Cibola National Forest Mountain
Ranger Districts Plan Revision

Draft Forest-wide Ecological and Socioeconomic Desired Conditions

DRAFT

July 21, 2015

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Introduction

The Cibola National Forest Mountain Ranger Districts (Cibola) is revising the 1985 Cibola Forest Plan, and the revised plan will guide the management of the Cibola for the next 15 years. This document of draft forest-wide desired conditions for the many resources, goods, and services the Cibola provides has been compiled by Cibola planning and resource specialist staff and initially reviewed by and with input from cooperating agencies (local, state, and federal units of governments, including land grants and tribes). These cooperating agencies have formed landscape teams among themselves, centered around the four ranger districts of the Cibola, (Sandia, Mountainair, Magdalena, and Mt. Taylor). The cooperating agency landscape teams have worked hard to review and provide input to the original draft desired conditions. The Cibola made changes to its initial draft based on input from the respective landscape team cooperating agencies regarding what the vision of the local communities is for their respective areas of the Cibola, what are perceived as the most important issues, and how local community members might best understand (format, language, familiarity of terms used) and be able to offer comment on these draft desired conditions. Many of the landscape teams' suggestions have been incorporated into this document, where those suggestions have been within the authority of the Cibola to incorporate those suggestions. Additionally, the landscape teams provided suggested input on other plan content including standards, guidelines, and management approaches and that input has been retained and will be carried forward during the next steps of plan revision.

The landscape teams and the Cibola hope you will review these desired conditions and comment upon them by September 25th, using the desired condition comment form provided at the end of this document. The comment form presents several ways you can comment, either by handwritten form and postal mail, or electronically. The landscape teams and the Cibola will review and consider your comments, and a draft plan will be released this fall as the next opportunity for your review and comment. Thank you for taking the time to review.

Landscape Team Vision Statements

The following four vision statements were created collaboratively by landscape teams centered around the four mountain ranger districts. These statements represent the collective values and vision for future management each landscape team has for their respective area on the Cibola. These vision statements will be used to guide development of the revised forest plan.

Magdalena and San Mateo Mountains

We, the Magdalena Landscape Team, support the vision of continued historical multiple uses including grazing, hunting, recreation, mining, and forest products. We also foster continued sustainability of the forest through responsible resource management and support of the communities through responsible land and water development, utilization of the forest and continued partnerships with research entities (specically the Magdalena Ridge Observatory and the Very Large Array).

Mount Taylor and Zuni Mountains

We envision a landscape that is sustained in health by and through a commitment to stewardship as our most basic and deeply held value.

We envision a landscape that is sustained collaboratively by a rich and growing partnership of individuals, groups, and institutions, recognizing the legal status of the USDA Forest Service as the government's designated management agency representing the people of the United States, and

appreciating its commitment to partnership as a guiding principle of informed functioning. We are mutually committed to finding common ground and using that commonality as a strong basis for continuing success.

We envision a landscape that is managed in a manner which respects and recognizes the historic, cultural, and spiritual significance of the area to multiple constituencies, both native and non-native, and both protects and facilitates appropriate access to areas which are considered special places.

We envision a landscape that is managed for multiple sustainable use, for vegetation, for wildlife, for enhanced water resources, for reduced risk of wildfire, for forest industries, for raw materials, for viable agriculture, for recreation and for tourism. We recognize that some specific portions of the landscape may merit special management area emphasis within a policy of multiple use, but we believe that the principle that potentiates and ensures multiple use of our forest is access.

We envision a landscape that is actively managed to develop and sustain healthy local economies. Fundamental to our local economies are ranching and other agriculture, forest products industries, extraction industries, and tourism. These activities entail stewardship and responsible planning , with proper attention to sustainable use and public health. Granted this approach, they are to be encouraged in forest management policy. Viable local economies are intimately linked to good forest management.

We envision a landscape that is enhanced by a proactive policy of educating and informing the public, one which involves outreach to local schools, clubs, community groups, and businesses. Education also plays an important role in tourism. Visitors to our forest should have access to user-friendly information, both centrally and on-site, that enriches their understanding and elevates their appreciation of our forest.

We envision a landscape that is managed with attention to dynamic action. Planning should be strategic, and action should be efficient and effective. Good customer service is important and is fundamental to effective collaboration. We see collaboration as key to long-term success, and we plan to use our partnerships to create consensus and actively both pursue and acquire funding to further our vision of a healthily functioning forest.

Mountainair, Manzano, and Gallinas Mountains

The Forest Plan will emphasize watershed health through sustainability, regeneration and protection of natural resources while ensuring that local adjacent communities benefit from the implementation of the plan and the use of the forest through improved water quality and quantity, forest related economic development opportunities, access for traditional and multiple uses. Watershed health as the over-arching goal will ensure a legacy for future generations.

Sandia Mountains

The Sandia Landscape Team is a collaboration of stewards for the Cibola National Forest. This collaboration allows the Landscape Team the opportunity to present their vision for the broader Forest Plan Revision, by utilizing their expertise in the diversity of natural, recreational, historical and agricultural resources.

VEGETATION

Background and Description

Ecological Classification

The vegetation types for which desired conditions were developed were based on Ecological Response Units (ERUs). ERUs represent an ecosystem stratification based on vegetation characteristics that would occur when natural disturbance regimes and biological processes prevail and combine potential vegetation and historic fire regimes to form ecosystem classes useful for landscape assessment. Spatial representation of ERUs is derived from map unit delineation in the Terrestrial Ecosystem Unit Inventory (TEUI) database (USDA Forest Service 1986); one ERU polygon may encompass multiple map unit polygons. A TEUI map unit comprises one or more soil components, with each component having its own potential natural vegetation type (PNVT). When implementing this Forest Plan at the project level, the applicable vegetation-type desired conditions are those of the PNVT of the site being treated. For example, where a woodland now occupies a historic grassland site (the TEUI map unit description indicates a soil classification of mollisol—a signature of grassland ecosystems), grassland desired conditions apply. In other words, the desired condition for vegetation type must be consistent with the site's soil type.

Scale

Desired conditions for forest and woodland vegetation types are presented at three spatial scales: landscape scale (1,000–10,000+ acres), mid-scale (10–1,000 acres), and fine-scale (<10 acres). (Not enough science is available to provide descriptions at multiple scales for pinyon-juniper woodland, grassland, shrubland, and riparian vegetation types.) The landscape scale describes the "big picture" of desired conditions (Figure 1). 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.

Ranges

Ranges (minimum, maximum) of values presented in desired conditions were informed by current science for natural variation in the composition and structure within a vegetation type and tempered by socioeconomic desires and management experience. Desired conditions vary within a vegetation type due to spatial variability in soils, elevation, and aspect, and to provide managerial flexibility to meet local project objectives. The ranges presented here often represent the upper and lower extremes for a given variable (e.g., the lowest and highest tree densities in a vegetation type). It is important to recognize that the goal is generally to manage toward average desired conditions for a given variable; 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 than outside of it so as to reduce fire risk to human life and property.

