource damage due to over-use.
7. Once a permit site is depleted of desirable materials, or if resource damage is occurring, a different site should be used for further permits.

### Geology Resources

Geology addresses the science and physical features of the earth apart from extractive uses of mineral commodity resources. This covers aspects such as landforms, rock formations, and fossils. Geologic features occur on every ranger district and illustrate the origin of mountain ranges, provide opportunities for scientific study, and offer stunning scenic values. Geologic educational opportunities and scientific research can contribute to the greater understanding of our planet and its history. The identification of geologic hazards can inform forest management decisions; for example, rock type and rock stability can affect structures or roads.

### Desired Conditions for Geology Resources

#### FW-DC-GEO

1. The outstanding geologic features on the Cibola provide high-quality educational opportunities for students, scientists, and the casual visitor.

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<sup>35</sup> 36 Code of Federal Regulations 228 part C, 228.57d and 228.62

2. Significant geologic features are protected from being defaced or destroyed.
3. Geologic field investigations and instruction as well as other geology-based education opportunities occur and are encouraged on the Cibola.
4. Geologic hazards are avoided or mitigated.

## Standards for Geology Resources

### FW-STD-GEO

1. Professional geologic field investigations involving sampling, such as for fossils, rock and mineral types, and formal investigations into geologic features, will be accommodated by permit according to regulatory requirement, unless conflicting with the protection and management of other resources (for example, cultural resources).
2. The scientific collection of paleontological and geological specimens will be accommodated and permitted as required, unless conflicting with the protection and management of other resources (for example, cultural resources).

## Management Approach for Geology Resources

### FW-MGAP-GEO

1. Develop opportunities for public geologic interpretation including interpretive signs, printed material, and interpretive information on Forest Service websites.

## Abandoned Mine Lands

Abandoned mines are the remains of former mining operations. The abandoned mine lands program in the Forest Service identifies mine features posing a danger to the public; these are prioritized and identified for closure and or remediation. The classification as “abandoned” applies when there are no entities or individuals left operating the mining activity or who have financial ties to the mining. The significance of this classification is that for most abandoned sites, there is no money from the original operators available to clean up the sites. Although occasionally a potentially responsible party can be found and contribute toward cleanup, the major burden falls on the Forest Service to fund cleanup and remediation. Closures are conducted to remediate hazardous materials as well as to safeguard physical openings such as shafts, adits, collapsed headframes, and remaining mine equipment.

## Desired Condition for Abandoned Mine Lands

### FW-DC-AML

1. Abandoned mines are appropriately remediated and do not endanger people or the environment.

## Standards for Abandoned Mine Lands

### FW-STD-AML

1. When closing underground mine features to public entry, pre-closure inspections shall be conducted to determine if cave-dependent species are present. Closures will be designed and implemented to address the needs of resident or historically occurring wildlife within the constraints of meeting public safety concerns.

2. Environments in abandoned mines shall not be altered except where necessary to protect associated natural resources or human health and safety.
3. Altering historic properties will be avoided unless public safety is in jeopardy.
4. Appropriately remediated abandoned mines are available for roosting bats, reducing the potential for displacement, abandonment of young, and possible mortality.
5. No Forest Service employee will enter abandoned mine underground workings unless certified as a qualified certified mineral examiner or accompanied by a qualified certified mineral examiner or person similarly qualified.

## Management Approaches for Abandoned Mine Lands

### FW-MGAP-AML

1. Coordinate management of bat roosts with New Mexico Department of Game and Fish and the U.S. Fish and Wildlife Service personnel.
2. Where mining-related features remain, cultural resource surveys could be conducted to inform the closure design.

## Caves

Caves are natural biophysical features that include any naturally occurring void, cavity, recess, or system of interconnected passages beneath the surface of the earth or within a cliff or ledge and which are large enough to permit a person to enter, whether the entrance is excavated or naturally formed. This definition includes any fissure (large crack), lava tube, natural pit, sinkhole, karst feature, or other opening which is an extension of a cave entrance or which is an integral part of the cave. Cliffs are also defined as caves for any high, steep, or overhanging rock or earth face. Most caves on the Cibola can be described as lava tubes or overhanging cliff features, although there are some karst features. These features provide specialized seasonal and year-round habitats for a variety of wildlife species including bats, cliff-nesting birds, snails, reptiles, and amphibians. Animal species found in caves include many species of bats and small and large mammals as opportunistic users.

Twenty significant caves have been listed for the plan area. Refer to the “Significant Caves” section within the “Designated Areas” section for further information.

## Desired Conditions for Caves

### FW-DC-CAVE

1. Caves retain their cultural, historic, geologic, and biologic integrity.
2. Caves known to be important for at-risk species are intact or provide habitat for these species.
3. Significant cave aesthetic, cultural, and scientific values remain intact and are protected from damage to provide for uses by people (traditional cultural uses), wildlife, or both.
4. Caves provide habitat for species that require specialized conditions for roosting and overwintering, such as bats. Caves maintain moisture and temperature levels consistent with historic conditions.
5. Archaeological, geological, paleontological, and biological features of caves are not adversely affected by visitors.

## Standards for Caves

### FW-STD-CAVE

1. When closing caves to public entry, pre-closure inspections shall be conducted to determine if cave-dependent species or other species are present. Closures will be designed and implemented to address the needs of resident or historically occurring wildlife within the constraints of meeting public safety needs.
2. Caves that have been designated or nominated as significant will be managed to perpetuate those features, characteristics, values, or opportunities for which they were designated.

## Guidelines for Caves

### FW-GDL-CAVE

1. In caves where traditional or cultural uses exist, management should accommodate those uses.
2. Decontamination procedures should be followed to prevent the introduction of white-nose syndrome or other pathogens when entering caves.
3. Environments in caves should not be altered except where necessary to protect associated natural resources or to protect health and safety.
4. Where mine closure is necessary to protect human health and safety, closures should preserve habitats for roosting bats and avoid direct impacts to bats. If bat roost sites are present, closure structures, such as wildlife-friendly bat gates that meet the most current recommendations, should allow bats to continue to use the cave.
5. Management of cave access for recreational purposes should be balanced with wildlife protection, cultural resources, or both.

## Management Approaches for Caves

### FW-MGAP-CAVE

1. Use caves for educational opportunities.
2. Post interpretive and informational signs near caves with known recreation access providing information on prevention of the spread of white-nose syndrome and other pathogens.
3. Close caves to the public based on visitor impacts as a method to protect the ecology of resources.
4. Manage bat roosts to provide for the enhancement and protection of bat populations. Where wildlife use caves, use protective measures including seasonal closures, public education, and wildlife-friendly gates.
5. Avoid or minimize the alteration of naturally occurring rocky outcroppings or cliff faces associated with caves.

## Renewable Energy

The Cibola National Forest has the potential to host or facilitate the development of alternate or renewable energy sources, which may include solar, wind, and biomass. Renewable energy has the potential to provide ecosystem services that are important to people in a local, regional, and national scale. Construction and maintenance of facilities and transmission lines could provide employment while energy produced or transmitted provides direct benefits in power generation.

Wind and solar energy are clean fuels that do not release hydrocarbons to the atmosphere and as such do not contribute to global warming. Use of small solar panels can provide energy for wildlife and livestock range improvements.

### Desired Conditions for Renewable Energy

#### FW-DC-RE

1. Energy transmission and development on the Cibola meets mandates to facilitate the transmission and development of energy resources in a manner that minimizes adverse impacts to other resources and does not detract from meeting other desired conditions applicable to the area.
2. Energy corridors will allow a reliable supply of energy essential to meet local, regional, and national economic demands in balance with other national forest resources.
3. The operation of renewable energy projects will provide beneficial uses without endangering forest or agricultural resources.

### Standard for Renewable Energy

#### FW-STD-RE

1. Reclamation plans for disturbed sites will be site-specific and appropriate for the soils, vegetation, and climate.

### Guidelines for Renewable Energy

#### FW-GDL-RE

1. Construction and maintenance of energy facilities, transmission corridors, and transmission lines should avoid the introduction and spread of nonnative invasive species.
2. Energy corridors should be planned to avoid or limit disturbance in or near riparian zones to protect surface water, shallow groundwater, unstable areas, hydric soils or wetlands, and surface water.
3. Rights-of-way for roads, utility infrastructure, and communications sites should maximize use of existing infrastructure and corridors before new uses or corridors are authorized, within technical, security, and environmental constraints.
4. New special use authorizations for utility distribution, including electricity distribution less than 46kV in capacity, should be buried if physical site conditions permit, to reduce fire hazard and minimize resource impacts.
5. Forest management within energy rights-of-way should allow for the operation and maintenance of the facilities and infrastructure as well as desired vegetation conditions and land uses.

6. Energy facilities and transmission corridors should avoid locations in areas identified as having a demonstrated high risk to wildlife, cultural resources, agricultural land uses, and areas of high scenic integrity or in areas of public concern for scenery, such as travelways and recreation sites (concern level 1 are the routes identified with the most public concern for scenery).
7. Environmental analysis of proposed energy facilities or transmission corridors should address the overall wildlife habitat of the project area. To safeguard migration of smaller mammals, amphibians, ground-nesting birds, and reptiles, facilities should be designed and constructed to avoid habitat fragmentation. Projects should avoid disturbance to rock features which are known dens or burrows. Vegetation around rock features should be maintained for wildlife cover. Project development should minimize activities during breeding seasons. Projects should minimize mortality for wildlife, including small species.
8. When considering proposed wind energy developments, current industry technology to protect against wildlife mortality should be investigated and the best available technology should be used in any wind project implementation.
9. Proposals to develop solar energy should investigate the impacts to wildlife such as heated microclimates adjacent to solar energy arrays. Solar energy developments should use best available technology to mitigate heat-induced impacts to wildlife.
10. Solar energy projects should give priority consideration to previously disturbed sites to minimize impacts to wildlife, vegetation, traditional cultural properties, and cultural resources.
11. Proposals for renewable biomass energy should be considered. Portable biomass pellet plants could reduce the need to burn slash, while providing a heating fuel.
12. Potential solar or wind energy development should not be located in areas with high scenic integrity objectives or in the foreground along trails, recreations sites, and roads identified with the most public concern for scenery, in areas where conflicts with wildlife would occur, or where sacred sites exist.

## Recreation

### General Recreation

The Cibola 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 as a whole.

Recreation contributes greatly to the physical, mental, and spiritual health of individuals, bonds family and friends, instills pride in heritage, and provides economic benefits to communities, regions, and the Nation. Contributions from recreation and scenery on the Cibola National Forest provide a host of cultural ecosystem services to society, and because many of the cultural ecosystem services are unique to the Cibola and limited outside the national forest, the value of these services is increasing.

The natural, cultural, and scenic environments of the Cibola National Forest 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 to the natural scenery and add to the richness of the experience and sense of place.

Recreation opportunities on the Cibola include nonmotorized, motorized, developed, and dispersed recreation on land, water, and in the air. The social, managerial, and physical attributes of a place, when combined, provide a distinct set of recreation opportunities. Forest Service personnel use the recreation opportunity spectrum to define the types of outdoor recreation opportunities, settings, and experiences the public might desire, and identify that portion of the spectrum the national forest might be able to provide. The opportunities, settings, and activities for obtaining experiences are arranged across a continuum or spectrum of six classes: primitive, semi-primitive nonmotorized, semi-primitive motorized, roaded natural, rural, and urban. The recreation opportunity spectrum classes are shown on maps available in appendix G map packet and on the [Cibola plan revision website](#).<sup>36</sup>

Forest landscapes, resources, and programs offer opportunities for education and engagement of children and adults alike. This facilitates an understanding of and participation in resource conservation and promotes knowledge and appreciation of the natural world and its relationship to human communities.

## Desired Conditions for General Recreation

### FW-DC-GREC

1. Desired recreation opportunity spectrum settings serve as the desired conditions for recreation. Refer to figures 5 through 8, Desired Recreation Opportunity Spectrum, in appendix G. A variety of developed and dispersed recreation and tourism opportunities (such as camping, picnicking, hiking, mountain biking, hunting, fishing, wildlife viewing, equestrian use, driving for pleasure, climbing, and motorized recreation) are available for a diverse group of users commensurate with mapped desired recreation opportunity spectrum classes.
2. Sustainable recreation opportunities are available commensurate with public interest, recreation resource capacity, and other natural and cultural resources.
3. Conflicts among various recreation uses and other forest uses (such as grazing) are rare. There is minimal vandalism, theft, illegal activity, or resource damage on the national forest from recreation activities.
4. The unique cultural, historical, and ecological resources of the Cibola are featured through recreation opportunities, conservation education, visitor information, and interpretation. These resources are readily available and encourage increased forest stewardship, ecological awareness, visitor orientation, and knowledge of recreation opportunities. Visitors are connected to the importance of the past, present, and future.
5. Recreation opportunities enhance the economic, cultural, and social vitality and well-being of surrounding communities. Local communities are involved in partnerships and long-term relationships with stakeholders are fostered to facilitate and participate in the management of sustainable recreation on the national forest.

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<sup>36</sup> <https://www.fs.usda.gov/main/cibola/landmanagement/planning>.

## Standard for General Recreation

### FW-STD-GREC

1. Impacts to recreation resource values resulting from forestry and other activities (such as temporary roads and entry points) shall be addressed during project planning and during implementation.

## Guidelines for General Recreation

### FW-GDL-GREC

1. All project-level decisions and implementation activities should be consistent with mapped classes and setting descriptions in the recreation opportunity spectrum to sustain recreation settings and opportunities.
2. Recreation activities (such as rock climbing, dispersed camping, and other activities) should be managed to accommodate sustainable use levels within the capacities of other resource values, including the need to protect plants, animals (such as at-risk species), and other natural and cultural resources.
3. Healthy, older, and larger trees should comprise the majority of trees in developed and dispersed recreation sites to provide shade and screening around hardened sites in order to preserve the recreation setting; some younger and mid-aged trees are retained to serve as replacement trees and as additional screening.

## Management Approaches for General Recreation

### FW-MGAP-GREC

1. Build and maintain relationships with a diversity of local communities, partnerships, volunteers, other government agencies, range permittees, cooperators, recreation users, and permit holders to help co-manage a sustainable recreation program and minimize conflicts among uses, including planning, design, implementation, and operations and maintenance. Recognize partners for their roles in providing recreational opportunities when possible.
2. To help connect people to nature and encourage responsible use, develop a multilingual interpretive strategy to address educational, interpretive, and informational needs of each ranger district, and identify key messages for the Cibola National Forest.
3. Promote established conservation programs and develop new ones.
4. Follow Forest Service sign and poster guidelines (USDA Forest Service 2013a), Forest Service outdoor recreation accessibility guidelines (USDA Forest Service 2013b), and the built environment image guide (Potyondy and Geier 2011) or most current versions to develop sign plans as needed for scenic byways and other popular areas to provide improved visitor information and a consistent Forest Service image.
5. Use the Forest Service outdoor recreation accessibility guidelines (USDA Forest Service 2013b) and Forest Service trail accessibility guidelines (USDA Forest Service 2013c) or most current versions to improve accessibility for visitors.
6. Consider eliminating or minimizing impacts to range infrastructure (such as corrals, drinkers, and fences) from recreational infrastructure or use through location, design, and collaborative solutions with range specialists, permittees and recreation managers.

7. For emerging recreation activities, adopt design standards and best management practices as they become available. Adopt management policies for new forms of recreation in accordance with the interest they attract in relation to other known recreation uses and resource concerns.
8. Schedule management activities that affect visitors outside of the major recreation season to prevent negative socioeconomic impacts to the public, communities, and local businesses.

## **Developed Recreation**

Developed recreation on the Cibola National Forest includes management of campgrounds, picnic areas, trailheads, ski areas, and other day-use sites. The Cibola's four mountain districts have approximately 137 developed sites at the time of publication of this document. Most are easily accessible by passenger car. With the exception of some trailheads, the developed recreation areas are open primarily in the summer and fall. Some developed recreation sites remain open year-round.

### **Desired Conditions for Developed Recreation**

#### **FW-DC-DREC**

1. All desired conditions for general recreation (see "General Recreation" section) apply to developed recreation.
2. There is a spectrum of developed recreation opportunities characterized by varying levels of development and amenities appropriate to the setting. The quality, locations, and variety of recreation sites and their associated amenities add to visitor satisfaction.
3. Recreation sites complement the Cibola's scenery resources and scenic character. Facilities range from primitive to highly developed and blend with the natural landscape.
4. Healthy forest vegetation (species, size, and age) in developed sites complements recreational activities, scenery, and safety.
5. Resources and facilities are free from deterioration and damage, and changes in recreational use are appropriate within the setting.

### **Guidelines for Developed Recreation**

#### **FW-GDL-DREC**

1. Design, construction, and maintenance of facilities should be complimentary with the surrounding landscape and be consistent with the development scale appropriate to the recreation opportunity spectrum class.
2. Recreation sites should be planned, designed, and managed to prevent resource damage, and for activities and capacities that do not cause resource damage or adversely impact the scenic character.
3. Recreation facilities and improvements should be designed to prevent human and wildlife conflicts; for example, provide animal-resistant trash cans, cap or screen pipes on gates and vault toilet vents, or put bases on interpretive signs.

4. Constructed features should be maintained to support the function(s) for which they were built. When no longer used as intended, they should be repurposed to accommodate the new use or decommissioned to reduce maintenance backlog and infrastructure deterioration and protect public safety and health.

## Management Approaches for Developed Recreation

### FW-MGAP-DREC

1. Use sustainable “green” design techniques and incorporate them in the alteration of existing facilities and in new construction of recreation sites and facilities. Use sustainable operations at developed recreation sites (for example, recycling receptacles or electric maintenance vehicles).
2. Provide public safety and stewardship information at developed recreation sites (including a welcome to the site and rules and regulations on recreational activities).
3. Provide design narratives for projects to determine the appropriate location, capacity, and type of facilities required to meet user needs in the context of the forest setting.
4. Develop design guidelines to manage specific design issues, identify appropriate architectural themes and styles, and provide consistent design that represents each mountain landscape’s unique scenic character. Use the built environment image guide (Potyondy and Geier 2011) or most current references to accomplish this.
5. Operate or close sites based on the season’s volume of use, resource protection, opportunities for public or private partnerships, and operating costs.
6. Install or replace trash and food boxes with wildlife-resistant models at developed sites.
7. Collaborate in developing new recreation facilities with government agencies and non-governmental agencies to become a regional destination to support local and economic development.

## Dispersed Recreation

Dispersed recreation is outdoor recreation occurring over broad expanses of the Cibola National Forest and includes management of a variety of motorized and nonmotorized recreation opportunities. Examples of popular dispersed recreation include motorized and nonmotorized trail use, hiking, dispersed camping, wildlife viewing, hunting, fishing, and photography.

## Desired Conditions for Dispersed Recreation

### FW-DC-DISP

1. All desired conditions for general recreation (see “General Recreation” section) apply to dispersed recreation.
2. Dispersed recreation occurs in mostly undeveloped, natural areas appropriate to the setting and other resources are not impacted by dispersed recreation.
3. The systems of motorized and nonmotorized trails provide a variety of opportunities and settings for visitors to explore the national forest. The trail system is sustainable and enhances the recreation opportunity, while minimizing user conflict and damage to the Cibola’s natural and cultural resources.

4. The trail system accommodates sustainable use levels and public interests within the capacities of other resource values.
5. Trails vary in length and challenge and provide linkages to local neighborhoods, communities, and other public lands.

### Objective for Dispersed Recreation

#### FW-OBJ-DISP

1. Within 10 years of plan approval, evaluate forestwide trail system (using established protocol) for need, condition, use, relevance, and sustainability.

### Standards for Dispersed Recreation

#### FW-STD-DISP

1. No new motorized routes (roads and trails) or areas shall be constructed or designated in desired primitive recreation opportunity spectrum settings.
2. No new motorized routes (roads and trails) or areas shall be constructed or designated in desired semi-primitive nonmotorized recreation opportunity spectrum settings, except for necessary administrative activities, permitted activities, and emergency access.
3. Any temporary project-level motorized routes or road construction in semi-primitive nonmotorized recreation opportunity spectrum settings shall be decommissioned.
4. Motorized uses are prohibited in primitive recreation opportunity spectrum settings.
5. Motorized uses are prohibited in semi-primitive nonmotorized recreation opportunity spectrum settings, except for necessary administrative activities, permitted activities, and emergency access.
6. Motorized vehicle travel shall be managed to occur as depicted on the most current motor vehicle use map. Motorized use off the designated system of roads, trails, and areas is prohibited except as authorized (for example, by law, permit, right, or order).

### Guidelines for Dispersed Recreation

#### FW-GDL-DISP

1. Trails should be designed, constructed, rerouted, decommissioned, or maintained using current best practices to promote sustainable design while providing desired recreation opportunities and protecting the values of other resources.
2. Trail markings, kiosks, and interpretive signage should communicate site-specific information, be consistent with agency and Forest Service sign guidelines, and should be designed to complement the scenic and cultural character of the surrounding landscape.
3. Trails should not be used for management activities that may negatively impact the trail, such as for landings and as skid trails. Impacts to system trails should be avoided; unavoidable impacts should be mitigated upon project completion.
4. Existing trail segments found to adversely impact natural and cultural resources should be evaluated to address such impacts. Use alternative designs, reroutes, mitigations, or decommissioning of the trail to eliminate, minimize, or resolve adverse impacts.

5. Dispersed sites should be closed, rehabilitated, or otherwise mitigated when:
  - site conditions are no longer consistent with the area's scenic integrity objective;
  - there are social use conflicts;
  - unacceptable environmental damage is occurring (for example, large areas of denuded vegetation, eroded streambanks, piles of campfire ash, or human waste impacting natural water features); or
  - there is a combination of these things.
6. When closing or rehabilitating dispersed recreation sites due to resource conditions, recontouring practices, native vegetation, and natural barriers should be used. In addition, information should be posted to redirect use and encourage public compliance in rehabilitation efforts.

## Management Approaches for Dispersed Recreation

### FW-MGAP-DISP

1. Base trail management priorities on preventing erosion, providing appropriate and meaningful recreation opportunities, developing trail-based tourism to help develop rural and local communities, and accommodating administrative needs.
2. Consider destination and loop opportunities when new trails or modifications to the trail system are planned.
3. Analyze, add, or decommission unauthorized trails when revising the trail system.
4. Use signing, enforcement, public information, trail management objectives, seasonal and special closures, maintenance, construction, and restoration to address sustainable recreation opportunities, conflicts between uses, and resource damage. Educational techniques (such as brochures, signs, websites, and social media) enhance visitor knowledge of proper nonmotorized and motorized trail use etiquette.
5. Coordinate and communicate with local agencies and community organizations in planning trail system extensions, additions, or modifications.

## Scenic Resources

The Cibola National Forest provides high-quality scenery for present and future generations, and the public values the scenic character of the national forest. Scenic character is the set of physical, biological, and cultural features that give an area its scenic identity or sense of place. The Cibola's diverse sky island landscapes range from semi-desert grasslands to mixed-coniferous forests and alpine meadows. The scenic character encompasses both social and ecological elements, including landform, vegetative pattern, water features, recreation opportunities, and cultural features. Buildings, structures, and other human alterations are considered a valuable aspect of scenic integrity when these features add to the sense of place or reflect the cultural legacy of an area. High-quality scenery, especially scenery with natural-appearing landscapes, enhances people's lives and benefits society. Ecosystem services provided by scenic resources include enhanced human well-being, both physically and psychology; natural landscapes are restorative and provide reprieve from built urban environments. Increased well-being in turn contributes to increased job productivity, increased community involvement, and improved well-being in society as a whole. High-quality scenery is also beneficial to tourism and property values

in areas adjacent to national forest. People value the scenery, recreation resources, and special places on our national forests, and it is important to manage scenic resources on public lands sustainably for present and future generations. Please refer to Appendix F: Desired Scenic Character Descriptions for further detail on the distinct desired scenic character descriptions for each ranger district.

The Cibola uses the Forest Service scenery management system to determine the value and importance of scenery and identify scenic resources as they relate to people. Scenic integrity indicates the degree of intactness and wholeness of the scenic character. Scenic integrity objectives are defined by degrees or levels of alteration from the desired scenic character and the intent is to achieve the highest scenic integrity possible.

The Cibola National Forest is divided into four levels of desired scenic integrity: very high, high, moderate, and low.<sup>37</sup> These levels set objectives for the amount of variation from the existing scenic character that is permissible within the scenic integrity level. The current set of scenic integrity objectives are on maps available in appendix G, map packet, and on the [Cibola plan revision website](#).<sup>38</sup>

As with all desired conditions, projects implemented under the land management plan are designed to maintain or move toward desired conditions (see “Contents of a Land Management Plan” in chapter 1). Due to the forestwide scale of mapping for scenic integrity objectives, some inconsistencies may be present. Examples of this are existing features with long-term impacts that will not achieve the desired scenic integrity objective in the life of the plan (roads or trails, power lines, recreation facilities, pipelines, utility corridors, etc.), or geospatial data inconsistencies, especially along scenic integrity objective boundaries. Updates based on these types of inconsistencies would be administrative changes to the scenic integrity objectives maps.

## Desired Conditions for Scenic Resources

### FW-DC-SCE

1. The scenic character of the Cibola National Forest is characterized by a predominately natural-appearing landscape and valued cultural landscape, which reflect the national forest’s sense of place. The scenic quality of landscapes is restored, maintained, or enhanced across the Cibola.
2. Scenic integrity objectives serve as the desired conditions for scenery. Refer to figures 9 through 12, Desired Scenic Integrity Objectives, in appendix G.
3. High-quality scenery and scenic values are protected in areas the public values highly for scenery, such as scenic byways, major roads and trails, designated wilderness areas, inventoried roadless areas, and developed recreation sites.
4. Scenic resources and scenic character reflect ecosystem diversity, enhance the recreation settings, and contribute to the quality of life of local residents and communities.

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<sup>37</sup> Scenic integrity is a measure of the minimum degree to which desired scenic character attributes are to remain intact (Agriculture Handbook 701, page 20 and 5-9). Scenic integrity levels are determined by three factors including dominance, degree of deviation, and intactness (see Glossary for further information).

<sup>38</sup> <https://www.fs.usda.gov/main/cibola/landmanagement/planning>.

## Standard for Scenic Resources

### FW-STD-SCE

1. Scenery management, scenic character, and scenery values are integrated into the design, planning, and implementation of all resource management decisions.

## Guidelines for Scenic Resources

### FW-GDL-SCE

1. Constructed features, facilities, and management activities should closely follow the form, line, color, texture, and pattern common to the desired scenic character being viewed to remain visually subordinate to the surrounding landscape, except where the size or design of a structure is such that it would dominate the landscape. For those exceptions, the structures should complement the desired scenic character.
2. Management activities should be consistent with scenic integrity objectives for the area.
3. Management activities that result in short-term impacts inconsistent with the scenic integrity objectives should achieve the scenic integrity objectives over the long term. Short- and long-term timeframes should be defined during site-specific project planning. Projects should include mitigation measures to address impacts to scenic resources.
4. In areas with very high scenic integrity objectives, only minor changes from valued attributes described in desired scenic character should be allowed. The existing landscape character and sense of place should be expressed at the highest possible level and the landscape appears intact.
5. In areas with high scenic integrity objectives, management activities should be unnoticed and the landscape appears unaltered. Deviations from desired scenic character may be present but should repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident.
6. In areas with moderate scenic integrity objectives, management activities may be noticeable but should be subordinate to the desired scenic character. The landscape may appear slightly altered. Deviations from desired scenic character should remain visually subordinate to the desired scenic character (by repeating the scenic attributes of size, shape, form, line, color, texture, or patterns common to the scenic character).
7. In areas with low scenic integrity objectives, the landscape may appear altered. Management activities may be evident and sometimes dominate, but should be designed to blend with surroundings by repeating form, line, color, and texture of attributes described in the scenic character. Deviations may dominate the desired scenic character being viewed but they borrow valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed.
8. Mining activities should incorporate reclamation measures that reduce visual contrasts with the surrounding landscapes. Mitigation measures, including recontouring topography and revegetation of bare sites where necessary, should be utilized to move areas impacted by mining activities to the long-term scenic integrity objectives of that area.

9. Potential solar or wind energy development should not be located in areas with high scenic integrity objectives or in the foreground along concern level 1 trails, recreations sites, and roads (concern level 1 are the routes and areas identified with the most public concern for scenery as found in the scenery management system).
10. For vegetation management, ecosystem restoration, and forest health improvement projects:
  - Vegetation management projects should avoid even spacing of retained trees, leave a diversity of tree species and sizes, avoid damage to remaining vegetation, and naturalize disturbed areas. Edges of treatment units should be natural-appearing, feathered, and blend with general surroundings.
  - Prescribed slash treatment in the immediate foreground (up to 300 feet) of concern level 1 and 2 travelways and areas (areas with the most public concern for scenery as found in the scenery management system) should be completed as soon as conditions permit.
  - Healthy, large trees should comprise the majority of the immediate foreground along concern level 1 and 2 travelways and areas as defined in the scenery management system, unless doing so would not achieve project goals; some younger and mid-aged trees are retained to serve as replacement trees and as additional screening.
  - In the immediate foreground along concern level 1 and 2 travelways and areas as defined in the scenery management system, stumps should be treated to reduce their visibility by methods such as cutting as low as possible (no more than 6 inches above ground on uphill side) and angling large stump faces away from viewing locations unless doing so would pose a safety hazard.
11. Effects from prescribed fire should be considered during project planning and implementation. Blackened and scorched vegetation may be visible in project areas in the short-term following treatments, but scenic integrity objectives should be met in the long term. Efforts should be made to minimize high intensity fire along areas valued highly by the public for scenery (as defined by concern level 1 travelways and use areas in the scenery management system).
12. Range facilities are allowed in all scenic integrity objectives but should use mitigation measures that respond to appropriate scenic integrity objectives.
13. New facilities added to communication sites, astrophysical complexes, administrative sites, and utilities should be clustered within the existing areas where possible. Facility colors and materials should blend with the landscape, structures should generally be below the height of vegetation, and vegetation that screens views to facilities should be protected and encouraged unless doing so would not achieve project goals.

## Management Approaches for Scenic Resources

### FW-MGAP-SCE

1. Integrate ways to improve scenic integrity (where existing scenic conditions are not consistent with desired scenic integrity objectives) into other resource projects, such as including project activities to remove unwanted or unneeded facilities, recontour topography, or revegetate bare ground.
2. Display interpretive or informational signs at sites with impacts to scenery to inform the public about the nature and consequences of such projects or events.

3. Cooperate with other entities, such as the New Mexico Department of Transportation, Tribal and local governments, and commercial and private entities to protect scenic integrity on and adjacent to the national forest, including along scenic byways. Provide scenery management inventory information to local adjacent and neighboring land management agencies for integration into projects and plans.
4. Activities that affect scenic quality should be scheduled outside the major recreation season, unless doing so would not achieve project goals or would conflict with wildlife restrictions.

## Special Uses

Use and occupancy of National Forest System lands are allowed with the issuance of special use authorizations in the form of permits, leases, and easements. Authorizations are issued when the proposed activities are consistent with natural resource management goals, facilitate the delivery of recreational opportunities on National Forest System lands, and are consistent with National Forest System land and resources 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 uses 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 residences, commercial filming, and still photography. The majority of the Cibola's recreation special uses are commercial in nature and generate land use fees for the Forest Service, some of which are retained by the local unit.

Land special uses include activities related to communication sites, military training, research, road access, and utilities such as electric transmission and distribution lines, oil and gas pipelines, telephone lines, and water transmission pipelines. Special uses authorizations are administered in a manner to protect the environment, promote health and safety, and serve the public.

Communication sites on the Cibola play a critically important role in supporting electronic connectivity across the Nation. Requests for use of Federal lands for communications sites are predicted to increase in the future as the population grows and new technologies emerge. Requests to use Federal lands for utilities transmission and energy development are also predicted to increase due to higher demand.

## Desired Conditions for Special Uses

### FW-DC-SU

1. Activities authorized as special uses provide goods and services that support the public's enjoyment and understanding of the Cibola National Forest and nearby communities, and have a minimal impact on national forest resources, opportunities for other uses, and national forest users.
2. Environmental, visual, and sound impacts of emerging technology, communication sites, utility corridors, and other authorized infrastructure are minimized within the surrounding landscape. Constructed features, facilities, and activities associated with special uses do not dominate the views in high scenic integrity areas and developed recreation sites.

3. Research authorized on the Cibola is focused on improving the general scientific understanding of natural and social systems. Research on the national forest does not negatively impact long-term vegetation structure and composition and does not introduce new invasive plants or animals.
4. Special uses activities including permitted outfitter and guide activities meet the public's need and have a minimal impact on the experiences of other national forest users as well as other national forest resources.
5. Services provided by recreation special uses enhance the recreation experiences of national forest visitors, increase public understanding and respect for the Cibola and nearby communities, provide for public health and safety, and have minimal impact to ecological and cultural resources.

### Guidelines for Special Uses

#### FW-GDL-SU

1. Utilities should be located to avoid potential conflicts with cultural resources, wildlife, scenery, wildfire, and long-term vegetation management.
2. Rights-of-way for roads, utility infrastructure, and communications sites should maximize use of existing infrastructure and corridors before new uses or corridors are authorized, within technical, security, and environmental constraints.
3. Only one authorization for access should be issued for any singular block of private land, regardless of current or future landownership patterns, number of parcels affected, terrain, or inability of adjoining landowners to cooperate with each other.
4. Special uses authorizations for recreation events and outfitting and guiding services should be relevant to any current and future capacity studies and administrative capabilities, and should use tools that assist in efficiencies to the special use program.
5. New special use authorizations for utility distribution, including electricity distribution less than 46kV in capacity, should be buried if physical site conditions permit, to reduce fire hazard and minimize resource impacts.
6. Communication sites should be secured to restrict access to only authorized users only.
7. Newly constructed features, facilities, and management activities for special uses should closely follow the form, line, color, texture, and pattern common to the desired scenic character being viewed to remain visually subordinate to the surrounding landscape, except where the size or design of a structure is such that it would dominate the landscape. For those exceptions, the structures should complement the desired scenic character.
8. Power pole installation or replacement under special use authorization should include raptor protection devices. Raptor protection devices should be installed on existing poles and areas where raptors have been killed.
9. Dispersed activities (nonmotorized and motorized) authorized under special uses authorizations should be limited to existing National Forest System infrastructure unless authorized, to protect national forest resources.

## Infrastructure

The following section provides management direction for roads and facilities across the Cibola National Forest.

### Roads

The system of roads within the plan area consists of approximately 3,100 miles of roads. These roads are under Forest Service jurisdiction and are referred to as National Forest System roads. There are other Federal, State, county and private roads and many unauthorized routes in the plan area. System roads provide access for a wide variety of recreational opportunities, cattle grazing, mining, forest and resource management, and research sites.

The portion of the road system available for motor vehicle use by the public is displayed on motor vehicle use maps. These maps also include motorized trails and areas designated for motor vehicle use. The transportation system also includes National Forest System roads that are only available for limited administrative and permitted use as well as system roads that are placed in storage for periods of at least year between intermittent uses. Maintenance level 1 roads are not displayed on the motor vehicle use map.

Forest Service staff use the term “maintenance level” to describe the level of service provided by and maintenance required for a National Forest System road. There are five maintenance levels, 1 through 5, but there are no maintenance level 5 roads in the Cibola National Forest transportation system. Refer to the glossary for complete maintenance level definitions. Table 24 provides a breakdown of the transportation system in the plan area by maintenance level.