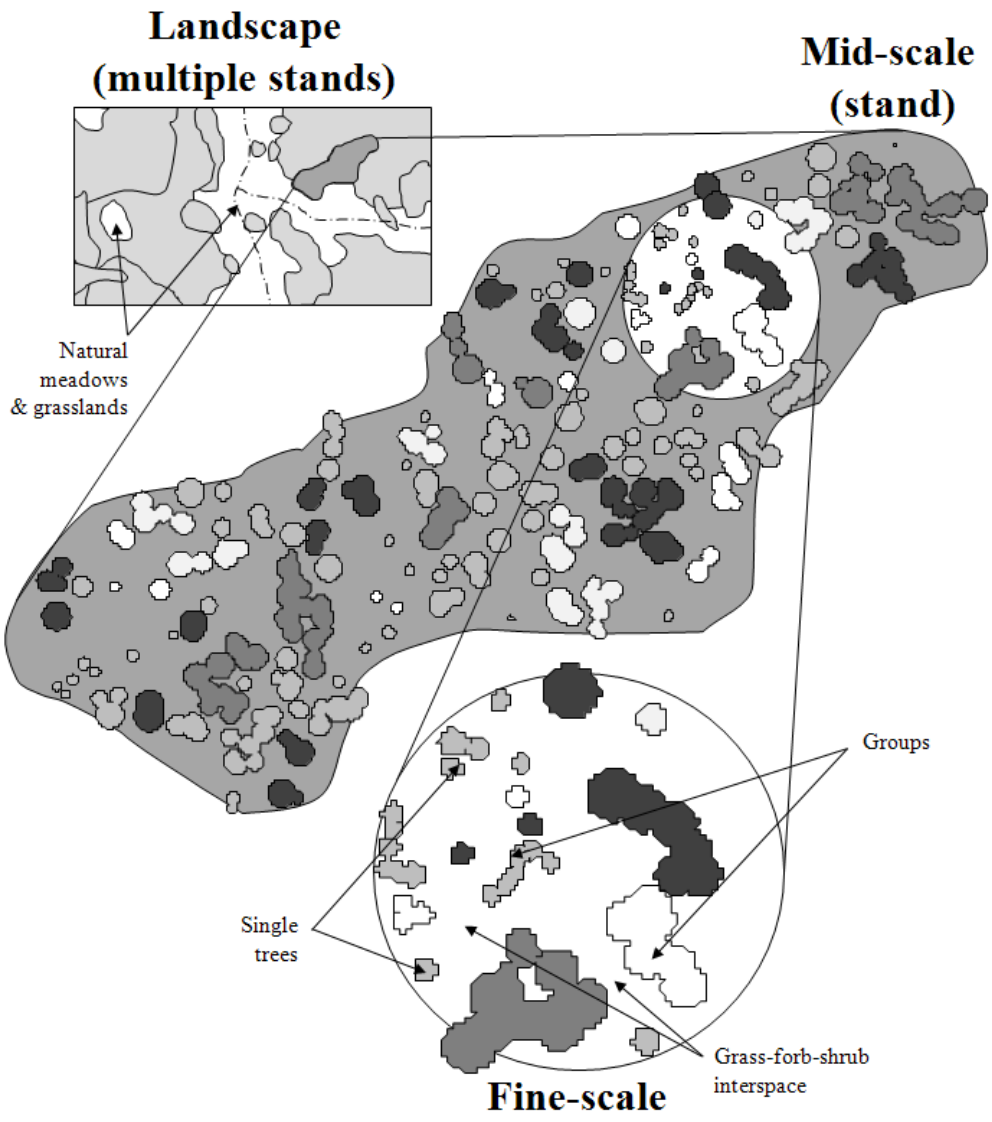

Figure 1. Desired conditions at three spatial scales. The landscape scale illustrates multiple stands and natural meadows and grasslands. The mid- and fine-scales illustrate open grass-forb-shrub interspaces and uneven-aged stand conditions consisting of single and grouped trees of different vegetation structural stages, young to old, represented by different shades and sizes (Reynolds et al. 2013).

Fire Regime

Fire frequency and severity are referred to by their Fire Regime Group (Table 1).

Table 1. Fire Regime Groups and descriptions (adapted from Barrett et al. 2010).

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

The above definitions use 25% and 75% as severity thresholds between the low, mixed, and replacement regimes.

DESIRED CONDITIONS COMMON TO ALL VEGETATION TYPES[1]

Wildland-Urban Interface Desired Conditions

Wildland fires in the wildland-urban interface (WUI) result in minimal loss of life, property, and characteristic ecosystem function. Wildland fires in the WUI are low-intensity surface fires, for ladder fuels are nearly absent. Firefighters are able to safely and efficiently suppress wildfires in the WUI.

In forested vegetation communities, 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 otherwise. Interspaces between tree groups are of sufficient size so as to discourage isolated group torching from spreading as a crown fire to other groups. The tree basal area in the WUI is on the lower end of the range given in the vegetation community desired conditions. Where the WUI intersects 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. In shrublands, fuel loading in the WUI is on the lower end of the range given for the vegetation community desired conditions. Adequate cover exists to meet the needs of a variety of wildlife species.

Logs and snags, which often pose fire control problems, are present in the WUI, but at the lower end of the range given in the appropriate vegetation community desired conditions. The dead and down fuel load is 1–10 tons/acre, depending on vegetation type, with lower amounts in fire-adapted vegetation types, and higher amounts in infrequent fire types. This light fuel load applies even in vegetation types with higher reference fuel loads, such as mixed conifer with aspen or spruce-fir. Higher fuel loading or tree densities may occur in areas where it provides for important fine-scale habitat structure, as long as it meets the overall intent of protecting values at risk.

[1] All vegetation desired conditions correspond to need-for-change statement I.c.

Adjusting Desired Conditions to Account for Vulnerability to Climate Change

In areas of high vulnerability to climate change, based on 100-year climate projections (Triepke et al. 2014), tree basal area is restored or maintained at the low end of the desired range to mitigate water stress and increase resiliency to climate change. In these areas, early and mid-seral[2] species dominate over late-seral species, given the adaptations of many early and mid-seral species for warmer and drier conditions. Early seral species characteristic of lower-elevation life zones (e.g., Douglas-fir on a spruce-fir site) are maintained. Late-seral species (especially large specimens) are maintained primarily in locally cooler (north-facing aspects) and wetter (draws, seeps) areas to maintain diversity, wildlife habitat, and a local seed source.

Forest Insects and Disease

Insects and diseases are integral components of forest and woodland ecosystems. Often there are numerous positive impacts of insects and disease on the forest ecosystem including creation of small openings, increasing biodiversity, enhancing nutrient cycling, as food sources for animals, creation of wildlife habitat, and many other ecologically significant benefits. However, under severe disease infection levels or episodic outbreaks of insects, their effects are more evident, sometimes negative, and cause greater forest change. With the exception of white pine blister rust, the insects and diseases on the Cibola that are often considered pests are native organisms that have long been part of the ecosystem and have evolved with their plant hosts.

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

FOREST VEGETATION TYPES

Spruce-Fir Forest

General Description

The Spruce-Fir Forest vegetation type is often dominated by Engelmann spruce; codominant and subdominant species vary by elevation. 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 sub- 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 mixed conifer with aspen with a different composition of tree species, due to relatively warmer, drier conditions, and occupies the ecotone between mixed conifer with aspen 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, white fir, and occasionally blue spruce. Subdominant species may include subalpine fir,[3] white fir, and bristlecone pine. In the upper-elevation type, dominant tree species are Engelmann spruce and subalpine fir; patches of aspen may be present.

[2] "Seral" refers to the transitory stages that plant communities develop during ecological succession from bare ground to the climax stage.

[3] "Subalpine fir" refers to subalpine fir (*Abies lasiocarpa* var. *lasiocarpa*) or corkbark fir (*Abies lasiocarpa* var. *arizonica*), or both.

Disturbances in these types typically occur at two temporal and spatial scales: large-scale infrequent disturbances (mostly fire) and small-scale frequent disturbances (fire, insect, disease, wind).

Landscape-Scale Desired Conditions (1,000-10,000+ acres)

The spruce-fir forest is a mosaic of structural and seral stages ranging from young trees through old. 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 (Figure 2). Native grass, forbs, and shrubs comprise the understory. Seral state proportions are applied at the landscape scale **(**Table 2**).**

Old growth generally occurs over large areas and includes old trees, standing 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 spruce-fir community is composed predominantly of vigorous trees; older, declining trees provide snags and coarse woody material. The abundance of snags, downed logs, and coarse woody material varies by seral stage.

Figure 2. Typical appearance of Spruce-Fir Forest with dense canopy and interlocking crowns.
Photo: Wahlberg et al. 2015

Table 2. 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.[4]
Mid	33%	Young forest with regeneration; tree canopy is closed.
Late	46%	Mature-old forest with regeneration; tree canopy is closed.
Aspen may be present in all seral stages		

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 (150–400 years); in the upper-elevation type, high-severity fire (Fire Regime Groups IV & V) occurs very infrequently (>400 years). Natural and anthropogenic disturbances are sufficient to maintain desired overall tree density, age, structure, species composition, coarse woody material, and nutrient cycling.

Mid-Scale Desired Conditions (10–1,000 acres)

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% of the mid-scale area following major disturbance. Aspen is occasionally present in large patches.

Basal area varies from 20–250+ ft^2/acre depending on site productivity, disturbance history, and seral stage. Large snags (≥18" DBH[5]), range from 5–30+/acre, with lower end of the range associated with early seral stages and the upper end associated with late-seral stages. Overall snag (>8" DBH) density ranges from 13–30/acre, averaging 20/acre. Coarse woody material (dead and downed wood) ranges from 5–30 tons/acre for early seral stages, 30–40 tons/acre for mid-seral stages, and >40 tons/acre for late-seral stages.

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, and nutrient cycling. Ground cover consists of shrubs, perennial grasses, and forbs with plant basal cover ranging from about 5–20% depending on site conditions.

[4] Seedlings and saplings are trees <5 inches DBH (diameter at breast height), small trees are 5–9.9 inches DBH, medium trees are 10–19.9 inches DBH, and large trees are >20 inches DBH. The terms "open" and "closed" describe canopy cover—under 30% and over 30%, respectively. The terms "tolerant" and "intolerant" refer to species that are tolerant (e.g., spruce, fir) or intolerant (e.g., ponderosa pine) of shade, respectively; "mixed-tolerant" refers to species intermediate in shade tolerance (e.g., Douglas-fir).

[5] DBH=diameter at breast height (4.5 feet).

Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests are typically denser (at least 10% more basal area) than goshawk foraging areas and the general forest. Nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the spruce-fir type.

Fine-Scale Desired Conditions (<10 acres)

Mid- to old-age trees grow tightly together with interlocking crowns. Trees are generally of the same height and age in early stages of patch development but may be multilayered later.

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

General Description

The mixed conifer with aspen 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. It 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 (Figure 3). Ponderosa pine may be present in minor proportions. The absence of Engelmann spruce and subalpine fir plant associations (USDA 1997) distinguishes mixed conifer with aspen 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, insect, disease, wind). The understory includes a wide variety of shrubs, grasses, and forbs; species composition varies with site conditions (soil type, aspect, elevation, disturbance).

Landscape-Scale Desired Conditions (1,000-10,000+ acres)

The mixed conifer with aspen 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. Seral state proportions are applied at the landscape scale (Table 3). Native grass, forbs, and shrubs comprise the understory.

Figure 3. Mixed Conifer with Aspen Forest. Photo: Wahlberg et al. 2015

Old growth generally occurs over large areas and includes old trees, standing 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 spruce-fir community is composed predominantly of vigorous trees; older, declining trees provide snags and coarse woody material. The abundance of snags, downed logs, and coarse woody material varies by seral stage.

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. Mixed-severity fire (Fire Regime Group III) is characteristic, especially at lower elevations of this type. High-severity fire (Fire Regime Groups IV & V) is rare and typically limited to higher elevations of this type. Natural and anthropogenic disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody material, and nutrient cycling.

Table 3. Desired seral stage proportions for Mixed Conifer with Aspen Forest.

Seral Stage	Proportion	DESCRIPTION
Early	7%	Grass/forb understory with aspen or oak ramets & suckers ranging in cover from 10–40% 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–>60%; primarily seedlings, saplings, and small trees.
Mid (medium conifer)	14%	Dominated by a mix of conifer species. Tree canopy cover is 20–>60%; primarily medium-sized trees.
Late	40%	Dominated by mature, shade-tolerant conifer species. Tree canopy cover is 20–60% or more; primarily very large trees.

Mid-Scale Desired Conditions (10–1,000 acres)

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, primarily even-aged, and variable in size, species composition, and age is present. Openness and prevalence of some species, such as aspen, is dependent on seral stage. Grass, forb, and shrub openings created by disturbance may compose 10–100% of the mid-scale area, depending on disturbance history. Aspen is occasionally present in large patches.

Basal area varies from 20–180+ ft^2/acre depending on site productivity, disturbance history, and seral stage. Large snags (≥18" DBH), range from 1–5/acre, with lower end of the range associated with early seral stages and the upper end associated with late-seral stages. Overall snag (>8" DBH) density averages 20/acre. Coarse woody material (dead and downed wood) ranges from 5–20 tons/acre for early seral stages, 20–40 tons/acre for mid-seral stages, and ≥35 tons/acre for late-seral stages.

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, and nutrient cycling. Under moister conditions, smoldering low-intensity surface fires torch single trees and isolated groups; under drier conditions, passive to active crown fires kill up to 100% of the conifers in patches (usually <1,000 acres). Other smaller disturbances occur more frequently. Ground cover consists of shrubs, perennial grasses, and forbs with plant basal cover ranging from about 5–20% depending on site conditions.

Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests are typically denser (at least 10% more basal area) in mid- to old-age tree groups than in goshawk foraging areas and in the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the mixed conifer with aspen type.

Fine-Scale Desired Conditions (<10 acres)

In mid-aged and older forests, trees are typically variably spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages. Disturbances create small openings.

Organic ground cover and herbaceous vegetation provide protection for soil and moisture infiltration and contribute to plant diversity and ecosystem function. Due to presence of ladder fuels, fires usually burn either with low-intensity, smoldering combustion, or transition rapidly in the canopy as passive or active crown fire.

Mixed Conifer—Frequent Fire ("Dry Mixed Conifer") Forest

General Description

The Mixed Conifer—Frequent Fire Forest is transitional with increasing elevation between ponderosa pine forest (below) and mixed conifer with aspen forest (above) and generally occurs at elevations ranging from approximately 6,000 to 9,500 feet. Mixed conifer—frequent fire 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. This forest vegetation community typically occurs with an understory of grasses, forbs, and shrubs.

Landscape Scale Desired Conditions (1,000-10,000+ acres)

The Mixed Conifer—Frequent Fire 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. Openness typically ranges from 10% on more productive sites to 50% on less productive sites. Size, shape, number of trees per group, and number of groups per area, vary across the landscape. Groups of aspen and all structural stages of oak are present. Higher tree densities exist in some locations such as north-facing slopes and canyon bottoms. Seral state proportions (Table 4) are applied at the landscape scale.

Figure 4. Mixed Conifer—Frequent Fire Forest. Photo: Wahlberg et al. 2015

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).

The mixed conifer—frequent fire 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. Overall snag (>8" DBH) density averages 9 per acre, including 4 large snags (≥18" DBH) per acre. In forested areas (as opposed to openings), coarse woody material (dead and downed wood) ranges from 5–15 tons/acre, including an average of 3 downed logs (>12" diameter at mid-point, >8 feet long) per acre.

Table 4. Desired seral stage proportions for Mixed Conifer—Frequent Fire 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% per decade) to sustain >25% mature closed forest condition (≥10" DBH) for Mexican Spotted Owl habitat.

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. Frequent low-severity fires (Fire Regime Group I) are characteristic throughout this vegetation type (including goshawk home ranges). Natural and anthropogenic disturbances maintain desired overall tree density, structure, species composition, coarse woody material, and nutrient cycling.

Mid-Scale Desired Conditions (10–1,000 acres)

The Mixed Conifer—Frequent Fire 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 10% on more productive sites to 50% on the less productive sites. Basal area within forested areas ranges from 30–100 ft^2/acre.

The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages. Small patches (usually <50 acres) of even-aged forest structure are occasionally present. Disturbances sustain the overall age and structural distribution.

Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation cover ranging from about 5–20% depending on site conditions. Fires burn primarily on the forest floor and do not spread between tree groups as crown fire.

Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests are typically denser (at least 10% more basal area) in mid- to old-age tree groups than in goshawk foraging areas and in the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the mixed conifer—frequent fire type.

Fine-Scale Desired Conditions (<10 acres)

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 <1 acre. Groups at the mid- to old-age stages contain 2 to about 50 trees per group.

Ponderosa Pine Forest

General Description

The Ponderosa Pine Forest vegetation type includes two sub-types: Ponderosa Pine–Bunchgrass and Ponderosa Pine–Gambel Oak (desired conditions are the same for both). The Ponderosa Pine Forest generally occurs at elevations ranging from approximately 5,000 to 9,000 feet. It 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. This forest vegetation community typically occurs with an understory of grasses and forbs although it sometimes includes shrubs (Figure 5).

Landscape Scale Desired Conditions (1,000-10,000 + acres)

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 historic patterns. Openness typically ranges from 10 percent in more productive sites to 70 percent in the less productive sites. Size, shape, number of trees per group, and number of groups per area are variable across the landscape. Seral state proportions are applied at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition (Table 5). In the Gambel oak sub-type, all sizes and ages of oak trees are present. Denser tree conditions exist in some locations such as north facing slopes and canyon bottoms.

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).

Figure 5. Ponderosa Pine Forest. Photo: Wahlberg et al. 2015

Table 5. 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 plurality 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% mature closed forest condition as Northern Goshawk nesting habitat or Mexican Spotted Owl habitat.

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 (>3 inch diameter), all well-distributed throughout the landscape. Ponderosa pine snags are typically 18 inches or greater at DBH and average 1 to 2 snags per acre. In the Gambel oak subtype, large oak snags (>10 inches) are a well-distributed component. Downed logs (>12 inch diameter at mid-point, >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.