**Table 24. Transportation system miles in the plan area by maintenance level**

Maintenance Level	Miles	Portion of Total National Forest System Miles (percent)	Partial Description
1	285	9.1	Closed to all motorized (basic custodial maintenance required to prevent resource damage and maintain for future use).
2	2,564	81.8	Maintained for high-clearance vehicles
3	275	8.8	Maintained for standard passenger cars
4	10	0.3	Maintained for standard passenger cars (higher level of user comfort than maintenance level 3)
Total	3,134	100	Not applicable

As indicated in table 24, most of the road miles in the plan area fall into the maintenance level 2 category. These are maintained for high-clearance vehicles. System roads that are not presently needed but may be required for future use are closed to motorized uses and classified as maintenance level 1. Many roads provide access to National Forest System lands and cross private property. Some system roads do not have legal access.

The road system is larger than can be adequately maintained. Road maintenance budgets have declined substantially over the last several years, resulting in a large backlog of deferred maintenance needs.

## Desired Conditions for Roads

### FW-DC-RD

1. The Cibola's transportation system and infrastructure are sufficient to support appropriate multiple uses of the national forest, they contribute to social and economic sustainability, and they are designed and maintained to blend with the natural environment while being cost effective.
2. Legal access is available to all National Forest System roads and lands.
3. Roads and bridges on the Cibola provide safe, legal, and reasonable access for traditional and cultural uses where in balance with other resources.
4. National Forest System roads are well marked and provide for traveler safety and information.
5. Unauthorized access is not present on the landscape.
6. Use of National Forest System roads does not hinder wildlife movement or interrupt critical life-cycle needs (such as calving, nesting, or breeding).

## Objective for Roads

### FW-OBJ-RD

1. Relocate, improve, or decommission 3 to 5 miles annually of system roads or unauthorized routes to protect ecosystems and watersheds.

## Guidelines for Roads

### FW-GDL-RD

1. Bridges and other infrastructure that serve as important habitat for at-risk wildlife species should be maintained unless demolition is necessary for safety.
2. To offset resource damage from construction of new or temporary roads, decommissioning or closing other roads, unauthorized routes, or trails should take place in the same watershed.
3. Temporary roads that support ecosystem restoration activities, fuels management, or other short-term projects should be decommissioned and rehabilitated upon project completion.
4. Reconstruction and rehabilitation of existing roads should be emphasized over new road construction.
5. When a practical alternative does not exist, the footprint of new roads constructed in the riparian management zone or 100-year floodplain should be minimized and the design should include mitigations to minimize or eliminate resource damage to ecological resources. The number of designated stream crossings should be limited to avoid impacts to these features.
6. During project planning, design, and implementation, unneeded roads should be decommissioned, restoring the watershed hydrologic functions and all habitats.
7. Infrastructure design, construction, reconstruction, and maintenance should prevent or mitigate impacts to water quality, cultural and historic resources, and terrestrial and aquatic species and should also decrease species mortality. Examples of preventing or mitigating impacts to species are avoiding reflective surfaces that would cause confusion and collision by birds and adding structures to accommodate appropriate movement for fish and other aquatic organisms.

8. After management activities occur in areas with high potential for unauthorized motorized vehicle use, methods (for example, barriers, signs, and law enforcement) should be used to prevent unauthorized motor vehicle use.
9. Low-water fords should be designed and maintained to mitigate effects on water quality and stream stability. Fords on perennial streams should be a priority.

## Management Approaches for Roads

### FW-MGAP-RD

1. Work with Federal, State, county, and local governments, partners, and other potentially affected users to build good relationships and communications involving roads and road usage.
2. Prioritize road system maintenance to provide safe travel and to prevent or mitigate resource damage. Collaborate on joint agreements to help defray the costs of road maintenance.
3. Provide early notification of changes in a road's status, significant deviations in traffic patterns, or both when duration is a month or greater.
4. Integrate transportation planning into all management activities and project design. Analyze unauthorized routes for either addition to the transportation system or decommissioning.
5. Follow regulatory requirements, best management practices, and other design features for management of system roads as appropriate for all applicable resources such as reducing the potential for wildlife entrapment.
6. Prioritize relocation, closure, or decommission system roads or unauthorized routes to meet desired conditions (such as in inventoried roadless areas), or improve protection of resources (for example, where roads are redundant, adversely impact flow regimes, or causing damage to cultural resources).
7. Use methods to relocate, close, or decommission system roads; close unauthorized routes; or a combination of these things that are appropriate to the setting, are designed and maintained to blend with the natural environment, and are effective in eliminating motor vehicle traffic.
8. Work with local governments, partners, and affected users to acquire legal access to all National Forest Service system roads.

## Facilities

Cibola National Forest personnel manage a variety of facilities, both buildings and non-transportation system structures. This classification includes administrative facilities (offices, warehouses, employee housing, and fire facilities); public recreational facilities (visitor centers, campground or picnic ground restrooms, storage buildings, etc.); associated water and wastewater treatment systems; dams; and communication towers. These facilities serve a variety of purposes and enable the Forest Service to fulfill its mission.

The Cibola has facilities being used for purposes not originally intended; for instance, warehouses have office workspaces instead of just fabrication and storage areas. Some recreation facilities and areas have been converted from one use type to another or multiple use types to try to meet the needs of the agency and the community within the budget and workforce established. The maintenance requirements across the portfolio of assets is increasing, with much of the preventative maintenance (annual activities, cyclic activities, or both) becoming deferred.

The accumulation of deferred maintenance leads to deterioration of performance, increased costs to repair, and a decrease in asset value.

As the workforce and mission services continue to evolve, the existing infrastructure may become obsolete from the originally designed purpose and will require managers to look at adaptive reuses, multi-uses, and other ways to address accumulating deferred maintenance. The facilities master plan, sustainable recreation plan, recreation site analysis, and other long-term planning documentation will dictate how infrastructure will be maintained, modified, or removed from service.

### Desired Conditions for Facilities

#### FW-DC-FAC

1. Facilities are safe, well maintained, and function as intended or are adapted to accommodate the current and anticipated demands.
2. Facilities are broadly accessible to national forest users, including persons with disabilities.
3. Facilities are energy-efficient, promote resource sustainability, and effectively serve their intended purpose.

### Guidelines for Facilities

#### FW-GDL-FAC

1. Facilities should be managed and maintained in a manner that meets the needs of the intended purpose and user and provides long-term sustainability of the resources and structure.
2. Facilities no longer used as intended should be repurposed to accommodate a new use or be decommissioned to reduce maintenance backlog and infrastructure deterioration and to protect public safety and health.
3. Emerging technologies and sustainable concepts consistent with the Built Environment Image Guide (Potyondy and Geier 2011) or most current references should be incorporated in facility design, maintenance, and renovation in order to improve energy efficiency, improve economy, conserve natural resources, improve functionality and ensure consistency with the scenic character of the Cibola National Forest.
4. Forest facilities, including those which are historic properties (listed or eligible for the National Register of Historic Places), should be available for Forest Service administration, public recreation, and interpretation, tribal events, and other uses.
5. Exterior lighting for new and reconstructed facilities should be designed to minimize light pollution, unless necessary to provide public safety and accessibility.

## Management Approaches for Facilities

### FW-MGAP-FAC

1. Work with Federal, Tribal, State, county, and local governments, universities, and other partners to prioritize current and long-term planning goals and investments, to conduct maintenance, or to repurpose excess infrastructure as outlined in facilities master plans, sustainable recreation plan, recreational facility analysis, preservation maintenance plans, and other resource planning documents while following applicable standards and guidelines.
2. Develop and implement comprehensive preventive maintenance plans for buildings and infrastructure to minimize major unplanned repairs or replacements.
3. Evaluate all infrastructure with employee occupancy subject to the Occupational Safety and Health Administration standards regularly to protect the health and safety of the Cibola's employees, volunteers, and the visiting public.
4. Manage potable water systems to serve the public or administrative needs. Decommission developed systems that no longer serve the current needs.
5. When work is being planned for administrative facilities and infrastructure that are historic resources, work with the heritage program staff and partnerships to administer and maintain facilities according to the facility master plan and any developed preservation maintenance plans (historic property plans) for administrative facilities and infrastructure that are historic resources.

## Chapter 3. Management Areas and Designated Areas

As a collection of diverse locations with different meanings and needs, the Cibola National Forest includes several areas and places that require different management direction than the overall forestwide direction provided in chapter 2. This direction differs from forestwide direction by providing additional focus, constraints, or allowances. It takes precedence over forestwide direction. There are two types of areas in this plan:

- **Management areas** are mapped areas that have the same direction for a specific purpose that applies to several places across the Cibola National Forest.
- **Designated areas** are also management areas but they differ from the management areas described above in that they are designated by statute through Congress or other higher levels of administration. Once established, the designation continues until a subsequent decision by the appropriate authority removes the designation.

### Management Areas

The following section describes management areas that occur on more than one ranger district throughout the Cibola National Forest.

Management areas that occur on more than one ranger district are:

- recommended wilderness areas;
- eligible wild and scenic rivers;
- conservation management area; and
- restoration management area.

Some management areas overlap with designated areas, such as inventoried roadless areas and the Continental Divide National Scenic Trail. Refer to the “Designated Areas” section of this chapter for a complete understanding of all related management direction for an area.

### Recommended Wilderness Areas

Recommended wilderness areas are National Forest System lands the Cibola staff has determined (through the plan revision process) have the potential to become included in the Wilderness Preservation System. Congress reserves the authority to make final decisions on wilderness designation. While recommended wilderness is not a designated area through either Congress or administratively, this category is included here to provide management direction for these areas while they remain in recommended status.

Five areas totaling 14,900 acres are recommended for inclusion in the National Wilderness Preservation System: four expansion areas to the existing Apache Kid Wilderness on the Magdalena District and one expansion area to the existing Manzano Wilderness on the Mountainair District. Refer to figures 14 and 15, Management Areas and Designated Areas, in appendix G.

## Desired Conditions for Recommended Wilderness Areas

### MA-DC-RECW

1. Recommended wilderness management areas maintain or enhance the wilderness characteristics they were evaluated to possess at the time of recommendation until congressional action.
2. Recommended wilderness management areas represent environments that are essentially unmodified and natural landscapes. Constructed features exist only when they reflect the historic and cultural landscape, when they are the minimum necessary for administration of the area as a recommended wilderness management area, or for the protection of resources.
3. Natural processes (insects, disease, blowdown, and fires) function within their natural ecological role or are mimicked (using prescribed fire). Unplanned human-caused fires are suppressed.
4. Recommended wilderness management areas provide recreation opportunities where social encounters are infrequent and occur only with individuals or small groups so that there are opportunities for solitude. Visitors experience self-reliance, challenge, and risk while enjoying freedom to pursue nonmotorized and nonmechanized activities with only the regulation necessary to protect wilderness characteristics in the recommended wilderness management areas.
5. Livestock grazing and acequia management continue to contribute to the long-term socioeconomic diversity and stability of local communities and cultural identity tied to a recommended wilderness management area.
6. Recommended wilderness management areas provide ecosystem services such as contributing to clean air and water, enhancing wildlife habitat, providing primitive recreation and solitude opportunities, and other wilderness characteristics.

## Standards for Recommended Wilderness Areas

### MA-STD-RECW

1. Natural processes shall be maintained within recommended wilderness management areas.
  - Insect and disease infestations shall be allowed to run their natural course except where they unacceptably threaten wilderness characteristics.
  - Nonnative invasive species shall be treated using methods, and in a manner, consistent with wilderness characteristics, or in order to allow natural processes to occur in a recommended wilderness management area.
2. The following activities are not authorized in recommended wilderness management areas:
  - New permanent or temporary roads, motorized trails, or mechanized (mountain bike or e-bike) trails for public access shall not be constructed or designated.
  - Commercial timber harvest shall not be authorized.
  - Infrastructure for renewable (such as wind, solar, and geothermal) and other energy developments for power generation shall not be authorized.
  - Sales or extraction of common variety minerals shall not be authorized.
  - Minerals leasing shall not be authorized.

- Motor vehicles, motorized or mechanized equipment (such as chainsaws or wheelbarrows), and mechanical transport, with the following exceptions:
  - ◆ unless specifically authorized for emergency use,
  - ◆ for management activities that move the area toward desired conditions while protecting existing wilderness characteristics over the long term, or
  - ◆ for the limited needs required for authorized management of a grazing allotment or acequia access, which will not result in long-term degradation to wilderness characteristics.
- Mechanized recreation.

### Guidelines for Recommended Wilderness Areas

#### MA-GDL-RECW

1. Activities in recommended wilderness management areas should maintain the wilderness characteristics until Congress acts on the recommended area, either designating it as wilderness or releasing it for other management.
2. Intervention in natural processes through management activities should only occur where this would move the area towards desired conditions, enhance or preserve wilderness characteristics, protect public health and safety within and adjacent to the recommended wilderness management area, or uphold other Federal laws and regulations.
  - Unplanned natural ignitions and planned ignitions should be allowed to reduce the risks and consequences of uncharacteristic wildfire, to increase apparent naturalness, or to enhance ecosystem function.
3. Recommended wilderness areas should be managed to preserve a very high or high scenic integrity objective as displayed on the desired scenic integrity objectives maps (appendix G).
4. Existing structures necessary for administration of the area should be maintained but not expanded to protect the area's wilderness characteristics. Maintenance of existing structures should be carried out in a manner that does not expand the evidence of installations, motorized use, or mechanized or motorized transport use beyond current conditions within the recommended wilderness management area.
5. Competitive events should not be permitted in recommended wilderness areas to maintain wilderness characteristics of solitude and primitive and unconfined recreation.
6. Prescribed fire should be considered to reduce the risks and consequences of uncharacteristic wildfire if necessary, to meet fire management objectives, to increase apparent naturalness, or to enhance ecosystem function in recommended wilderness areas.

## Eligible Wild and Scenic Rivers

There are no designated wild, scenic, or recreational rivers on the Cibola National Forest. In 2016, all rivers on the Cibola were evaluated to determine their eligibility as wild or scenic rivers. This evaluation resulted in seven eligible wild and scenic rivers on the national forest, for a total of 24.2 miles. Each river found to be eligible was assigned a preliminary classification, based on the condition and development level in and around the river at the time it was deemed eligible. Refer to figures 17 through 23, Eligible Wild and Scenic Rivers, in appendix G.

There are three possible classifications of eligible river segments, based on the level of development and human use in the river and along its corridor: wild, scenic, or recreational. The outstandingly remarkable values and preliminary classifications for the seven eligible wild and scenic rivers on the Cibola are described below.

### *Mount Taylor Ranger District*

- **Agua Remora, 1.9 miles:** Eligible for fish population outstandingly remarkable values, wild and scenic classification.
- **Little Water Canyon, 2.0 miles:** Eligible for botanical outstandingly remarkable values, wild and scenic classification.
- **Water Canyon 1, 2.2 miles:** Eligible for geology and scenery outstandingly remarkable values, wild classification.
- **Rinconada, 2.7 miles:** Eligible for wildlife population and habitat outstandingly remarkable values, wild and scenic classification.

### *Magdalena Ranger District*

- **West Red Canyon, 7.7 miles:** Eligible for historic and cultural outstandingly remarkable values, recreational classification.

### *Mountainair Ranger District*

- **Tajique Canyon, 3.9 miles:** Eligible for botanical, scenery, and recreation outstandingly remarkable values, recreational classification.

### *Sandia Ranger District*

- **Las Huertas Creek, 3.8 miles:** Eligible for historic and cultural and scenery outstandingly remarkable values, recreational classification.

Eligible wild and scenic rivers must be protected sufficiently to maintain the free flow and outstandingly remarkable values unless a determination of ineligibility or nonsuitability is made. A river determined through a suitability study to be not suitable shall no longer be considered eligible and interim protection measures will no longer apply. 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.

## Desired Conditions for Eligible Wild and Scenic Rivers

### MA-DC-WSR

1. The existing outstandingly remarkable values, free-flowing condition, and classifications of eligible wild and scenic river corridors are protected or enhanced until rivers are designated or released from consideration.

## Standards for Eligible Wild and Scenic Rivers

### MA-STD-WSR

1. The free flowing condition, classification, and outstandingly remarkable values for eligible wild and scenic river corridors shall be maintained when implementing projects.
2. When management activities are proposed that may compromise the outstandingly remarkable values, potential classification, or free-flowing character of an eligible wild and scenic river segment or corridor, a suitability study shall be completed for that eligible river segment prior to initiating activities.
3. Rivers found unsuitable for inclusion in the National Wild and Scenic River System shall be released from further consideration and restrictions of this section.
4. Where eligible wild and scenic river corridors occur within other management areas, the most restrictive management direction shall apply.
5. Existing or new mining activity must minimize surface disturbance, sedimentation, pollution, or visual impairment.

## Guidelines for Eligible Wild and Scenic Rivers

### MA-GDL-WSR

1. New roads or motorized trails should not be constructed within one-quarter mile of a wild or scenic eligible river segment.
2. Management activities should be consistent with the scenic integrity objectives as found in the scenery management system:
  - Very high: within eligible river corridors classified as wild
  - High: within eligible river corridors classified as scenic
  - Moderate to high: within eligible river corridors classified as recreational
3. Management activities should be consistent with the recreation opportunity spectrum classes:
  - Semi-primitive, nonmotorized recreation opportunity spectrum: within eligible river corridors classified as wild
  - Semi-primitive, nonmotorized to semi-primitive motorized recreation opportunity spectrum: within eligible river corridors classified as scenic
  - Semi-primitive to roaded natural, motorized recreation opportunity spectrum: within eligible river corridors classified as recreational.

## Management Approaches for Eligible Wild and Scenic Rivers

### MA-MGAP-WSR

1. Consider opportunities for enhancing outstandingly remarkable values in all project management activities within an eligible wild and scenic river corridor.

## Conservation Management Area

This area is composed of three geographic areas containing a total of 36,547 acres: portions of the San Mateo area (11,380 acres), the Datil area (10,179 acres) on the Magdalena Ranger District, and the Guadalupe area (14,988 acres) on the Mount Taylor Ranger District. This management area identifies and emphasizes the need to increase the scale and intensity of certain management actions compared to the general forestwide plan components. Refer to figures 13 and 14, Management Areas and Designated Areas, in appendix G.

These areas protect and enhance values such as uninterrupted wildlife habitat, solitude, and scenic integrity and provide socioeconomic opportunities that emphasize backcountry and primitive recreation. Locations for these management areas are remote with primarily nonmotorized access along with opportunities for solitude within an expansive terrain absent of significant human development. The setting in these areas provide solitude, scenic views, and access to unique features and places including culturally significant areas for local Tribes. The areas are also valued for their premiere big game and bird hunting, wildlife viewing, and high-quality wildlife habitat for both game and nongame bird species.

## Desired Conditions for Conservation Management Area

### MA-DC-CONS

1. Primitive, unconfined, and backcountry types of recreation opportunities are emphasized, to provide opportunities for solitude. Examples of primitive-type recreation activities to be emphasized include observing wildlife, hiking, backpacking, horseback riding, fishing, cross-country skiing, dispersed camping, enjoying nature, and big game and bird hunting.
2. Apparent naturalness reflects ecological conditions normally associated with the area without human intervention.
3. Motorized access remains limited to protect high-value natural and tribal cultural resources within the area, as well as to maintain the emphasis on backcountry and primitive recreation opportunities.
4. Motorized access for existing permitted grazing and range improvements remains available to local communities.

## Standards for Conservation Management Area

### MA-STD-CONS

1. The construction of new roads or motorized trails within the area is prohibited to emphasize primitive recreation opportunities.
2. Minerals leasing shall not be authorized in Conservation Management Areas.

## Guidelines for Conservation Management Area

### MA-GDL-CONS

1. Forest and vegetation management should be limited to wildlife habitat and range improvement projects, with planned and unplanned fire as the primary tool where there is a demonstrated need.
2. Ponderosa pine and mixed conifer should be primarily treated via planned and unplanned fire ignition, except within road corridor buffers adjacent to roads designated in approved travel management plans. These areas would not be classified as suitable timber.

3. Facilities should be made of materials that complement the surrounding landscape with an emphasis on providing natural resource protection rather than user comforts.

## Management Approaches for Conservation Management Area

### MA-MGAP-CONS

1. Within a 660-foot corridor on each side of the roads approved in travel management plans, the restoration goal would be to mechanically restore ponderosa pine, dry mixed conifer, meadows, encroached grasslands, and woodland ecotypes. The purpose of this restoration would be to create shaded fuelbreaks to use as holding features during the management of planned and unplanned ignitions, to allow safe ingress and egress for the public and Forest Service personnel, and to create fuelwood opportunities for the public.
2. Restoration activities would focus on aspen regeneration through thinning and planned and unplanned fire.
3. Within the identified road corridors for roads designated in approved travel management plans, personal use and commercial wood product removal would occur to reduce excessive fuel loading levels. Personal use and commercial wood-gathering would not be permitted outside of these buffers.

## Restoration Management Area

Lands within the restoration management areas are suitable for timber production. These management areas contain a concentration of sites with a high capital investment, such as developed recreation sites (campgrounds, trailheads, day use areas, trails, and administrative sites), recreation residences, fire lookouts, telecommunication sites, and facilities managed under special use permits. The restoration management areas are composed of six distinct geographic locations totaling 318,148 acres: Mount Taylor (3,132 acres) and the Zuni Mountains (176,941 acres) on the Mount Taylor Ranger District, the San Mateo Mountains (57,840 acres) on the Magdalena Ranger District, the Manzano (40,087 acres) and Gallinas Mountains (4,388 acres) on the Mountainair Ranger District, and the Sandia Mountains (35,760 acres) on the Sandia Ranger District. Refer to figures 13 through 16, Management Areas and Designated Areas, in appendix G.

The focus for management of these areas is on landscape-based restoration projects that are currently being implemented or are under analysis with pending decisions. Emphasis is on intensive management, specifically on mechanical thinning, to reduce fire hazard, protect infrastructure, and to provide fuelwood collection where appropriate and in balance with other resource needs. Treatments would occur more often than in the general forest area using both mechanized methods and prescribed fire where appropriate in balance with other resource needs. Timber harvested in these areas contributes to regulated timber harvest estimates where appropriate in balance with other resource needs.

The restoration management areas are identified in certified community wildfire protection plans and wildland-urban interface areas. Wildland-urban interface is the wildland area surrounding resident populations and other human developments having special significance that are at imminent risk from wildfire. Since residential populations are increasing within wildland-urban interface areas and forests are departed from reference conditions, these communities are at risk from uncharacteristic wildfires.

## Desired Conditions for Restoration Management Area

### MA-DC-REST

1. Ecosystems are resilient to drought, insects, disease, and uncharacteristic wildfires.
2. The composition, density, structure, and mosaic of vegetative conditions reduce uncharacteristic wildfire hazard to local communities.
3. Fuelwood is readily available to communities and partners in balance with other resource constraints.

## Guidelines for Restoration Management Area

### MA-GDL-REST

1. Temporary roads may be constructed where appropriate and in balance with other resources to facilitate the removal of wood products, and mitigations should be taken to meet other resource desired conditions once roads are no longer needed after projects are complete.
2. The ability to access areas for vegetation treatments and removal of wood products should help determine the nature and frequency of road maintenance.
3. Management within the area should provide a balance of vegetation treatment opportunities and recreation opportunities.
4. Forest management should result in wildfires that are low- to mixed-severity surface fires that limit loss of structures or ecosystem function.

## Management Approaches for Restoration Management Area

### MA-MGAP-REST

1. Work closely with adjacent landowners and communities, particularly planning and zoning departments, to encourage new and existing developments that protect people, property, and natural resources from wildfire.
2. Partner with communities and organizations on workforce development programs to build capacity for a wide variety of restoration jobs (mechanized harvesters, wood processors, and thinning crews).
3. Collaborate with organizations that promote training and education of youth in natural resource management.
4. Support local industry's efforts to utilize wood products from restoration treatments in order to sustain wood processing facilities and jobs.

## Designated Areas

Designated areas are also management areas, but they differ in that they are designated by statute through Congress or other higher levels of administration. Once established, the designation continues until a subsequent decision by the appropriate authority removes the designation, which is outside the scope of this plan.

Designated areas provide many ecosystem services. Designated special areas contribute to social sustainability by connecting people to their natural and cultural heritage, and providing economic benefits to surrounding communities. They promote the preservation of cultural traditions including historical features that contribute to social wellbeing through education, and provide

recreational opportunities. Economic sustainability is supported by increased employment opportunities, supporting small businesses, and sharing Federal receipts with county and state governments. Designated areas contribute to ecological sustainability as well, by preserving intact natural systems and their individual components.

Significant caves are also considered designated areas. Plan components for these areas are described under the “Significant Caves” section.

The following section first describes designated areas that occur on more than one ranger district, followed by designated areas that occur on only one ranger district. Designated areas that occur on more than one district are:

- Continental Divide National Scenic Trail
- inventoried roadless areas
- scenic byways
- designated wilderness areas
- significant caves

Designated areas that occur on only one ranger district are:

- Magdalena Ranger District – Langmuir Research Site and Magdalena Ridge Observatory
- Sandia Ranger District – Bernalillo Watershed Research Natural Area, Withdrawal Area, Sandia Cave National Historic Landmark, and T’uf Shur Bien Preservation Area

## Designated Wilderness Areas

The Cibola National Forest manages four designated wilderness areas totaling 138,378 acres. Designated wilderness areas provide places where natural processes dominate and the impacts of people are minimized. Congress preserved these places to pass on to future generations. Wilderness provides large areas for the study of nature and unique scientific and educational opportunities. Table 25 lists the four designated wilderness areas on the three mountain ranger districts of the Cibola. Refer to figures 14 through 16, Management Areas and Designated Areas, in appendix G.

**Table 25. Designated wilderness areas by ranger district**

Wilderness	Ranger District	Acres	Act	Year
Apache Kid	Magdalena	44,626	New Mexico Wilderness Act	1980
Withington	Magdalena	19,000	New Mexico Wilderness Act	1980
Manzano Mountain	Mountainair	36,875	Endangered American Wilderness Act	1978
Sandia Mountain	Sandia	37,877	Endangered American Wilderness Act	1978

### *Magdalena Ranger District*

**Apache Kid Wilderness** – Under the New Mexico Wilderness Act, Congress designated the Apache Kid Wilderness in 1980. The wilderness is named for the Apache Kid, an Apache Indian scout employed by the U.S. Army who was a legendary outlaw of the late 19th century in this area. His gravesite is located and marked in San Mateo Canyon.

This is a remote wilderness where visitors can experience a high degree of solitude. However, a number of trailheads provide access to the wilderness from all sides. The trailheads are accessible by National Forest System roads outside the wilderness boundary. There is a developed campground, Springtime, to the south in Nogal Canyon.

Narrow, steep canyons bisect the peaks of the southern San Mateo Mountains where elevations exceed 10,000 feet. The vegetation is typical of the region, with pinyon-juniper woodland at lower elevations; spruce, fir, and aspen at higher elevations; and ponderosa pine in between.

Human visitors are few, but wildlife is abundant here including Coue's white-tailed deer, mule deer, elk, black bear, bobcat, cougar, antelope, javelina, coyote, rabbit, squirrel, and quail. There are 68 miles of maintained and unmaintained trails. The Crest Trail, which leads to the Apache Kid's gravesite, follows about 13 miles of mountain crest. Water is limited to less than a dozen semi-dependable springs, most of which dry up in summer.

**Withington Wilderness** – This wilderness was designated under the New Mexico Wilderness Act in 1980. This wilderness is located in the northern extreme of the San Mateo Mountains and almost entirely on the eastern slopes. Elevations range from 6,800 feet to 10,100 feet atop Mount Withington, which marks the center of the western boundary. Mixed conifers grow in the shady bottoms of steep-walled canyons here, giving way to a woodland of pinyon and juniper as the ground becomes more open and drier, and the vistas stretch eastward toward the Rio Grande. In the lowest land near the eastern boundary, there are small stands of ocotillo.

Many of the Withington trails are seldom used, and promise solitude for the adventurous. Winters bring snow, and summers are often hot and dry. During the desert monsoon season (July and August), rainwater may flood the narrow canyons, but most of the year, there is no water. The wilderness is accessible from trailheads located along the west, south, and east sides. Beartrap and Hughes Mill Campgrounds provide developed camping facilities on the west side in Bear Trap Canyon.

### *Mountainair Ranger District*

**Manzano Mountain Wilderness** – Congress designated the Manzano Mountain Wilderness under the Endangered American Wilderness Act of 1978. In the early 1700s, explorers visiting a small village on the eastern edge of these mountains discovered very old manzanos (apple trees), hence the area's name. Spread out across the western slope of the Manzano Mountain range, this wilderness varies in elevation from about 6,000 feet to 10,098 feet atop Manzano Peak. Pinyon and juniper grow at lower elevations, gradually changing to ponderosa pine and then spruce, fir, and aspen higher up. This is mostly steep and rugged terrain cut with canyons and marked with outcroppings of rock.

Thousands of raptors migrate along the Manzano Mountains in spring and fall as they work their way between Canada and Mexico. More than 64 miles of a well-developed trail system provide access to the wilderness. The wilderness can be accessed from numerous trailheads along the wilderness boundary, and there are six developed campgrounds on Mountainair District near the east side of the wilderness.

### *Sandia Ranger District*

**Sandia Mountain Wilderness** – Congress designated the Sandia Mountain Wilderness under the Endangered American Wilderness Act of 1978. The area lies primarily on the western slope of the Sandia Mountains, but it crosses over the crest to the eastern side of the mountain at the north and south ends. Spruce and fir dominate the high country, with stands of mixed conifers just below.

Many raptors migrate through these mountains in spring and fall. Mule deer and black bear inhabit the area. A major recreation feature, the Crest Trail, runs along the main ridge of the Sandia Mountains for 26.54 miles, at an elevation averaging 10,000 feet. There are 117 miles of trails in varied condition. The wilderness can be accessed from a number of trailheads on the west side from Cibola lands and City of Albuquerque Open Space land, as well as the crest near the tram, or the Sandia Crest Scenic and Historic Byway on the east side.

Management emphasis is to provide quality wilderness experience opportunities through maintenance of wilderness character and values. Dispersed recreation managed within established capacities and compatible with the needs of important wildlife species is the key objective. Livestock grazing is not permitted.

### Desired Conditions for Wilderness

#### DA-DC-WILD

1. Wilderness character and values are enhanced and/or maintained.
2. Wilderness provides opportunities in accordance with the Wilderness Act. Social encounters are infrequent and occur only with individuals or small groups in order to provide opportunities for solitude and primitive, unconfined recreation. Self-reliance is required.
3. Wilderness provides ecosystems services such as clean air and water, enhancing wildlife habitat, primitive recreation opportunities, and other values of wilderness character.
4. Wilderness represents an environment that is essentially an unmodified and natural landscape. Constructed features are rare and provided primarily for resource protection. When present, they reflect the historic and cultural landscape and utilize natural or complementary materials.
5. Natural processes are maintained within wilderness. Fires function in their natural ecological role within wilderness and species are predominantly native.

### Standards for Wilderness

#### DA-STD-WILD

1. Group size limit shall be 15 persons and 15 recreational livestock per group, except as determined under special use permit, emergency services, formal agreements, and management activities for maintaining wilderness character.
2. Outfitter-guide activities shall include appropriate wilderness practices, such as “leave no trace” principles, and incorporate awareness for wilderness values in their interaction with clients and others.
3. A minimum requirements analysis must be used when considering nonconforming or prohibited uses in designated wilderness.

## Guidelines for Wilderness

### DA-GDL-WILD

1. Management activities should use methods consistent with maintaining or improving wilderness character in designated wilderness.
2. Management activities for intervention in natural processes (such as fire, insects, and disease) should only occur where this would move the area towards desired conditions; improve, preserve, or maintain wilderness character; protect public health and safety within and adjacent to wilderness; or uphold other Federal laws and regulations.
3. Within designated wilderness, management activities should be consistent with the scenic integrity objective of very high or high, as displayed on the desired scenic integrity objectives maps (appendix G).
4. Trails in wilderness or leading into wilderness areas should be designed, constructed, or reconstructed to control or limit resource degradation in a sustainable manner (trail class 1 or 2).
5. Signage should be limited to those essential for resource protection and user safety, to retain the wilderness character of self-reliance and challenging recreation opportunities.
6. Naturally occurring fires should be allowed to perform their natural ecological role.
7. Fire operations and associated activities within designated wilderness areas should minimize effects to wilderness character (using minimum impact suppression techniques, and locating fire camps, helispots, and temporary facilities outside the area).
8. Nonnative, invasive species should be treated using methods, and in a manner, consistent with wilderness character to allow natural processes to predominate in designated wilderness.

## Management Approaches for Wilderness

### DA-MGAP-WILD

1. Work with partners and Federal, Tribal, State, county, and local governments to ensure management is consistent with adjacent wilderness areas, recommended wilderness areas, and wilderness areas administered by other agencies.
2. Collaborate on projects and activities that cultivate trails maintenance skills and construction; and interpretation, education, and stewardship to users about preserving wilderness character.
3. Consider developing education, trail design, patrols, and other methods to discourage and enforce no bicycle use in wilderness.
4. Collaboratively develop and design plans and projects with partners and users to evaluate trails for their need, sustainability, and impact on wilderness character (for example, reconstruct trails that have the highest potential for impacts to wilderness character, decommission unused trails or realign or reconstruct needed trails, and remove nonconforming structures).
5. Consider managing and preserve preserving wilderness character through the elements outlined in the Forest Service Wilderness Stewardship Performance Guidebook or most recent comparable document.

6. Consider adapting management and using corrective measures if overuse causes unacceptable resource damage. Overuse can be determined through monitoring of wilderness stewardship performance elements or comparable wilderness character monitoring, other resource analyses, wilderness management plans, or professional judgment.

## **Inventoried Roadless Areas**

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. These areas also provide biological diversity, which is important for wildlife habitat and the long-term survival of many at-risk species. Inventoried roadless areas provide opportunities for dispersed outdoor recreation, opportunities that diminish as open space and natural settings are developed elsewhere. They serve as buffers against the spread of nonnative invasive plant species and provide reference areas for study and research.

Cibola National Forest personnel manage 13 inventoried roadless areas totaling 239,143 acres. Five are located on the the Mount Taylor Ranger District and eight are on the Magdalena Ranger District. Refer to figures 24 and 25, Existing Inventoried Roadless Areas, in appendix G.

### **Mount Taylor Ranger District**

- Mount Taylor Inventoried Roadless Area: 6,355 acres
- Ranger Cabin Inventoried Roadless Area: 6,124 acres
- Cerro Alesna Inventoried Roadless Area: 6,184 acres
- Guadalupe Inventoried Roadless Area: 13,619 acres
- Ignacio Chavez Contiguous Inventoried Roadless Area: 993 acres

### **Magdalena Ranger District**

- Madre Mountain Inventoried Roadless Area: 19,839 acres
- Datil Inventoried Roadless Area: 13,957 acres
- Scott Mesa Inventoried Roadless Area: 39,515 acres
- Goat Spring Inventoried Roadless Area: 5,755 acres
- Ryan Hill Inventoried Roadless Area: 34,200 acres
- White Cap Inventoried Roadless Area: 8,036 acres
- Apache Kid Contiguous Inventoried Roadless Area: 67,542 acres
- San Jose Inventoried Roadless Area: 16,950 acres

The Chief of the Forest Service 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 activities, which are reviewed by the regional forester:

- Any necessary timber cutting or removal or any road construction or 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, proposed, or sensitive 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 variation that would be expected to occur under natural disturbance regimes of the current climatic period
  - ◆ for the 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

## Desired Conditions for Inventoried Roadless Areas

### DA-DC-IRA

1. Inventoried roadless areas encompass large, relatively undisturbed landscapes and unfragmented landscapes that function as biological strongholds for populations of threatened and endangered species. They serve as safeguards against the spread of invasive species and provide reference areas for study and research.
2. In inventoried roadless areas, ecosystems are intact and function to provide a full range of ecosystem services.
3. Inventoried roadless areas appear natural, have high scenic quality, and provide opportunities for dispersed recreation.

## Guidelines for Inventoried Roadless Areas

### DA-GDL-IRA

1. Inventoried roadless areas should be managed for semi-primitive nonmotorized and semi-primitive motorized recreation settings as defined in the recreation opportunity spectrum.<sup>39</sup>
2. Management activities should be consistent with the scenic integrity objective of high in inventoried roadless areas as defined in the scenery management system.

## Management Approach for Inventoried Roadless Areas

### DA-MGAP-IRA

1. Prioritize decommissioning roads within inventoried roadless areas to maintain roadless character where possible.

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<sup>39</sup> The following often characterize inventoried roadless areas: (1) high quality or undisturbed soil, water, and air; (2) sources of public drinking water; (3) diversity of plant and animal communities; (4) habitat for threatened, endangered, proposed, candidate, and species of conservation concern and for those species dependent on large, undisturbed areas of land; (5) primitive, semi-primitive non-motorized, and semi-primitive motorized classes of dispersed recreation; (6) reference landscapes; (7) natural appearing landscapes with high scenic quality; (8) traditional cultural properties and sacred sites; and (9) other locally identified unique characteristics (66 FR 3244).

## Scenic Byways

The National Scenic Byways program was established in 1991 to recognize, preserve, and enhance selected roads throughout the Nation. The program aims to promote tourism and economic development in rural communities and provide opportunities to explore the beauty, history, and natural heritage of the national forests.

The National Scenic Byways Program is administered by the U.S. Department of Transportation, Federal Highway Administration. The U.S. Secretary of Transportation recognizes these designated roads based on one or more intrinsic qualities—archaeological, cultural, historic, natural, recreational, or scenic (U.S. Department of Transportation 1995).

The most important management tool and metric associated with scenic byways is the scenery management system, which is used to manage, maintain, and improve the viewshed associated with the designated byway. Secondary is the recreation opportunity spectrum, which further defines the recreation setting, development levels, and opportunities to users within the byway corridor.

Scenic byways provide the important cultural ecosystem service of access to, and experience of, natural settings. In some cases, people who may not be able to hike trails can still access the Cibola National Forest and its accompanying cultural, historic, and social values and traditions via motorized recreation on scenic byways. Scenic views can also contribute to psychological and emotional health, which are important cultural ecosystem services. When people use the scenic byways to view outstanding scenic views or historic elements, they also spend time and money in small communities; the scenic qualities created by nurturing supporting, regulating, and provisioning ecosystem services thereby support rural economic development. The scenic byways may also contribute to these other ecosystem services by drawing people away from more sensitive areas for their recreation, thereby providing space for biodiversity and other supporting and regulating ecosystem services to function undisturbed.

Three national scenic byways are within the Cibola area of influence, and two scenic byways designated by the State of New Mexico are within the plan area (Salt Missions Trail and Trail of the Ancients). Refer to figures 13, 15, and 16, Management Areas and Designated Areas, in appendix G. The following plan direction only applies to the national byways listed below:

- Route 66 National Scenic Byway is sometimes called “The Mother Road.” This byway also carries a historic state designation.
- El Camino Real National Scenic Byway
- Turquoise Trail National Scenic Byway that includes the Sandia Crest Scenic and Historic Byway

### Desired Conditions for Scenic Byways

#### DA-DC-SB

1. Viewsheds from scenic byways are consistent with desired conditions for scenery. The immediate foreground (300 feet on either side) of these travelways is natural appearing and generally appears unaltered by human activities.

## Guidelines for Scenic Byways

### DA-GDL-SB

1. Visual impacts from vegetation treatments, recreation uses, range developments, and other structures should meet scenery objectives as identified on the scenic integrity objective map.
2. To maintain and protect the scenic quality of scenic byways, management activities planned and implemented within the foreground (up to 0.5 mile on either side) should be consistent with the scenic integrity objective of high as defined in the scenery management system.

## Management Approaches for Scenic Byways

### DA-MGAP-SB

1. Work together with the New Mexico Department of Transportation and Department of Tourism, counties, cities, and local communities to promote economic development by improving services and interpretive opportunities on byways.
2. Collaboratively develop and promote roadside interpretive services along scenic byways. Signs, kiosks, exhibits, and other educational tools (such as brochures, websites, and social media) may provide interpretive, education, and safety information along scenic byways, in adjacent recreation sites, and at visitor contact points such as ranger stations.

## Continental Divide National Scenic Trail

The National Trails System Act of 1968, as amended, established a system of congressionally designated, long-distance trails located to provide maximum outdoor recreation potential and promote the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the lands through which such trails may pass. The Continental Divide National Scenic Trail was designated by Congress in 1978. An approximately 45-mile segment exists on the Mount Taylor Ranger District, running generally northeast from a trailhead near Grants. Refer to figure 13, Management Areas and Designated Areas, in appendix G.

The Continental Divide National Scenic Trail is a quiet, continuous, mountain path that traverses 3,100 miles along the spine of the Rocky Mountains from Mexico to Canada. The trail is the highest and most rugged national scenic trail, reaching the 14,270-foot summit of Grays Peak in Colorado and connecting the Chihuahuan Desert of New Mexico to majestic coniferous forests, remote valleys, and wild, snow-capped mountains and glaciers. It is one of the most spectacular and rugged trails in the United States.

The nature and purposes of the Continental Divide National Scenic Trail are to provide high-quality scenic and primitive hiking and horseback riding opportunities and to conserve the natural, historic, and cultural resources along the trail corridor.

Motorized use is allowed on the Continental Divide Trail only under certain conditions that fall within exemptions stated in the National Trails System Act. In general, established motorized uses, both summer and winter, are allowed to continue, but new motorized uses will not be designated on the trail.

## Desired Conditions for Continental Divide National Scenic Trail

### DA-DC-CDNST

1. The Continental Divide National Scenic Trail provides high-quality scenic, primitive hiking, and pack and saddle stock opportunities. The natural, historic, and cultural resources along the trail corridor are conserved. Other activities and opportunities are allowed when compatible with the nature and purposes of the trail.
2. Viewsheds from the Continental Divide National Scenic Trail are consistent with desired conditions for scenery, and have high scenic values. The foreground of the trail (up to 0.5 mile on either side) is natural appearing.
3. Visitors are aware of the Continental Divide National Scenic Trail corridor and the nature and purposes of the trail designation.

## Standards for Continental Divide National Scenic Trail

### DA-STD-CDNST

1. Surface occupancy for oil, gas, or geothermal energy leasing activities shall not occur within the Continental Divide National Scenic Trail corridor.
2. Management of the trail shall comply with the most recent Continental Divide National Scenic Trail comprehensive plan. Best available scientific information can be used in lieu of the comprehensive plan if the plan is out of date with science.
3. Permits shall not be issued for salable or common variety mineral extraction within Continental Divide National Scenic Trail corridor.
4. Motorized use shall not be authorized on the Continental Divide National Scenic Trail except on segments currently located on a road or trail designated for motorized use per the motor vehicle use map. No new motorized special use permits, or events shall be permitted on the Continental Divide National Scenic Trail.

## Guidelines for Continental Divide National Scenic Trail

### DA-GDL-CDNST

1. To be consistent with the most current comprehensive management plan, the Continental Divide National Scenic Trail route should be relocated to occur off roads in the life of the plan. The trail will be located as close to the geographic Continental Divide as possible.
2. To protect or enhance scenic qualities of the Continental Divide National Scenic Trail, management activities should be consistent with the scenic integrity objective of high within the foreground of the trail (up to 0.5 mile on either side).
3. Management projects and activities within the Continental Divide National Scenic Trail corridor (up to 0.5 mile on either side) should be compatible with the original intent for the trail's national designation as well as current management direction.
4. If management activities result in short-term impacts to the scenic integrity of the Continental Divide National Scenic Trail, mitigation measures should be included to meet the scenic integrity objectives within and adjacent to the trail corridor (within visible foreground of the trail at a minimum, up to 0.5 mile on either side of the trail). Examples of mitigation measure are screening, feathering, and other scenery management techniques for forest health projects.

5. In order to promote a nonmotorized setting, the Continental Divide National Scenic Trail should not be permanently relocated onto routes open to motor vehicle use.
6. To maintain the outstanding features of the Continental Divide National Scenic Trail and be compatible with the surrounding environment, all facilities should blend in with the surrounding environment. The minimum trail facilities necessary should be provided to protect resource values and for health and safety, not for promoting user comfort.
7. To retain the character for which the trail was designated, management actions, including special use authorizations, should be consistent with the recreation opportunity spectrum classes of the Continental Divide National Scenic Trail.
8. Uses that could conflict with the nature and purpose of the Continental Divide National Scenic Trail should be prohibited when it is determined that the use would interfere with the nature and purpose of the trail.
9. Special use authorizations for new communication sites, utility corridors, and renewable energy sites should not be visible within the trail corridor foreground (up to 0.5 mile) and should be visually subordinate in the middle ground viewshed to protect the trail's scenic values.
10. Linear utilities and rights-of-way in the Continental Divide National Scenic Trail corridor should be avoided or limited to a single crossing of the trail to maintain the integrity of the trail corridor unless additional crossings are documented as the only prudent and feasible alternative.
11. New road or motorized trail construction across or adjacent to the Continental Divide National Scenic Trail should be avoided unless needed for resource protection, provide access to public lands, or protect public health and safety.
12. Using the Continental Divide National Scenic Trail for landings or as a temporary road should not be allowed. Hauling or skidding along the trail itself should be allowed only when design criteria are used to minimize impacts to the trail infrastructure and where the trail is currently located on a designated open road and no other haul route or skid trail options are available.
13. Unplanned fires in the foreground (up to 0.5 mile) of the Continental Divide National Scenic Trail should be managed using minimum impact suppression tactics, or other tactics appropriate for the protection of values and resources for which the trail was designated. Prescribed fires in the foreground of the trail should be managed to incorporate the values of the trail.
14. Use of heavy equipment for fireline construction within the Continental Divide National Scenic Trail should not be allowed unless necessary for emergency protection of property and safety.

### Management Approaches for Continental Divide National Scenic Trail

#### DA-MGAP-CDNST

1. Collaborate with Federal, State, Tribal, county, and local governments, volunteer groups, partners, and adjacent landowners to plan, develop, relocate as needed, maintain, and manage the trail and facilities to promote economic development, maintain the character of the surrounding landscape, and to support trail users with low-impact principles.

2. Provide interpretation and signage where appropriate along the trail.
3. Use side and connecting trails to access points of interest or provide supply points away from the main trail.

## **Withdrawal Area**

This 20,486-acre management area is adjacent to the Albuquerque metropolitan area in the Sandia Ranger District. These withdrawal areas were established by Public Land Order 995 (as modified by Public Land Order 5692) and Public Land Order 4569. This area is closed to public entry for security and safety purposes. Kirtland Air Force Base manages 15,891 acres under withdrawal for military purposes through the Department of Defense. Department of Energy manages a 4,595-acre area withdrawn as a safety buffer for testing in Lurance Canyon. The area will remain under joint control of the Forest Service, U.S. Air Force, and Department of Energy until released from the public land orders withdrawing the areas. Refer to figure 16, Management Areas and Designated Areas, in appendix G.

Management emphasis will be to improve wildlife habitat diversity and decrease the threat of escaped wildfire from either entity within the intent of established memoranda of agreement. All resource activities will be coordinated between the Forest Service, Department of Defense, and Department of Energy. All public use of the area will be restricted and enforced by personnel of the Departments of Defense and Energy.

### **Desired Conditions for Withdrawal Area**

#### **DA-DC-KAFB**

1. Department of Defense and Department of Energy withdrawal lands are jointly managed with the Cibola National Forest in fulfillment of agency missions and to improve wildlife habitat diversity, maintain cultural resources, and provide for wildfire safety.

### **Management Approaches for Withdrawal Area**

#### **DA-MGAP-KAFB**

1. Coordinate with Department of Energy and Department of Defense staff to release any unneeded lands from withdrawal for return to public access for multiple use.
2. Coordinate management activities through use of a memorandum of agreement.
3. Coordinate Forest Service wildlife habitat improvements with U.S. Air Force and Sandia Laboratories personnel.
4. Maintain a fire mutual aid agreement with Kirtland Air Force Base, Department of Defense.
5. Coordinate with Departments of Energy and Defense personnel to implement vegetation thinning and prescribed burning activities to improve forest health and decrease threat of wildfires.
6. Coordinate National Forest System road development and maintenance with the Departments of Energy and Defense personnel.
7. Coordinate with Departments of Energy and Defense personnel to close or abandon roads that are no longer necessary to carry out their respective missions.

8. Coordinate with Departments of Energy and Defense personnel to rehabilitate roads that are contributing to soil loss and sedimentation but are still necessary to carry out their missions.
9. Identify and maintain withdrawal area boundary with signs for public safety.
10. Identify and maintain collaborative opportunities for fuels reduction and restoration activities.

## **Bernalillo Watershed Research Natural Area**

Research natural areas are administratively designated by the regional forester, with concurrence of station directors, and managed to maintain the natural features for which they were established. Because of the emphasis on natural conditions, they are excellent areas for studying ecosystems or their component parts and for monitoring succession and other long-term ecological change. The Bernalillo Watershed Research Natural Area is the only research natural area on the Cibola National Forest. Located on the Sandia Ranger District in the Bernalillo watershed, the research natural area was designated in 1997 for its grassland ecosystem natural features. It comprises 299 acres of juniper grassland and 731 acres of semi-desert grassland. It has not been grazed by domestic livestock since 1953. Refer to figure 16, Management Areas and Designated Areas, in appendix G.

### **Desired Conditions for Research Natural Area**

#### **DA-DC-RNA**

1. The natural integrity of the grama-galleta, steppe, and juniper grassland ecosystems and associated natural features are protected and maintained.
2. The area serves as a reference for the study of natural processes and natural features and provides an example of naturally occurring ecosystems in unmodified conditions for research and educational purposes.

### **Standards for Research Natural Area**

#### **DA-STD-RNA**

1. Public access and management activities shall be consistent with the purposes of the research for this area.
2. Salable minerals extraction shall not be allowed.
3. Livestock grazing shall not be allowed.
4. Removal of special forest products for commercial purposes and personal use (including firewood) shall not be permitted or authorized, unless it helps meet the research natural area desired conditions.
5. To minimize impacts to ecological values, cross-country travel (off National Forest System trails) is prohibited, and special use permits shall not be authorized or permitted.
6. Campfires shall not be authorized or permitted.
7. Camping shall not be authorized or permitted.

### **Guidelines for Research Natural Area**

#### **DA-GDL-RNA**

1. Management activities should be consistent with the scenic integrity objective of the research natural area.

2. Management measures and controls should be used to protect the research natural area.
3. Research special use authorizations should limit harm to sensitive resources, unique features, and species within the research natural area.
4. Vegetation manipulation should be allowed only when necessary to achieve or maintain the ecological conditions for which the area is being studied in research natural areas.
5. Mineral withdrawal on the Bernalillo watershed should be maintained. Mineral leasing may be permitted in the research natural area, but surface occupancy should be excluded.

## Management Approaches for Research Natural Area

### DA-MGAP-RNA

1. Explore opportunities for collaborative partnerships for interpretation and monitoring for the research natural area and on-site stewards.
2. Incorporate signage to provide education, interpretation, and information to the public about the research natural area purpose, its boundary, and permitted and prohibited activities.
3. Work with appropriate agencies and universities to explore scientific opportunities for research.

## Significant Caves

Significant caves are considered invaluable and irreplaceable parts of the Nation's natural heritage and in some cases are threatened due to improper use, increased recreational demand, urban spread, and a lack of specific statutory protection.

The Federal Caves Resources Protection Act of 1988, directs the Secretary of Agriculture to prepare and maintain a list of significant caves. The criteria for listing are in 36 CFR part 290.3(c). The Forest Service policy is to identify and manage significant caves. The Federal Caves Resources Management and Protection Act defines a significant cave as a cave located on National Forest System lands that has been evaluated and shown to possess features, characteristics, values, or opportunities in one or more of the following resource areas: biota; cultural; geologic, minerals or paleontologic significance; hydrologic; recreational; or educational-scientific for scientific, educational, or recreational purposes; and which has been designated "significant" by the forest supervisor.

Depending on the criteria of each significant cave, they can provide supporting ecosystem services (geologic-mineralogic-paleontologic or biota values), regulating ecosystem services (hydrological values), and cultural ecosystem services (cultural values; recreational, educational, or scientific values).

Cave resources that include wildlife habitat, are most notably designated for bat populations, such as pale Townsend's big-eared bat. Risks to bats include activities known to impact habitat such as mining, vandalism, and recreational caving, as well as potentially white-nose syndrome.

Twenty significant caves have been listed for the plan area. Caves must meet at least one of a number of criteria of significance. All the plan area caves have met the criterion of cultural significance. The listings are omitted here (with the exception of the Sandia Cave National Historic Landmark), as information associated with caves, including common names and locations, is sensitive with regard to cultural and heritage resources, sensitive bat hibernacula (habitat), fragility of the sites, and safety concerns.

The Sandia Cave in Las Huertas Canyon is a significant archaeological feature and is an area of tribal importance (refer to Sandia Cave National Historic Landmark). Caves not determined significant will be managed under the standards and guidelines of the land management plan for nonsignificant caves (refer to Minerals and Geology), Forest Service Manual 2372, Forest Service Manual 2882.6, and 36 CFR section 261-Prohibitions.

### Desired Conditions for Significant Caves

#### DA-DC-CAVE

1. Significant cave resources' aesthetic, cultural, and scientific values remain intact, and are protected from damage to provide for uses either by people (traditional cultural uses) or wildlife.

### Sandia Cave National Historic Landmark

Sandia Cave National Historic Landmark (formally known as Sandia Man Cave) is a horizontal solution cavity located high on the east side of Las Huertas Canyon in the northern Sandia Mountains, just east of the city of Albuquerque, New Mexico. The cave was designated a national historic landmark in 1961. It is also listed on the National and New Mexico State Register of Historic Places and is a designated traditional cultural property. The cave displays evidence of sporadic but continuous use for the past 10,000 years and continues to be a place of cultural and spiritual significance to several pueblo communities in New Mexico. It has also played an important role in the history of archaeological thought about the Paleoindian period and southwestern archaeology. Because it is a cave with historic, recreational, educational, geological and biological value in an area of very few caves, the cave has become one of the most popular sites on the Cibola for recreationists and school and university environmental education groups.

Sandia Cave is located near Placitas, New Mexico. The boundary of the national historic landmark was defined as the entire northwest quarter of Section 22, Township 12 North, Range 5 East, New Mexico Principal Meridian, encompassing 160 acres of National Forest System land. The site is a solution-tunnel cave formed in a prominent west-facing limestone cliff located about 300 feet above the canyon floor at an elevation of about 7,180 feet above sea level. The trailhead and small dirt parking area are located adjacent to New Mexico State Route 165. A half-mile-long National Forest System trail contours a steep west-facing slope. The trail includes a metal spiral staircase at the base of the cave.

### Desired Conditions for Sandia Cave National Historic Landmark

#### DA-DC-SCNHL

1. Cultural, natural, educational, and recreational values and uses are balanced in a manner that remedies existing problems and provides responsible and sustainable stewardship of the Sandia Cave National Historic Landmark.

### Management Approach for Sandia Cave National Historic Landmark

#### DA-MGAP-SCNHL

1. Manage Sandia Cave to ensure its sustainable use and enhancement as a place with significant and unique cultural, natural, educational, and recreational values; meanings; and potential both locally and nationally.

2. Promote and facilitate partnerships that create a higher integration of traditional communities, local advocacy groups, and members of the public into the planning and management of Sandia Cave.
3. Develop a collaborative working group to direct site management.
4. Define appropriate criteria, areas, and time frames to allow and encourage public education and recreation while ensuring the vitality of cultural practices and traditions and a healthy cave ecology.

## Additional Congressionally Designated Areas

There are three additional and unique congressionally designated areas on the Cibola National Forest: the Langmuir Research Site, Magdalena Ridge Observatory, and the T'uf Shur Bien Preservation Trust Area. Refer to figures 14 and 16, Management Areas and Designated Areas, in appendix G. The specific intent of the congressional direction for these areas may supersede forestwide direction. Forestwide plan direction would not apply if it conflicts with congressional designations.

### Langmuir Research Site and Magdalena Ridge Observatory

Langmuir Laboratory for Atmospheric Research (Langmuir Research Site) was established under Title II of the New Mexico Wilderness Act on the Magdalena Ranger District in 1980 to encourage scientific research into atmospheric processes and astronomical phenomena and to preserve conditions necessary for that research. Congress found the high altitude and lack of air pollution and glare from city lights make the research site uniquely suited for conducting research probes into thunder clouds and for other atmospheric and astronomical research purposes. This designation authorized the Secretary of Agriculture to enter into an appropriate land use agreement with New Mexico Institute of Mining and Technology for the Langmuir Research Site to establish conditions for use of the Cibola National Forest.

The research site consists of approximately 31,000 acres and includes a principle research facility of approximately 1,000 acres. The facility operates under a special use permit that authorizes the use of rockets, weather balloons, buried monitoring stations, overhead wires, buried utilities, waterlines, improvements, roads, towers, a storage area, and other uses (Langmuir Laboratory for Atmospheric Research 2013). In April and May of 2012, a new special use permit was signed to continue scientific operations at the Langmuir Research Site and associated Magdalena Ridge Observatory; it is valid until December 31, 2031.

The Magdalena Research Observatory is a multi-use research and educational observatory of two major facilities: an operational 2.4-meter fast-tracking telescope and a 10-element optical/infrared interferometer. The basic objectives are to:

- conduct classical astronomical research and provide scientific research tool for the professional astronomy community,
- study near-earth objects and act as a space situational awareness resource, and
- support and enhance education through public outreach and provide an educational resource to the community at large.

About 72 percent of the Langmuir Research Site has slopes in excess of 40 percent and vegetation ranges from grassland to spruce-fir forest. Recreation use is light, and there are no developed sites. Hiking is the primary recreation activity. Regulated even-age timber management is

planned, but activities will be managed to minimize disturbance to Langmuir Research Site. Livestock grazing is permitted, and wildlife habitat and species diversity are maintained. Designated critical habitat for Mexican spotted owl overlaps the Langmuir Research Site, and northern goshawk post-fledging family areas are on the Magdalena Ranger District.

## Management Approach for Langmuir Research Site and Magdalena Ridge Observatory

### DA-MGAP-LANG

1. Coordinate with interest groups, partners, New Mexico Institute of Mining and Technology, local governments, and adjacent landowners in managing Langmuir Research Site to achieve research objectives and multiple use consistent with operations allowed by law.

## T'uf Shur Bien Preservation Trust Area

The T'uf Shur Bien Preservation Trust Area (hereinafter referred to as the Trust Area) is a congressionally designated area that was established in response to a land claim dispute over lands adjacent to the Pueblo of Sandia and City of Albuquerque along the western slope of the Sandia Mountains.

T'uf Shur refers to one of the remaining pueblos (T'uf Shur T'ia) located in the middle Rio Grande valley just beneath the Sandia Mountains. The Pueblo of Sandia (T'uf Shur T'ia) participated in the 1680 Pueblo Revolt against Spanish rule. The Pueblo of Sandia was abandoned for a period of time and reoccupied about 1748.

In 1748, the Pueblo of Sandia received a grant from a representative of the King of Spain, which Congress recognized and confirmed in 1858. In December 1994, the Pueblo of Sandia filed a lawsuit against the Secretary of the Interior and the Secretary of Agriculture, asserting Federal surveys of the grant boundaries erroneously excluded certain land within the Cibola National Forest, including a portion of the Sandia Mountain Wilderness. The Forest Service, the Pueblo of Sandia, and the Sandia Peak Tram Company eventually reached a settlement agreement permanently resolving the Pueblo's claims.

The "Agreement of Compromise and Settlement", signed by all parties in April 2000, was later ratified by Congress through the T'uf Shur Bien Preservation Trust Area Act.<sup>40</sup> The purposes of the act<sup>41</sup> were to establish the T'uf Shur Bien Preservation Trust Area; confirm the status of the land as national forest and wilderness area while resolving the land dispute; and provide the Pueblo, other parties to the civil action, and the public with a fair and just settlement of the Pueblo's claim.

The Trust Area covers 9,890 acres within the Cibola National Forest and the Sandia Mountain Wilderness. The Trust Area was established to (1) recognize and protect in perpetuity the rights and interests of the Pueblo in and to the area, (2) to preserve in perpetuity the national forest and wilderness character of the Trust Area, and (3) to recognize and protect in perpetuity the longstanding use and enjoyment of the Trust Area by the public. The act outlines the provisions for management of the Trust Area.

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<sup>40</sup> Public Law Number 108-07, Div. F, Title IV, sections 401-415, 117 Stat. 11, 279-294 (February 20, 2003)

<sup>41</sup> 16 U.S.C. sections 539m-539m-12

The act specifies that the Trust Area continues to be administered by the Secretary of Agriculture as part of the National Forest System, subject to and consistent with the provisions of the act, which include the following:

- There shall be no restrictions on traditional or cultural uses by the Pueblo of Sandia and other federally recognized Indian Tribes authorized to use the Trust Area by the Pueblo, except to the extent those uses are inconsistent with Federal wildlife protection laws and the Wilderness Act and its regulations. Traditional and cultural use is defined by the act as being a ceremonial activity or the use, hunting, trapping, or gathering of plants, animals, wood, water, and other natural resources for a noncommercial purpose.
- No use prohibited by the Wilderness Act shall be permitted in the wilderness portion of the Trust Area.
- Gaming or gambling, mineral production, timber production, and any new use to which the Pueblo objects is prohibited within any portion of the Trust Area.
- The Trust Area is closed to the location of mining claims under the Mining Law of 1872.
- Besides having exclusive authority to administer access to the Trust Area for traditional and cultural uses by members of the Pueblo and other federally recognized Indian Tribes, the Pueblo shall also have the right to consent or withhold consent on any new use within the Trust Area, the right to consultation regarding any modified use, and the right to consultation regarding the management and preservation of the Trust Area. The Secretary retains the authority to manage emergency situations and issue emergency closure orders without first consulting the Pueblo.

The act also addresses lands to be exchanged or conveyed. In 2016, the Forest Service regional forester and the Bureau of Indian Affairs regional director signed a joint order for the interchange of lands. In the interchange, approximately 30.91 acres of land under the jurisdiction of the Department of the Interior, Bureau of Indian Affairs and held in trust status was transferred to the Department of Agriculture. In exchange, approximately 701.12 acres of land under the jurisdiction of the Department of Agriculture was transferred to the jurisdiction of the Department of the Interior, Bureau of Indian Affairs to be held in trust for the Pueblo. The act states the Forest Service will be granted irrevocable rights-of-way in perpetuity for National Forest System trails crossing Pueblo lands to provide public access to the Trust Area. One of these is a right-of-way for a portion of the Piedra Lisa trail (Trail 135) that crosses the Piedra Lisa tract. The act also addresses a separate conservation easement that establishes limitations on the use of the Piedra Lisa tract. This easement is currently being developed.

Refer to the 2000 “Agreement of Compromise and Settlement” and the 2003 T'uf Shur Bien Preservation Trust Area Act for more detail relating to the establishment and management of the Trust Area.

### Management Approaches for T'uf Shur Bien Preservation Trust Area

#### DA-MA-TUSB

1. Work closely with the Pueblo of Sandia to develop information (such as brochures or signs at kiosks) that can be used to educate and inform the public about the Trust Area.
2. Provide Forest Service employees opportunities to receive training about the Trust Area to ensure continuity in the familiarity and understanding of the history, background, creation, and special management requirements for the Trust Area.



## Chapter 4. Suitability of Lands

Suitability is the appropriateness of applying certain resource management practices to a particular area of land in consideration of the relevant social, economic, and ecological factors. Suitability is determined based on compatibility with desired conditions and objectives in the plan area.<sup>42</sup> Descriptions of the criteria used in making the determinations are provided along with the results. The identification of an area as suitable for a particular use or uses is guidance for project and activity decision making and is not a commitment or a final decision approving projects and activities. It also does not mean that a particular use will or will not occur in the area. The suitability of lands need not be identified for every use or activity; however, per the 2012 Planning Rule, all plans must identify those lands that are not suitable for timber production.

### Identification of Lands as Not Suitable and Suitable for Timber Production

Harvest of timber on National Forest System lands occurs for many different reasons, including ecological restoration, community protection in wildland-urban interfaces, habitat restoration, protection of municipal water supplies, and production of timber, pulp for paper, specialty woods for furniture, and fuel as a renewable energy source—all of which can support local businesses and employment. While timber harvest often occurs on lands classified as suitable for timber production, much of the forest products (timber, firewood, etc.) generated on the Cibola has been, and will continue to be, produced as a result of restoration and fire protection activities on lands classified as not suitable for timber production.

The National Forest Management Act guides land management planning on national forests and grasslands. Congress enacted the act in 1976 and, like all laws, it is a product of the social and political issues at that time. Beginning in the 1950s, the Forest Service was called upon to provide large amounts of wood products for the marketplace, and did so, using industrial forest management techniques that emphasized maximum production. As harvest levels increased over the decades, Congress and members of the public became increasingly concerned about the impacts of intensive forest management on national forests. The National Forest Management Act was enacted in response to those public concerns, most notably, concerns associated with clearcutting. Consequently, the law has numerous timber-specific management requirements that focus on the appropriate regulation of harvest practices, especially clearcutting.

The political environment and social values related to national forest management have substantially changed since the National Forest Management Act was enacted. The largely utilitarian views of the 1950s have given way to a balanced and integrated view of national forest management. Timber harvest may be considered a resource use (as described in the act) or a tool (an activity to improve or restore healthy forest conditions).

The agency now focuses land management plans on desired conditions (outcomes) rather than on production of goods and services (outputs). This shift in management direction affects how the agency presently analyzes the National Forest Management Act required timber harvest suitability and sustained yield limit.

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<sup>42</sup> A complete analysis of suitability is available in this plan's final environmental impact statement (Appendix B, Methodologies and Analysis Processes). Printable maps (PDF files) of suitable timberlands by alternative are available within the final environmental impact statement map packet (appendix I) and within the project record.

## Timber Production Suitability Analysis

The National Forest Management Act of 1976 requires the agency to determine the suitability of National Forest System lands for timber production and has specific requirements for timber suitability analysis in land management plans. The agency makes a distinction between timber harvest as a resource use (timber production) and timber harvest as a management tool to achieve desired conditions.<sup>43</sup> For further information on the timber production suitability analysis and suitable timber lands mapping, refer to the “Vegetation” section and appendix B in the Cibola environmental impact statement.

**Timber production** is the purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use” (36 CFR 219.19). The following definitions are in Forest Service Manual 1909.12, chapter 60, section 60.5.

- **Projected wood sale quantity (PWSQ)** is the estimated quantity of timber and all other wood products expected to be sold from the plan area for the plan period. The projected wood sale quantity consists of the projected timber sale quantity as well as other woody material such as fuelwood, firewood, or biomass that is also expected to be available for sale. The projected wood sale quantity includes volume from timber harvest for any purpose based on expected harvests that would be consistent with the plan components. The projected wood sale quantity is also based on the planning unit’s fiscal capability and organizational capacity. Projected wood sale quantity is not a target or a limitation on harvest and is not an objective unless the responsible official chooses to make it an objective in the plan.
- The **projected timber sale quantity (PTSQ)** is the estimated quantity of timber meeting applicable utilization standards that is expected to be sold during the plan period. As a subset of the projected wood sale quantity, the projected timber sale quantity includes volume from timber harvest for any purpose from all lands in the plan area based on expected harvests that would be consistent with the plan components. The projected timber sale quantity is also based on the planning unit’s fiscal capability and organizational capacity. Projected timber sale quantity is neither a target nor a limitation on harvest, and it is not an objective unless the responsible official chooses to make it an objective in the plan.
- The **sustained yield limit (SYL)** is the amount of timber, meeting applicable utilization standards, which can be removed from a forest annually in perpetuity on a sustained-yield basis.<sup>44</sup> It is the volume that could be produced in perpetuity on lands that may be suitable for timber production. Calculation of the limit includes volume from lands that may be deemed not suitable for timber production after further analysis during the planning process. The calculation of the sustained yield limit is not limited by land management plan desired condition, other plan components, or the planning unit’s fiscal capability and organizational capacity. The sustained yield limit is not a target but is a limitation on harvest, except when the plan allows for a departure.

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<sup>43</sup> 2012 Planning Rule (36 CFR 219.11(a)) and directives (Forest Service Handbook 1909.12, chapter 60, sections 61 through 61.3)

<sup>44</sup> National Forest Management Act at section 11, 16 U.S.C. 1611; 36 CFR 219.11(d)(6)

The general analysis process first identifies lands that *may* be suitable for timber production:

1. Screens are applied to identify “lands not suitable for timber production” based on legal and technical factors. No timber harvest is permitted on the following lands for any purpose:<sup>45</sup>
  - a. lands on which timber production is prohibited or lands withdrawn from timber production
  - b. lands on which technology to harvest timber is not currently available without causing irreversible damage
  - c. lands on which there is no reasonable assurance that lands can be adequately restocked within 5 years of final regeneration harvest
  - d. land that is not forest land

Forest lands that remain after this screening are termed “lands that may be suitable for timber production.” This classification does not vary by land management plan alternative.

“Lands suitable for timber production” based on compatibility with desired conditions and objectives<sup>46</sup> are a subset of “lands that *may be* suitable for timber production” and may vary by land management plan alternative. Analysis of alternatives allows the responsible official to identify where timber production is compatible with the desired conditions established through the land management planning process.<sup>47</sup> Planners should identify lands suitable for timber production based on compatibility with desired conditions and objectives by determining if meeting and sustaining desired conditions and objectives would involve developing and maintaining regulated forest structure using planned, periodic timber harvest activities and planned regeneration of the stand. Timber production may not be the key management objective for the area. However, if regulated forest structure conditions maintained by periodic forest harvest and regeneration would be either consistent with or necessary for achieving and maintaining land management goals and desired conditions (such as fuel conditions, wildlife habitat, or other conditions), these lands should be classified as suitable for timber production, and harvest quantity projections are included in projected wood sale quantity and projected timber sale quantity calculations. While projected wood sale quantity and projected timber sale quantity may vary by plan alternative, sustained yield limit does not (table 26). Designation of lands suitable for timber production based on compatibility with desired conditions and objectives does not imply that management will be focused on maximizing timber yields, only that periodic harvests are expected to occur as a tool for meeting land condition outcomes, including regulated forest structure. Areas that are economically unfeasible to harvest should not be included in lands suitable for timber production based on compatibility with desired conditions and objectives.

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<sup>45</sup> Refer to Forest Service Handbook 1909.12, chapter 60, sections 61.11-61.14 and the 2012 Planning Rule at 36 CFR 219.11(a).

<sup>46</sup> Forest Service Handbook 1909.12, chapter 60, section 61.2

<sup>47</sup> Areas recommended for wilderness, wilderness study areas, and eligible or suitable wild river segments are not suitable for timber production to maintain their wild character should designation eventually occur. The remaining lands after subtracting the lands that are suited from the lands that *may be* suited are not suited for timber production because it is not compatible with the land area’s desired conditions and objectives (36 CFR 219.11(a)(1)(iii)). This is done in the environmental impact statement for each alternative considered in plan development or plan revision.

Lands not suitable for timber production, based on compatibility with desired conditions and objectives, are determined through the analysis of alternatives process during land management plan development.<sup>48</sup> These are lands where periodic timber harvest is unpredictable, unnecessary, or undesirable to achieve management goals, but harvest is permitted where necessary to achieve plan- or project-level resource protection or enhancement objectives. Timber harvest may be scheduled as a planned activity on these lands, and harvest quantity projections are included in the projected wood sale quantity and projected timber sale quantity calculations.