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 (e.g. insects, diseases, fire, and wind), including snags, downed logs, and old trees. Grasses, forbs, shrubs, and 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. At the Plan unit scale, overall plant composition similarity to site potential is greater than 66%, but can vary considerably at fine- and mid- scales owing to a diversity of seral conditions. Frequent, low severity fires (Fire Regime I) are characteristic in this type, including throughout goshawk home ranges. Natural and anthropogenic disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody material, and nutrient cycling.

Mid-Scale Desired Conditions (100–1,000 acres)

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 78-90%. 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%.

The mosaic of tree groups generally comprises an uneven-aged forest with all age classes present. Infrequently, patches of even-aged forest structure are present. Disturbances sustain the overall age and structural distribution.

Fires burn primarily on the forest floor and do not spread between tree groups as crown fire.

Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests contain 10 to 20 percent higher basal area in mid- to old-age tree groups than in goshawk foraging areas and the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the ponderosa pine type.

Fine-Scale Desired Conditions (<10 acres)

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.

WOODLAND VEGETATION TYPES

Pinyon-Juniper Woodland

General Description

Pinyon-Juniper (PJ) Woodland is collectively composed of the Juniper Grass, PJ Grass, PJ Sagebrush, PJ Evergreen Shrub, and PJ Woodland (persistent) vegetation types. These generally occur at elevations between approximately 4,500 and 7,500 feet. They are dominated by one or more species of pinyon pine and/or juniper and can occur with a grass/forb dominated understory (PJ grassland), a shrub-dominated understory (PJ Sagebrush/Evergreen Shrub), or a discontinuous understory of some grasses and/or shrubs (PJ Woodland). Two-needle, single-leaf, Mexican, and border pinyon pine are common. One-seed, Utah, redberry, 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 Grass Woodland and Juniper Grass Woodland

Landscape Scale Desired Conditions (1,000–10,000+ acres)

Pinyon-Juniper Grass and Juniper Grass are generally uneven aged and open in appearance (Figure 6). 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 (e.g. insects, diseases, and fire) and climate variability. Fires are typically frequent and low-severity (Fire Regime I).

Seral state proportions are applied at the landscape scale (Table 6). Snags with diameters 8 inches and above at the base average 5 snags per acre, while snags 18 inches and above average 1 snag per acre. Coarse woody material increases with succession and averages 1–3 tons per acre.

Table 6. 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.

Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values averaging between about 10 and 30%. Shrubs average less than 30% canopy cover. Overall plant composition similarity to site potential is greater than 66%, but can vary considerably at the fine- and mid- scales owing to a diversity of seral conditions. Patch sizes of woodlands range from individual trees and clumps that are less than one-tenth acre, to tree groups of approximately an acre.

Figure 6. Pinyon-Juniper Grass Woodland (above) and Juniper Grass Woodland (below).
Photos: Wahlberg et al. 2015

Pinyon-Juniper Sagebrush Woodland

Landscape Scale Desired Conditions (1,000-10,000+ acres)

Pinyon-Juniper Sagebrush Woodland 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 (Figure 7). Trees occur as individuals or in smaller groups ranging from young to old. Pinyon trees are occasionally absent but one or more juniper species is always present. Typically groups are even-aged in structure. The understory is dominated by moderate to high density shrubs depending on successional stage. The shrub component consists of one or a mix of sagebrush, evergreen shrub, oak, and other shrub species, which are well-distributed. Shrubs typically are in a closed canopy state during later successional stages. Native perennial grasses and annual and perennial forbs are present as understory components. Snags and old trees with dead limbs/tops are scattered across the landscape. Coarse woody material is present. The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (e.g. insects, diseases, and fire) and climate variability. Fires are typically infrequent mixed-severity, with rare stand-replacement fires.

Figure 7. Pinyon-Juniper Sagebrush Woodland. Photo: Wahlberg et al. 2015

Seral state proportions are applied at the landscape scale (Table 7). Snags with diameters 8 inches and above at the base average 6 snags per acre, while snags 18 inches and above average 1 snag per acre. Coarse woody material averages about 4 tons per acre.

Table 7. Desired seral stage proportions for Pinyon-Juniper Sagebrush Woodland.

Seral Stage	Proportion	DESCRIPTION
Early	10%	Post-disturbance state.
Mid (open)	25%	Comprised of seedlings, saplings, and small trees with a predominantly open canopy.
Mid (closed)	20%	Closed tree canopy from small trees.
Late (open)	35%	Open tree canopy dominated by medium to very large trees.
Late (closed)	10%	Closed tree canopy consisting of medium to very large trees.

Ground cover consists primarily of shrubs, perennial grasses, and forbs capable of carrying surface fire only infrequently, with basal vegetation values averaging between about 10 and 35% depending on site conditions. Shrubs average greater than 30% canopy cover. Overall plant composition similarity to site potential is greater than 66%, but can vary considerably at the fine- and mid- scales owing to a diversity of seral conditions. The patch size of woodlands ranges from 1 to 10s of acres.

Pinyon-Juniper Evergreen Shrub Woodland

Landscape Scale Desired Conditions (1,000-10,000+ acres)

Pinyon-Juniper Evergreen Shrub Woodland 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 (Figure 8). Trees occur as individuals or in smaller groups ranging from young to old. Pinyon trees are occasionally absent but one or more juniper species is always present. Typically groups are even-aged in structure with all ages represented across the landscape for an overall uneven-aged grouped appearance. The understory is dominated by low to moderate density shrubs depending on successional stage. The shrub component consists of one 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. Snags and old trees with dead limbs/tops are scattered across the landscape. Large dead wood is present. 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 (e.g. insects, diseases, and fire), and climate variability. Fires are typically mixed-severity with a moderate frequency (Fire Regime III). Some evergreen shrub types exhibit occasional high severity fires (Fire Regime IV).

Seral state proportions are applied at the landscape scale (Table 8). Snags with diameters 8 inches and above at the base average 3 snags per acre, while snags 18 inches and above average 1 snag per acre. Coarse woody material averages 2-4 tons per acre.

Table 8. 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%.

Shrubs average greater than 30% canopy cover. Overall plant composition similarity to site potential is greater than 66%, but can vary considerably at fine- and mid- scales owing to a diversity of seral conditions. Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about 5 and 15%. The patch size of woodlands ranges from 1 to 10s of acres.

Figure 8. Pinyon-Juniper Evergreen Shrub Woodland. Photo: Wahlberg et al. 2015

Pinyon-Juniper Woodland (Persistent)

Landscape Scale Desired Conditions (1,000-10,000+ acres)

Pinyon-Juniper Woodland (persistent) is characterized by even-aged patches of pinyons and junipers that at the landscape level form multi-aged woodlands (Figure 9). Very old trees (>300 years old) are present. Tree density and canopy cover are high, shrubs are sparse to moderate, and herbaceous cover is low and discontinuous. Snags and older trees with dead limbs and/or tops are scattered across the landscape. Old growth features are often concentrated in mid- and fine-scale units as patches of old growth. Old growth includes 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 (e.g. 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. The fires that do occur are mixed to high severity (Fire Regime III, IV, & V). Seral state proportions are applied at the landscape scale (Table 9).

Snags with diameters 8 inches and above at the base average 5 snags per acre, while snags 18 inches and above average 1 snag per acre. Coarse woody material increases with succession and averages 2-5 tons per acre. Overall plant composition similarity to site potential is greater than 66%, but can vary considerably at fine- and mid- scales owing to a diversity of seral conditions. Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about 5 and 15%. Some sites are capable of carrying surface fire. The patch size of woodlands ranges from 10s to 100s of acres.

Figure 9. Pinyon-Juniper Woodland (persistent). Photo: Wahlberg et al. 2015

Table 9. 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.

Madrean Woodland

General Description

Madrean Woodland comprises Madrean Pinyon–Oak Woodland (Figure 10) and Madrean Encinal Woodland (Figure 11). Madrean Encinal Woodland often occurs below Madrean Pinyon–Oak at the interface with semi-desert grassland.

The Madrean Woodlands generally occur at elevations between 4,900 and 7,500 feet and can occur with a grass/forb-dominated understory or a shrub-dominated understory. Madrean Encinal Woodland is characterized by the dominance of oak trees, while Madrean Pinyon–Oak is dominated by both oaks and pinyon. Juniper can be co-dominant in either type. The two Madrean types can intergrade with one another and with pinyon-juniper woodlands. Common tree species include Arizona white oak, Emory oak, gray oak, and Mexican blue oak, with lesser amounts of silverleaf oak, and Toumey oak depending on the location. In central and southeastern New Mexico, oaks include gray oak and occasionally Chinkapin oak. Juniper species include alligator juniper, one-seed juniper, and redberry juniper. Arizona cypress is co-dominant on some sites. In the Madrean Pinyon–Oak, common pines include Mexican pinyon, Chihuahua pine, border pinyon, and Apache pine, with twoneedle pinyon as the surrogate pine in central and southeastern New Mexico. Interior chaparral species may be present in some locations but do not co-dominate. A shrub layer is present and often contains species such as beargrass, littleleaf and evergreen sumac, silktassel, birchleaf buckthorn, and ceanothus species. The herb layer is dominated by warm-season grasses such as threeawns, blue grama, sideoats grama, Rothrock grama, Arizona cottontop, curly-mesquite, green sprangletop, muhly grasses, or Texas bluestem.