**Table 26. Characteristics of timber volume measures**

Characteristic	Sustained Yield Limit (SYL)	Projected Wood Sale Quantity (PWSQ)	Projected Timber Sale Quantity (PTSQ)
Based on lands that <i>may</i> be suitable for timber production	Yes	No	No
Based on quantity sold from all lands in plan area	No	Yes	Yes
Based on the assumption that all lands that may be suitable for timber production are managed for timber production	Yes	No	No
Limited by plan components, fiscal capability, and organizational capacity	No	Yes	Yes
All volume meets utilization standards <sup>1</sup>	Yes	No	Yes
Includes salvage or sanitation harvest volume	No	No	No
Varies by alternative in plan environmental impact statement <sup>2</sup>	No	Yes	Yes

1. Specifications for merchantable forest products offered in a timber sale.

2. A departure limit shares the characteristics of a sustained yield limit, except that it is unique for an alternative that uses a departure from sustained yield limit to more quickly meet overall multiple-use objectives and achieve the plan's desired conditions and objectives. To do so, the responsible official may decide to increase the expected sale of timber above the sustained yield limit for the first decade of the plan, and for a second decade if necessary. In a departure, the sustained yield limit is replaced by a departure limit that represents the maximum amount of timber meeting utilization standards that can be sold for the first or second decade of the plan. The departure limit can be different for each of these two decades. The departure limit is only applicable to a departure alternative considered in the appropriate environmental document. In all other respects, the assumptions for its calculation are the same as for the sustained yield limit (Forest Service Manual 1909.12, chapter 64, section 64.33).

<sup>48</sup> Forest Service Handbook 1909.12, chapter 60, section 61.2

The timber production suitability analysis for the Cibola determined that out of 1,617,316 total acres of National Forest System lands, 87,739 acres are suitable for timber production (table 27). Refer to figures 26 through 29, Areas Suitable for Timber Production, in appendix G.

**Table 27. Timber production suitability classification for the Cibola**

Land Classification Category	Area (acres)
A. Total National Forest System lands in the plan area	1,617,316
B. Lands not <b>suitable</b> for timber production due to legal or technical reasons	1,528,913
C. Lands that <b>may be suitable</b> for timber production (A–B)	88,403
D. Total lands <b>suitable</b> for timber production because timber production is compatible with the desired conditions and objectives established by the plan	87,739
E. Lands <b>not suitable</b> for timber production because timber production is not compatible with the desired conditions and objectives established by the plan (C–D)	664
F. Total lands <b>not suitable</b> for timber production (B+E)	1,529,577

## Sustained Yield Limit Analysis

Areas classified as lands that may be suitable for timber production provide the basis for calculating the sustained yield limit of the national forest.<sup>49</sup> These lands are usually designated by mapping, and managers should recognize that there may be scattered inclusions of areas more appropriately managed as lands classified as unsuitable for timber production within larger areas classified as lands that may be suitable for timber production.

Questions have arisen about (1) whether sustained yield limit estimates should incorporate other multiple use considerations, (2) whether it is an estimate based only on existing inventory data, or (3) whether it should represent the highest potential yield from a national forest. The sustained yield limit should be calculated using vegetation management strategies and assumptions that are appropriate for the forest type and that achieve and maintain a regulated forest condition for lands suitable for timber production based on compatibility with desired conditions and objectives. It is not necessary to select a management strategy that maximizes production, only one that sustains production over the long term. The strategy should take into account basic environmental factors that would affect timber production such as fire risk, insects and disease, soil conditions, and other factors needed to sustain production. These same management assumptions should be used for developing the sustained yield limit estimates for lands not suitable for timber production based on compatibility with desired conditions and objectives, even though regulated forest production is not planned or desirable for these lands.

The sustained yield limit is an estimate of the amount of commercial wood products that may be sustainably harvested over a long period. This estimate assumes forest vegetation on these lands is structured in a desired, regulated condition (balance of tree age or structural stages by area). In reality, the forest vegetation on most lands is not in a regulated condition, so planners use growth simulation models to estimate sustainable harvest levels. Short-term harvest levels on lands where timber production is a regular, predictable activity would tend to fluctuate until those lands are at a desired, regulated condition and then remain steady around that level on lands suitable for timber production based on compatibility with desired conditions and objectives. For lands not

<sup>49</sup> 36 Code of Federal Regulations 219.11(d)(6) and Forest Service Handbook 1909.12, chapter 60, section 64.31

suitable for timber production based on compatibility with desired conditions and objectives, a regulated forest vegetation condition is not likely to be a desired objective, but the *potential* sustained yield of these lands is estimated by assuming a regulated condition.

### Southwestern Region Approach to Analysis of Sustained Yield and Timber Harvest Levels

Determination of land suitability for uses and desired conditions for these lands (and their contributions to socioeconomic and ecological sustainability) are the vision that drives the land management plan revision and implementation process. The Southwestern Region has adopted a regionally consistent set of forest management strategies designed to promote sustained yield and consistency with desired conditions for all forest vegetation types as a starting point for land management plan revisions. Due to this common vision for management outcomes (desired, regulated forest conditions), it is reasonable to analyze the sustained yield limit in a consistent fashion for all national forests in the Southwestern Region.

The following assumptions were used as the basis for the sustained yield limit analysis:

#### **Sustained yield limit calculations are based on uneven-aged forest management systems for the following forest vegetation types:**

- ponderosa pine and its subtypes, ponderosa pine–bunchgrass and ponderosa pine–Gambel oak (assumes management favors dominance of ponderosa pine)
- dry mixed conifer (assumes management favors dominance of shade intolerant species)
- wet mixed conifer (assumes management favors dominance of wind-firm species—Douglas-fir, southwestern white pine)
- lower-elevation spruce-fir (assumes management favors dominance of wind-firm species—Douglas-fir, southwestern white pine)

Uneven-aged management analysis assumptions:

- group selection cutting
- a 20- or 30-year cutting cycle, 6 age classes, group or patch sizes and density increase by vegetation type as forest conditions become progressively more mesic
- some analysis strategies combine group selection cutting with mid-cycle intermediate thinning
- target matrix density varies by vegetation type

**Sustained yield limit calculations are based upon an even-aged forest management system for the following forest vegetation type:**

- upper-elevation spruce-fir (assumes management favors shade-tolerant species—Engelmann spruce, subalpine fir)

The even-aged management strategy implies for analysis:

- establish even-aged regeneration (natural and/or artificial)
- clearcutting or patch-cutting (with or without reserves)<sup>50</sup>
- rotation age at or after culmination of mean annual increment (CMAI)

**Analysis Methods:**

- Regionwide forest inventory analysis plot data, sorted by vegetation type and site index
- Forest Vegetation Simulator (FVS) – Regionally calibrated:
  - ◆ diameter growth
  - ◆ stand density mortality
  - ◆ tree senescence mortality
  - ◆ seen tree defect
  - ◆ merchantable cubic feet volumes (5 inches or larger in diameter at breast height, 4-inch minimum top diameter inside bark)
  - ◆ merchantable board feet volumes (9 inches or larger in diameter at breast height, 6-inch minimum top diameter inside bark)
  - ◆ natural tree regeneration

The plan’s sustained yield limit is 1.6 million cubic feet (7.2 million board feet) per year. The projected timber sale quantity for the first two decades (table 28) is below the sustained yield limit.

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<sup>50</sup> Silvics of subalpine fir and Engelmann spruce (susceptibility to windthrow, historic fire regime, etc.) are not suited to uneven-aged management.

Table 28. Planned wood product output for the first and second decades of the plan

Sustained Yield Limit (SYL) = 16 MMCF <sup>1</sup> (72 MMBF) <sup>2</sup> per decade	Decade 1 MMCF	Decade 1 MMBF	Decade 1 Tons	Decade 2 MMCF	Decade 2 MMBF	Decade 2 Tons
<b>A. Lands suitable for timber<sup>3</sup> production</b>	na	na	na	na	na	na
A1. Sawtimber <sup>4</sup>	10	49	154,469	12	60	180,493
A2. Other products <sup>5</sup>	2.0	na	28,616	1.9	na	27,490
<b>B. Lands not suitable for timber production</b>	na	na	na	na	na	na
B1. Sawtimber	0.04	0.18	609	0.05	0.22	712
B2. Other products	0.01	na	209	0.01	na	182
<b>C. Projected Timber Sale Quantity (PTSQ)<sup>6</sup></b>	12	49	183,904	14	60	208,876
<b>D. Other Estimated Wood Products<sup>7</sup></b>	na	na	na	na	na	na
D1. Softwood fuelwood <sup>8</sup>	3.5	na	1.0	3.4	na	0.9
D2. Hardwood fuelwood <sup>9</sup>	0.4	na	0.2	0.5	na	0.2
D3. Aspen <sup>10</sup>	0.1	na	0.01	0.1	na	0.01
<b>E. Projected Wood Sale Quantity (PWSQ)<sup>11</sup></b>	16	na	183,905	18	na	208,877

na = not applicable.

1. MMCF = millions of cubic feet.

2. MMBF = millions of board feet.

3. Volumes other than salvage or sanitation volumes that meet timber product utilization standards.

4. Industrial softwood species meeting sawtimber specifications (9 inches+ in diameter at breast height [DBH]).

5. Industrial softwood species not meeting sawtimber specifications (5–9 inches DBH).

6. PTSQ = A1+A2+B1+B2

7. Fuelwood, biomass, and other volumes that do not meet timber product utilization standards.

8. Fuelwood (nonindustrial softwood species 5"+ DBH).

9. Fuelwood (other hardwood species 5"+ DBH).

10. Aspen (5 inches+ DBH).

11. PWSQ = C+D1+D2+D3

# Chapter 5. Monitoring and Evaluation

## Introduction

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 regional forester develops broader-scale monitoring strategies; however, at this time those strategies have not yet been completed.

The plan monitoring program is to be developed collaboratively with other agencies, organizations, and individuals, in consultation with Tribes, while coordinating with Forest Service research and State and Private Forestry. Monitoring is continuous and provides feedback for the planning cycle by testing relevant assumptions, tracking relevant conditions over time, and measuring management effectiveness. It should also use the best available scientific information and be within the financial and technical capabilities of the agency. The plan-level monitoring program is informed by the assessment phase; developed during plan development; and implemented after plan decision. Biennial monitoring evaluation reports document whether a change to the plan or change to the monitoring program is warranted based on new information, whether a new assessment may be needed, or whether there is no need for change at that time. The monitoring strategy provides a framework for subsequent monitoring and evaluation designed to inform adaptive management. By using appropriate indicators that can be measured, observed, or described over time, management actions can be evaluated to determine if they are trending conditions toward the anticipated results.

In addition to the requirements above, a plan monitoring program must contain at least one monitoring question and associated indicator to address each of the eight following elements (topics). These are the minimum monitoring requirements as specified in the 2012 Planning Rule (36 CFR 219.12(a)(5)).

1. The status of select watershed conditions
2. The status of select ecological conditions (including key characteristics of terrestrial/aquatic ecosystems)
3. The status of focal species to assess ecological conditions
4. The status of select ecological conditions that contribute to the recovery of threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of species of conservation concern
5. The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives
6. Measurable changes on the plan area related to climate change and other stressors
7. Progress toward meeting desired conditions and objectives (including those for multiple uses)
8. The effects of management systems so that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C))

There is also a need to address the plan contributions to communities, social and economic sustainability of communities, multiple use management in the plan area, or progress toward meeting the desired conditions and objectives related to social and economic sustainability (Forest Service Handbook 1909.12, chapter 30, section 32.13f).

Monitoring questions should focus on providing the information necessary to evaluate whether plan components are effective and appropriate and whether management is being effective in maintaining or achieving progress toward the desired conditions and objectives for the plan area. Indicators are quantitative or qualitative variables that can be measured or described and when observed periodically, show trends in conditions that are relevant to the associated monitoring questions. It should be recognized that some monitoring questions and associated indicators may address more than one of these required topics.

## Watershed Conditions

These monitoring questions and their associated indicators are related to water resources and watershed conditions in the plan area. The geographic scale may extend beyond the plan area and may include receiving areas for water that flows from the plan area to outside the plan area.

**Table 29. Monitoring questions and associated indicators that evaluate select watershed conditions**

<b>Selected Desired Condition and Objective or Other Plan Component</b>	<b>Monitoring Question</b>	<b>Associated Indicators</b>	<b>Reporting Frequency</b>	<b>Other Associated Monitoring Topics</b>
<p>FW-DC-WTR: Watersheds are functioning properly and all indicators are rated as good according to the Watershed Condition Framework (Potyondy and Geier 2011) or similar protocol.</p>	<p>Are watersheds functioning properly? Are the indicators of properly functioning watersheds rated as good? Is soil quality being maintained or improved to satisfactory condition?</p>	<p>Number of watersheds in each condition class Percent of indicators rated as good for each watershed. Are aquatic habitats still connected in terms of temperature, aquatic organism passage, and/or flows? Is large wood present and recruited into riparian systems where wood is an ecosystem component? Focal species: aquatic macroinvertebrates Soil functions indicators for stability, hydrology, and nutrient cycling are assessed.</p>	<p>Annual for all indicators except for the life of the plan, as ecologically appropriate for the aquatic focal species</p>	<p>1, 2, 4, 5</p>
<p>FW-STD-WTR: Cost-effective, reasonable, and effective best management practices will be prescribed to mitigate potential effects on watershed condition, including water quality.</p>	<p>Are best management practices prescribed to mitigate potential effects to watershed condition? Are they being implemented? Are they effective in protecting watershed condition, including water quality?</p>	<p>Results of best management practices monitoring.</p>	<p>Annually</p>	<p>1, 2, 4</p>

## Terrestrial and Aquatic Ecosystems

A select set of ecological conditions is monitored for terrestrial, riparian, and aquatic ecosystems. The monitoring questions and indicators are selected to measure the effectiveness of the plan to maintain or restore ecological conditions for key ecosystem characteristics associated with composition, structure, function, and connectivity.

**Table 30. Monitoring questions and associated indicators that evaluate select ecological conditions for key characteristics of terrestrial and aquatic ecosystems**

Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators	Reporting Frequency	Other Associated Monitoring Topics
FW-DC-TRSP-07: Natural processes occur within the vegetative communities that enhance species richness and diversity. Terrestrial ecosystems are resilient to disturbance and tolerate the effects of, and therefore benefit from, wildland fire in a near natural fire regime as well as other naturally occurring disturbances.	Are management activities moving terrestrial habitat toward desired conditions?	Seral state proportions and species compositions of Terrestrial ERUs Acres of terrestrial habitat restored or enhanced Number of water features maintained, improved, or installed for wildlife benefit	Annual	2, 4, 6
FW-DC-WRF-1: Riparian areas are in proper functioning condition with all indicators rated as satisfactory and support higher ecological values such as wildlife habitat.	Are riparian areas in proper functioning condition? Are the indicators of proper functioning condition rated as satisfactory? Are management actions maintaining or improving riparian condition and contributing to proper functioning condition?	Proper functioning condition rating of selected riparian areas Acres of riparian area improved to proper functioning condition Best management practices monitoring of selected projects in riparian areas	Annual	Not applicable
FW-OBJ-WRF-1: Annually improve water resources features (for example, riparian areas, springs, streams) or soils.	Are activities implemented to improve water resources features?	Acres of improvement Focal species: aquatic macroinvertebrates	Annual for acres and as ecologically appropriate for focal species	2
FW-DC-NIS-01: Invasive species do not disrupt the structure or function of ecosystems, species life cycles, or populations, and minimize impacts to native wildlife or plant species.	Are invasive species locations changing?	Acres of infestation and acres of treatment	Annual	2, 4, 6, 8

## Focal Species

Focal species are defined by the 2012 Planning Rule<sup>51</sup> as:

A small subset of species whose status permits inference to the integrity of the larger system to which it belongs and provides meaningful information regarding the effectiveness of the plan in maintaining or restoring ecological conditions to maintain the diversity of plant and animal communities... commonly selected based on their functional role in ecosystems.

Focal species are not selected to make inferences about other species. Focal species are selected because they are believed to be responsive to ecological conditions in a way that can inform future plan decisions. Forest Service handbook direction (1909.12 chapter 30, section 32.13c) for focal species further specifies every plan monitoring program must identify one or more focal species and one or more monitoring questions and associated indicators addressing the status of the focal species. The purpose for monitoring the status of focal species over time is to provide insight into the following:

- integrity of ecological systems on which focal species depend
- effects of management on those ecological conditions
- effectiveness of the plan components to provide for ecological integrity and maintain or restore ecological condition
- progress towards achieving desired conditions and objectives for the plan area. It is not expected that a focal species be selected for every element of ecological conditions

The key considerations for selecting focal species are:

- Does the species provide feedback that is necessary to inform management?
- Are focal species abundant enough to measure change in status?
- Are there “off-site” stressors that would mask the response to activities or conditions on National Forest System lands?
- Can the species be effectively monitored?
- Is the species cryptic, rare, or otherwise difficult species to monitor?
- Is it within financial capability of the unit(s)?
- Do standardized monitoring approaches exist?
- Are species responses to management activities and other stressors well known?
- Sampling design: how to monitor effectively
- Opportunities for multi-party monitoring

The rule does not require managing habitat conditions for focal species nor does it confer a separate conservation requirement for these species simply based on them being selected as focal species. The 2012 Planning Rule does not require or prohibit monitoring of population trends of focal species. Instead, it allows the use of any existing or emerging approaches for monitoring the status of focal species that are supported by current science.

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<sup>51</sup> 36 Code of Federal Regulations 219.19

Monitoring methods for evaluating the status of focal species may include measures of abundance, distribution, reproduction, presence or absence, area occupied, survival rates, or others. The objective is not to choose the monitoring technique(s) that will provide the most information about the focal species but to choose a monitoring technique(s) for the focal species that will provide useful information with regard to the purpose for which the species is being monitored. The expectation is monitoring key ecosystem and watershed conditions, along with monitoring the status of a set of well-chosen focal species, will provide timely information about the effectiveness of plan components related to plant and animal diversity.

Overall, two focal species are recommended for the mountain districts on the Cibola National Forest. The following section describes the recommended focal species and how they provide information regarding ecological integrity and ecosystem diversity. These species were selected because they will help inform management about the status of ecological conditions, diversity, and integrity.

## **Recommended Focal Species on the Cibola National Forest Mountain Districts**

### **Pinyon-Juniper Woodland: Ash-Throated Flycatcher (*Myiarchus cinerascens*)**

The ash-throated flycatcher is a widespread and relatively common inhabitant of mixed riparian hardwood and pinyon-juniper habitats (Lawrence 1851). They breed throughout the Western U.S. and the Mexican plateau (Lanyon 1961), in arid and semiarid scrub and open woodland, as well as riparian woodland in arid and semiarid regions. Pinyon pine-juniper woodland and riparian associations are among their preferred habitat types (Cardiff and Dittmann 2002, Kaufman 2001). Within the breeding range, the limiting habitat characteristics appear to be presence of shrubs or trees with trunks or branches thick enough to serve as nest-cavity substrates, presence of a woodpecker species to excavate cavities, and relatively dry and open woodland or scrub habitat for foraging (Cardiff and Dittmann 2002). They are opportunistic cavity nesters using a variety of natural and artificial cavities (Brush 1983, Purcell et al. 1997, Milligan and Dickinson 2016). They prefer open habitats with relatively sparse understory, foraging relatively low in vegetation strata and preferring to capture prey by sallying to foliage or the ground rather than by aerial pursuit of flying insects (Johnson 1982, Cardiff and Dittmann 2002).

This land management plan includes direction for restoring and maintaining desired condition for pinyon-juniper habitats and a guideline for retaining snags for cavity-nesting birds such as the ash-throated flycatcher. These desired conditions also meet the habitat needs of woodpecker species, upon which ash-throated flycatchers rely on to excavate nest cavities. Historically, fire within pinyon-juniper habitat limited the extent and distribution of vegetation, regulated tree densities, and maintained grassland composition, which would be beneficial for this species. Due to fire suppression, the intensity of fire in pinyon-juniper habitat has been altered from low-severity to high-severity which would negatively affect the ash-throated flycatcher (Bock and Block 2005). In general, research indicates severe fire has a negative effect on ash-throated flycatcher presence (Johnson and Wauer 1996) whereas moderate-intensity burns have a neutral effect (Kirkpatrick et al. 2002). In addition, experiments manipulating cavity availability generally resulted in increased densities when availability of cavities was increased and vice versa (Brush 1983; Bock et al. 1992). Thus, this species is a good indicator that desired conditions on the landscape are met for both habitat quality and snag presence.

While they are susceptible to habitat loss and degradation, the species appears to be increasing rangewide (Rosenburg et al. 2016). The ash-throated flycatcher is listed as a species of least concern by the international Union for the Conservation of Nature due to its extensive range, large population size, and increasing numbers (BirdLife International 2020). Additionally, some degradation may actually benefit the species in the short term as it may create additional snags suitable for nesting

(Cardiff and Dittman 2002). Breeding bird survey data indicates the species trend is increasing survey-wide, including in the state of New Mexico (Sauer et al. 2017). They were routinely documented on breeding bird surveys on all four of the mountain districts (H. Schwarz, Cibola unpublished data) and have been reported through eBird on all four mountain districts (eBird 2017).

This species is an excellent focal species for monitoring pinyon-juniper habitat types on the Cibola National Forest. Ash-throated flycatchers are conspicuous and easily observed on surveys. Treatments on the landscape to meet desired conditions within riparian and pinyon-juniper habitats should have a positive influence on providing adequate habitat for this species.

### **Ponderosa Pine Forest and Dry Mixed Conifer: Grace's Warbler (*Setophaga graciae*)**

Grace's warbler is well associated with pine and pine-oak forests with park-like characteristics and patches of mature trees (Stacier and Guzy 2002). In New Mexico, it is described as inhabiting mesa tops and canyon bottoms with ponderosa pine (Travis 1992, Cornell Lab of Ornithology 2019) and may prefer areas with a Gambel oak understory (Levad 1998). This species uses tall ponderosa pine for both breeding and foraging; they nest in larger ponderosa trees averaging 15.1 meters tall and will often forage for insects in the upper canopy (Stacier and Guzy 2002 and references therein).

Grace's warbler response to both timber and fire management within its preferred habitat has been relatively well studied. In general, abundance of this species declined in stands that were severely thinned, including clearcuts (Finch et al. 1997 and references therein), overstory removal plots (Kalies et al. 2010), and areas affected by wildfire (Johnson and Wauer 1996; Kalies et al. 2010). However, Grace's warbler was detected in areas with small-diameter removals and thinning and burning treatments (Finch et al. 1997 and references therein; Kalies et al. 2010). Due to its dependency on mature trees and open understory, this species is a good indicator for healthy ponderosa pine and dry mixed-conifer woodlands as outlined within the desired conditions of this plan.

Although this species shows a small population decline for the state of New Mexico (Sauer et al. 2017), recent surveys for this species indicated that it is readily found on the Cibola National Forest mountain districts (H. Schwarz, Cibola unpublished data; New Mexico Department of Game and Fish 2017). It has been reported through eBird on all four of the mountain districts as well (eBird 2017). It is easily detected through vocalizations.

It is expected that management actions meeting the desired conditions outlined in this plan would have a positive effect on Grace's warbler. Detecting this species within treatment units would indicate habitat conditions on the landscape are moving towards the stated desired conditions.

### **Focal Species Monitoring Strategy**

The recommended songbirds can be monitored via a variety of methods, including, but not limited to, point counts, line transects, or breeding bird surveys. Overall, the goal is to establish whether a species is present within an area, so collecting data to determine population trend is not necessary. Rather, the appropriate method will be selected to allow surveyors (either internal, contracted, or as part of a partnership) to cover the necessary survey area. In addition, the timeline for determining occupancy of a focal species will depend on the management activities and treatments that occurred across the landscape. Depending on the conditions prior to treatment, as well as conditions that contribute to improving habitat after treatment (such as weather or water availability), the time frame for monitoring bird species after treatment will likely vary. Some areas, such as ponderosa pine, may have a faster response due to park-like conditions created by treatment. However, wet mixed conifer may require monitoring years after treatments occur as a structural or habitat response to management activities may take longer.

Due to these different time frames for monitoring, the reporting frequency is “for the life of the plan, as ecologically appropriate,” which refers to a time frame that is specific to the species being monitored. Some species may take longer than others to respond to a management activity, and different management activities may also cause species to respond variably. Thus, monitoring for each focal species may change depending on both the species and management activity that is occurring.

**Table 31. Monitoring questions and associated indicators that evaluate the status of focal species to assess the ecological conditions required under section 219.9**

Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators	Reporting Frequency	Other Associated Monitoring Topics
<p><b>FW-DC-TRSP-07:</b> Natural processes occur within the vegetative communities that enhance species richness and diversity. Terrestrial ecosystems are resilient to disturbance and tolerate the effects of, and therefore benefit from, wildland fire in a near natural fire regime as well as other naturally occurring disturbances.</p> <p><b>FW-DC-FP-04:</b> Private and commercial timber harvest supplements other restoration and maintenance treatments at a scale that achieves 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.</p> <p><b>FW-DC-PJ-01 (Landscape Scale):</b> Pinyon-Juniper Grass and Juniper Grass are generally uneven aged and open in appearance. Trees occur as individuals but occasionally in smaller groups and range from young to old. Scattered shrubs and a dense herbaceous understory, including native grasses, forbs, and annuals, are present to support frequent surface fires. Snags are scattered across the landscape. Old growth occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Old-growth components include old trees, dead trees (snags), downed wood (coarse woody material), and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (for example, insects, diseases, and fire) and climate variability. Fires are typically frequent and low severity (fire regime I).</p>	<p>What is the area of forest occupied by the ash-throated flycatcher?</p> <p>Are management actions maintaining or improving habitat for ash-throated flycatcher?</p>	<p>Proportion of nesting territories occupied from March to June</p> <p>Habitat acreage</p>	<p>For the life of the plan, as ecologically appropriate</p>	<p>2, 3, 4, 6</p>

Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators	Reporting Frequency	Other Associated Monitoring Topics
<p><b>FW-DC-TRSP-07:</b> Natural processes occur within the vegetative communities that enhance species richness and diversity. Terrestrial ecosystems are resilient to disturbance and tolerate the effects of, and therefore benefit from, wildland fire in a near natural fire regime, as well as other naturally occurring disturbances.</p> <p><b>FW-DC-FP-04:</b> Private and commercial timber harvest supplements other restoration and maintenance treatments at a scale that achieves 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.</p> <p><b>FW-DC-PPF-01 (Fine Scale):</b> Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees within the mid- to old-age groups are interlocking or nearly interlocking. Interspaces surrounding tree groups are variably shaped and comprised of a grass/forb/shrub mix. Some natural openings contain individual trees. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Size of tree groups typically is less than 1 acre but averages 0.5 acres. Groups at the mid- to old-age stages consist of 2 to approximately 40 trees per group.</p>	<p>What is the area of Cibola occupied by Grace's warbler?</p> <p>Are management actions maintaining or improving habitat for the Grace's warbler?</p>	<p>Proportion of nesting territories occupied from March to June</p> <p>Habitat acreage</p>	<p>For the life of the plan, as ecologically appropriate</p>	<p>2, 3, 4, 6</p>

## Ecological Conditions for At-Risk Species

For particular at-risk species, a select set of ecological conditions, including habitat, is monitored. The selected ecological conditions are necessary to provide for diversity of plant and animal communities and to contribute to 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 Cibola 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 32. Monitoring questions and associated indicators that evaluate the status of a select set of ecological conditions for at-risk species**

Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators	Reporting Frequency	Other Associated Monitoring Topics
<p><b>FW-DC-TRSP-9:</b> Non-vegetative habitat features required for some species (for example, cliffs, caves, cavities) are maintained with limited disturbance. Vegetative habitat features (such as snags, grasses, forbs, and shrubs) provide forage, cover, fawning, and nesting sites for species with these requirements.</p>	<p>Are management actions maintaining or improving the appropriate number, distribution, and recruitment of snags?</p>	<p>Number, distribution, and recruitment of snags</p>	<p>Every 5 years</p>	<p>2, 3, 8</p>
<p><b>FW-DC-TRSP-07:</b> Natural processes occur within the vegetative communities that enhance species richness and diversity. Terrestrial ecosystems are resilient to disturbance and tolerate the effects of, and therefore benefit from, wildland fire in a near natural fire regime, as well as other naturally occurring disturbances.</p>	<p>Is vegetation structure meeting or approaching desired conditions?</p>	<p>Departure</p>	<p>Approximately every 2 years or as new data become available (the average frequency of new LANDFIRE VDEP data is 2 years).</p>	<p>2, 3</p>
<p><b>FW-DC-PPF-01 (Fine Scale):</b> Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees within the mid- to old-age groups are interlocking or nearly interlocking. Interspaces surrounding tree groups are variably shaped and comprised of a grass/forb/shrub mix. Some natural openings contain individual trees. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Size of tree groups typically is less than 1 acre but averages 0.5 acres. Groups at the mid- to old-age stages consist of 2 to approximately 40 trees per group.</p>	<p>What is the area of Cibola occupied by Grace's warbler?</p>	<p>Occupancy</p>	<p>For the life of the plan, as ecologically appropriate</p>	<p>2, 3</p>

## Visitor Use, Visitor Satisfaction, and Progress toward Meeting Recreation Objectives

The plan monitoring program includes monitoring questions and associated indicators that address the status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.

**Table 33. Monitoring questions and associated indicators that evaluate the status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives**

Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators	Reporting Frequency	Other Associated Monitoring Topics
<p><b>FW-DC-REC-01:</b> A variety of developed and dispersed recreation and tourism opportunities (for example, camping, picnicking, hiking, mountain biking, hunting, fishing, wildlife viewing, equestrian use, driving for pleasure, climbing, and motorized recreation) are available for a diverse group of users commensurate with mapped desired recreation opportunity spectrum classes.</p> <p><b>FW-DC-REC-03:</b> Sustainable recreation opportunities are available commensurate with public interest, recreation resource capacity, and other natural and cultural resources.</p>	What are the status, trends, and conditions of visitor satisfaction on the Cibola National Forest?	<p>Visitor use in numbers of visitors to Cibola (national visitor use monitoring)</p> <p>Changes in recreation trends Visitor measured satisfaction levels</p>	Every 6 years	Not applicable

## Climate Change and Other Stressors

The plan monitoring program includes monitoring questions and associated indicators to determine whether there are measurable changes on the plan area resulting from climate change and other stressors.

**Table 34. Monitoring questions and associated indicators that measure changes on the plan area related to climate change and other stressors that may be affecting the plan area**

Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators	Reporting Frequency	Other Associated Monitoring Topics
<b>FW-DC-CC-01:</b> Vegetation is resilient to the effects of climate change.	Are plant communities migrating in response to climate change?	Mapped boundaries of dominant vegetation types	As new data becomes available (mid-scale analysis framework from Southwestern Region)	7

<b>Selected Desired Condition and Objective or Other Plan Component</b>	<b>Monitoring Question</b>	<b>Associated Indicators</b>	<b>Reporting Frequency</b>	<b>Other Associated Monitoring Topics</b>
<b>FW-DC-CC-02:</b> The Cibola maintains its forest extent over time in response to climate change.	Is the forest extent expanding or shrinking over time in response to climate change?	Forest extent	As new data becomes available (Southwestern Region analysis framework)	7

## Progress toward Meeting the Desired Conditions, Objectives, or other Plan Components

Progress toward meeting desired conditions, objectives, or other plan components that do not fall under one of the other nine required items are included in the monitoring program. Specifically, the plan monitoring program must contain one or more questions and associated indicators addressing the plan’s multiple-use management in the plan area, or progress toward meeting the desired conditions and objectives.

**Table 35. Monitoring questions and associated indicators that evaluate progress toward meeting the desired conditions and objectives in the plan, including providing for meeting multiple-use opportunities**

Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators	Reporting Frequency	Other Associated Monitoring Topics
<p><b>FW-DC-GR-01:</b> Sustainable rangelands provide forage for livestock grazing opportunities that contribute to the agricultural business, local employment, as well as traditional lifestyles and generational ties to the land.</p>	<p>Are rangelands providing adequate forage resources to sustain traditional lifestyles, socioeconomic diversity, and cultural identity of local communities?</p>	<p>Number of livestock permittees authorized head months</p>	<p>Every 10 years</p>	<p>8, 9</p>
<p><b>FW-DC-GR-03:</b> Rangelands are resilient to disturbances and variations in the natural environment (for example, fire, flood, climate vulnerability).</p> <p><b>FW-DC-GR-04:</b> Livestock grazing and associated management activities are compatible with ecological functions and processes (for example, water infiltration, wildlife habitat, soil stability, and natural fire regimes). Livestock grazing and associated management activities are also compatible with the management of social resources of the forest including designated areas (for example, wilderness).</p> <p><b>FW-DC-GR-05:</b> Native plant communities support diverse age classes of shrubs, and vigorous, diverse, self-sustaining understories of grasses and forbs relative to site potential, while providing forage for livestock and wildlife.</p>	<p>Is rangeland condition moving towards identified vegetation desired conditions, ecological site potential, or both?</p>	<p>Terrestrial Ecological Unit Inventory, vegetation frequency, Daubenmire plots or similar protocol</p>	<p>Every 10 years</p>	<p>5</p>
<p><b>FW-DC-ID-01:</b> All vegetation types experience endemic infestation levels, patterns, and cycles of native insects and diseases.</p>	<p>Are insect and disease levels within the natural range of variability?</p>	<p>Mapped boundaries of insect and disease infestations.</p>	<p>Every 5 years or as new data becomes available</p>	<p>Not applicable</p>

Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators	Reporting Frequency	Other Associated Monitoring Topics
<b>FW-DC-VEG-01:</b> Vegetation structure is in low departure from reference conditions as described in the Cibola assessment (USDA Forest Service 2015a).	Is vegetation structure meeting or approaching desired conditions?	Departure	Approximately every 2 years or as new data become available (the average frequency of new LANDFIRE VDEP data is 2 years).	1, 2, 3, 4
<b>FW-DC-VEG-02:</b> Vegetation structure is in low departure from reference conditions as described in the Cibola assessment as indicated by terrestrial ecosystem unit.	Are our management actions moving us towards our desired conditions?	Ecologically appropriate methods such as, but not limited to, stand exams	Every 10 years on selected areas treated	4, 6, 8

## Productivity of the Land

This monitoring requirement comes from the National Forest Management Act requirement for research regarding the effects of timber management systems on the productivity of the land, and that such research is based on continuous monitoring and assessment in the field. Monitoring is focused on key ecosystem characteristics related to soils and soil productivity.

**Table 36. Monitoring questions and associated indicators that evaluate the effects of each management system to determine that they do not substantially and permanently impair the productivity of the land\***

Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators	Reporting Frequency	Other Associated Monitoring Topics
FW-DC-SOIL: Soil condition is satisfactory, soil functions are sustainable, and soil is functioning properly as defined by current Forest Service protocol. The ability of soil to maintain resource values on a sustainable level.	Are soils in satisfactory condition? Are management actions maintaining or improving vegetative ground cover and contributing to improved soil condition?	Percent of satisfactory soils by terrestrial ecosystem unit for each district Acres of soil improved Review a sample of projects for soil condition indicators	Every five years Annually Annually	1

## Social, Economic and Cultural Sustainability

The monitoring plan required that one or more questions be created that address the social, economic, and cultural sustainability of communities. This must be addressed because sustainability is an inherent part of several of the required monitoring items (section 32.13f of 1909.12 planning handbook).