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 (e.g. 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 I/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 anthropogenic disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody material, and nutrient cycling.

Landscape Scale Desired Conditions (10,000+ acres)

Seral state proportions are applied at the landscape scale (Table 10 and Table 11). The Madrean types are 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. Snags 8 inches or greater at DBH average 4 snags per acre; snags 18 inches or greater average 1 snag per acre. Large oak snags (>10 inches) are a well-distributed component. Coarse woody material increases with forest succession and averages 2-3 tons per acre. The amount of shrub cover depends on the TEUI unit (USDA Forest Service 1986). Overall plant composition similarity to site potential is greater than 66%, but can vary considerably at fine- and mid- scales owing to a diversity of seral conditions.

Figure 10. Madrean Pinyon-Oak Woodland. Photo: Wahlberg et al. 2015

Figure 11. Madrean Encinal Woodland. Photo: Wahlberg et al. 2015

Table 10. 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.

Table 11. Desired seral stage proportions for Madrean Encinal Woodland.

Seral Stage	Proportion	DESCRIPTION
Early	20%	Post-disturbance state dominated by grasses or shrubs. Tree canopy cover is below 10%.
Mid (open)	25%	Comprised of seedlings, saplings, and small trees with a predominantly open canopy.
Mid (closed)	40%	Closed tree canopy from small trees.
Late	15%	Open tree canopy dominated by medium to very large trees.

Mid-Scale Desired Conditions (100-1000 acres)

The majority of woodland is in open condition with tree cover averaging between 10 and 40% 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 less than one acre to tens of acres. 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. 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 2 and 20% depending on site conditions.

Fine-Scale Desired Conditions (<10 acres)

At the fine-scale, forest arrangement is in individual trees, small clumps, and groups of trees interspersed within variably-sized openings of grass/forbs/shrub vegetation associations similar to historic patterns. 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/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 pine. The size of tree groups is typically 1 acre or less. Groups at the mid- to old-age stages consist of 2 to approximately 40 trees.

SHRUBLAND VEGETATION TYPES

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 (Figure 12). 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 (*Cercocarpus montanus*) and skunkbush sumac (*Rhus*

trilobata) typically dominate. Historically, tree canopy cover was <10%. Seral stage proportions are applied at the landscape scale (Table 12).

Table 12. Desired seral stage proportions for Mountain Mahogany Mixed Shrubland.

Seral Stage	Proportion	DESCRIPTION
Early	5%	Recently disturbed state with shrub cover <10%.
Mid	65%	Dominated by shrubs with tree cover <10%.
Late	30%	Dominated by trees with >10% cover.

Fire Regime

The Mountain Mahogany Mixed Shrubland vegetation type is characterized by Fire Regime Group IV, with an average fire return interval of 35-200 years from stand-replacing fire.

Figure 12. Mountain Mahogany Mixed Shrubland. Photo: Wahlberg et al. 2015

Gambel Oak Shrubland[6]

Gambel Oak Shrubland vegetation type is dominated by long-lived Gambel oak clones that form largely monotypic overstories (Figure 13). 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 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 root crown. Larger forms may survive low-intensity surface fire. Not enough science is available to provide descriptions at multiple scales for this vegetation type. Seral stage proportions are applied at the landscape scale (Table 13).

Fire Regime

The Gambel Oak Shrubland vegetation type is characterized by Fire Regime Group IV, with an average fire return interval of 35-200 years from stand-replacing fire.

Figure 13. Gambel Oak Shrubland. Photo: Wahlberg et al. 2015

[6] 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	Proportion	DESCRIPTION
Early	80%	Herbaceous species dominate with shrub cover <10%.
Late	20%	Shrub cover >10%.

Sagebrush Shrubland

This vegetation type is dominated by big sagebrush (Artemisia tridentata). 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 (Atriplex confertifolia) are common, as are grassland species such as blue grama (Bouteloua gracilis). Historically, this vegetation type had less than 10% tree canopy cover (Figure 14). Sagebrush shrubland sites are usually found on deep well-drained valley bottom soils between 4,800 and 5,800ft 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. Seral stage proportions are applied at the landscape scale (Table 14).

Figure 14. Sagebrush Shrubland. Photo: Wahlberg et al. 2015

Table 14. Desired seral stage proportions for Sagebrush Shrubland.

Seral Stage	Proportion	DESCRIPTION
Early	80%	Herbaceous species dominate with shrub cover <10%.
Late	20%	Shrub cover >10%.

Fire Regime

The Sagebrush Shrubland vegetation type is characterized by Fire Regime Group III, with an average fire return interval of 35-200 years from mixed severity fire.

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 Forest Service lands of the Southwest (Figure 15). 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 one or more Atriplex species such as *Atriplex confertifolia, Atriplex canescens, Atriplex polycarpa*, or *Atriplex spinifera*. Other shrubs present to codominate may include *Artemisia tridentata* ssp. *wyomingensis, Chrysothamnus viscidiflorus*, *Ericameria nauseosa, Ephedra nevadensis, Grayia spinosa, Krascheninnikovia lanata, Lycium* spp., *Picrothamnus desertorum, Tetradymia* spp., or *Sarcobatus vermiculatus*. Not enough science is available to provide descriptions at multiple scales for this vegetation type. Seral stage proportions are applied at the landscape scale (Table 15).

Table 15. Desired seral stage proportions for Intermountain Salt Scrub.

Seral Stage	Proportion	DESCRIPTION
Early	25%	Herbaceous species dominate with only widely scattered shrubs.
Mid	45%	Open canopy shrub cover and discontinuous grasses.
Late	30%	Dominated by shrubs and lacking an herbaceous component.

Fire Regime

The Intermountain Salt Scrub vegetation type is characterized by Fire Regime Group III, with an average fire return interval of 35-200+ years from mixed severity fire.

Figure 15. Intermountain Salt Scrub.
Photo courtesy of http://www.tarleton.edu/Departments/range/Shrublands/Great%20Basin%20Desert/greatbasindesert.html

Chihuahuan Salt Desert Scrub

This vegetation type occurs in the high sun mild climate gradient and includes extensive open-canopied shrublands of typically saline basins (saline, sodic, or saline-sodic soils) in the Chihuahuan Desert (Figure 16). Stands often occur on alluvial flats and around playas. Substrates are generally fine-textured, saline soils. Vegetation is typically composed of one or more saltbush species such as *Atriplex canescens, Atriplex obovata*, or *Atriplex polycarpa* along with species of *Allenrolfea, Flourensia, Salicornia, Suaeda*, or other halophytic plants. Graminoid species may include *Sporobolus airoides, Pleuraphis mutica*, or *Distichlis spicata* at varying densities. Not enough science is available to provide descriptions at multiple scales for this vegetation type. Seral stage proportions are applied at the landscape scale (Table 16).

Fire Regime

The Chihuahuan Salt Desert Scrub vegetation type is characterized by Fire Regime Group III, with an average fire return interval of 100-200 years from mixed severity fire.

Figure 16. Chihuahuan Salt Desert Scrub.
Photo courtesy of http://www.tarleton.edu/Departments/range/Shrublands/Great%20Basin%20Desert/greatbasindesert.html

Table 16. Desired seral stage proportions for Chihuahuan Salt Desert Scrub.

Seral Stage	Proportion	DESCRIPTION
Early	25%	Sparsely vegetated and dominated by herbaceous species.
Mid	35%	Open canopy shrub cover and discontinuous grasses.
Late	40%	Closed canopy and dominated by shrubs.

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 (Figure 17). The major dominant is creosotebush (*Larrea tridentata*), often mixed with tarbush (*Flourensia cernua*). Other sites may be dominated by whitethorn acacia (*Acacia constricta*), viscid acacia (*Acacia neovernicosa*), Rio Grande saddlebush (*Mortonia scabrella*), and ocotillo (*Fouquieria splendens*). Sub-shrubs are also abundant and often codominants. These include lechugiulla (*Agave lechuguilla*), cactus apple (*Opuntia engelmannii*), Wright's beebrush (*Aloysia wrightii*), and mariola (*Parthenium incanum*). Other typical sub-shrub associates are broom snakeweed (*Gutierrezia sarothrae*), pricklyleaf dogweed (*Thymophylla acerosa*), plumed crinklemat (*Tiquilia greggii*), and mat rockspirea (*Petrophyton caespitosum*). Herbaceous cover can by sparse or grassy with fluffgrass

(*Dasyochloa pulchela*) and bush muhly (*Muhlenbergia porter*) key indicators. Black grama (*Bouteloua eripoda*), tobosagrass (*Pleuraphis mutica*), and burrograss (*Scleropogon brevifolius*) may also occur.[7] Not enough science is available to provide descriptions at multiple scales for this vegetation type. Seral stage proportions are applied at the landscape scale (Table 17).

Figure 17. Typical appearance of Chihuahuan Desert Scrub. Some areas within this vegetation type may be barren with an abundance of sand, rock, gravel, scree, or talus. Photo: Wahlberg et al. 2015.

Table 17. Desired seral stage proportions for Chihuahuan Desert Scrub.

Seral Stage	Proportion	DESCRIPTION
Early	5%	Sparsely vegetated and dominated by herbaceous species.
Mid	20%	Open canopy shrub cover and discontinuous grasses.
Late	75%	Closed canopy and dominated by trees and shrubs.

Fire Regime

The Chihuahuan Desert Scrub vegetation type is characterized by Fire Regime Group III, with an average fire return interval of 200+ 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.

[7] Excerpted from ILAP (2012).

Sandsage

The Sandsage Shrubland occurs mainly on sand dunes and areas and areas that were overblown with a thicker, sandier soil surface during disturbances (Figure 18). Characteristic plant species for the Sandsage vegetation type are sand sagebrush (*Artemesia filifolia*), blue grama (*Bouteloua gracilis*), sideoats grama (*Bouteloua curtipendula*), big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), needle and thread (*Hesperostipa comata*) and Indiangrass (*Sorghastrum nutans*). Not enough science is available to provide descriptions at multiple scales for this vegetation type. Seral stage proportions are applied at the landscape scale (Table 18).

Figure 18. Sandsage Shrubland. Photo: Wahlberg et al. 2015.

Table 18. Desired seral stage proportions for Sandsage Shrubland.

Seral Stage	Proportion	DESCRIPTION
Early	30%	Herbaceous species dominate with open shrub canopy.
Late	70%	Closed shrub cover.

Fire Regime

The Sandsage vegetation type is characterized by Fire Regime Group III, with an average fire return interval of 35-200+ years from mixed-severity fire.

GRASSLAND VEGETATION TYPES

Montane/Subalpine Grassland

Also referred to as montane grasslands, this system occurs at elevations ranging from 8,000-11,000 feet, and often harbors several plant associations with varying dominant grasses and herbaceous species (Figure 19). Such dominant species may include Parry's oatgrass (*Danthonia parryi*), Arizona fescue (*Festuca arizonica*), Thurber's fescue (*Festuca thurberi*), pine dropseed (*Blepharoneuron tricholepis*), Kentucky bluegrass (*Poa pratensis*), various sedges (*Carex* spp.), shooting star (*Dodecatheon jeffreyi*), fowl manna grass (*Glyceria striata*), Sierra rush (*Juncus nevadensis*), Rocky Mountain iris (*Iris missouriensis*), Parry's bellflower (*Campanula parryi*), California false hellebore (*Veratrum californicum*), and bulrush spp. (*Scirpus* and/or *Schoenoplectus* spp). Trees may occur along the periphery of the meadows, which may include Engelmann spruce (*Picea engelmannii*), blue spruce (*Picea pungens*), Douglas-fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), limber pine (*Pinus flexilis*), and subalpine fir (*Abies lasiocarpa*). 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 <10% each. The fire return interval is 0–35 years from stand-replacing fire (Fire Regime Group II). The Montane/ Subalpine Grassland if often interspersed with the Herbaceous Riparian vegetation type. Not enough science is available to provide descriptions at multiple scales for this vegetation type. Seral stage proportions are applied at the landscape scale (Table 19).

Figure 19. Montane/Subalpine Grassland. Photo: Wahlberg et al. 2015.

Table 19. Desired seral stage proportions for Montane/Subalpine Grassland.

Seral Stage	Proportion	DESCRIPTION
Early	20%	Recently disturbed. Grass, shrub, tree canopy cover <10% each
Late	80%	Mature grassland, grass is dominant lifeform. Shrub and tree canopy cover <10% each

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 (Figure 20). Grass species may include but are not limited to: Indian ricegrass (*Achnatherum hymenoides*), threeawn (*Aristida* spp.), blue grama (*Bouteloua gracilis*), fescue (*Festuca* spp.), needle-and-thread (*Hesperostipa comata*), spike fescue (*Leucopoa kingii*), muhlies (*Muhlenbergia* spp.), James' galleta (*Pleuraphis jamesii*), and Sandberg bluegrass (*Poa secunda*). Shrub species may include but are not limited to: sagebrush (*Artemesia tridentata*), saltbush (*Atriplex* spp.), jointfir (*Ephedra spp.*), snakeweed (*Gutierrezia* spp.), winterfat (*Krascheninnikovia lanata*), one-seeded juniper (*Juniperus monosperma*), Utah juniper (*Juniperus osteosperma*) and wax currant (*Ribes cereum*). Shrub cover may occasionally exceed 10%; tree cover is <10%. Not enough science is available to provide descriptions at multiple scales for this vegetation type. Seral stage proportions are applied at the landscape scale (Table 20).

Figure 20. Colorado Plateau/Great Basin Grassland. Photo: Wahlberg et al. 2015.

Table 20. Desired seral stage proportions for Colorado Plateau/Great Basin Grassland.

Seral Stage	Proportion	DESCRIPTION
Early	25%	Perennial-mixed grasses; combined shrub and tree cover ≥10%, grass cover ≥10%.
Mid	5%	Perennial-mixed grasses; combined shrub and tree cover <10%, grass cover ≥10%. Includes post-fire plant communities previously late-seral.
Late	70%	Perennial grasses; combined shrub and tree cover <10%, grass cover ≥30%.

Fire Regime

The Colorado Plateau/Great Basin Grassland vegetation type is characterized by Fire Regime Group II, with an average fire return interval of 0-35 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.

Semi-Desert Grassland

The Semi-Desert Grassland vegetation type occurs throughout southern New Mexico at elevations ranging from 3,000 to 4,500 feet (Figure 21). 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 as 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/types are black grama (Bouteloua eriopoda) grassland, blue grama (Bouteloua gracilis) grassland, curly mesquite (Hilaria belangeri) grassland, tobosa (Pleuraphis mutica) grassland, giant sacaton (Sporobolus wrightii) grassland, mixed native perennial grassland, and nonnative perennial grassland. Shrubs also occupy these grasslands and their abundance and species composition also vary. Shrub cover may occasionally exceed 10%; tree cover is <10%. Not enough science is available to provide descriptions at multiple scales for this vegetation type. Seral stage proportions are applied at the landscape scale (Table 21).

Figure 21. Semi-Desert Grassland. Photo: Wahlberg et al. 2015.

Two subclasses of the Semi-Desert Grassland vegetation type occur on the Cibola:

Piedmont Grassland[8]

This grassland vegetation is typical of coalesced alluvial fan piedmonts along mountain fronts and characterized the dominance of black grama (*Bouteloua eripoda*), bush muhly (*Muhlenbergia porteri*), and fluffgrass (*Dasyochloa pulchella*). Other grasses that are prevalent and may dominate or co-dominate are curlyleaf muhly (*Muhlenbergia setifolia*), tobosagrass (*Pleuraphis mutica*), New Mexico feathergrass (Hesperostipa neomexicana), sideoats grama (*Bouteloua curtipendula*), hairy grama (*Bouteloua hirsuta*), and blue grama (*Bouteloua gracilis*). Additional grass associates include plains lovegrass (*Eragrostis intermedia*), purple three-awn (*Aristida purpurea*), red grama (*Bouteloua trifida*), Arizona cottontop (*Digitaria californica*), curly-mesquite (*Hilaria belangeri*). The exotic Lehmann's lovegrass (*Eragrostis lehmanniana*) can displace native piedmont grasses, especially in disturbed soils. While shrubs and sub-shrubs are clearly subordinate in these grasslands, they are always common and sometimes abundant, forming a shrub-steppe. The most diagnostic tall shrubs are longleaf jointfir (*Ephedra trifurca*) and Torrey's yucca (*Yucca torreyi*) along with the sub-shrubs pricklyleaf dogweed (*Thymophylla acerosa*), lechuguilla (*Agave lechuguilla*), Bigelow sage (*Artemisia bigelovii*), woody crinklemat (*Tiquilia canescens*). Broom snakeweed (*Gutierrezia sarothrae*) and burroweed (*Isocoma tenuisecta*) are most abundant following disturbance.