**Table 37. Monitoring questions and associated indicators that evaluate the social, economic, and cultural sustainability within Cibola National Forest.**

Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators	Reporting Frequency	Other Associated Monitoring Topics
<b>FW-DC-FP-01:</b> Forest products (for example, fuelwood, latillas, vigas, Christmas trees, herbs, medicinal plants, and piñon nuts) are available to businesses and individuals in a sustainable manner (for example, forest products recover between collections) that also effectively contributes to watershed health and the restoration and maintenance of desired vegetation conditions.	To what extent is the Cibola meeting land management plan objectives and moving towards desired conditions in providing forest products for personal use and demands of local timber industry?	Hundred cubic feet provided for industry Hundred cubic feet for fuelwood	Every 2 years	8
<b>FW-DC-FRT-03:</b> Cibola resources important for cultural and traditional needs, as well as for subsistence practices and economic support of tribal communities, are available and sustainable.	Is the Cibola providing resources important for cultural and traditional needs and for subsistence and economic support to tribal communities?	Number of free use permits or forest product authorization letters administered or issued for traditional and cultural uses.	Annually	7, 8
<b>FW-DC-RHC-03:</b> Is the Cibola providing resources important for subsistence and economic support to rural historic communities?	Is the Cibola providing resources important for subsistence and economic support to rural historic communities?	Number of permits sold for forest products (fuelwood, vigas latillas, plant collection, Christmas trees).	Annually	7, 8
Sustainable livestock grazing contributes to the long-term socioeconomic diversity and stability of local communities, and cultural identity tied to traditional uses.	Is the Cibola moving toward desired condition by providing grazing opportunities in support of our local economies?	Level of permitted livestock grazing Number of closed and vacant allotments	Annually	7, 9

Selected Desired Condition and Objective or Other Plan Component	Monitoring Question	Associated Indicators	Reporting Frequency	Other Associated Monitoring Topics
<p><b>FW-DC-CHR-06:</b> The public has opportunities for learning about and appreciating cultural and historic resources, and knowledge about the past is available to the public. The public participates in the identification, protection, and preservation of cultural and historic resources, and public understanding about cultural resources and historic preservation issues contribute to their protection.</p> <p><b>FW-DC-CHR-05:</b> Knowledge about cultural and historic resources contributes to the growth of knowledge about our Nation's past, and is understood, appreciated, and is available to the public. Knowledge regarding the past occupation and use of landscapes contributes to the understanding of contemporary natural ecosystems and cultural landscapes.</p>	<p>Is the Cibola providing interpretative and educational opportunities to the public about cultural and historic resources?</p>	<p>Number of historic and cultural interpreted sites, presentations, Passport in Time projects, and tours.</p>	<p>Every 2 years</p>	<p>5, 7</p>



## References

- Allen, C.D., D.D. Breshears, and N.G. McDowell. 2015. [On underestimation of global vulnerability to tree mortality and forest die-off from hotter drought in the Anthropocene](#). *Ecosphere* 6(8): 129. <http://dx.doi.org/10.1890/ES15-00203.1>.
- Barrett, S., D. Havlina, J. Jones [et al.]. 2010. Interagency fire regime condition class guidebook (version 3.0). U.S. Department of Agriculture, Forest Service; U.S. Department of Interior; The Nature Conservancy.
- BirdLife International. 2020. Species factsheet: *Myiarchus cinerascens*. Downloaded from <http://www.birdlife.org>. Accessed 20 October 2020.
- Bock, C.E. and W.M. Block. 2005. Fire and birds in the southwestern United States. In: Saab, V.; Powell, H., eds. Fire and avian ecology in North America. Studies in avian biology no. 30. Camarillo, California: Cooper Ornithological Society: 14–32.
- Bock, C.E., A. Cruz Jr., MC. Grant, C.S. Aid, and T.R. Strong. 1992. Field experimental evidence for diffuse competition among southwestern riparian birds. *The American Naturalist* 140(5): 815–828.
- Brush, T. 1983. Cavity use by secondary cavity-nesting birds and response to manipulations. *The Condor* 85(4): 461-466.
- Cardiff, S.W. and D.L. Dittmann. 2002. [Ash-throated flycatcher](#) (*Myiarchus cinerascens*), version 2.0. In A.F. Poole and F.B. Gill, editors. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. Available at: <https://doi.org/10.2173/bna.664>. Accessed 6 June 2018.
- Conklin, D. A., M.L. Fairweather, D.E. Ryerson, B.W. Geils, and D.R. Vogler, 2009. White pines, blister rust, and management in the Southwest. U.S. Department of Agriculture, Forest Service, Southwestern Region, R3-FH-09-01. 16 p.
- Cornell Lab of Ornithology. 2019. All About Birds. Cornell Lab of Ornithology, Ithaca, New York. <https://www.allaboutbirds.org>. Accessed 23 October 2020.
- Dellinger, R.L., P.B. Wood, and P.D. Keyser. 2007. Occurrence and nest survival of four thrush species on a managed central Appalachian forest. *Forest Ecology and Management*. 243: 248–258.
- Dellinger, R.L., P.B. Wood, P.W. Jones, and T.M. Donovan. 2012. [Hermit thrush](#) (*Catharus guttatus*), version 2.0. In A.F. Poole and F.B. Gill, editors. *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY, USA. Available at: <https://doi.org/10.2173/bna.261>. Accessed 17 July 2018.
- Dixon, G.E. 2002. Essential FVS: a user's guide to the forest vegetation simulator, reference manual. U.S. Department of Agriculture, Forest Service, Forest Management Service Center. Fort Collins, Colorado.
- eBird. 2017. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available at: <http://www.ebird.org>. Accessed 22 October 2020.

- Finch, D.M., J.L. Ganey, W. Yong, R.T. Kimball, and R. Sallbanks. 1997. Effects and interactions of fire, logging, and grazing. In: W.M Block and D.M Finch, tech. eds. Songbird ecology in southwestern ponderosa pine forests: a literature review. Gen. Tech. Rep. RM-292. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Forest and Range Experiment Station:103–136.
- Hassell, M.J. 1968. The people of northern New Mexico and the national forests. Unpublished report. [https://lgc.unm.edu/sites/default/files/desktop/hassell\\_report\\_0.pdf](https://lgc.unm.edu/sites/default/files/desktop/hassell_report_0.pdf).
- Hurst, W.D. 1972. Region 3 policy on managing national forest land in northern New Mexico. File no.1030-Objective and Policy, William D. Hurst to Forest Supervisors and District Rangers.
- Integrated Landscape Assessment Project. 2012. VDDT/Path state-and-transition model documentation Arizona and New Mexico (Region 3) arid lands (nonforest). Institute of Natural Resources technical report, Oregon State University, Corvallis.
- Johnson, T.B. 1982. Ash-throated Flycatcher takes sagebrush lizard. *The Southwestern Naturalist* 27(2): 222.
- Johnson, T. H. and R. H. Wauer. 1996. Avifaunal response to the 1977 La Mesa fire. In: C. Allen, tech. ed. Fire effects in southwestern forests: proceedings of the second La Mesa Fire symposium; 1994 March 29–21; Los Alamos, New Mexico. Gen. Tech. Rep. RM-GTR-286. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Forest and Range Experiment Station. 216 p.
- Kalies, E.L., C.L. Chambers, and W.W. Covington. 2010. Wildlife responses to thinning and burning treatments in southwestern conifer forests: a meta-analysis. *Forest Ecology and Management* 259: 333–342.
- Kaufman, K. 2001. Lives of North American Birds. Text adapted for Audubon’s Guide to North American Birds online. <https://www.audubon.org/field-guide/bird/ash-throated-flycatcher>. Accessed October 2020.
- King, D.I. and R.M. DeGraaf. 2000. Bird species diversity and nesting success in mature, clearcut, and shelterwood forest in northern New Hampshire, USA. *Forest Ecology and Management*. 129: 227–235.
- Kirkpatrick, C., S. DeStefano, R.W. Mannan, and J. Lloyd. 2002. Trends in abundance of grasslands birds following a spring prescribed burn in southern Arizona. *The Southwestern Naturalist*. 47(2): 282–292.
- Kotliar, N.B., P.L. Kennedy, and K. Ferree. 2007. Avifaunal responses to fire in southwestern montane forests along a burn severity gradient. *Ecological Applications*. 17(2): 491–507.
- LANDFIRE. 2010. [LANDFIRE](#) 1.1.0 vegetation dynamics models. U.S. Department of Agriculture, Forest Service; U.S. Department of Interior. Model files and reports available online: <http://www.landfire.gov/index.php>. Accessed December 2013.
- Lanyon, W.E. 1961. Specific limits and distribution of ash-throated and nutting flycatchers. *The Condor*. 63(6): 421–449. <https://doi.org/10.2307/1365276>.

- Lawrence, G.N. 1851. Descriptions of new species of birds of the genera *Toxostoma* Wagler, *Tyrannula* Swainson, and *Plectrophanes* Meyer. *Annals of the Lyceum of Natural History of New York*. 5: 121–123.
- Levad, R. 1998. Grace's Warbler. In: Kingery, H.E. ed. *Colorado breeding bird atlas*. Colorado Bird Atlas Partnership and Colorado Division of Wildlife, Denver, CO: 424–425.
- Milligan, M.C. and J.L. Dickinson. 2016. Habitat quality and nest-box occupancy by five species of oak woodland birds. *The Auk*. 133: 429–438.
- Muldavin, E.; Triepke, F.J. 2020. North American pinyon-juniper woodlands: ecological composition, dynamics, and future trends. In: Dellasala, D.A., Goldstein, M.I. eds. *The encyclopedia of the world's biomes*. Academic Press/Elsevier: 516–531.
- National Interagency Fire Center. 2009. [Guidance for the implementation of federal wildland fire management policy](https://www.nifc.gov/policies/policies_documents/GIFWFMP.pdf). U.S. Department of Agriculture and U.S. Department of Interior. 20 p. [https://www.nifc.gov/policies/policies\\_documents/GIFWFMP.pdf](https://www.nifc.gov/policies/policies_documents/GIFWFMP.pdf).
- New Mexico Department of Game and Fish (NMDGF). 2017. Population size estimation of breeding red-faced and Grace's warblers in pine woodlands of New Mexico: 2017 report. Albuquerque, NM, Ecological Services, Inc. 53 p.
- Partners in Flight Science Committee 2013. [Population estimates database](http://pif.birdconservancy.org/popestimates), version 2013. Available at <http://pif.birdconservancy.org/popestimates>. Accessed 12 July 2018.
- Potyondy J.A. and T.W. Geier. 2011. Watershed condition classification technical guide. FS-978. U.S. Department of Agriculture, Forest Service. Washington DC.
- Purcell K., Verner J. and Oring L. 1997. A comparison of the breeding ecology of birds nesting in boxes and tree cavities. *The Auk*. 114: 646–656.
- Raish, C. and A.M. McSweeney. 2003. Economic, social, and cultural aspects of livestock ranching on the Espanola and Canjilon Ranger Districts of the Santa Fe and Carson National Forests: a pilot study. Gen. Tech. Rep. RMRS-GTR-113. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 89 p.
- Reynolds, R.T., A.J. Sánchez Meador, J.A. Youtz [et al.]. 2013. Restoring composition and structure in southwestern frequent-fire forests: a science-based framework for improving ecosystem resiliency. Gen. Tech. Rep. RMRS-GTR-310. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 76 p.
- Rosenberg, K.V., J. A. Kennedy, R. Dettmers [et al.]. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee. 119 p.
- Sauer, J.R., D.K. Niven, J.E. Hines [et al.]. 2017. The North American breeding bird survey, results, and analysis 1966–2015. Version 2.07.2017. U.S. Geological Survey Patuxent Wildlife Research Center, Laurel, MD.
- Schwab, F.E., N.P.P. Simon, S.W. Stryde, and G.J. Forbes. 2006. Effects of postfire snag removal on breeding birds of western Labrador. *Journal of Wildlife Management*. 70(5): 1464–1469.

- Simon, N.P.P., F.E. Schwab, and R.D. Otto. 2002. Songbird abundance in clear-cut and burned stands: a comparison of natural disturbance and forest management. *Canadian Journal of Forest Research*. 32(8): 1343–1350.
- Society for Range Management. 1998. *Glossary of terms used in range management* (4th edition). Denver, CO. 32 p.
- Stacier, C.A. and M.J. Guzy. 2002. Grace's warbler (*Steophaga graciae*), version 2.0. In: A.F. Poole and F.B. Gill, eds. [The Birds of North America](#). Cornell Lab of Ornithology, Ithaca, NY, USA. Available at: <https://doi.org/10.2173/bna.677>. Accessed 16 July 2018.
- Strenger, S., S Sebring, W. Robbie, F. Escobar, C. Vaandrager, V. Andrew, E. Brooks, C. Krasine, B. Nielson, and R. Fletcher. 2007. *Terrestrial ecosystems survey of the Cibola National Forest and National Grasslands*. U.S. Department of Agriculture, Forest Service, Southwestern Region, Albuquerque, NM. 696 p.
- Sun, G.; Caldwell, P.V.; McNulty, S.G. 2015. Modelling the potential role of forest thinning in maintaining water supplies under a changing climate across the conterminous United States. *Hydrological Processes*. 29(24): 5016–5030.
- Schussman, H., C. Enquist, M. List. 2006. *Historic fire return intervals for Arizona and New Mexico: a regional perspective for southwestern land managers*. The Nature Conservancy: Phoenix, AZ, USA.
- Triepke, F.J., Wahlberg, M.M., Cress, D.C., and Benton, R.L. 2013. [RMAP – regional riparian mapping project](#). U.S. Department of Agriculture, Forest Service project report, Southwestern Region, Albuquerque, NM. 53 p. <http://www.fs.usda.gov/main/r3/landmanagement/gis>.
- Travis, J. 1992. *Atlas of breeding birds of Los Alamos County, New Mexico: Pajarito ornithological survey*. Los Alamos National Laboratory, Los Alamos, NM.
- Triepke, F.J., E.H. Muldavin, and M.M. Wahlberg. 2019. Using climate projections to assess ecosystem vulnerability at scales relevant to managers. *Ecosphere*. 10(9): e02854.
- Triepke, F.J., J.C. Moreland, and P.C. Shahani. 2016. Patch size analysis for major ecosystems of the Gila National Forest. Contributed talk, 6th [Natural History of the Gila Symposium](#), February 25–27, Western New Mexico University, Silver City NM.
- USDA Forest Service. 1986. *Terrestrial ecosystem survey handbook*. Technical guide TESH-04/25/86, Southwestern Region, Albuquerque, NM.
- USDA Forest Service. 1995. *Landscape aesthetics: a handbook for scenery management*. Agricultural Handbook 701. Washington DC.
- USDA Forest Service. 1997a. *Plant associations of Arizona and New Mexico. Volume 1: Forests*. Southwest Region habitat typing guides. Albuquerque, NM.
- USDA Forest Service. 1997b. *Plant associations of Arizona and New Mexico. Volume 2: Woodlands*. Southwest Region habitat typing guides. Albuquerque, NM.
- USDA Forest Service. 2012. *National best management practices for water quality management on National Forest Systems lands. Volume 1: National Core BMP Technical Guide*. FS-990a. Washington DC: Washington Office.

- USDA Forest Service. 2013a. Sign and poster guidelines for the Forest Service. EM7100-15. Engineering Staff. Washington, DC.
- USDA Forest Service. 2013b. Forest Service outdoor recreation accessibility guidelines. U.S. Department of Agriculture, Forest Service, Washington DC.
- USDA Forest Service. 2013c. Forest Service trail accessibility guidelines. U.S. Department of Agriculture, Forest Service, Washington DC.
- USDA Forest Service 2015a. Assessment report of ecological/social/economic conditions, trends, and risks to sustainability, Cibola National Forest Mountain Ranger Districts, volume 1 ecological assessment. Albuquerque, NM.
- USDA Forest Service. 2015b. Assessment report of ecological/social/economic conditions, trends, and risks to sustainability, Cibola National Forest Mountain Ranger Districts, volume 2 socioeconomic assessment. Albuquerque, NM.
- USDA Forest Service. 2019a. Desired conditions for use in forest plan revision in the Southwestern Region. Technical report. On file at the Southwestern Region, Regional Office, Albuquerque, NM. 59 p.
- USDA Forest Service. 2019b. Riparian and aquatic ecosystem strategy: Southwestern Region of the Forest Service. MB-R3-16-13. Albuquerque, NM. 51 p.
- USDA Forest Service. 2019c. Existing and desired conditions for riparian and aquatic ecosystems: supplement to riparian and aquatic ecosystem strategy of the USDA Forest Service Southwestern Region. MB-R3-16-13. Albuquerque, NM. 46 p.
- U.S. Department of Transportation. 1995. National Scenic Byways Program. 60 Federal Register 26759, May 18, 1995. Federal Highway Administration, Washington DC.
- Vanderwel, M.C., J.R. Malcolm, and S.C. Mills. 2007. A meta-analysis of bird responses to uniform partial harvesting across North America. *Conservation Biology*. 21(5): 1230-1240.
- Vose, J.M., J.S. Clark, C.H. Luce, T. Patel-Weynand, eds. 2016. Effects of drought on forests and rangelands in the United States: a comprehensive science synthesis. Gen. Tech. Rep. WO-93b. Washington, DC: U.S. Department of Agriculture, Forest Service. 289 p.
- Wahlberg, M.M., F.J. Triepke, W.A. Robbie [et al.]. 2015. [Ecological response units of the southwestern United States](#). U.S. Department of Agriculture, Forest Service technical report available online: <http://fsweb.r3.fs.fed.us/eap/nfma/assessments>. Southwestern Region, Regional Office, Albuquerque, NM. 198 p.
- Weisz, R., D. Vandendriesche, M. Moeur [et al.]. 2011. Calibrating natural and anthropogenic events in state and transition models with FVS. In: Draft Proceedings of the State and Transition Modeling Conference, June 2011, Portland, OR. Technical report on file at the Southwestern Region, Regional Office, Albuquerque, NM.

## Cooperating Agencies with Memoranda of Understanding

The following cooperating agencies helped develop the plan during their active involvement from summer of 2015 to fall of 2016.

- Acoma Pueblo
- City of Albuquerque
- Bernalillo County
- Bureau of Land Management
- Cañón de Carnué Land Grant
- Chilili Land Grant
- Cibola County
- Ciudad Soil and Water Conservation District
- Claunch Pinto Soil and Water Conservation District
- Pueblo de Cochiti
- Coronado Soil and Water Conservation District
- East Torrance Soil and Water Conservation District
- Edgewood Soil and Water Conservation District
- City of Gallup
- City of Grants
- Pueblo of Isleta
- Kirtland Air Force Base
- Pueblo of Laguna
- Lava Soil and Water Conservation District
- Lincoln County
- Magdalena Village
- Manzano Land Grant
- McKinley County
- McKinley Soil and Water Conservation District
- National Park Service-Salinas Pueblo Missions National Monument
- New Mexico Department of Agriculture
- New Mexico Environment Department
- New Mexico Game and Fish
- New Mexico Land Grant Council
- New Mexico State Historic Preservation Office
- Salado Soil and Water Conservation District
- San Antonio de las Huertas Land Grant
- Pueblo of San Felipe
- Sandoval County
- Pueblo of Santa Ana
- Sierra County
- Sierra Soil and Water Conservation District
- Socorro County
- Tajiique Land Grant
- Torrance County
- Torreon Land Grant
- Valencia Soil and Water Conservation District

# Glossary of Terms

Terms and phrases used in this plan have the meaning defined in the most current applicable statute, regulation or Forest Service manual or handbook (see appendix D). For user convenience, many of these terms are repeated below, but where there is any conflict, the most current applicable statute, regulation, or Forest Service manual or handbook definition prevails. Where not defined by statute, regulation, or policy, the terms are defined as follows.

**administrative unit:** A national forest, a national grassland, a purchase unit, a land utilization project, Columbia River Gorge National Scenic Area, Land between the Lakes, Lake Tahoe Basin Management Unit, Midewin National Tallgrass Prairie, or other comparable unit of the National Forest System (36 CFR 212.1, 36 CFR 261.2).

**assessment:** For the purposes of land management plan revision, an assessment is the identification and evaluation of existing information to support land management planning. Assessments are not decision-making documents but provide current information on select topics relevant to the plan area in the context of the broader landscape.

**basal area:** The total cross-sectional area of trees in a stand measured at 4.5 feet (figure 3). For example, 200 six-inch-diameter trees and 50 twelve-inch-diameter trees have a combined basal area of about 79 square feet (also see table 38).



**Figure 3. Diagram of basal area (left), basal area of 40 ft<sup>2</sup> per acre (center), basal area of 120 ft<sup>2</sup> per acre (right)**

Diagram courtesy of D.R. Larsen [<http://oak.snr.missouri.edu/nr3110/topics/basalarea.php>]. Photos courtesy of <http://www.wkolsen.com>.

**Table 38. Relationship between basal area, tree diameter, tree density, and tree spacing\***

Basal Area (square feet per acre)	Tree Diameter (DBH)**	Tree Density (trees per acre)	Tree Spacing (feet) (average distance between trees)
40	6	204	15
40	12	51	29
40	18	23	44
120	6	612	8
120	12	153	17
120	18	68	25

\*Density, spacing, and basal area numbers rounded to nearest integer.

\*\*DBH = diameter measured at breast height (4.5 feet).

**best management practices (BMPs):** Practical and economically achievable methods used in land management for protecting the environment. Best management practices exist in mining to protect water, in forestry to protect soil, in reclamation to prevent the introduction of noxious weeds, for example. In water quality, best management practices (1) are defined as methods, measures, or practices selected by an agency to meet its nonpoint source control needs; (2) include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures; and (3) can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters.

**bole:** The main stem of a tree (compare crown).

**candidate species:** (1) For U.S. Fish and Wildlife Service candidate species, a species for which the Service possesses sufficient information on vulnerability and threats to support a proposal to list as endangered or threatened but for which no proposed rule has yet been published by the Service;

(2) For National Marine Fisheries Service candidate species, a species that is: (i) The subject of a petition to list and for which the National Marine Fisheries Service has determined that listing maybe warranted, pursuant to section 4(b)(3)(A) of the Endangered Species Act (16 U.S.C. 1533(b)(3)(A)), or (ii) Not the subject of a petition but for which the National Marine Fisheries Service has announced in the Federal Register the initiation of a status review.

**carbon sequestration:** The ability of a plant to remove carbon dioxide from the atmosphere and convert it to carbohydrates through photosynthesis and store it in the plant (leaves, stems, roots). Forests are by far the best land cover for storing carbon since a high percentage of wood fiber is made up of carbon.

**carbon stock:** Carbon stored in the ecosystem—in living biomass, soil, dead wood, and litter (see carbon sequestration). For purposes of carbon assessment for National Forest System land management planning, carbon in fossil fuel resources, lakes or rivers, emissions from agency operations, or public use of National Forest System lands (such as emissions from vehicles and facilities) is not included.

**climate change:** A statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period, typically 30 years or longer (compare drought).

**collaboration or collaborative process:** A structured manner in which a collection of people with diverse interests shares knowledge, ideas, and resources while working together in an inclusive and cooperative manner toward a common purpose. In the context of land management planning, collaboration falls within the full spectrum of public engagement described in “Collaboration in NEPA—A Handbook for NEPA Practitioners” (Council on Environmental Quality 2007).

**concern level:** A measure of the degree of public importance placed on landscapes viewed from travelways and use area.

**connectivity:** Ecological conditions that exist at several spatial and temporal scales that provide landscape linkages that permit the exchange of flow, sediments, and nutrients; the daily and seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long distance range shifts of species, such as in response to climate change.

**conservation:** The protection, preservation, management, or restoration of natural environments, ecological communities, and species.

**conserve:** For purposes of the Planning Rule (36 CFR 219.9), to protect, preserve, manage, or restore natural environments and ecological communities to potentially avoid federal listing of proposed species and candidate species.

**crown:** The upper portion of a shrub or tree.

**culmination of mean annual increment of growth:** See “mean annual increment of growth.”

**cultural resources:** An object or definite location of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence. Cultural resources are prehistoric, historic, archaeological, or architectural sites, structures, places, or objects and traditional cultural properties. Cultural resources include the entire spectrum of resources for which Forest Service personnel are responsible, from artifacts to cultural landscapes, without regard to eligibility for listing on the National Register of Historic Places (Forest Service Manual 2360.5).

**decommission:** Demolition, dismantling, removal, obliteration, disposal, or a combination of these things of a deteriorated or otherwise unneeded asset or component, including necessary restoration and cleanup work.

**designated area:** An area or feature identified and managed to maintain its 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, 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.

**deferred maintenance:** Maintenance that was not performed when it should have been or when it was scheduled and which, therefore, was put off or delayed for a future period. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased costs to repair, and decrease in asset value. Deferred maintenance needs may be categorized as critical or noncritical at any point in time. Continued deferral of noncritical maintenance will normally result in an increase in critical deferred maintenance. Code compliance (for example, life safety, Americans with Disabilities Act, Occupational Safety and Health Act, environmental, etc.), Land management plan direction, best management practices, biological evaluations other regulatory or executive order compliance requirements, or applicable standards not met on schedule are considered deferred maintenance (Financial Health–Common Definitions for Maintenance and Construction Terms, July 22, 1998).

**designated road, trail, or area:** A National Forest System road, a National Forest System trail, or an area on National Forest System lands that is designated for motor vehicle use pursuant to 36 CFR 212.51 on a motor vehicle use map (36 CFR 212.1).

**disturbance:** Any relatively discrete event in time that disrupts ecosystem, watershed, community, or species population structure or function and changes resources, substrate availability, or the physical environment.

**disturbance regime:** A description of the characteristic types of disturbance on a given landscape; the frequency, severity, and size distribution of these characteristic disturbance types and their interactions.

**drought:** Short-term (several years) period of below-average precipitation.

**easement:** A type of special use authorization (usually granted for linear rights-of-way) that is utilized in those situations where a conveyance of a limited and transferable interest in National Forest System land is necessary or desirable to serve or facilitate authorized long-term uses, and that may be compensable according to its terms (36 CFR 251.51).

**ecological conditions:** The biological and physical environment that can affect the diversity of plant and animal communities, the persistence of native species, and the productive capacity of ecological system. Ecological conditions include habitat and other influences on species and the environment. Examples of ecological conditions include the abundance and distribution of aquatic and terrestrial habitats, connectivity, roads and other structural developments, human uses, and invasive species.

**ecological integrity:** The quality or condition of an ecosystem when its dominant ecological characteristics (for example, composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence.

**ecological response unit (ERU):** A unit of land that is homogenous in character such that similar units will respond in the same way to disturbance or manipulation (Society for Range Management 1998). Ecological response units represent an ecosystem stratification based on vegetation characteristics that would occur when natural disturbance regime and biological processes prevail and combine potential vegetation and historical fire regimes to form ecosystem classes useful for landscape assessment.

**ecological sustainability:** See “sustainability.”

**ecological system:** See “ecosystem.”

**economic sustainability:** See “sustainability.”

**ecosystem:** A spatially explicit, relatively homogeneous unit of the Earth that includes all interacting organisms and elements of the abiotic environment within its boundaries. An ecosystem is commonly described in terms of its (1) composition—the biological elements within the different levels of biological organization, from genes and species to communities and ecosystems;

(2) structure—the organization and physical arrangement of biological elements such as snags and down woody debris, vertical and horizontal distribution of vegetation, stream habitat complexity, landscape pattern, and connectivity; (3) function—ecological processes that sustain composition and structure, such as energy flow, nutrient cycling and retention, soil development and retention, predation and herbivory, and natural disturbances such as wind, fire, and floods; and (4) connectivity (see “connectivity”).

**ecosystem diversity:** The variety and relative extent of ecosystems.

**ecosystem services:** Benefits people obtain from ecosystems, including: (1) provisioning services, such as clean air and fresh water, energy, fuel, forage, fiber, and minerals; (2) regulating services, such as long-term storage of carbon; climate regulation; water filtration, purification, and storage; soil stabilization; flood control; and disease regulation; (3) supporting services, such as pollination, seed dispersal, soil formation, and nutrient cycling; and (4) cultural services, such as educational, aesthetic, spiritual and cultural heritage values, recreational experiences and tourism opportunities.

**ecotone:** A transition area between two ecosystems.

**endemic:** Native to a particular area. “Endemic levels” refer to historically typical levels; for example, “endemic levels of insect and disease infestations.”

**environmental document:** For the purposes of this part: an environmental assessment, environmental impact statement, finding of no significant impact, categorical exclusion, and notice of intent to prepare an environmental impact statement.

**environmental impact statement:** A detailed written statement as required by section 102(2)(C) of the National Environmental Policy Act of 1969 (40 CFR 1508.11; 36 CFR 220).

**even-aged stand:** A stand of trees composed of a single age-class (compare uneven-aged stand).

**federally recognized Tribe:** An Indian or Alaska Native Tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian Tribe under the Federally Recognized Indian Tribe List Act of 1994 (25 U.S.C. 479a).

**federally recognized species:** Those species that have been determined by the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration to be endangered or threatened per the Endangered Species Act, as amended (Public Law 93-205) or have been proposed for listing or have been identified as candidates for listing.

**focal species:** A small subset of species whose status permits inference to the integrity of the larger ecological system to which it belongs and provides meaningful information regarding the effectiveness of the plan in maintaining or restoring the ecological conditions to maintain the diversity of plant and animal communities in the plan area. Focal species would be commonly selected based on their functional role in ecosystem.

**forb:** An herbaceous dicotyledonous (“broadleaf”) plant. Forbs may be annual or perennial. (Grasses are herbaceous monocotyledonous plants).

**forest (vegetation type):** A tree-dominated plant community in which the dominant trees are typically tall and straight-boled, often with overlapping crown (compare to woodland).

**forest land:** Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for nonforest uses. Lands developed for nonforest use include areas for crops, improved pasture, residential or administrative areas, improved roads of any width and adjoining road clearing, and power line clearings of any width.

**forest road or trail:** See *National Forest System road or trail*.

**fuel (fire and forestry):** Live or dead vegetation that can carry a fire.

**geographic area:** A spatially contiguous land area identified within the planning area. A geographic area may overlap with a management area.

**grassland:** A vegetation type dominated by grasses. Forbs are commonly present. Trees and shrubs may be present as minor components of the plant community.

**group (related to vegetation):** A cluster of two or more trees with interlocking or nearly interlocking crowns at maturity surrounded by grass-forb-shrub interspaces. Size of tree groups is typically variable depending on forest type and site conditions and can range from fractions of an acre (such as a two-tree group), such as in ponderosa pine or dry mixed-conifer forests, to many acres, as is common in wet mixed-conifer and spruce fir forests. Trees within groups are typically not uniformly spaced, some of the trees may be tightly clumped.

**heavy equipment:** Large motorized machinery such as a dozer, excavator, or grader.

**integrated resource management:** Multiple-use management that recognizes the interdependence of ecological resources and is based on the need for integrated consideration of ecological, social, and economic factors.

**interspace:** Area of relatively low-growing vegetation (or no vegetation) between patches of taller vegetation.

**jackstrawing:** A restoration and resource protection method that involves felling multiple trees—usually conifers—within a stand of young aspen. Letting the trees fall in loose, crisscross patterns on top of each other creates a collection of obstacles, several feet high, around aspen seedlings. Jackstrawing deters browsing animals from eating the aspen seedlings, giving them a chance to grow and strengthen until they can survive browsing effects.

**ladder fuels:** Live or dead vegetation (tall grasses, shrubs, small trees) that allows flames to climb up into the forest canopy.

**land management plan:** A document or set of documents that provide management direction for an administrative unit of the National Forest System developed under the requirements of this part or a prior planning rule.

**landscape:** A defined area irrespective of ownership or other artificial boundaries, such as a spatial mosaic of terrestrial and aquatic ecosystem, landforms, and plant communities, repeated in similar form throughout such a defined area.

**line officer:** A Forest Service official who serves in a direct line of command from the Chief.

**lop and scatter:** Silvicultural practice of felling and disposing of unwanted material by cutting into lengths and disturbing relatively evenly.

**maintain** (in reference to an ecological condition): To keep in existence or continuance of the desired ecological condition in terms of its desired composition, structure, and processes. Depending upon the circumstance, ecological conditions may be maintained by active or passive management or both.

**maintenance** (roads): The upkeep of the entire forest transportation facility including surface and shoulders, parking and side areas, structures, and such traffic-control devices as are necessary for its safe and efficient utilization (36 CFR 212.1).

**management area:** A land area identified within the planning area that has the same set of applicable plan components. A management area does not have to be spatially contiguous.

**management system:** For purposes of the 2012 Planning Rule, a timber management system including even-aged management and uneven-aged management.

**mastication:** Mechanical grinding of slash, often left in place to aid soil health.

**monitoring:** A systematic process of collecting information to evaluate effects of actions or changes in conditions or relationships.

**motor vehicle:** Any vehicle which is self-propelled, other than (1) a vehicle operated on rails and (2) any wheelchair or mobility device, including one that is battery-powered, that is designed solely for use by a mobility-impaired person for locomotion and that is suitable for use in an indoor pedestrian area (36 CFR 212.1, 36 CFR 261.2).

**motor vehicle use map:** A map reflecting designated roads, trails, and areas on an administrative unit or a ranger district of the National Forest System (36 CFR 212.1).

**multiple use:** The management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output, consistent with the Multiple-Use Sustained-Yield Act of 1960 (16 U.S.C. 528–531).

**National Environmental Policy Act (NEPA):** The National Environmental Policy Act requires Federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions.

**National Forest System:** The National Forest System includes national forests, national grasslands, and the National Tallgrass Prairie.

**National Forest System land:** All lands, waters, or interests therein administered by the Forest Service (36 CFR 251.51).

**National Forest System road or trail:** A road or trail wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources (36 CFR 212.1, 251.5, 261.2).

**native species:** An organism that was historically present or is present in a particular ecosystem as a result of natural migratory or evolutionary processes and not as a result of an accidental or deliberate introduction into that ecosystem. An organism's presence and evolution (adaptation) in an area are determined by climate, soil, and other biotic and abiotic factors.

**natural range of variation:** Spatial and temporal variation in ecosystem characteristics under historical disturbance regime during a reference period. The reference period considered should be sufficiently long to include the full range of variation produced by dominant natural disturbance regimes, often several centuries, for such disturbances as fire and flooding and should also include short-term variation and cycles in climate. "Natural range of variation" is a term used

synonymously with historical range of variation or range of natural variation. The natural range of variation is a tool for assessing ecological integrity, and does not necessarily constitute a management target or desired condition. The natural range of variation can help identify key structural, functional, compositional, and connectivity characteristics, for which plan components may be important for either maintenance or restoration of such ecological conditions.

**nutrient cycling:** The transformation and movement of nutrients within an ecosystem. For example, nutrients cycle through an ecosystem when fallen leaves decompose and become part of the soil, eventually being incorporated into new leaves as plants grow.

**off-highway vehicle (OHV):** Any motorized vehicle designed for or capable of cross county travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain; except that term excludes (A) any registered motorboat; (B) any fire, military, emergency or law enforcement vehicle when used for emergency purposes, and any combat or combat support vehicle when used for national defense purposes; and (C) any vehicle whose use is expressly authorized by the respective agency head under a permit, lease, license, or contract (Executive Order 116-44 as amended by Executive Order 11989). See also Forest Service Manual 2355, 01–Exhibit 01.

**old growth:** A forest type that typically supports communities of plants and animals that are associated with or require large, old trees.

**online:** Refers to a particular location on the internet.

**open to public travel:** The road section is available, except during scheduled periods, extreme weather, or emergency conditions; passable by four-wheel standard passenger cars; and open to the general public for use without restrictive gates; prohibitive signs; or regulation other than restrictions based on size, weight, or class of registration. Toll plazas of public toll roads are not considered restrictive gates (23 CFR 460.2).