[8] Adapted from ILAP (2012).

Sandy Plains Grassland[9]

This grassland vegetation is typical of sandy plains (sandsheets) and dominated by black grama (*Bouteloua eripoda*), sand dropseed (*Sporobolus cryptandrus*), mesa dropseed (*Sporobolus flexuosus*), spike dropseed (*Sporobolus contractus*), ear muhly (*Muhlenbergia arenacea*), and sand muhly (*Muhlenbergia arenicola*). In addition to the dominant grasses, blue grama (*Bouteloua gracilis*), purple three-awn (*Aristida purpurea*), low woollygrass (*Dasyochloa pulchella*), bush muhly (*Muhlenbergia porteri*), sandhill muhley (*Muhlenbergia pungens*), and giant dropseed (*Sporobolus giganteus*) can be common associates. On gypsum substrates, gyp dropseed (*Sporobolus nealleyi*), gyp grama (*Bouteloua breviseta*), and New Mexico bluestem (*Schizachyrium neomexicanum*) dominate. While shrubs and sub-shrubs are clearly subordinate in these grasslands, they are always common and sometimes abundant, forming a shrub-steppe. Typical indicators include Torrey's jointfir (*Ephedra torreyana*), and soaptree yucca (*Yucca elata*).

Table 21. Desired seral stage proportions for Semi-Desert Grassland.

Seral Stage	Proportion	DESCRIPTION
Early	5%	Perennial-mixed grasses; combined shrub and tree cover ≥10%, grass cover ≥10%.
Mid	25%	Perennial mixed grasses; combined shrub and tree cover <10%, grass cover ≥10%. Includes post-fire plant communities previously late-seral.
Late	70%	Perennial grasses; combined shrub and tree cover <10%, grass cover ≥30%.

Fire Regime

The Semi-Desert Grassland vegetation type is characterized by Fire Regime Group II, with an average fire return interval of 0-35 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. TNC synthesis of fire history in this vegetation type reports large scale fire events occurring every 2.5-10 years and typically occurring in the early summer. This coincides with pre-monsoon lightning activity in the region and contemporary fire behavior suggests that historic ignitions would likely have burned until they ran out of contiguous fuel or were rained out.

[9] Adapted from ILAP (2012).

RIPARIAN VEGETATION TYPES

Arizona Alder - Willow

The Arizona Alder-Willow riparian vegetation type (Figure 22) is typically found at elevations ranging from 3,330 to 9,900 feet. While both Arizona alder and willow species are indicative of this unit, some areas may contain only one species or the other. Common willow species include red willow and arroyo willow. Arizona walnut, velvet ash, and Rocky Mountain maple are common.

Figure 22. Arizona Alder-Willow riparian vegetation type. Photo by Max Wahlberg.

Desert Willow

This vegetation type is typically found at elevations ranging from 1,300 to 6,900 feet. Species commonly found in this vegetation type include netleaf hackberry and velvet mesquite (Figure 23).

Figure 23. Desert Willow riparian vegetation type. Photo by Max Wahlberg.

Fremont Cottonwood-Conifer

Species commonly found in this vegetation type include juniper species and velvet mesquite (Figure 24).

Figure 24. Fremont Cottonwood-Conifer riparian vegetation type.
Photo by Mark W. Skinner @ USDA-NRCS PLANTS Database.

Fremont Cottonwood/Oak

This vegetation type is typically found at elevations ranging from 2,200 to 7,500 feet. Oak species include Emory oak and Sonoran scrub oak (Figure 25). Other riparian species commonly found in this vegetation type include Arizona sycamore and velvet ash.

Figure 25. Fremont Cottonwood/Oak riparian vegetation type.
Photo ©Al Schneider, www.swcoloradowildflowers.com

Fremont Cottonwood/Shrub

This vegetation type is typically found at elevations ranging from 1,000 to 7,600 feet (Figure 26). Some areas are dominated by Gooding's willow and velvet ash and have the potential for cottonwood regeneration. Other riparian species commonly found include willow species, box elder, and desert willow. This vegetation type also supports a mesquite bosque subtype. Lanceleaf cottonwood, which is a hybrid between Fremont cottonwood and narrowleaf cottonwood, may occur in place of Fremont cottonwood where transitions into the Narrowleaf Cottonwood/Shrub vegetation type.

Figure 26. Fremont Cottonwood/Shrub riparian vegetation type. Photo by Debbie Cress.

Herbaceous Riparian

This vegetation type is typically found at elevations ranging from 2,100 to over 12,000 feet and supports a whole host of riparian and wetland herbaceous species, and species occurrence varies greatly with elevation and climate (Figure 27).

Figure 27. Herbaceous riparian vegetation type. Photo by Max Wahlberg.

Narrowleaf Cottonwood/Shrub

This vegetation type is typically found at elevations ranging from 1,900 to 10,000 feet (Figure 28). Species commonly found include box elder, willow species, Arizona alder, and Arizona walnut. Lanceleaf cottonwood, which is a hybrid between Fremont cottonwood and narrowleaf cottonwood may occur in place of narrowleaf cottonwood in some places where this vegetation type transitions with the Fremont Cottonwood/Shrub vegetation type.

Figure 28. Narrowleaf Cottonwood/Shrub riparian vegetation type. Photo by Max Wahlberg.

Rio Grande Cottonwood/Shrub

This vegetation type is typically found at elevations ranging from 3,300 to 8,500 feet. While multiple willow species occur, narrowleaf willow is the most common (Figure 29).

Figure 29. Rio Grande Cottonwood/Shrub riparian vegetation type. Photo by Max Wahlberg.

Upper Montane Conifer/Willow

This vegetation type is typically found at elevations ranging from 6,100 to 11,400 feet. Conifer species include spruce, subalpine fir, white fir, and Douglas-fir. Quaking aspen (*Populus tremuloides*) can be present to codominant (Figure 30). Other riparian species commonly found include thinleaf alder and boxelder.

Figure 30. Upper Montane Conifer/Willow riparian vegetation type.
Photo by Mike Bradley, from Muldavin et al. (2000).

Willow–Thinleaf Alder

This vegetation type is typically found at elevations ranging from 5,400 to 11,900 feet. While both thinleaf alder and willow species are indicative of this vegetation type, some locations may contain only one species or the other. This vegetation type frequently occurs in wet drainages associated with ponderosa pine and mixed conifer forests (Figure 31). Common willow species include dewystem willow (*Salix irrorata*), Drummond's willow (*S. drummondiana*), park willow (*S. monticola*), and grayleaf willow (*S. glauca*).

Figure 31. Willow–Thinleaf Alder riparian vegetation type. Photo by Max Wahlberg.

Arizona Walnut

This highly diverse vegetation type is typically found at elevations ranging from 4,000 to 8,300 feet and tends to occur in drier drainages than other riparian types and often also includes species such as willows, box elder (*Acer negundo*), ponderosa pine (*Pinus ponderosa var. scopulorum*), pinyon pines, juniper, and various species of oak (Figure 32).

Figure 32. Arizona Walnut riparian vegetation type. Photo by Max Wahlberg.

Ponderosa Pine/Willow

This vegetation type is typically found at elevations ranging from 4,500 to 9,700 feet and is typified by an overstory of ponderosa pine with an understory of shrub-form willow species (Figure 33). Species commonly found include Arizona walnut (*Juglans major*), box elder (*Acer negundo*), and velvet ash (*Fraxinus velutina*).

Figure 33. Ponderosa Pine/Willow riparian vegetation type. Photo by Debbie Cress.

WATERSHED RESOURCES

Watershed resources include water resource features and soil features. Water rights is also included in this section, since management of water rights is related to water resources and has an impact on multiple resources including range management, wildlife, infrastructure, and recreation. Water resources include surface water features such as streams, springs, wetlands, riparian areas, groundwater, and watersheds. Soil resources include those features that support productivity of soils such as ground cover and woody material (USDA FS R3 Technical Guidance, 2013).