**overstory:** The uppermost layer of vegetation in a plant community (compare understory).

**participation:** Activities that include a wide range of public involvement tools and processes, such as collaboration, public meetings, open houses, workshops, and comment periods.

**passenger cars:** These include passenger cars of all sizes, sport or utility vehicles, minivans, vans and pickup trucks (AASHTO [2001], A Policy on Geometric Design of Highways and Streets).

**patch:** Areas larger than tree groups in which the vegetation composition and structure are relatively homogeneous. Patches can be composed of randomly arranged trees or multiple tree groups, and they can be even-aged or uneven-aged. Patches comprise the mid-scale, ranging in size from 10 to 1,000 acres. Patches and stands are roughly synonymous.

**persistence:** Continued existence.

**plan:** See *land management plan*.

**plan area:** The National Forest System lands covered by a land management plan.

**private road:** A road under private ownership authorized by easement to a private party, or a road which provides access pursuant to a reserved or private right (FS-643, Roads Analysis: Informing Decisions about Managing the National Forest Transportation System, August 1999).

**productivity:** The capacity of National Forest System lands and their ecological system to provide the various renewable resources in certain amounts in perpetuity. For the purposes of this subpart, productivity is an ecological term, not an economic term.

**project:** An organized effort to achieve an outcome on National Forest System lands identified by location, tasks, outputs, effects, times, and responsibilities for execution.

**proposed species:** Any species of fish, wildlife, or plant that is proposed by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service in the *Federal Register* to be listed under section 4 of the Endangered Species Act.

**ramet:** An individual plant that is part of a clone.

**reasonable assurance:** A judgment made by the responsible official based on best available scientific information and local professional experience that practices based on existing technology and knowledge are likely to deliver the intended results. Reasonable assurance applies to average and foreseeable conditions for the area and does not constitute a guarantee to achieve the intended results.

**recovery:** For the purposes of the 2012 Planning Rule, and with respect to threatened or endangered species: The improvement in the status of a listed species to the point at which listing as federally endangered or threatened is no longer appropriate.

**recreation:** See *sustainable recreation*.

**recreational vehicle (RV):** These include motor homes, cars with camper trailers, cars with boat trailers, motor homes with boat trailers and motor homes pulling cars. (American Association of State Highway Transportation Officials 2001).

**recreation opportunity:** An opportunity to participate in a specific recreation activity in a particular recreation setting to enjoy desired recreation experiences and other benefits that accrue. Recreation opportunities include nonmotorized, motorized, developed, and dispersed recreation on land, water, and in the air. (36 CFR 219.19 and FSH 1909.12, zero code, sec. 05).

**recreation opportunity spectrum (ROS):** A system, by which existing and desired recreation settings are defined, classified, inventoried, and monitored. Recreation settings are divided into six distinct classes (primitive, semi-primitive nonmotorized, semi-primitive motorized, road natural, rural, and urban). Classifications are based on physical, social, and managerial setting characteristics. The recreation opportunity spectrum framework integrates individual recreation setting characteristics (including access and scenic character) to function collectively in providing distinct recreation opportunities. The underlying premise of the ROS is that visitors choose a specific setting and activity to derive desired experience(s) and other benefits.

**recreation opportunity spectrum class characteristics:** The physical, social, and managerial features that function collectively to define a specific recreation opportunity spectrum setting (ROS class). Because setting characteristics may change by season, the corresponding ROS class may also change by season.

**recreation opportunity spectrum classes:** There are six, nationally defined, recreation opportunity classes or settings. They are defined by the social, managerial, and physical characteristics of a place that, when combined, provide distinct recreation opportunities (36 CFR 219.19 and FSH 1909.12, zero code, sec. 05). The terms “recreation setting” and “recreation class” are synonymous and used interchangeably. The Forest Service uses the recreation opportunity spectrum to define recreation settings and categorize them into six distinct classes:

primitive, semi-primitive nonmotorized, semi-primitive motorized, roaded natural, rural, and urban. Each of the six primary ROS settings/classes is defined below:

- Primitive settings encompass large, wild, and predominately unmodified landscapes. Their size and configuration create remoteness from the sights and sounds of human activities, management, and development. Signs and other structures are minimal and constructed of rustic, native materials. Motorized travel does not occur. Encounters with other users is very low, offering visitors the opportunity for solitude, self-reliance, closeness with nature, challenge, risk, and discovery. Many primitive settings coincide with designated wilderness areas in which mechanized equipment is not present. Additional primitive settings may also occur outside of wilderness areas. Mechanized travel and motorized equipment may occur in non-wilderness primitive settings.
- Semi-Primitive Nonmotorized settings are characterized by predominantly natural or natural-appearing landscapes. The size of these areas facilitate distance from more heavily used and developed areas, creating a sense of remoteness. Interaction with other users is low. These settings provide opportunities for self-reliance and utilizing wildland skills. Motorized vehicles are not present, while mountain bikes, and other mechanized equipment may be present. Although some roads may be evident, they do not dominate the landscape. Vehicular use is infrequent. Occasional administrative use occurs on these roads for the purpose of natural and cultural resource protection and management.
- Semi-Primitive Motorized classes are characterized as predominately natural or natural appearing backcountry settings. Motorized travel by off-highway vehicles (OHVs) or high clearance vehicles occurs on designated routes and areas. Motorized routes are typically maintenance level 0-2 roads or motorized trails, offering a high degree of self-reliance, challenge, and risk in exploring these large backcountry settings. Mountain bikes, other mechanized equipment, and nonmotorized uses are also present. Limited rustic facilities are present for the purpose of visitor safety, sanitation and resource protection.
- Roaded Natural settings are characterized by predominately natural-appearing settings, with moderate sights and sounds of human activities and development. The overall perception is one of naturalness. Evidence of human activity varies from area to area and may include: improved highways and high maintenance level roads; developed campgrounds and other recreation sites; small resorts and summer homes; and evidence of other multiple uses and management activities such as livestock grazing, timber harvesting, mining, watershed restoration activities, and oil and gas operations. Roads, motorized equipment, and vehicles are common in this setting. Nonmotorized uses are also present. The density of use is moderate except at developed sites, where concentrations of use are higher. Regulations pertaining to user behaviors are common but generally less restrictive than those in the Rural and Urban ROS classes.
- Rural settings are characterized as modified natural environments. While these landscapes often contain geometric patterns created by management activities, there is a dominant sense of open, green-space, typically characterized as pastoral farm and ranch lands. Facilities are common and may include: resorts and summer home complexes; administrative sites and work centers; and highly developed campgrounds, interpretive sites, trailheads, picnic areas, and other recreation facilities. The sights and sounds of human activity and management are readily evident and the level of interaction with other users ranges from moderate to high.
- Urban settings are characterized as highly modified landscapes, dominated by structures and other infrastructure. Clustered facilities contain amenities for user convenience and comfort.

There is a preponderance of on-site regulations that direct and limit the behavior of visitors. Very high and concentrated use levels are common. These settings are typically small in overall size and not common on forest system lands. Large ski areas, visitor centers, and resorts are sometimes classified as urban ROS settings.

**resilience:** The ability to return to predisturbance condition after facing the effects of a disturbance or stressor (fire, drought, climate change, insect and disease infestation).

**resistance:** The ability to withstand the effects of a disturbance or stressor (fire, drought, climate change, insect and disease infestation).

**responsible official:** The official with the authority and responsibility to oversee the planning process and to approve a plan, plan amendment, and plan revision.

**restoration:** The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. Ecological restoration focuses on reestablishing the composition, structure, pattern, and ecological processes necessary to facilitate terrestrial and aquatic ecosystems sustainability, resilience, and health under current and future conditions.

**restore:** To renew by the process of restoration (see “restoration”).

**right-of-way:** A privilege or right to cross over or use the land of another party for egress and ingress such as roads, pipelines, irrigation canals, or ditches. The right-of-way may be conveyed by an easement, permit, license, or other instrument (Forest Service Manual 5460.5).

**riparian vegetation:** The plant community adjacent to a river, stream, or spring. Riparian vegetation is typified by the presence of hydrophilic (water-loving) plants.

**riparian areas:** Three-dimensional ecotones of interaction that include terrestrial and aquatic ecosystem 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 management zone:** Portions of a watershed where riparian-dependent resources receive primary emphasis, and for which plans include components to maintain or restore hydrologic and ecological function.

**risk:** A combination of the likelihood that a negative outcome will occur and the severity of the subsequent negative consequences.

**road:** A motor vehicle route over 50 inches wide, unless identified and managed as a trail (36 CFR 212.1).

**road maintenance level:** The level of service provided by, and maintenance required for, a specific road.

- maintenance level 1: Closed to vehicular traffic intermittently for periods that exceed 1 year. Can be operated at any other maintenance level during periods of use.
- maintenance level 2: Open and maintained for use by high-clearance vehicles; surface smoothness is not a consideration. Most have native material surface (not paved and no aggregate surface).
- maintenance level 3: Open and maintained for use by standard passenger cars. Most have gravel surface.

- maintenance level 4: Open and maintained for use by standard passenger cars and to provide a moderate degree of user comfort and convenience at moderate travel speeds. Most are paved or have an aggregate surface.
- maintenance level 5: Open and maintained for use by standard passenger cars and to provide a high degree of user comfort and convenience. Most are paved.

**scenic character:** A combination of the physical, biological, and cultural images that gives an area its scenic identity and contributes to its sense of place. Scenic character provides a frame of reference from which to determine scenic attractiveness and to measure scenic integrity. (36 CFR 219.19).

**scenic integrity objectives (SIOs):** The minimum degree to which desired scenic character attributes are to remain intact (Agriculture Handbook 701, page 20 and 5-9). There are four, nationally defined scenic integrity objectives that can serve as desired conditions, and one (Very Low) used only in describing existing (not desired) conditions. Each is defined below.

- Very High: The landscape is intact with only minor changes from the valued attributes described in the scenic character.
- High: Management activities are unnoticed and the landscape appears unaltered.
- Moderate: Management activities are noticeable but are subordinate to the scenic character. The landscape appears slightly altered.
- Low: The landscape appears altered. Management activities are evident and sometimes dominate, but are designed to blend with surroundings by repeating form, line, color, and texture of attributes described in the scenic character.
- Very Low: Used to describe landscapes that are heavily altered and in which the valued attributes described in the scenic character are not evident. Very Low is used only to describe the existing scenic integrity. It is not used as a scenic integrity objective or desired condition.

**scenery management system (SMS):** The scenery management system provides a systematic approach to inventory, analyze, monitor, and define desired conditions for the scenic resources on National Forest System lands (FSM 2380 and Agriculture Handbook 701). A classification system that recognizes scenery as the visible expression of dynamic ecosystems functioning within “places”, which have unique aesthetic and social values. It recognizes that in addition to naturally occurring features, positive scenery attributes associated with social, cultural, historic, and spiritual values, including human presence and the built environment, can also be valued elements of the scenery. The scenery management system also allows for “seamless” analysis and conservation beyond National Forest System lands into adjacent communities and other jurisdictions, through the application of varying scenery “themes” within a single analysis. It is structured to emphasize “natural appearing” scenery.

**seral stage:** See *succession*.

**shelterwood:** The cutting of most trees, leaving enough large trees to produce seed and shade for a new generation of trees (adapted from Society of American Foresters 2016). A shelterwood treatment leaves more large trees after treatment than a seed-tree treatment.

**shrubland:** A vegetation type dominated by shrubs. Grasses and forbs are commonly present. Trees may be present as a minor component of the plant community.

**slash:** Coarse and fine woody material generated during timber harvest, thinning, or other vegetation management activities.

**snag:** A standing, dead tree.

**social sustainability:** See *sustainability*.

**special use authorization:** A permit, term permit, lease, or easement which allows occupancy, use, rights, or privileges of National Forest System land (36 CFR 251.51).

**species of conservation concern:** A species, other than federally recognized threatened, endangered, proposed species, or candidate species, which is 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 the species' capability to persist over the long term in the plan area.

**stressor:** For the purposes of the 2012 Planning Rule: A factor that may directly or indirectly degrade or impair ecosystem composition, structure, or ecological process in a manner that may impair its ecological integrity, such as an invasive species, loss of connectivity, or the disruption of a natural disturbance regime.

**succession:** Change in species composition and structure over time. Early successional stages (“seres” or “states”) are often dominated by small, short-lived, poorly competitive, nonwoody species (annual forbs and grasses) that take advantage of the available “biological space” and plentiful soil nutrients and sunlight present after a disturbance. As succession proceeds, soil nutrients are converted into plant biomass, and plant community dominance generally shifts toward larger, longer-lived, woody species that are better competitors for limited soil nutrients and sunlight—shrubs, shade-intolerant tree species, and eventually, shade-tolerant tree species (figure 4). Disturbances like wildfire, drought, invasive species, and herbivory can interrupt or reverse succession.



**Figure 4. Representation of the different seral stages in the succession of a forest**

**sustainability:** The capability to meet the needs of the present generation without compromising the ability of future generations to meet their needs. For purposes of this part, “ecological sustainability” refers to the capability of ecosystem to maintain ecological integrity; “economic sustainability” refers to the capability of society to produce and consume or otherwise benefit from goods and services including contributions to jobs and market and nonmarket benefits; and “social sustainability” refers to the capability of society to support the network of relationships, traditions, culture, and activities that connect people to the land and to one another, and support vibrant communities.

**sustainable recreation:** The set of recreation settings and opportunities on the National Forest System that is ecologically, economically, and socially sustainable for present and future generations (36 CFR 219.19 and FSH 1909.12, zero code, section 05). At the forest scale, sustainable recreation is derived through the integrated planning process and emerges as the resultant set of desired recreation opportunities spectrum classes and other plan components (FSH 1909.12, chapters 20, 23.23 1.d.).

**temporary road or trail:** A road or trail necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a National Forest System road or trail and that is not included in a forest transportation atlas (36 CFR 212.1).

**timber harvest:** The removal of trees for lumber, wood fiber, or other multiple-use purposes.

**timber production:** The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use.

**traditional cultural property:** A historic property that is eligible for inclusion in the National Register of Historic Places because of its association with cultural practices or beliefs of a living community that 1) are rooted in that community’s history, and 2) are important in maintaining the continuing cultural identity of the community (National Park Service National Register Bulletin 38).

**traditional knowledge:** As per the 2012 Planning Rule (36 CFR Part 219) definition for ‘Native knowledge’ (36CFR 219.19): Native knowledge. A way of knowing or understanding the world, including traditional ecological and social knowledge of the environment derived from multiple generations of indigenous peoples’ interactions, observations, and experiences with their ecological systems. Native knowledge is place-based and culture-based knowledge in which people learn to live in and adapt to their own environment through interactions, observations, and experiences with their ecological system. This knowledge is generally not solely gained, developed by, or retained by individuals, but is rather accumulated over successive generations and is expressed through oral traditions, ceremonies, stories, dances, songs, art, and other means within a cultural context.

**traditional use:** Uses that maintain relationships between people and the world around them. Uses that are rooted in the community’s history and are important in maintaining the continuing cultural identity of the community.

**trail:** A route 50 inches or less in width or a route over 50 inches wide that is identified and managed as a trail (36 CFR 212.1).

**trailhead:** The transfer point between a trail and a road, lake, or airfield. The area may have developments that facilitate the transfer from one transportation mode to another (Forest Service Manual 2353.05).

**travelways:** Linear concentrations of public viewing (such as roads, trails, railroads, streams, etc.). Recreation use areas are spots that receive concentrated public viewing use (such as campgrounds, scenic overlooks, visitor centers, lakes, etc.).

**transportation system:** The system of National Forest System roads, National Forest System trails, and airfields on National Forest System lands (36 CFR 212.1).

**unauthorized route:** A road or trail that is not a National Forest System road or trail or a temporary road or trail and that is not included in a forest transportation atlas (36 CFR 212.1).

**understory:** The layer(s) of vegetation in a plant community beneath the overstory (compare overstory).

**uneven-aged stand:** A stand of trees composed of a single age class (compare even-aged stand).

**vehicle:** Any device in, upon, or by which any person or property is or may be transported, including any frame, chassis, or body of any motor vehicle, except devices used exclusively upon stationary rails or tracks (36 CFR 261.2).

**viable population:** A population of a species that continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments.

**watershed:** A region or land area drained by a single stream, river, or drainage network; a drainage basin.

**watershed condition:** The state of a watershed based on physical and biogeochemical characteristics and processes.

**wild and scenic river:** A river designated by Congress as part of the National Wild and Scenic Rivers System that was established in the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 (note), 1271–1287).

**wilderness:** Any area of land designated by Congress as part of the National Wilderness Preservation System that was established in the Wilderness Act of 1964 (16 U.S.C. 1131–1136).

**wildland:** Forests, shrublands, grasslands, and other vegetation communities that have not been significantly modified by agriculture or human development.

**wildland-urban interface:** Place where development adjoins or intermingles with undeveloped natural area (rural neighborhood, ski area, campground, etc.).

**witches' broom:** Dense clump of deformed plant growth resulting from infection (such as by mistletoe).

**woodland:** A plant community in which the dominant trees are typically small and short-boled, usually with little crown overlap (compare forest).



# Appendix A: Proposed Probable and Possible Future Actions

## Introduction

This appendix describes some of the proposed management actions that may take place on the Cibola National Forest at the project or activity level during the planning period (approximately 10 to 15 years) to maintain or move toward desired conditions as described in this plan. Program strategies, inventories, assessments, resource analyses, and ongoing work with partners and cooperating agencies anticipated during the next 15 years are outlined below. Any objectives and management approaches listed in chapters 2 or 3 may be repeated here.

This list is not all-inclusive; it is simply a list of possible actions that may take place based on the plan objectives and management approaches. This information is not a commitment to take any action and is not a “proposal” as defined by the Council on Environmental Quality regulations for implementing the National Environmental Policy Act.<sup>52</sup> During the life of the plan, the Cibola is not limited to these possible actions when proposing projects and activities. A plan amendment is not required to change or modify the possible actions. These possible future actions can be updated at any time through an administrative change of the plan.

## Proposed Management Actions

Objectives as outlined within chapter 2 of the land management plan represent projects or activities intended to be accomplished during the planning period. These are listed below by resource area.

### All Vegetation Types

- Mechanically treat 750 to 3,500 acres annually of highly departed areas (including prevalent fire-adapted vegetation types such as ponderosa pine, dry mixed conifer, and pinyon-juniper grass woodland).

### Water Resources Features

- Improve water resources features (such as riparian areas, springs, and streams) or soils by implementation of at least two to five projects annually.

### Fire and Fuels

- Prescribe burn 8,900 to 13,000 acres annually to reduce wildfire risk and restore conditions.

### Livestock Grazing

- Remove, improve, or reconstruct at least 15 to 20 improvements annually (such as fences, water developments, and cattle guards) that are no longer necessary or in poor condition, or to move toward desired conditions.

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<sup>52</sup> 40 Code of Federal Regulations 1508.23, 42 U.S.C. 4322(2)C)

## Forest Products

- On average, provide 11,000 to 13,000 cords of fuelwood annually through the issuance of fuelwood permits.

## Dispersed Recreation

- Within 10 years of plan approval, evaluate forestwide trail system (using established protocol) for need, condition, use, relevance and sustainability.

## Roads

- Relocate, improve, or decommission 3 to 5 miles annually of system roads or unauthorized routes to protect ecosystems and watersheds.

## Possible Management Actions

Management approaches in chapters 2 and 3 of the land management plan describe some possible management actions for achieving desired conditions and objectives. The following list is organized by resources area. It highlights some of the possible key actions but does not repeat every management approach in the plan.

## Vegetation

- Consider focusing restoration and maintenance activities in order to mitigate water stress in areas with high vulnerability to climate change.
- For forests and woodlands in areas of high vulnerability to climate change (based on 100-year climate projections; Triepke et al. 2019), tree basal area may be restored or maintained at levels that mitigate water stress and increase resistance to climate change (Allen et al. 2015, Sun et al. 2015, Vose et al. 2016); often this is the lower half of the range of desired conditions for basal area. In these areas, early- and mid-seral tree species may be allowed to 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 characteristics of lower-elevation life zones (such as Douglas-fir on a spruce-fir forest site) are maintained. Late-seral tree species (especially large specimens) may be maintained primarily in locally cooler (north-facing aspects) and wetter (draws and seeps) areas to maintain diversity, wildlife habitat, and a local seed source.
- Planting rust-resistant trees may be the only option to maintain or restore white pines in some locations, such as where no rust-free trees exist on sites that support white pines.
- Significant plant communities may be managed to maintain their unique characteristics.
- Use a variety of strategies for reestablishing desired conditions such as leaving snags, downed logs, and other woody components that collect drifting seeds, provide shade and cooler temperatures, retain moisture, and provide protection from ungulate herbivory.
- Move all vegetation types towards desired conditions by monitoring, recovering, and mitigating severe or uncharacteristic disease outbreaks and insect infestations to ensure watershed health and to allow development of a diversity of age classes across the landscape.

- Manage cultural resources (including species of cultural significance) and historic properties by proactively integrating their consideration into the planning, design, and implementation of vegetation projects.
- Prioritize vegetation treatment in riparian areas that are important for wildlife, in the wildland-urban interface, along scenery management system concern level 1 and 2 travelways, in recreation sites, and in historically occurring openings.
- Work closely with U.S. Fish and Wildlife Service personnel to address the habitat needs of the Mexican spotted owl by minimizing disturbance and providing nesting and roosting habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody material.
- Consider cutting or burning oaks to stimulate new growth, maintain growth in large-diameter trees, or to stimulate mast production.
- Engage with partners to educate and enforce activities to reduce illegal wood cutting to ensure sustainability of oak habitat over the long term. Manage fuelwood collection and permits to specify the amount and size of oak that can be collected in areas where live and dead woody oak habitat components are limited.

## **Water Resources**

- Develop prescriptions and plans for improvement of priority watersheds through the Watershed
- Work with local, State, and Tribal governments, land grants, and other stakeholders to identify watershed improvements and priorities for protection and management thereby increasing collaboration across boundaries.
- Plan watershed condition improvement projects with other project activities (such as vegetation, recreation, and range management projects) to support the natural variability of ecological characteristics to support satisfactory watershed condition while considering the effects of Water Resources Features
- Emphasize natural channel design principles and native wetland and riparian plants over construction involving artificial materials during restoration of water resources features such as areas of poor riparian vegetation recruitment.
- Collaborate with Federal, Tribal, State, and local governments, universities, and industry partners to identify, inventory, assess, and develop plans, and monitor water resources features and groundwater resources on National Forest System lands. Provide public education opportunities to improve understanding of water resources and water rights.
- Identify and inventory groundwater-dependent resources and aquifers within the plan area, including important recharge areas. Manage watershed conditions to support groundwater recharge processes such as snowpack management and improved soil condition.

## **Soils**

- Assess the extent to which soil condition is being maintained. Evaluate the effectiveness of soil condition practices and monitor changes in soil properties to maintain satisfactory soil condition.

- Use the Terrestrial Ecological Unit Inventory as the basis for planning project activities where soil condition may be affected, including vegetation management, grazing, and transportation projects. Verify at the project level to confirm accurate site-specificity.
- Manage forest and rangelands in a manner that will improve soil productivity.
- Collaborate with local, State, Tribal, and Federal governments to ensure policies and actions of soil resource protection are fully considered to the benefits of the resource.

## **Aquatic and Terrestrial Species**

- Work collaboratively with New Mexico Department of Game and Fish personnel to coordinate on management of sport and native fishes, including reintroductions, habitat improvements, control or eradication of nonnative species, and the identification of refugia for native fish.
- Pursue partnership potential for collaborative management of aquatic resources with State, county and local government entities. Work with partners and through collaborative efforts to increase the frequency of restoration efforts benefitting aquatic species.
- Work collaboratively with New Mexico Department of Game and Fish personnel to plan and implement projects that make progress towards the Cibola's desired conditions and help achieve conservation actions specified in the New Mexico State Wildlife Action Plan or equivalent.
- Consider potential climate change, drought, El Niño Southern Oscillation, and the resulting potential effects of management activities during project planning.
- Develop partnerships with interested individuals and groups to help implement the wildlife program, including wildlife survey and habitat assessment.
- Coordinate with other Federal and State agencies, Tribal governments, counties, local governments, Cooperative Extension Service, grazing permittees, and adjacent landowners in efforts for prevention, control, and eradication of invasive species populations incorporating the best available scientific information.
- Use strategies and best management practices to minimize and prevent the spread of invasive species and nonnative exotics including aquatic systems, such as education, inventory, and control guidelines.
- Work with the New Mexico Department of Agriculture personnel to ensure special management consideration are given to all species on the State noxious weed list to limit, and eradicate, any noxious weeds on the Cibola National Forest.
- Emphasize the protection and replacement of key habitats that contain threatened species, endangered species, species of conservation concern plants and animals, or a combination of these species.
- Work with the U.S. Fish and Wildlife Service and other partners to develop conservation measures (for example, public education to reduce human impacts) to prevent listing and to aid in the recovery and delisting of federally listed species. For 10(j) species, such as the Mexican wolf, this applies inside and outside the designated experimental range.

- At-risk species management approach should take into account activities occurring simultaneously within at-risk species habitat as well as activities occurring on adjacent land that may impact species.
- In coordination with New Mexico Game and Fish personnel, consider dusting prairie dog colonies with flea-controlling powder to reduce the spread of sylvatic plague. When possible, identify and potentially avoid burrows occupied with burrowing owls prior to application.

## **Air**

- Work with agencies, organizations, Tribes, and other entities, such as New Mexico Environmental Department, to actively pursue actions designed to reduce the impacts of pollutants from sources both within and outside the Cibola National Forest.
- Manage smoke in conjunction with State of New Mexico and Bernalillo County personnel through compliance with their respective smoke management programs.
- Document evidence of initial and continued compliance with local, State, and Federal air quality permits for projects. Maintain the files for the duration of the activity. Provide resources for meaningful enforcement of permit compliance documentation.

## **Fire and Fuels**

- Collaborate with stakeholders and partnering agencies (such as Federal, State, county, local, and Tribal governments, and land grants-*mercedes*) early and often to successfully meet incident objectives. Educate internally and externally about the potential challenges and tradeoffs of using wildland fire to meet resource objectives. This includes water sources, access, and land use agreements. This is done with the understanding that fire-adapted ecosystems and communities transcend jurisdictional boundaries.
- Collaboratively plan and implement fuels projects and wildfire response with Federal, State, and local governments, and private landowners. Promote public safety and reduce the risk of wildfire on lands outside the national forest by supporting the development and implementation of community wildfire protection plans or similar assessments and management plans in order to mitigate negative impacts of wildfire. Community wildfire protection plans are also important tools for mitigation efforts such as wildfire preparedness, evacuation planning, and other mitigations that will aid in wildfire response.
- Base wildfire objectives on interdisciplinary assessment of site-specific values such as desired conditions, existing fuel conditions, current and expected weather, fire location, resource availability, and social and economic considerations; consider courses of action to protect or enhance those values.
- Implement treatments where they provide the most benefit, are logistically feasible, and improve or maintain ecological integrity (by addressing vegetative departure). This includes, when appropriate, combining prescribed fire with mechanical treatments to improve forest structure and function in areas departed or trending away from the desired conditions. When mechanical treatments are not feasible due to steep and rugged terrain in remote areas, consider the use of naturally ignited wildfires and prescribed fires to meet protection and resource objectives when conditions facilitate safe progress towards desired conditions. These objectives can change as fire spreads across the landscape.

- Increase resiliency in areas of high vulnerability to the effects of changing climate by using a diversity of treatments to facilitate natural adaptation to changing conditions, such as managing in favor of early- to mid-seral species over late-seral species in ecotones, as species characteristic of lower life zones are adapted for warmer and drier conditions. Manage tree basal area at the low end of the range of desired conditions to mitigate water stress. Seed native vegetation or implement other site rehabilitation practices in areas burned by wildfire and not expected to reseed naturally.

### **Sustainable Rangelands and Livestock Grazing**

- Cooperate, collaborate, and coordinate with permit holders to respond to changing resource conditions. Cooperation, collaboration, and coordination among Cibola managers and permit holders is key to improving rangeland and forest conditions for multiple uses, moving towards desired conditions, and contributing to the socioeconomic well-being of local communities. In addition, collaboration among stakeholders is important, including local communities; permit holders; and Federal, State, county, and local government entities.
- Emphasize large-scale landscape approaches and treatments for restoring rangelands and the use and perpetuation of a diversity of native plant species, with an emphasis on grass, forb, and shrub communities.
- Implement adaptive management strategies to manage livestock grazing in a manner that promotes ecosystem resiliency, sustainability, species diversity, and the improvement of groundwater sources and riparian areas, based on changes in range conditions, climate, and other resource conditions. The adaptive management strategy is to provide more flexibility to grazing management while improving or maintaining the health of rangelands.
- Facilitate dialogue between New Mexico Department of Game and Fish personnel and permit holders about ungulates (elk, deer, and livestock) and other wildlife species, and the cumulative impacts on national forest resources.

### **Sustainable Forestry and Forest Products**

- Work collaboratively with Federal, State, and local governments, federally recognized Tribes, and private landowners when planning and implementing projects, to promote integrated ecological and social-economic goals of harvesting forest products using mechanisms such as collaborative forest restoration projects, Tribal Forest Protection Act, youth programs, and stewardship contracting authorities to support a sustainable and appropriately scaled industry.
- Make fuelwood more available through public access within a project area, consistent with scenic integrity objectives providing some decked woody material along roads, or allowing collection within utility or road corridors that are being thinned or cleared.
- Manage fuelwood collection within dry soils by specifying the location, amount, and size of wood that can be collected in areas where live and dead woody habitat components are limited to protect slopes and roads (soil type, soil condition, erosion hazard). Use post-fuelwood-collection rehabilitation measures to restore soil stability and watershed function.

## Traditional Communities and Uses

- Formalize working agreements (such as memoranda of understanding and stewardship contracts) with federally recognized Tribes to understand their needs and build respectful, collaborative relationships; to develop ways of accomplishing mutually desired conditions and objectives; to promote internships or partnerships that provide employment training opportunities; and to collaborate in ecosystem restoration efforts.
- Coordinate with federally recognized Tribes to develop collaborative proposals and implement projects through partnerships of mutual benefit that support economic development across shared boundaries, and use available federally authorized or advocated programs (such as the Tribal Forest Protection Act of 2004 and Collaborative Forest Restoration Program).
- Work with Tribes to identify opportunities where locations on the Cibola can provide a setting for educating tribal youth in culture, history, land stewardship, and the health benefits of outdoor activities and for exchanging information between tribal elders and youth.
- Incorporate native languages into signs, interpretive materials, and place names to highlight the American Indian culture as part of the national forest landscape and its surrounding areas.
- Work with representatives of historic communities, governing bodies for land grants-*mercedes*, and acequia associations to understand their needs and build respectful, collaborative relationships; develop collaborative proposals and implement projects of mutual benefit across shared boundaries and with shared infrastructure (such as boundary fences and roads); develop ways of accomplishing mutually desired conditions and objectives; and collaborate in ecosystem restoration efforts.
- Work with rural historic communities to identify opportunities where locations on the Cibola can provide a setting for educating rural youth in culture, history, and land stewardship (including internships or partnerships that provide employment training opportunities), and for exchanging information between elders and youth and promoting the health benefits of outdoor activities.
- Incorporate Spanish language interpretive materials into signage to highlight Hispanic culture as part of the landscape and surrounding areas.
- Coordinate with the land grant and acequia association governing bodies to provide and accommodate access for their constituent communities to engage in activities such as the collection of forest products for traditional uses, and for other traditional uses. Develop sustainable approaches (sensitive to environmental and other cultural concerns) for members of historic communities to continue to practice occupational and subsistence-based activities.

## Cultural and Historic Resources

- Work collaboratively to develop public participation and partnerships that allow the diversity of interests to identify, manage, preserve, protect, and interpret historic properties.
- Develop appropriate measures for historic properties to prevent deterioration due to natural forces, visitor use, vandalism, looting, and other impacts. Protective measures may include vegetation treatment in and adjacent to site boundaries (provided appropriate protection measures are in place), signing, fencing, administrative closure, patrols, interpretive signs, stabilization, or data recovery.

- When resolving adverse effects to historic properties of importance to descendant communities (American Indian Tribes, land grants, acequia associations, rural historic communities, and others), involve communities members in the resolution process through visits to the sites to be adversely affected and in the development of specific mitigation measures.
- Use emerging information and communication technologies when developing opportunities for public participation, and in plans for the protection, preservation, and interpretation of historic properties.

## **Lands**

- Consider working with Federal, State, tribal, county, municipal, land grant-*merced*, and adjacent landowners and partners to prioritize and cooperate on boundary issues, right-of-way needs, and land adjustments and joint surveys to resolve encroachments, to provide habitat connectivity, and improve all-lands management.
- Collaborate with rural historic communities that are dependent on the Cibola to ensure traditional and cultural uses are incorporated into the management of any newly acquired lands.

## **Minerals and Geology**

- Plan mining operations to use by-products (such as timber or gravel) as part of construction or maintenance. Collaborate with other resource specialists to identify these possibilities.
- Develop opportunities for public geologic interpretation including interpretive signs, printed material, and interpretive information on Forest Service websites.
- Coordinate management of bat roosts with New Mexico Department of Game and Fish and the U.S. Fish and Wildlife Service personnel.
- Use caves for educational opportunities.
- Avoid or minimize the alteration of naturally occurring rocky outcroppings or cliff faces associated with caves.

## **Recreation**

- Build and maintain relationships with a diversity of local communities, partnerships, volunteers, other government agencies, range permittees, cooperators, recreation users, and permit holders to help co-manage a sustainable recreation program and minimize conflicts among uses, including planning, design, implementation, and operations and maintenance. Recognize partners for their roles in providing recreational opportunities when possible.
- To help connect people to nature and encourage responsible use, develop a multilingual interpretive strategy to address educational, interpretive, and informational needs of each ranger district, and identify key messages for the Cibola National Forest.
- Promote established conservation programs and develop new ones.
- Follow Forest Service sign and poster guidelines (USDA Forest Service 2013a), Forest Service outdoor recreation accessibility guidelines (USDA Forest Service 2013b), and the built environment image guide (Potyondy and Geier 2011) or most current versions to develop sign plans as needed for scenic byways and other popular areas to provide improved visitor information and a consistent Forest Service image.

- Use sustainable “green” design techniques and incorporate them in the alteration of existing facilities and in new construction of recreation sites and facilities. Use sustainable operations at developed recreation sites (for example, recycling receptacles or electric maintenance vehicles).
- Collaborate in developing new recreation facilities with government agencies and non-governmental agencies to become a regional destination to support local and economic development.
- Base trail management priorities on preventing erosion, providing appropriate and meaningful recreation opportunities, developing trail-based tourism to help develop rural and local communities, and accommodating administrative needs.
- Consider destination and loop opportunities when new trails or modifications to the trail system are planned.
- Analyze, add, or decommission unauthorized trails when revising the trail system.
- Use signing, enforcement, public information, trail management objectives, seasonal and special closures, maintenance, construction, and restoration to address sustainable recreation opportunities, conflicts between uses, and resource damage. Educational techniques (such as brochures, signs, websites, and social media) enhance visitor knowledge of proper nonmotorized and motorized trail use etiquette.

## **Scenic Resources**

- Display interpretive or informational signs at sites with impacts to scenery to inform the public about the nature and consequences of such projects or events.
- Cooperate with other entities, such as the New Mexico Department of Transportation, Tribal and local governments, and commercial and private entities to protect scenic integrity on and adjacent to the national forest, including along scenic byways. Provide scenery management inventory information to local adjacent and neighboring land management agencies for integration into projects and plans.

## **Infrastructure**

- Prioritize road system maintenance to provide safe travel and to prevent or mitigate resource damage. Collaborate on joint agreements to help defray the costs of road maintenance.
- Follow regulatory requirements, best management practices, and other design features for management of system roads as appropriate for all applicable resources such as reducing the potential for wildlife entrapment.
- Prioritize relocation, closure, or decommission system roads or unauthorized routes to meet desired conditions (such as in inventoried roadless areas), or improve protection of resources (for example, where roads are redundant, adversely impact flow regimes, or causing damage to
- Work with local governments, partners, and affected users to acquire legal access to all National Forest Service system roads.

- When work is being planned for administrative facilities and infrastructure that are historic resources, work with the heritage program staff and partnerships to administer and maintain facilities according to the facility master plan and any developed preservation maintenance plans (historic property plans) for administrative facilities and infrastructure that are historic resources.

## **Management Areas**

- Consider opportunities for enhancing outstandingly remarkable values in all project management activities within an eligible wild and scenic river corridor
- Within a 660-foot corridor on each side of the roads approved in travel management plans, the restoration goal would be to mechanically restore ponderosa pine, dry mixed conifer, meadows, encroached grasslands, and woodland ecotypes. The purpose of this restoration would be to create shaded fuelbreaks to use as holding features during the management of planned and unplanned ignitions, to allow safe ingress and egress for the public and Forest Service personnel, and to create fuelwood opportunities for the public.
- Work closely with adjacent landowners and communities, particularly planning and zoning departments, to encourage new and existing developments that protect people, property, and natural resources from wildfire.
- Partner with communities and organizations on workforce development programs to build capacity for a wide variety of restoration jobs (mechanized harvesters, wood processors, and thinning crews).

## **Designated Areas**

- Work with partners and Federal, Tribal, State, county, and local governments to ensure management is consistent with adjacent wilderness areas, recommended wilderness areas, and wilderness areas administered by other agencies.
- Prioritize decommissioning roads within inventoried roadless areas to maintain roadless character where possible.
- Collaboratively develop and promote roadside interpretive services along scenic byways. Signs, kiosks, exhibits, and other educational tools (such as brochures, websites, and social media) may provide interpretive, education, and safety information along scenic byways, in adjacent recreation sites, and at visitor contact points such as ranger stations.
- Collaborate with Federal, State, Tribal, county, and local governments, volunteer groups, partners, and adjacent landowners to plan, develop, relocate as needed, maintain, and manage the trail and facilities to promote economic development, maintain the character of the surrounding landscape, and to support trail users with low-impact principles.
- Coordinate management activities [on the withdrawal area] through use of a memorandum of agreement.
- Explore opportunities for collaborative partnerships for interpretation and monitoring for the research natural area and on-site stewards.

- Promote and facilitate partnerships that create a higher integration of traditional communities, local advocacy groups, and members of the public into the planning and management of Sandia Cave.
- Provide Forest Service employees opportunities to receive training about the Trust Area to ensure continuity in the familiarity and understanding of the history, background, creation, and special management requirements for the Trust Area.

## Appendix B: Project Consistency with the Plan

As required by the National Forest Management Act of 1976, all projects and activities authorized by the Forest Service must be consistent with the land management plan.<sup>53</sup> If a proposed project or activity is not consistent with the land management plan, the responsible official has the following options (subject to valid existing rights):

- Modify the proposed project or activity to make it consistent with the applicable plan components
- Reject the proposal or terminate the project or activity
- Amend the plan so that the project or activity will be consistent with the plan as amended
- Amend the plan contemporaneously with the approval of the project or activity so that the project or activity will be consistent with the plan as amended. This amendment may be limited to apply only to the project or activity.

Because of the many types of projects and activities that can occur over the life of the plan, it is not likely that a project or activity can maintain or contribute to the attainment of all desired conditions nor are all desired conditions 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 plan.

Every project and activity must be consistent with the applicable plan components. A project or activity approval document must describe how the project or activity is consistent with applicable plan components by meeting the following criteria:<sup>54</sup>

- **Desired conditions and objectives.** The project or activity contributes to the maintenance or attainment of one or more desired conditions or objectives, or does not foreclose the opportunity to maintain or achieve any desired conditions or objectives, over the long term.
- **Standards.** The project or activity complies with applicable standards.
- **Guidelines.** The project or activity:
  - ◆ complies with applicable guidelines as set out in the plan or
  - ◆ is designed in a way that is as effective in achieving the purpose of the applicable guidelines.<sup>55</sup>
- **Suitability.** A project or activity can occur in an area:
  - ◆ the plan identifies as suitable for that type of project or activity or
  - ◆ for which the plan is silent with respect to its suitability for that type of project or activity.

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<sup>53</sup> 16 U.S.C. 1604(i) and 36 Code of Federal Regulations 219.15(b-c)

<sup>54</sup> 36 Code of Federal Regulations 219.15(d)

<sup>55</sup> 36 Code of Federal Regulations 219.7(e)(1)(iv)

## Determining Consistency with Desired Conditions and Objectives

A project is consistent with plan desired conditions and objectives if the project:

- contributes to the maintenance or makes progress toward attaining one or more plan desired conditions or objectives applicable to the project;
- has no effect or only a negligible adverse effect on the maintenance or attainment of applicable desired conditions or objectives;
- does not foreclose the opportunity to maintain or achieve any of the applicable desired conditions or objectives over the long term even if the project (or an activity authorized by the project) would have an adverse short-term effect on one or more desired conditions or objectives; or
- maintains or makes progress toward attaining one or more of the plan's desired conditions or objectives even if the project or activity would have an adverse but negligible effect on other desired conditions or objectives.

The project decision document should include an explicit finding that the project is consistent with the plan's desired conditions, objectives, or goals and briefly explain the basis for that finding. In providing this brief explanation, the project decision document does not need to explicitly address every desired condition or objectives set forth in the plan. A general explanation is all that is needed, so long as the consistency finding is made based on a consideration of one of the four factors noted above. When a categorical exclusion from detailed environmental analysis and documentation applies and there is no project decision document, the finding and explanation should be in the project record.

## Determining Project Consistency with Standards

A project or activity is consistent with a standard if the project or activity is designed in exact accord with the standard. The project documentation should confirm the project or activity is designed in exact accord with all applicable plan standards. The line officer can make a single finding of consistency with all applicable standards, rather than there needing to be individual findings.

## Determining Project Consistency with Guidelines

A project or activity must be consistent with all guidelines applicable to the type of project or activity and its location in the plan area. A project or activity can be consistent with a guideline in either of two ways:

- the project or activity is designed exactly in accord with the guideline, or
- a project or activity design varies from the exact words of the guideline but is as effective in meeting the purpose of the guideline to contribute to the maintenance or attainment of relevant desired conditions and objectives.

The project documentation should briefly explain how the project is consistent with the applicable plan guidelines. When the project is designed in exact accord with all applicable guidelines, the project documentation should simply confirm that fact in a single finding of consistency with all applicable guidelines. When the project varies from the exact guidance of one or more applicable guidelines, the project documentation should explain how the project design is as effective in meeting the purpose of the guideline(s) as the exact guidance in the guideline(s).

## Determining Project Consistency with Suitability of Land Determinations

A project with the purpose of timber production may only occur in an area identified as suitable for timber production<sup>56</sup>. Except for projects with a purpose of timber production, a project or activity can be consistent with plan suitability determinations in either of two ways:

- the project or activity is a use for which the area is specifically identified in the plan as suitable, or
- the project or activity is not a use for which the area is specifically identified in the plan as suitable, but is not a use precluded by a not suitable determination.

The project documentation should confirm that the project or activity conforms to bullets 1 or 2 above.

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<sup>56</sup> 16 U.S.C. 1604(k)

## Appendix C: Common, Latin, and Spanish Plant Names

Common Name	Scientific Name (Latin)	Spanish Name(s)
agave, century plant	<i>Agave</i> spp.	lechuguilla, maguey
alpine clover	<i>Trifolium dasyphyllum</i>	trébol
Arizona alder	<i>Alnus oblongifolia</i>	alamillo, aliso, júcaro
Arizona cottontop	<i>Digitaria californica</i>	plumero blanco, zacate punta blanca
Arizona cypress	<i>Cupressus arizonica</i>	cedro, cipres
Arizona fescue	<i>Festuca arizonica</i>	cañuela arizonica
Arizona sycamore	<i>Platanus wrightii</i>	lamo blanco, aliso, ciclamor
Arizona walnut	<i>Juglans major</i>	nogal
big bluestem	<i>Andropogon gerardii</i>	none
Bigelow sage	<i>Artemisia bigelovii</i>	chamiso
birchleaf buckthorn	<i>Condalia spathulata</i>	teconblate
black grama	<i>Bouteloua eriopoda</i>	navillta
blue grama	<i>Bouteloua gracilis</i>	artiguilla, navajita
blue spruce	<i>Picea pungens</i>	abeto azul, picea azul
bluegrass	<i>Poa</i> spp.	epsinguilla, pasto azul
boxelder	<i>Acer negundo</i>	acer, acecinte, acer negundo, el palo blanco
bristlecone pine	<i>Pinus longaeva</i>	pino de cola de zorro, pino de piñas aritadas de las rocosas
bulrush	<i>Cyperus papyrus</i>	cyperus, papiro
burrograss	<i>Scleropogon brevifolius</i>	cola de zorra, zacate de burro
bush muhly	<i>Muhlenbergia porteri</i>	liendrilla, zacate aparejo, amacollada, teleraña
cactus apple	<i>Opuntia engelmannii</i>	abrojo, coyonoxtle, cuija, joconstle
California false hellebore	<i>Veratium album</i>	ballestera, cebadilla
corkbark fir, subalpine fir	<i>Abies lasiocarpa</i>	abeto blanco, pino real blanco
creosote bush, greasewood	<i>Larrea tridentata</i>	chaparral, hediondilla, gobernadora
curly mesquite	<i>Pleuraphis belangeri</i>	rizado, tobosa, zacate chino
currant (wax currant)	<i>Ribes</i> spp.	capulincillo, ciruelillo
desert willow	<i>Chilopsis linearis</i>	mimbre, sauce, flor de mimbres
Douglas-fir	<i>Pseudotsuga menziesii</i>	abeto, acahuite, cahuite, el pino real colorado

Common Name	Scientific Name (Latin)	Spanish Name(s)
ear muhly	<i>Muhlenbergia arenacea</i>	liendrilla
Engelmann spruce	<i>Picea engelmannii</i>	picea, pino real
fluffgrass, low woollygrass	<i>Dasyochloa pulchela</i>	none
fowl manna grass	<i>Glyceria striata</i>	gliceria estriada
Fremont cottonwood	<i>Populus fremontii</i>	alamo
Gambel oak	<i>Quercus gambelii</i>	encino, encino de hojas anchas
giant dropseed	<i>Sporobolus giganteus</i>	zacate gigante
giant sacaton	<i>Sporobolus wrightii</i>	zacate
goldenrod	<i>Solidago</i> spp.	vara de oro
gypsum grama	<i>Bouteloua breviseta</i>	chino grama, navijita china
hairy grama	<i>Bouteloua hirsuta</i>	grama, navijita, navajita velluda
honeysuckle	<i>Lonicera</i> spp.	madreselva
huckleberry	<i>Vaccinium myrtillus</i>	ráspero
Indiangrass	<i>Sorghastrum nutans</i>	zacate indio
Indian ricegrass	<i>Achnatherum hymenoides</i>	arroz indio
James' galleta	<i>Pleuraphis jamesii</i>	galleta
jointfir, Mormon tea	<i>Ephedra</i> spp.	canutillo, popotillo, tepopote
juniper	<i>Juniperus</i> spp.	sabina, cedron
Kentucky bluegrass	<i>Poa pratensis</i>	cañuela, espiguilla, gramade prados
lanceleaf cottonwood	<i>Populous x acuminata</i>	alamo
Lehmann lovegrass	<i>Eragrostis lehmanniana</i>	amor seco africano, pasto africano, zacate africano
limber pine	<i>Pinus flexilis</i>	ayacahuite, pino enano
little bluestem	<i>Schizachyrium scoparium</i>	popotillo azul, popotillo cañuelo
low woollygrass, fluffgrass	<i>Dasyochloa pulchella</i>	none
lupine	<i>Lupinus</i> spp.	altramuz, cola de zorra, lupino
manzanita	<i>Arctostaphylos manzanita</i>	manzanilla, coralillo, madrone borracho, pinguica
Rocky Mountain maple	<i>Acer glabrum</i>	palo de azucar
mariola	<i>Parthenium incanum</i>	copalillo, guayule, guayuchemara
mat rockspirea	<i>Petrophyton caespitosum</i>	none
mesquite	<i>Prosopis</i> spp.	tonillo
mesa dropseed	<i>Sporobolus flexuosus</i>	zacatón
mountain mahogany	<i>Cerococarpus</i> spp.	palo duro, palo ludo
narrowleaf cottonwood	<i>Populus angustifolia</i>	alamo

Common Name	Scientific Name (Latin)	Spanish Name(s)
narrowleaf willow, coyote willow, acequia willow	<i>Salix exigua</i>	none
needle and thread	<i>Hesperostipa comata</i>	none
needlegrass	<i>Stipa tenacissima</i>	esparto, raigon
New Mexico bluestem	<i>Schizachyrium neomexicanum</i>	popotillo azul
New Mexico feathergrass	<i>Hesperostipa neomexicana</i>	barba blanca, flechilla neomexicana
New Mexico locust	<i>Robinia neomexicana</i>	garrobo, hojalito, uña de gato
oak (general)	<i>Quercus</i> spp.	encino, encinillo
ocotillo (candlewood, couchwhip)	<i>Fouquieria splendens</i>	ocotillo
Parry's bellflower	<i>Campanula parryi</i>	campanula, aguinaldo, rapónchigo
Parry's oatgrass	<i>Danthonia parryi</i>	none
pine dropseed	<i>Blepharoneuron tricholepis</i>	pastille del pinar, popotillo del pinar
pinyon pine	<i>Pinus edulis</i>	piñon, ocote
plains lovegrass	<i>Eragrostis intermedia</i>	zacate llanero
plumed crinklemat	<i>Tiquilia greggii</i>	cenizo, herba del cenizo
ponderosa pine (yellow pine)	<i>Pinus ponderosa</i>	pino ponderosa, el pinabete amarillo, pinabete, pino blanco, pino real, pino real americano
pricklyleaf dogweed	<i>Dyssodia acerosa</i>	parralena, pagué
purple threeawn	<i>Artistida purpurea</i>	tres aristas
quaking aspen	<i>Populus tremuloides</i>	alamillo
red grama	<i>Bouteloua trifida</i>	navillita
Rio Grande cottonwood	<i>Populus wislizenii</i>	alamo, guerigo
Rio Grande saddlebush	<i>Mortonia scabrella</i>	afinador
Rocky Mountain iris (blue flag)	<i>Iris missouriensis</i>	lirio
saddlebush	<i>Mortonia scabrella</i>	afinador
sagebrush (wormwood)	<i>Artemisia</i> spp.	chamiso, altamisa, estafiate, mariola, alcanfor
saltbush	<i>Atriplex</i> spp.	chamiso, cenizo
sand dropseed	<i>Sporobolus cryptandrus</i>	zacate encubierto
sand muhly	<i>Muhlenbergia arenicola</i>	liendrilla
Sandberg bluegrass	<i>Poa secunda</i>	none
sandhill muhly	<i>Muhlenbergia pungens</i>	liendrilla
sedges (general)	<i>Carex</i> spp.	carrizo
serviceberry	<i>Amelanchier</i>	cornillo, corniluelo
shadscale	<i>Atriplex canescens</i>	chamizo

Common Name	Scientific Name (Latin)	Spanish Name(s)
shootingstar	<i>Dodecatheon</i> spp.	sarapico
sideoats grama	<i>Bouteloua curtipendula</i>	banderilla
Sierra rush	<i>Juncus nevadensis</i>	junco
silkassel (quinine bush)	<i>Garrya flavescens</i>	guachichi, cuauchichic
snakebroom (broomweed)	<i>Gutierrezia</i> spp.	yerba de la vibora, escoba de la vibora, collálle
snowberry	<i>Chiococca alba</i>	aceitilla, cahinca, cainia
southwestern white pine	<i>Pinus strobiformis</i>	acahuite, acamita, acanita, huiyoco, ocote
spike dropseed	<i>Sporobolus contractus</i>	zacate alcalino espigado
spike fescue	<i>Festuca kingii</i>	cañuela
spruce (general)	<i>Picea</i> spp.	pinabete
sumac (lemonadeberry)	<i>Rhus</i> spp.	pajul del norte, lemonita
tarbush	<i>Flourensia cernua</i>	hojase, ojasé, hojansen
thinleaf alder	<i>Alnus tenuifolia</i>	aliso, aliso cano, baraña
threeawn	<i>Aristida</i> spp.	tres aristas
Thurber's fescue	<i>Festuca thurberi</i>	cañuela
tobosagrass	<i>Pleuraphis mutica</i>	toboso
velvet ash	<i>Fraxinus velutina</i>	fresno
velvet mesquite	<i>Prosopis velutina</i>	mesquite, algarroba, chachuaca
viscid acacia	<i>Acacia neovernicos</i>	none
white fir	<i>Abies concolor</i>	abeto, pinabete, pino blanco, pino real blanco
whitethorn acacia	<i>Acacia constricta</i>	chabarroprieto, gigantillo, juisache
willow (general)	<i>Salix</i> spp.	jara, jarita, sauce, sauz
winterfat	<i>Krascheninnikovia lanata</i>	lanata
woody crinklemat	<i>Tiquilia canescens</i>	hierba de la virgen, orejade perro
Wright's beebrush	<i>Aloysia wrightii</i>	altamisa, oreganillo, vara dulce
yarrow, milfoil	<i>Achillea lanulosa</i>	plumajillo
yucca (Spanish bayonet/dagger)	<i>Yucca</i> spp.	amole, datil

# Appendix D: Relevant Laws, Regulations, and Policy

## Federal Statutes and Laws

The following is a partial list of relevant laws that have been enacted by Congress. A Federal statute or law is an act or bill that has become part of the legal code through passage by Congress and approval by the President (or via congressional override). Although not specified below, many of these laws have been amended. An internet search can provide more information.

- Agricultural Credit Act of 1987, as amended by the Federal Crop Insurance Reform and Department of Agriculture Reorganization Act of 1994
- American Indian Religious Freedom Act, as amended
- Americans with Disabilities Act of 1990
- Anderson-Mansfield Reforestation and Revegetation Act of October 11, 1949
- Antiquities Act of 1906
- Archaeological and Historic Preservation Act of 1974
- Archaeological Resources Protection Act of 1979, as amended
- Bald and Golden Eagle Protection Act of 1940
- Bankhead-Jones Farm Tenant Act of July 22, 1937
- Clarke-McNary Act of 1924
- Clean Air Act of August 7, 1977, as amended (1977 and 1990)
- Clean Water Act (see Federal Water Pollution Control Act)
- Clean Water Restoration Act of 1966
- Common Varieties of Mineral Materials Act of July 31, 1947 amended the General Mining Act of 1872
- Cooperative Forestry Assistance Act of July 1, 1978
- Emergency Flood Prevention Act (Agricultural Credit Act) of August 4, 1978
- Endangered American Wilderness Act of 1978
- Endangered Species Act of 1973
- Energy Independence and Security Act of December 19, 2007
- Energy Policy Act of 2005
- Energy Security Act of June 30, 1980
- Environmental Quality Act (1970)
- Federal Advisory Committee Act of October 6, 1972
- Federal Cave Resources Protection Act of November 18, 1988
- Federal Insecticide, Rodenticide, and Fungicide Act of October 21, 1972
- Federal Land Policy and Management Act of October 21, 1976
- Federal Noxious Weed Act, 1974

- Federal Power Act of June 10, 1920
- Federal-State Cooperation for Soil Conservation Act of December 22, 1944
- Federal Water Pollution Control Act and Amendments of 1972 (Clean Water Act), as amended in 1977, and 1987
- Federal Water Project Recreation Act of July 9, 1965
- Federal Wildland Fire Management Policy and Program Review (1995, 2001)
- Fish and Wildlife Conservation Act of September 15, 1960
- Fish and Wildlife Coordination Act of March 10, 1934
- Food, Conservation & Energy Act of 2008 (2008 Farm Bill) Public Law 110-246 Title VIII – Forestry, Subtitle A, B, and C.
- Forest Highways Act of August 27, 1958
- Forest and Rangeland Renewable Resources Planning Act of August 17, 1974 as amended by National Forest Management Act of 1976
- Freedom of Information Act of November 21, 1974
- Healthy Forests Restoration Act of 2003
- Granger-Thye Act of 1950
- Highway Safety Act of 1966
- Historic Sites Act of 1935
- Intergovernmental Cooperation Act of October 16, 1968
- Joint Surveys of Watershed Areas Act of September 5, 1962
- Knutson-Vandenberg Act of June 9, 1930
- Land Acquisition Act of March 3, 1925
- Land and Water Conservation Fund Act of September 3, 1964
- Migratory Bird Treaty Act of 1918
- Mineral Leasing Act of February 25, 1920
- Mining Claims Rights Restoration Act of August 11, 1955
- Mining and Minerals Policy Act of December 31, 1970
- Multiple- Use Mining Act of July 23, 1955
- Multiple-Use Sustained-Yield Act of June 12, 1960
- National Environmental Policy Act of January 1, 1970
- National 1990 Farm Bill (Title XII – Forest Stewardship Act) Act of November 28, 1990
- National Fire Plan, 2001
- National Forest Management Act of October 22, 1976
- National Forest Roads and Trails Act of October 13, 1964
- National Forest System Land and Resource Management Plans (16 U.S.C. 1604), part of Title 16 – Conservation
- National Historic Preservation Act of 1966 as amended
- National Trails System Act of October 2, 1968
- Native American Graves Protection and Repatriation Act of 1990

- New Mexico Wilderness Act of 1980
- North American Wetlands Conservation Act of December 13, 1989
- Oil and Gas Leasing Reform Act of 1987
- Organic Administration Act of June 4, 1897
- Pipelines Act of February 25, 1920
- Public Buildings Cooperative Use Act of 1976
- Public Rangelands Improvement Act of October 25, 1978
- Rehabilitation Act of 1973
- Religious Freedom Restoration Act
- Rescission Act of 1995
- Roadless Area Conservation Rule of January 12, 2001
- Safe Drinking Water Amendments of November 18, 1977
- Secure Rural Schools and Community Self-Determination Act of 2000
- Sikes Act of October 18, 1974
- Small Tracts Act of January 22, 1983
- Soil and Water Resources Conservation Act of November 18, 1977
- Surface Mining Control and Reclamation Act of August 3, 1977
- Timber Exportation Act of April 12, 1926
- Transfer Act of February 1, 1905
- Tribal Forest Protection Act of 2004
- U.S. General Mining Law (Public Domain Lands) Act of May 10, 1872
- United States v. Sandoval, 167 U.S. 278 (1897)
- Water Quality Improvement Act of April 3, 1965
- Water Resources Planning Act of July 22, 1965
- Watershed Protection and Flood Prevention Act of August 4, 1954
- Weeks Law of 1911 as amended
- Wild Free-Roaming Horses and Burros Protection Act of December 15, 1971
- Wild and Scenic Rivers Act of October 2, 1968
- Wilderness Act of September 3, 1964

## Executive Orders

Below is a partial listing of relevant executive orders. Executive orders are official mandates presented by the President and go through judicial review. An executive order may be used to reassign functions among executive branch agencies. It may adopt guidelines, rules of conduct, or rules of procedure for government employees or units of government.

- Executive Order 11514 issued March 5, 1970, as amended by Executive Order 11991 issued May 24, 1977. Protection and enhancement of environmental quality
- Executive Order 11593 Protection and Enhancement of the Cultural Environment, 1973

- Executive Order 11644 issued February 8, 1972. Use of off-road vehicles on the public lands. Amended by Executive Order 11989 issued May 24, 1977 and Executive Order 12608 issued September 9, 1987
- Executive Order 11988 Floodplain Management, 1977
- Executive Order 11990 Protection of Wetlands, 1977
- Executive Order 12862 Setting Customer Service Standards, 1993
- Executive Order 12898 Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, 1994
- Executive Order 13007 Indian Sacred Sites, 1996
- Executive Order 13112 Invasive Species, 1999
- Executive Order 13175 Consultation and Coordination with Indian Tribal Governments, 2000
- Executive Order 13186 Responsibility of Federal Agencies to Protect Migratory Birds, 2001
- Executive Order 13195 Trails for America in the 21st Century, 2001
- Executive Order 13287 Preserve America, 2003
- Executive Order 13352 Facilitation of Cooperative Conservation, 2004
- Executive Order 13433 Facilitation of Hunting Heritage and Wildlife Conservation, 2007
- Executive Order 13604 Improving Performance of Federal Permitting and Review of Infrastructure Projects, 2012
- Executive Order 13693 Planning for Federal Sustainability in the Next Decade, 2015

## State and Local Statutes, Regulations, Policies

- 20.6.1-4,6,11 New Mexico Administrative Code - Environmental Protection
- 3150.2 State and Private Forestry, Rural Community Fire Protection Program, objectives
- Ambient air quality standards set in New Mexico - Title 20, Ch. 2, Part 3
- Conservation agreement for Rio Grande cutthroat trout in the States of Colorado and New Mexico (2013)
- The Colorado Wilderness Act of 1980 (Public Law 96-560, section 108, congressional grazing guidelines)
- Regional haze rule to meet PM 2.5 and ozone standards
- New Mexico Air Quality Bureau smoke management plan
- New Mexico Executive Order 00-22, Office of the Governor, 2000
- New Mexico Statutes chapter 49: Land grants, Article 1: General provisions, section 49-1-1 through 49-1-23
- New Mexico Statutes chapter 49: Land grants, Article 2: Corporations for management of community land grants, section 49-2-1 through 49-2-18
- New Mexico Statutes article 2: Ditches or Acequias, section 73-2-1 through 73-2-68
- Noxious Weed Act of 1963 (New Mexico)

## Forest Service Directives

The following is a partial list of Forest Service policies relevant to the land management plan. A complete listing can be found in the Forest Service manual and the Forest Service handbook. Together, these are known as the Forest Service Directives System.

Forest Service manuals contain legal authorities, goals, objectives, policies, responsibilities, instructions and guidance needed on a continuing basis by Forest Service line officers and primary staff, in more than one unit, to plan and execute assigned programs and activities. Forest Service handbooks are directives that provide instructions and guidance on how to proceed with a specialized phase of a program or activity. Handbooks are either based on a part of the Forest Service manual or they incorporate external directives.

## Forest Service Manuals

- Forest Service Manual 1000 Organization and management
  - ◆ 1010 Laws, regulations, and orders
  - ◆ 1020 Forest Service mission
  - ◆ 1400 Controls
  - ◆ 1410 Management reviews
- Forest Service Manual 1500 External relations
  - ◆ 1560 State, Tribal, county, and local agencies, public and private organizations
  - ◆ 1563 American Indian and Alaskan Native relations
- Forest Service Manual 1600 Information resources
- Forest Service Manual 1800 Senior, youth and volunteer programs
  - ◆ 1802 and 1803 Senior, youth and volunteer programs, objectives and policy
- Forest Service Manual 1900 Planning
  - ◆ 1909.15 National Environmental Policy Act handbook
  - ◆ 1920 Land and resource management planning
  - ◆ 1950 Environmental policy and procedures
- Forest Service Manual 2000 National forest resource management
  - ◆ 2020 Ecological restoration and resilience
  - ◆ 2030 Large-scale event recovery
  - ◆ 2060 Ecosystem classification, interpretation, and application
  - ◆ 2070 Biological diversity
    - 2070.3 Vegetation ecology (use of native plants in revegetation, rehabilitation, and restoration)
  - ◆ 2080 Noxious weed management, Southwestern Region supplement (weed free policy)
    - 2080.2, Noxious weed management

- Forest Service Manual 2100 Environmental management
  - ◆ 2150, Pesticide-use management and coordination
- Forest Service Manual 2200 Range management
  - ◆ 2200 Zero Code
  - ◆ 2200 Zero Code Region 3 supplement
  - ◆ 2230 Grazing and livestock use permit system
  - ◆ 2230 Grazing and livestock use permit system Region 3 supplement
  - ◆ 2240 Range improvements
  - ◆ 2240 Range improvements Region 3 supplement
  - ◆ 2250 Range cooperation
  - ◆ 2250 Range cooperation Region 3 supplement
  - ◆ 2260 Wild free-roaming horses
  - ◆ 2260 Wild free-roaming horses Region 3 supplement
  - ◆ 2270 Information management and reports
- Forest Service Manual 2300 Recreation, wilderness, and related resource management
  - ◆ 2303 Recreation, wilderness and related resource management, policy
  - ◆ 2310 Planning and data management
  - ◆ 2311 Resource opportunities in recreation planning
  - ◆ 2320 Wilderness management
    - 2323.22-Exhibit 01, congressional grazing guidelines
  - ◆ 2330 Publicly managed recreation opportunities
    - 2332.11 Hazard trees
    - 2334 Recreation, wilderness, and related resource management, campgrounds and picnic grounds
  - ◆ 2350 Trail, river, and similar recreation opportunities
    - 2353.4 Administration of national scenic and national historic trails
  - ◆ 2360 Heritage program management
  - ◆ 2360 Special interest areas, Southwestern Region supplement 2300-99-3
    - 2364.02 Objectives, American Indian Religious Freedom Act, 1978
    - 2364.03 Protection and stewardship, policy

- ◆ 2380 Landscape management
  - 2380.3 Landscape management, policy
  - 2380.13 Landscape management, scenic trails and byways
  - 2380.14 Landscape management, wild and scenic rivers
  - 2380.18 Landscape management, landownership adjustments
  - 2382.1 Landscape management, scenery management, scenery management system
- ◆ 2390 Interpretive services
- ◆ 2300-99-3 Southwest Region supplement
- Forest Service Manual 2400 Timber management, Southwestern Region
  - ◆ 2430 Commercial timber sales, Southwestern Region, small sales and commercial/personal use permits of timber, fuelwood, and other forest products
  - ◆ 2467 Sales of special forest products
  - ◆ 2470 Silvicultural practices
- Forest Service Manual 2500 Watershed and air management
  - ◆ 2510 Watershed planning
  - ◆ 2520 Watershed protection and management
  - ◆ 2521 Watershed protection and management, watershed condition assessment
  - ◆ 2526 Riparian area management
  - ◆ 2527 Floodplain management and wetland protection
  - ◆ 2530 Water resource management
  - ◆ 2532 Water quality management
  - ◆ 2540 Water uses and development, Southwestern Region supplement
  - ◆ 2550 Watershed and air management, chapter 50, soil management
  - ◆ 2560 Groundwater resource management
  - ◆ 2580 – Air resource management
- Forest Service Manual 2600 Wildlife, fish, and sensitive plant habitat management
  - ◆ 2610 Cooperative relations
  - ◆ 2630 Management of wildlife and fish habitat
  - ◆ 2670 Threatened, endangered, and sensitive plants and animals
    - 2670-2671 Wildlife, fish, and sensitive plant habitat management, chapter 70, threatened, endangered, and sensitive plants and animals, cooperation
    - 2671.45 C & F 2671 Wildlife, fish, and sensitive plant habitat management, interim directives

- Forest Service Manual 2700 Special uses management
  - ◆ 2726 Energy generation and transmission
  - ◆ 2728 Communications
- Forest Service Manual 2800 Minerals and geology
  - ◆ 2802 and 2803 Minerals and geology, objectives and policy
  - ◆ 2810 Mining claims
  - ◆ 2814 Mining claims, rights, and obligations of the United States
  - ◆ 2820 Mineral leases, permits, licenses
    - 2822.41 Mineral licenses, permits, and leases administered by the Department of the Interior, Forest Service evaluation and report
  - ◆ 2850 Mineral materials
  - ◆ 2880 Geologic resources, hazards, and services
- Forest Service Manual 3100 Cooperative fire protection
  - ◆ 3110 Cooperative forest fire prevention
  - ◆ 3110.3 Policy (Smokey Bear)
- Forest Service Manual 3400 Forest pest management
  - ◆ 3400 Forest health protection and Southwestern Region supplement 3400-91-1
- Forest Service Manual 5100 Fire management
  - ◆ 5110.2 Fire management, wildfire prevention, objective
  - ◆ 5120 Fire management, preparedness
  - ◆ 5130 Wildland fire suppression
  - ◆ 5140.3 Fire use, policy
  - ◆ 5171, Agreements with Federal agencies
- Forest Service Manual 5300 Law enforcement
  - ◆ 5340.2 Law enforcement, objectives
- Forest Service Manual 5400 Land ownership
  - ◆ 5410 Appraisals
  - ◆ 5420 Land purchases and donations
  - ◆ 5430 Exchanges
  - ◆ 5460 Right-of-way acquisition
  - ◆ 5500 Land ownership title management
- Forest Service Manual 7100 Engineering operations
  - ◆ 7151.02 Land surveying, objectives

- Forest Service Manual 7300 Buildings and other structures
  - ◆ 7310 Buildings and related facilities
    - 7312.1 and 7312.2 Facility planning, plans, and preliminary project analysis
- Forest Service Manual 7400 Public health and pollution control facilities
  - ◆ 7420 Drinking water
- Forest Service Manual 7500 Water storage and transportation
- Forest Service Manual 7700 Transportation system
  - ◆ 7701.2 Travel management
  - ◆ 7710 Travel planning
  - ◆ 7720 Development (policy on transportation)
  - ◆ 7730 Road operation and maintenance

## Forest Service Handbook

- Forest Service Handbook 1909.12 Chapter 70, Wilderness recommendation, Chapter 80 wild and scenic river evaluation including 84.3 – Interim protection measures for eligible or suitable rivers
- Forest Service Handbook 2090.11 Ecological classification and inventory handbook chapter 20 and 90
- Forest Service Handbook 2209.13 Grazing permit administration handbook
  - ◆ Chapter 10 Permits with term status and Region 3 supplement
  - ◆ Chapter 20 Grazing agreements
  - ◆ Chapter 30 Temporary grazing permits
  - ◆ Chapter 40 Livestock use permits, and Region 3 supplement
  - ◆ Chapter 50 Other permits
  - ◆ Chapter 60 Records
  - ◆ Chapter 70 Compensation for permittee interest in range improvements
  - ◆ Chapter 80 Grazing fees
  - ◆ Chapter 90 – Rangeland management decision making, and Region 3 supplement
- Forest Service Handbook 2309.24 Cultural resources handbook, Southwestern Region supplement
  - ◆ Chapter 40 – Damage assessment
- Forest Service Handbook 2309.24 Cultural resources handbook, Southwestern Region supplement
  - ◆ Chapter 10 – Survey standards
- Forest Service Handbook 2309.18 Trails management handbook
- Forest Service Handbook 2509.13 Burned-area emergency rehabilitation handbook

- Forest Service Handbook 2509.16 Water resource inventory handbook
- Forest Service Handbook 2509.21 National Forest System water rights handbook
- Forest Service Handbook 2509.22 Soil and water conservation handbook
- Forest Service Handbook 2509.23 Riparian area handbook
- Forest Service Handbook 2509.24 National Forest System watershed codes handbook
- Forest Service Handbook 2509.25 Watershed conservation practices handbook
- Forest Service Handbook 2709.14 Recreation special uses handbook
- Forest Service Handbook 2709.11 Special uses handbook
- Forest Service Handbook 2809.15 Minerals and geology handbook
- Forest Service Handbook 5409.13 Land acquisition handbook
- Forest Service Handbook 5409.17 Rights-of-way acquisition handbook
- Forest Service Handbook 7309.11 Buildings and related facilities handbook
- Forest Service Handbook 7709.55 Travel analysis
- Forest Service Handbook 7709.56 Pre-construction handbook
- Forest Service Handbook 7709.57 Road construction handbook
- Forest Service Handbook 7709.59 Road operations

## Code of Federal Regulations (CFR)

- 33 CFR 323 Permits for discharges of dredged or fill material into waters of the United States
- 36 CFR 60 National Register of Historic Places, criteria for evaluation
- 36 CFR 62 National Natural Landmarks Program
- 36 CFR 63 Determinations of eligibility for inclusion in the National Register of Historic Places
- 36 CFR 65 National Historic Landmarks Program
- 36 CFR 79 Curation of federally owned and administered archaeological collections
- 40 CFR 121-135 Water programs
- 36 CFR 211.18, Subpart B: administrative review procedures
- 36 CFR 212 Travel management
- 36 CFR 213 Administration of lands under Title III of the Bankhead-Jones Farm Tenant Act by the Forest Service
- 36 CFR 215.5 Road system management
- 36 CFR 219 Planning
  - ◆ 36 CFR 219.24 Cultural and historical resources
- 36 CFR 221 Timber management planning

- 36 CFR 222 Range management
  - ◆ Subpart A: Grazing and livestock use on the National Forest System
  - ◆ Subpart B: Management of wild free-roaming horses and burros
  - ◆ Subpart C: Grazing fees
- 36 CFR 223 Sale and disposal of national forest timber, special forest products and forest botanical products
  - ◆ 36 CFR 223.1 Authority to sell timber
  - ◆ 36 CFR 223.5 through 36 CFR 223.10 Parks, forests, and public property, scope of free-use granted to individuals, cutting and removal of timber in free-use areas, permission for free-use of timber outside free-use areas, delegations of authority to approve free use by individuals, free-use to owners of certain mining claims, free-use to Alaskan settlers, miners, residents, and prospectors
  - ◆ 36 CFR 223.12 Permission to cut, damage, or destroy trees without advertisement
- 36 CFR 228 Minerals
  - ◆ 36 CFR 228.4 Plan of operations - notice of intent- requirements
  - ◆ 36 CFR 228.5 Plan of operations - approval
  - ◆ 36 CFR 228 Subpart A – locatable minerals
  - ◆ 36 CFR 228 Subpart C- mineral materials
  - ◆ 36 CFR 228 Subpart E, oil and gas resources;
- 36 CFR 241.2 Fish and wildlife
- 36 CFR 251 Land uses
  - ◆ 36 CFR 251.9 Management of municipal watersheds
- 36 CFR 254 Land ownership adjustments
- 36 CFR 261 Prohibitions in areas
- 36 CFR 291.19 Suspension and revocation of permits
- 36 CFR 293 Wilderness-primitive areas
- 36 CFR 294 Special areas
- 36 CFR 295 Use of motor vehicles off forest development road
- 36 CFR 296 Protection of archaeological resources: uniform regulations
- 36 CFR 297 Wild and scenic rivers
- 36 CFR 800 Protection of historic properties
- 40 CFR 51.300-309 Regional haze rule
- 40 CFR 1502.12 Environmental impact statement
- 43 CFR 3 Preservation of American antiquities
- 43 CFR 10 Native American Graves Protection and Repatriation Act regulations
- 49 CFR 24.102, 103, 104 Basic acquisition policies, criteria for appraisals, review of appraisals

## Other Resources

- Hassell, M.J. 1968. The People of Northern New Mexico and the National Forests.
- Hurst, William D. 1972. Region 3 policy on managing national forest land in northern New Mexico. File No.1030-Objective and Policy, William D. Hurst to Forest Supervisors and District Rangers.
- National forest landscape management volume 1. Agriculture handbook 434: 1973
- Utilities, chapter 2, Agriculture handbook 478: 1975
- Range, chapter 3, Agriculture handbook 484: 1977
- Roads, chapter 4, Agriculture handbook 483: 1977
- Timber, chapter 5, Agriculture handbook 559: 1980
- Fire, chapter 6, Agriculture handbook 608: 1985
- Ski Areas, chapter 7, Agriculture handbook 617: 1984
- Recreation, chapter 8, Agriculture handbook 666: 1987
- Landscape aesthetics: A handbook for scenery management. Agriculture handbook 701.
- USDA Forest Service. 2016a. Visitor use report, Santa Fe NF, data collected FY 2014. U.S. Department of Agriculture, Forest Service, Natural Resource Manager, National Visitor Use Monitoring Program.
- USDA Forest Service. 2016b. Visitor use report, Santa Fe NF, data collected FY 2016. U.S. Department of Agriculture, Forest Service, Natural Resource Manager, National Visitor Use Monitoring Program.
- Federal Register legal notices for 50 CFR section 217 Endangered Species Act listings, proposed listings, designated critical habitat, proposed critical habitat, five-year reviews, and other species or habitat status changes
- Protection of bald and golden eagles-definition of “disturb” (Federal Register, Volume 72, Number 107, June 5, 2007); Authorizations under the bald and golden eagle protection act for take of eagles (Federal Register, Volume 73, Number 98, May 20, 2008); and Forest Service Southwestern Region direction regarding permitting regulations for take of eagles (November 18, 2009)
- National and State bald eagle management guidelines (recommendations for avoiding disturbance, activity specific guidelines, and additional recommendations)
- Forest Service, Management recommendations for the northern goshawk in the southwestern United States (General Technical Report RM-217)
- Terrestrial species current biological opinions
- Conservation assessments or strategies and agreements with the U.S. Fish and Wildlife Service and other agencies
- Forest Service and the Western Hummingbird Monitoring Network, western hummingbird partnership action plan (section V: conservation actions)

- Western Association of Fish and Wildlife Agencies, Wild Sheep Working Group, recommendations for domestic sheep and goat management in wild sheep habitat (management recommendations)
- Rio Grande cutthroat trout wildfire risk assessment
- Conservation agreement for Rio Grande cutthroat trout in the states of Colorado and New Mexico
- Forest Service, Southwestern Region, minimum impact suppression tactics
- Forest Service, [minimum requirements decision guide](http://www.wilderness.net/MRA) <http://www.wilderness.net/MRA>
- [Wilderness.net toolboxes](http://wilderness.net/toolboxes) <http://wilderness.net/index.cfm?fuse=toolboxes>
- Forest Service, Keeping it Wild: an interagency strategy to monitor trends in wilderness character across the National Wilderness Preservation System (RMRS-GTR-212) Forest Service, Southwestern Region, minimum impact suppression tactics
- Interagency prescribed fire planning and implementation procedures guide (section: prescribed fire planning process)
- Interagency standards for fire and aviation operations (Red Book), Forest Service Wildland Fire and Aviation Program organization and responsibilities
- Interagency standards for fire and aviation operations (Red Book), Forest Service Wildland Fire and Aviation Program organization and responsibilities (section: fuels management)
- Interagency guidance for implementation of Federal wildland fire management policy (February 13, 2009)
- Annual interagency guidance for preventing spread of aquatic invasive organisms common to the Southwestern Region (section: technical guidelines for fire operations)
- National Wildfire Coordinating Group memorandum number 024-2010, terminology updates resulting from release of the guidance for implementation of Federal wildland fire management policy (2009)
- Preventing spread of aquatic invasive organisms common to the Southwestern Region technical guidelines for fire operations, Interagency guidance rev. August 2009
- Forest Service, Watershed condition framework: A framework for assessing and tracking changes to watershed conditions (FS-977)
- Forest Service, Watershed condition classification and technical guide (FS-978)
- Forest Service, National best management practices for water quality management on National Forest System lands, Volume 1 (FS-990a)
- New Mexico administrative code, Title 20 – Environmental protection, chapter 6 (water quality)
- Forest Service, Technical guide to managing groundwater resources part 2 (section: overview of national groundwater policy) (FS-881)
- Forest Service, groundwater-dependent ecosystems: level II inventory field guide (General Technical Report WO-86b)
- USDA Forest Service (2013). Technical guidance for soil quality monitoring in the Southwestern Region (Letter dated January 16, 2013)

- Bureau of Land Management, Riparian area management: a user guide to assessing proper functioning condition and the supporting science for lotic areas. Tech. Ref. 1737-15 and Tech. Ref. 1737-16
- Forest Service, outdoor recreation accessibility guidelines (FSORAG) (section: technical provisions)
- Forest Service, trails accessibility guidelines (FSTAG) (section: technical provisions)
- Forest Service, Connecting people with America's great outdoors: a framework for sustainable recreation (2010)
- Interagency ecological site descriptions: handbook for rangelands (January 2013)
- Forest Service, Southwestern Region, Rangeland analysis and management training guide (2013)
- Bureau of Land Management, Measuring and monitoring plant populations (Technical reference 1730-1, 1998)
- U.S. Department of Interior, Old Spanish National Historic Trail, final comprehensive administrative strategy
- 1985 Continental Divide National Scenic Trail (CDNST) comprehensive plan nonnative invasive species
- Forest Service Southwestern Region guidance for invasive species management
- Forest Service, Guide to noxious weed prevention practices
- Forest Service, Operational guidelines for aquatic invasive species prevention and equipment cleaning
- Preventing spread of aquatic invasive organisms common to the Southwestern Region technical guidelines for fire operations, Interagency Guidance Rev. August 2009
- Record of decision: USDA Forest Service designation of section 368 energy corridors on National Forest System land in 10 western states, January 14, 2009: Appendix A: Forest Service land use plan amendments
- IWSRCC (Interagency Wild and Scenic Rivers Coordinating Council), [An introduction to wild and scenic rivers](#) (technical report) [www.rivers.gov/documents/wsr-primer.pdf](http://www.rivers.gov/documents/wsr-primer.pdf)
- IWSRCC (Interagency Wild and Scenic Rivers Coordinating Council), A compendium of questions and answers relating to wild and scenic rivers (technical report) Forest Service, Southwestern Region, cultural affiliations: prehistoric cultural affiliations of southwestern Indian Tribes
- Secretary of Interior National Register bulletins
- Secretary of Interior guidelines for rehabilitation of historic buildings
- Archeology and historic preservation: Secretary of the Interior standards and guidelines, as amended and annotated
- Advisory Council on Historic Preservation, consultation with Indian Tribes in the section 106 review process: a handbook
- Advisory Council on Historic Preservation, guidance on coordinating NEPA and section 106

- Region 3 Policy on providing forest products to federally recognized Tribes for traditional and cultural purposes (in development)
- U.S.C. Title 25 Indians, Chapter 32 – A cultural and heritage cooperation authority (section: 3051-3057)
- National Register Bulletin 38, Guidelines for evaluating and documenting traditional cultural properties
- U.S. Department of Agriculture, Departmental regulation number 1350-002: tribal consultation, coordination, and collaboration
- U.S. Department of Agriculture, Report to the Secretary of Agriculture: USDA policy and procedures review and recommendations Indian sacred sites
- U.S. Department of Agriculture, American Indians and Alaska Native: A guide to USDA programs

# Appendix E: Climate Change Vulnerability Analysis Synthesis

## Cibola National Forest Climate Change Vulnerability Analysis Synthesis

Synthesis of the Cibola National Forest climate change vulnerability analysis<sup>57</sup> is presented in table 39 (below); the table is based on an approach piloted for Bureau of Land Management lands in New Mexico. Table 40 is a key to ecological response unit codes referenced in the synthesis.

### Methods

- The focus was only on management opportunities in frequent-fire ecological response units at the district level, Sandsage being the exception (see below).
- Management opportunities only included shrub control, invasive species control, fire, and thinning.
- All strata in “low” vulnerability were highlighted under the theme of restoration and maintenance.
- All strata in “moderate” vulnerability with at least 10 percent area were highlighted under themes of either realignment to changing climate or preservation, to resist climate forcing and buy time for affected organisms.
- Sandsage is a special case in that (1) there is not much of it, (2) it is not a closed-canopy fire disclimax (as with MMS or GAMB), (3) it is concentrated in one area of the Cibola, and (4) 100 percent of the area is in ‘moderate’ vulnerability.

### Results Summary

- A small percentage of the area in most ecological response units occurs as low vulnerability, warranting prioritization for restoration and maintenance of these areas, also serving as a refugia strategy for dependent plants and animals.
- There are considerable fire and thinning opportunities in fire-adapted forest and woodland ecological response units, to help these ecosystems resist/delay climate and drought effects as well as assist them in gradual realignment to new climate and vegetation conditions (versus an expected sudden type shift triggered by catastrophic fire).
- There are considerable adaptation opportunities in grassland ecological response units using fire, invasive species control, and mechanical treatment to reduce trees and shrubs, as means to help these ecosystems resist climate and drought effects as well as assist grasslands in their realignment to new climate and vegetation conditions.
- The Gallinas Mountains represents one of the most southern extents of the Sandsage ecological response unit, where this ecosystem is concentrated on the Cibola. There may be opportunities to apply weed control and to reduce tree encroachment, as possible measures for climate adaptation.

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<sup>57</sup> Cibola National Forest Climate Change Vulnerability Analysis (CCVA) Synthesis, adapted from J. Triepke; 20 Nov 2018.

## Definitions

### Restoration (rest)

- Refers to treatments with the likely effect of restoring the characteristic structure, composition, or processes of the ecological response unit, and favoring resilience (see following definition).
- Project objectives and effectiveness monitoring are unknown. This assignment assumes that treated areas were significantly departed from the characteristic conditions of the ecological response unit in terms of either structure, composition, or process (in contrast to an assignment of “maintenance”); however, this assignment was usually paired with maintenance (“rest, maint”) since the degree of ecosystem departure was unknown.
- This assignment is limited to low vulnerability areas. The working assumption for the vulnerability assessment is that moderate and high+ vulnerability areas are susceptible to type conversions and therefore are unlikely candidates for a restoration objective. The equivalent assignments in a moderate or high or greater vulnerability area would be “resistance,” “realignment,” or occasionally “stress.”

### Maintenance (maint)

- Refers to treatments with the likely effect of maintaining the characteristic structure, composition, or processes of the ecological response unit, and favoring resilience (see following definition).
- Project objectives and effectiveness monitoring are unknown. This assignment assumes that treated areas were not significantly departed from the characteristic conditions of the ecological response unit in terms of either structure, composition, or process (in contrast to an assignment of “restoration”); however, this assignment was usually paired with restoration (“rest, maint”) since the degree of ecosystem departure was unknown.
- This assignment is limited to low vulnerability areas. The working assumption for the vulnerability assessment is that moderate and high or greater vulnerability areas are susceptible to type conversions and therefore are unlikely candidates for an objective of system maintenance. The equivalent assignments in a moderate or high or greater vulnerability area would be “resistance,” “realignment,” or occasionally “stress.”

### Preservation (pres)

- Preservation, formerly termed resistance, refers to the ability of an ecosystem to endure natural disturbance and maintain the characteristic structure, composition, process, and function of the system. Resistance may be reduced by ecosystem departure (Fire Regime Condition Class), as with fire-adapted ecosystems (such as PPF, PJG, JUG) that are significantly departed from reference condition.
- Refers to treatments with the likely effect of favoring the resistance of an ecosystem to type-converting disturbances, in terms of the characteristic structure, composition, or processes of the ecological response unit. With some past plans and prescriptions, resistance may have been realized though not originally intended.
- Project objectives and effectiveness monitoring are unknown. This assignment assumes that treated areas may have been significantly departed from the characteristic conditions of the ecological response unit in terms of either structure, composition, or process.

- This assignment is limited to moderate and high or greater vulnerability areas. The working assumption for the vulnerability assessment is that moderate and high or greater vulnerability areas are susceptible to type conversions, and that resistance treatments can forestall conversion for a particular objective such as habitat preservation. The equivalent assignments in a low vulnerability area would be “restoration,” “maintenance,” or occasionally “departure.”

### Realignment (relgn)

- Refers to treatments with the likely effect of favoring long term and gradual ecological adaptation (facilitated type conversion) to another functioning system, in terms of structure, composition, or processes that are uncharacteristic to the site. “The most proactive strategic actions are those that work directly with the changes that climate is provoking; that is, they assist transitions to future states by mitigating and minimizing undesired and disruptive outcomes” (Peterson et al. 2011). With some past plans and prescriptions, realignment may have been realized though not originally intended.
- Project objectives and effectiveness monitoring are unknown. This assignment does not assume that treated areas were or were not significantly departed from the characteristic conditions of the ecological response unit, in terms of structure, composition, or process.
- This assignment is limited to moderate and high or greater vulnerability areas. The working assumption for the vulnerability assessment is that moderate and high or greater vulnerability areas are susceptible to type conversions, and that realignment treatments facilitate type conversions in a way that favors continual functioning and resilience of an ecosystem, albeit while an area transitions from one ecological response unit to another. The equivalent assignments in a low vulnerability area would be “restoration,” “maintenance,” or “departure.”

### Refugia (refg)

- A small percentage of the area in most ecological response units occurs as ‘low’ vulnerability, warranting prioritization for restoration and maintenance, also serving as a refugia strategy for dependent plants and animals.

**Table 39. Synthesis of the Cibola National Forest Climate Change Vulnerability Analysis (this table is based on an approach used for Bureau of Land Management lands in New Mexico; see table 40 for key to ecological response unit codes)**

Ecological Response Unit	Vulnerability	All	Zuni Mtns. and Mt. Taylor	Sandia and Manzano Mtns.	Magdalena Ranger District	Gallinas Mtns.	Shrub Control	Invasives Control	Fire	Tree Thinning
CPGB	Low	3%	6%	na	0%	0%	rest maint refg	rest	rest maint refg	rest maint refg
CPGB	Moderate	50%	38%	na	66%	71%	presv	presv	presv relgn	presv relgn
CPGB	High+	47%	56%	na	33%	29%	relgn	relgn	relgn	relgn
GAMB	Low	0%	1%	0%	0%	na	na	rest maint	rest maint	rest maint
GAMB	Moderate	44%	53%	69%	27%	na	na	relgn	relgn	na
GAMB	High+	55%	47%	31%	73%	na	na	relgn	na	na
JUGc	Low	1%	0%	4%	na	0%	rest maint refg	rest	rest maint refg	rest maint refg
JUGc	Moderate	94%	99%	67%	na	100%	presv	presv	presv relgn	presv relgn
JUGc	High+	5%	1%	29%	na	0%	relgn	relgn	relgn	relgn
JUGmHS	Low	9%	na	4%	10%	0%	rest maint refg	rest	rest maint refg	rest maint refg
JUGmHS	Moderate	64%	na	73%	62%	100%	presv	presv	presv relgn	presv relgn
JUGmHS	High+	27%	na	23%	28%	0%	relgn	relgn	relgn	relgn
MCD	Low	2%	0%	0%	3%	0%	rest maint refg	rest	rest maint refg	rest maint refg
MCD	Moderate	48%	74%	37%	45%	15%	presv	presv	presv relgn	presv relgn
MCD	High+	50%	26%	63%	52%	85%	na	relgn	relgn	relgn
MCW	Low	0%	na	0%	0%	na	na	rest	na	na
MCW	Moderate	48%	na	47%	48%	na	relgn	presv	presv relgn	relgn
MCW	High+	52%	na	53%	52%	na	relgn	relgn	relgn	relgn
MMS	Low	16%	na	17%	15%	na	na	rest maint	rest maint	rest maint
MMS	Moderate	78%	na	71%	81%	na	na	relgn	relgn	na
MMS	High+	7%	na	12%	4%	na	na	relgn	na	na

Ecological Response Unit	Vulnerability	All	Zuni Mtns. and Mt. Taylor	Sandia and Manzano Mtns.	Magdalena Ranger District	Gallinas Mtns.	Shrub Control	Invasives Control	Fire	Tree Thinning
MPO	Low	5%	na	11%	2%	na	rest maint refg	rest	rest maint refg	rest maint refg
MPO	Moderate	82%	na	84%	81%	na	presv	presv	presv relgn	presv relgn
MPO	High+	13%	na	5%	17%	na	relgn	relgn	relgn	relgn
MSG	Low	6%	5%	na	na	na	rest maint refg	rest	rest maint refg	rest maint refg
MSG	Moderate	59%	66%	na	na	na	presv	presv	presv relgn	presv relgn
MSG	High+	36%	29%	na	na	na	relgn	relgn	relgn	relgn
PJC	Low	19%	na	na	19%	20%	na	rest	rest maint refg	na
PJC	Moderate	81%	na	na	81%	80%	na	presv	presv relgn	presv relgn
PJC	High+	0%	na	na	0%	0%	na	relgn	relgn	relgn
PJGc	Low	0%	0%	2%	0%	0%	rest maint refg	rest	rest maint refg	rest maint refg
PJGc	Moderate	38%	44%	65%	82%	3%	presv	presv	presv relgn	presv relgn
PJGc	High+	61%	56%	34%	18%	97%		relgn	relgn	relgn
PJGmHS	Low	13%	na	1%	13%	na	rest maint refg	rest	rest maint refg	rest maint refg
PJGmHS	Moderate	58%	na	48%	59%	na	presv	presv	presv relgn	presv relgn
PJGmHS	High+	29%	na	52%	28%	na	na	relgn	relgn	relgn
PJOc	Low	11%	15%	2%	13%	0%	na	rest	na	na
PJOc	Moderate	81%	77%	83%	87%	53%	relgn	presv	presv relgn	relgn
PJOc	High+	9%	8%	15%	0%	47%	relgn	relgn	relgn	relgn
PJOm	Low	3%	na	7%	3%	na	na	rest	na	na
PJOm	Moderate	77%	na	86%	76%	na	relgn	presv	presv relgn	relgn
PJOm	High+	19%	na	7%	20%	na	relgn	relgn	relgn	relgn

Ecological Response Unit	Vulnerability	All	Zuni Mtns. and Mt. Taylor	Sandia and Manzano Mtns.	Magdalena Ranger District	Gallinas Mtns.	Shrub Control	Invasives Control	Fire	Tree Thinning
PPF	Low	0%	0%	0%	0%	0%	rest maint refg	rest	rest maint refg	rest maint refg
PPF	Moderate	43%	57%	10%	26%	9%	presv	presv	presv relgn	presv relgn
PPF	High+	57%	43%	90%	74%	91%	na	relgn	relgn	relgn
SDGhs	Low	14%	na	6%	15%	na	rest maint refg	rest	rest maint refg	rest maint refg
SDGhs	Moderate	75%	na	86%	74%	na	presv	presv	presv relgn	presv relgn
SDGhs	High+	11%	na	8%	11%	na	na	relgn	relgn	relgn
SAND	Low	na	na	na	na	0%	na	rest	na	rest maint
SAND	Moderate	na	na	na	na	100%	na	presv	na	presv relgn
SAND	High+	na	na	na	na	0%	na	relgn	na	relgn
SFF	Low	0%	0%	0%	na	na	na	rest	na	na
SFF	Moderate	9%	10%	0%	na	na	relgn	presv	presv relgn	relgn
SFF	High+	91%	90%	100%	na	na	relgn	relgn	relgn	relgn

na = not applicable

**Table 40. Ecological response unit codes, subclasses, and system types**

ERU code	Ecological response unit	ERU subclass	System type
CPGB	Colorado Plateau/ Great Basin Grassland	na	grassland
GAMB	Gambel Oak Shrubland	na	shrubland
JUGc	Juniper Grass	Cold	woodland
JUGmHS	Juniper Grass	High-Sun Precipitation, Mild	woodland
MCD	Mixed Conifer–Frequent Fire	na	forest
MCW	Mixed Conifer with Aspen	na	forest
MMS	Mountain Mahogany Mixed Shrubland	na	shrubland
MPO	Madrean Pine-Oak Woodland	na	woodland
MSG	Montane/Subalpine Grassland	na	grassland
PJC	Pinyon-Juniper Evergreen Shrub	na	woodland
PJGc	Pinyon-Juniper Grass	Cold	woodland
PJGmHS	Pinyon-Juniper Grass	High-Sun Precipitation, Mild	woodland
PJOc	Pinyon-Juniper Woodland	Cold	woodland
PJOm	Pinyon-Juniper Woodland	Mild	woodland
PPF	Ponderosa Pine Forest	na	forest
SAND	Sandsage	na	shrubland
SDGhs	Semi-Desert Grassland	High-Sun Precipitation	grassland
SFF	Spruce-Fir Forest	na	forest

na = not applicable; ERU = ecological response unit

## Appendix F: Desired Scenic Character Descriptions

The desired scenic character<sup>58</sup> descriptions below cover the Cibola National Forest's four mountain districts. Refer to figures 9 through 12, Desired Scenic Integrity Objectives, in appendix G. The districts are all geographically separated from each other across central New Mexico, and each District provides a sense of place for the communities nearest to them. Desired scenic character may be very similar to the existing scenic character. Desired scenic character also considers the dynamic nature of landscapes and that natural disturbances such as fire, insects, and disease change landscapes over time and scenery changes over time as the landscape mosaic changes.

The Cibola's diverse sky island landscapes range from semi-desert grasslands to mixed-conifer forests and alpine meadows. The scenic character of the Cibola encompasses both social and ecological elements, including landform, vegetative pattern, water features, recreation opportunities, and cultural features. Buildings, structures, and other human alterations are considered a valuable aspect of scenic integrity and these features add to the sense of place and reflect the cultural legacy of the Cibola National Forest.

Cultural components of the scenic character include the traces of Native American (American Indian) cultural and historic occupation and use dating to the past 12,000 years, and resources and uses associated with Euro-Americans and others for the past 400 years. Significant historic properties date to the Archaic, ancestral and early modern Pueblo, Spanish Colonial, and American eras. These features are part of the traditional landscape.

The Magdalena Ranger District holds a rich past of human presence and diverse topography ranging from the steep cliffs of the Sawtooth, Datil, Magdalena, and San Mateo Mountains to the rolling hills and low peaks of the Bear, Gallinas, and Crosby ranges. Dominant vegetation at lower elevations includes grasslands, mixed deciduous shrubs, and pinyon-juniper. Middle elevations are dominated by ponderosa pine and gambel oak. In the highest elevations Douglas fir, aspen, and spruce provide a variety of colors and textures. There are a few canyons with stringers of riparian vegetation, including narrow-leaf cottonwood, hackberry, Arizona walnut, and Arizona alder.

The Apache Kid and Withington Wilderness areas in the San Mateo Mountains and numerous inventoried roadless areas provide vast views of natural-appearing landscapes. In the southern San Mateo range, the Apache Kid Wilderness provides a largely undeveloped, wild landscape. This area is known for its sparse population, extensive and rugged terrain, and connection to many facets of New Mexico's history. From its peaks to its lush canyon floors, a range of ecosystems support high biodiversity here, despite the arid climate, and ecological processes continue to shape and change the land as they have in the past. Rugged terrain, deep canyons, and rolling ridgelines define the Withington Wilderness which provides some of the most remote and primitive landscapes of the forest. Situated along the northeastern slopes of the San Mateo Mountains, the wilderness lies on the eastern edge of the Mogollon-Datil volcanic field, a tectonically active and geologically complex area of the southwestern United States. Today, this

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<sup>58</sup> The desired scenic character is the appearance of the landscape to be retained or created over time, recognizing that a landscape is a dynamic and constantly changing mosaic of plants and terrain. It is a combination of landscape design attributes and opportunities as well as biological opportunities and constraints.

wilderness landscape is largely defined by a 2016 fire, and post-fire natural processes dominate with healthy successional regrowth and a mosaic of habitat.

The Mountainair Ranger District consists of the Gallinas and Manzano mountain ranges southwest of Albuquerque (the Gallinas Mountains on the Mountainair District are a different range from the mountains of the same name on the Magdalena District). The Manzano Mountains dominate the landscape as they rise up from surrounding plains and valleys and are characterized by projecting rock faces, deep canyons and gradual eastern slopes. Steep, rocky terrain, deep canyons, grassy alpine meadows, and dense foliage provide for natural appearing landscapes. In the fall, aspens, oaks, and maples offer vivid colors of yellow, orange and red, providing some of the best seasonal color in the Southwest. Fourth of July Canyon is a major destination for sight-seeing as the bigtooth and Rocky Mountain maples show off colors in a spectacular display. After a winter of muted hues, spring wildflowers bring a symphony of color to the landscape. Distinctive features of rock escarpments and outcrops occur throughout the range.

From the crest, the Manzano Mountains fall abruptly to the east, south, and west, transitioning into flat elevated plains and rolling hills. Prominent peaks, such as Manzano Peak at 10,098 feet, and open ridgelines boast panoramic vistas, often graced by a vibrant blue sky. Rocky peaks surrounded by densely wooded mountains frame a 360-degree view of spectacular scenery, including views of the San Mateo Mountains, Mount Taylor, and the Sangre de Cristo range. In the heart of the range lies the Manzano Mountain Wilderness, named for the unique history of Spanish settlement in the area. Apple trees were found on the Mountain by Mexican settlers in the early 19th century and were believed to have been planted by early Spanish missionaries two centuries before. “Manzano” is the Spanish word for “apple.”

The highest point in the Gallinas Mountains is Gallinas Peak at 8,637 feet. Water features in the Gallinas Mountains include Big Lake and Cement Spring, with riparian vegetation near the spring. Vegetation in the Gallinas Mountains consists primarily of ponderosa pine and gambel oak at high elevations, with mid-elevations dominated by pinyon pine and juniper. Grasslands dominate lower elevations and mesas. Fall colors attract visitors out for a scenic drive and are an important attribute of the scenic character. The lookout tower at Gallinas Peak dates to 1933 and is a historic feature that contributes to the cultural landscape.

The Mount Taylor Ranger District is divided into two mountain ranges, the Zuni Mountains and the San Mateo Mountains (the San Mateo Mountains on the Mount Taylor District are a different range than the ones located on the Magdalena District). The Mount Taylor and Guadalupe inventoried roadless areas provide views of natural-appearing landscapes. Mount Taylor rises from the mesas and tablelands that surround it to a summit of 11,301 feet in elevation. Mount Taylor is among the most sacred of mountains to numerous Native American Tribes. Basalt outcrop escarpments created by large lava flows are juxtaposed with gently rolling elevated plains and hills. Mount Taylor, an extinct volcano, dominates the landscape. At lower elevations, the prevailing vegetation in this division is pinyon-juniper and ponderosa pine. Engelmann spruce and Douglas-fir occur in higher elevations. Many parks and meadows with a mix of grasses are dispersed throughout the Mount Taylor division. Many trees and plants from these mountains are used for medicinal purposes, food products, and traditional ceremonies.

The Zuni Mountains lie west of Grants, north of the Malpais National Monument, and east of the Zuni Indian Reservation. The Zuni Mountains are a significant visual element in the landscape in central northwest New Mexico, and provide the natural backdrop which defines a sense of place for many communities including towns, villages and pueblos. The Zuni Mountains are the product of ancient tectonic uplift, with gently sloping mountainsides that give way to dramatic

cliffs and broad valleys. These mountains contain places sacred to many of the Native American (American Indian) Tribes in the region. The dominant vegetation across the Zuni Mountains is ponderosa pine, and scattered patches of pinyon-juniper, alderleaf mountain mahogany, and a mix of ponderosa pine and Douglas-fir are also found. Deciduous shrubs offer a variety of color. Many of the valley bottoms feature park-like grasslands. Cottonwood Canyon and Bluewater Creek are lined with stringers of riparian vegetation. McGaffey Lake, a historic reservoir constructed in 1935, is the primary distinctive water body. The riparian area of Little Water Canyon has unique botanical diversity, including an outstanding example of a blue spruce streamside forest ecosystem.

The Sandia Ranger District is defined by Sandia Mountains, creating a prominent backdrop for residents of Albuquerque, New Mexico. The District also encompasses the Manzanita Mountains to the south of the Sandia Mountains. As the sun sets, the potassium-feldspar crystals embedded within its west granite face give the mountain its distinctive pink color at sunset, evoking the name “Sandia,” the Spanish word for watermelon. The east slope is very steep and rugged, while the west slope has rolling mountainous terrain and is heavily forested. The top of the ridge, a sheer rock face known as the Sandia Crest, rises to 10,678 feet in elevation. The range in elevations provides rich habitat for diverse plant and animal life. At lower elevations, desert grasslands are dotted with yucca and cactus species such as cholla and purple prickly pear. With increasing elevation, this desert environment gradually transitions from pinyon-juniper woodlands to ponderosa pine and oak forests and eventually to spruce-fir forests just below the summit of Sandia Crest. Distinctive white fir is the dominant vegetation. Patches of deciduous-evergreen tree mix and deciduous shrubs including Rocky Mountain maple and Gambel oak also occur. Throughout the range, essential lichen, mosses, and fungi populate the surface of trees, rock, and the ground. During warmer months, over five hundred species of flowering plants pepper the wilderness with color including a host of endemic and rare plant species. Across the Sandias many small natural springs emerge, fed seasonally by snowmelt and the afternoon thunderstorms that are common in July and August. Trails in the Manzanita Mountains offer lower elevation recreational opportunities and are characterized by multiple canyons that feature rocky escarpments and varied vegetation.

The Sandia Mountain Wilderness comprises a large percentage of the Ranger District, with a scenic byway offering visitors a winding route to the Sandia Crest. The cultural landscape of the District is rich, with remnants of history present in the landscape, from the New Dealera iconic Kiwanis Cabin constructed in 1936 atop the Sandia Crest with its vast views, to the Sandia Cave, designated a National Historic Landmark for yielding some of the earliest evidence of human settlement in the Americas. The T’uf Shur Bien Preservation Trust Area is a designated area on the District that ties the importance of the area to the Pueblo of Sandia. At the Crest and from the mountain peaks, open sky, an array of geometric city shapes, and the winding Rio Grande dominate more nearby views. Beyond the city of Albuquerque, the brown hues of West Mesa stretch along the horizon, interrupted by the dark silhouettes of the ancient volcanoes of Petroglyph National Monument with Mount Taylor in the distance. A glance to the south will be rewarded with the dynamic layers and subtle, forested peaks of the Manzanita and Manzano Mountains.

## Appendix G: Map Packet

The following maps are located in a separate folder titled “Appendix G: Map Packet.”

Figure 5. Desired Recreation Opportunity Spectrum, Mount Taylor Ranger District

Figure 6. Desired Recreation Opportunity Spectrum, Magdalena Ranger District

Figure 7. Desired Recreation Opportunity Spectrum, Mountainair Ranger District

Figure 8. Desired Recreation Opportunity Spectrum, Sandia Ranger District

Figure 9. Desired Scenic Integrity Objectives, Mount Taylor Ranger District

Figure 10. Desired Scenic Integrity Objectives, Magdalena Ranger District

Figure 11. Desired Scenic Integrity Objectives, Mountainair Ranger District

Figure 12. Desired Scenic Integrity Objectives, Sandia Ranger District

Figure 13. Management Areas and Designated Areas, Mount Taylor Ranger District

Figure 14. Management Areas and Designated Areas, Magdalena Ranger District

Figure 15. Management Areas and Designated Areas, Mountainair Ranger District

Figure 16. Management Areas and Designated Areas, Sandia Ranger District

Figure 17. Eligible Wild and Scenic Rivers, Agua Remora

Figure 18. Eligible Wild and Scenic Rivers, Little Water Canyon

Figure 19. Eligible Wild and Scenic Rivers, Water Canyon

Figure 20. Eligible Wild and Scenic Rivers, Rinconada

Figure 21. Eligible Wild and Scenic Rivers, West Red Canyon

Figure 22. Eligible Wild and Scenic Rivers, Tajiue Canyon

Figure 23. Eligible Wild and Scenic Rivers, Las Huertas Canyon

Figure 24. Existing Inventoried Roadless Areas, Mount Taylor Ranger District

Figure 25. Existing Inventoried Roadless Areas, Magdalena Ranger District

Figure 26. Areas Suitable for Timber Production, Mount Taylor Ranger District

Figure 27. Areas Suitable for Timber Production, Magdalena Ranger District

Figure 28. Areas Suitable for Timber Production, Mountainair Ranger District

Figure 29. Areas Suitable for Timber Production, Sandia Ranger District