Watersheds that are functioning properly are resilient and recover rapidly from natural and human disturbances, maintain long term soil productivity, and sustain diverse populations of native species. In addition, healthy watersheds provide important ecosystem services, such as high quality water, dissipation of flood flows, recharge of streams and aquifers, maintenance of riparian communities, and resilience to climate change (USDA 2011).

Surface Water Resources

Surface water resources include streams and springs as well as the systems supported by these waters, such as riparian and wetland. Surface waters are very important for the ecosystem services they provide. These services include water for drinking, irrigation, livestock, groundwater recharge, acequias, and plant and wildlife support.

Of the 6,203 miles of mapped stream channels in the Plan Area, only about four percent are perennial, meaning they flow year round. Where assessed, water quality doesn't meet State standards. In addition, there are 367 mapped springs across the Plan Area, but many of these are dependent on snow packs for recharge and dry up seasonally. Since springs are supplied by groundwater, filtered through soil and bedrock, and away from pollutant sources, water quality is good.

There are 7,569 acres of riparian areas which includes wetlands (using the RMAP data), approximately 0.5 percent of the plan area (See Volume 1 of the Assessment Report of Ecological/Social/Economic Conditions, Trends, and Risks to Sustainability, Cibola National Forest Mountain Ranger Districts). Where assessed, many riparian areas are at risk in terms of proper functioning condition, largely due to lack of supporting riparian vegetation and/or stability. As with watersheds, properly functioning is a formalized concept (USDI-Bureau of Land Management 1998, 2003) that is applied to the assessment of streams and springs. Properly functioning means the site has the characteristics, within its potential or capability, to dissipate flood flows, filter sediment, recharge groundwater, and support stabilizing vegetation. Several components of the definition for properly functioning are included in the desired conditions. External factors such as climate change and continued drought continue to exert stress on these important resources.

Desired Conditions

New Mexico water quality standards are met. (Corresponds to Needs for Change III.C.c)

Water resources, including water quality are maintained by ensuring Best Management Practices as described in the National Best Management Practices for Water Quality Management on National Forest System Lands and in FSH 2509.22 are implemented and monitored. (Corresponds to Needs for Change III.C.c, III.C.e)

Stream and spring water flows provide for long term consumptive and non-consumptive water resource needs. (Corresponds to Needs for Change III.C.b, III.C.d)

Springs, riparian areas, and wetlands have the necessary soil, water, and vegetation attributes to be healthy and functioning. (Corresponds to Needs for Change III.C.a, III.C.c, III.C.e)

Instream flows provide for channel and floodplain maintenance, recharge of riparian aquifers, water quality, and minimal temperature fluctuations. (Corresponds to Needs for Change III.C.a, III.C.d, III.C.e)

Riparian and wetland areas withstand high flow events with resiliency. (Corresponds to Needs for Change III.C.a, III.C.c, III.C.e)

Surface water resources in the Plan Area are not impacted by surface or ground water withdrawals. (Corresponds to Needs for Change III.C.a, III.C.d)

Channel width-to-depth ratios are appropriate to the stream type within the potential or capability of the system. (Corresponds to Needs for Change III.C.a, III.C.c)

Channels are generally vertically stable, with isolated locations of aggradation or degradation, which would be expected in near natural conditions. (Corresponds to Needs for Change III.C.a)

Stream channels are connected to their floodplain. (Corresponds to Needs for Change III.C.a, III.C.c, III.C.e)

Floodplains are functioning and lessen the impacts of floods on human safety, health, and welfare. (Corresponds to Needs for Change III.C.a, III.C. c, III.C.e)

In aquatic and riparian systems that evolved with wood near the streams, large woody material is present and continues to be recruited into the system at near natural rates. (Corresponds to Needs for Change III.C.a, III.C.c, III.C.e)

Riparian, wetland, and spring dependent resources are supported preferentially. (Corresponds to Needs for Change III.C.a, III.C.c, III.C.e)

The unique character of water resource features such as springs are maintained and/or restored. (Corresponds to Needs for Change III.C.a, III.C.c, III.C.e)

Higher ecological values associated with water resource features such as springs, streams, riparian areas, and wetlands are supported by the healthy condition of these features. (Corresponds to Needs for Change III.C.a, III.C.c, III.C.d, III.C.e)

Wetland conditions function within their potential or capability by infiltrating water, recycling nutrients, resisting erosion. (Corresponds to Needs for Change III.C.a, III.C.c, III.C.d, III.C.e)

Bank characteristics are stable within the natural range of variability. (Corresponds to Needs for Change III.C.a, III.C.c, III.C.e)

Sufficient reproduction of native species appropriate to the site is occurring to ensure sustainability. (Corresponds to Needs for Change III.C.a, III.C.c)

Riparian and wetland plant communities occupy most of area where they might potentially grow. (Corresponds to Needs for Change III.C.a, III.C.c)

The ecological integrity of riparian areas is maintained or restored, including structure, function, composition, connectivity, water quality, sediment, aquatic and terrestrial habitats, and floodplain values. (Corresponds to Needs for Change III.C.a, III.C.c, III.C.e)

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) on National Forest System lands (an established management zone for approximately 100 feet from edges of all perennial streams and lakes per the 2012 Planning Rule). (Corresponds to Needs for Change III.C.a, III.C.b, III.C.c, III.C.d, III.C.e)

Ephemeral channels which only flow during snow melt and in direct response to precipitation events with minimal or no riparian vegetation provide support to downstream subsurface flows, supporting riparian vegetation and groundwater recharge. (Corresponds to Needs for Change III.C.a, III.C.b, III.C.c, III.C.d)

Riparian plants such as willows (e.g., Bebb, Peach Leaf) are reproducing with all age classes present. (Corresponds to Needs for Change III.C.a)

Groundwater Resources

Groundwater resources include groundwater dependent ecosystems such as springs, riparian and wetlands area, recharge zones, and aquifers underlying the Plan Area. Groundwater dependent ecosystems have been discussed under surface water resources. Much of the water on the forest comes from groundwater resources. In addition, the mountains on the Cibola provide water for recharging many aquifers in the region. In the winter, recharge depends mostly on snowfall which is greatest at the higher elevations within the plan area. In the summer, recharge occurs when summer precipitation collects in channels and then infiltrates through the bed to aquifers. Because of this, recharge in the mountains of the Cibola National Forest is very important to the groundwater resources of the region, not just within the Plan Area but outside as well.

Desired Conditions

Groundwater meets New Mexico water quality standards. (Corresponds to Needs for Change III.C. c)

Groundwater-dependent and riparian dependent resources are not impacted by Forest Service groundwater withdrawal activity. (Corresponds to Needs for Change III.C. c)

Watershed condition supports recharge of aquifers. (Corresponds to Needs for Change III.C.a, III.C.b, III.C.c)

Watersheds

A watershed is a “region or land area drained by a single stream, river, or drainage network; a drainage basin” (36 CFR 219.19). Functioning watersheds maintain and improve the soil, vegetation and watershed resources that sustain, and expand the beneficial uses of such resources while maintaining healthy ecosystems and fully supporting public safety, the customs and economic stability and viability of our industries and the general welfare of the citizens. Watershed boundaries cross ownership boundaries since they are based on topography. Current watershed condition for sub-watersheds that intersect the Plan Area was rated using the Watershed Condition Framework (WCF; USDA-USFS 2011) methodology. The WCF uses 12 indicators (included but not limited to water quality, aquatic habitat, terrestrial and aquatic invasive species, fire regime condition class) to evaluate the health of watersheds on National Forest System Lands. One hundred nineteen watersheds were rated as functioning properly,

46 watersheds were rated as functioning at risk, and one watershed was rated as impaired. Forty-two watersheds were not rated since these watersheds have 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.

Desired Conditions

Watersheds are functioning properly, in satisfactory condition. (Corresponds to Needs for Change III.C.a, III.C.b, III.C.c, III.C.d, III.C.e)

Watersheds are not at risk due to the fuels composition and uncharacteristic disturbance. The fire indicator of watershed framework is rated 'good'. (Corresponds to Needs for Change III.C.a, III.C.b, III.C.c, III.C.d, III.C.e)

Watersheds mostly contain free-flowing streams and functioning wetlands and riparian areas. (Corresponds to Needs for Change III.C.a, III.C.b, III.C.c, III.C.e)

The hydrologic regime within a watershed is not impacted by the density and distribution of roads, trails, and impervious surfaces. (Corresponds to Needs for Change III.C.a, III.C.b, III.C.c)

Watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. (Corresponds to Needs for Change III.C.a, III.C.b, III.C.c)

Soil

The diverse and productive soils of the Cibola are described, characterized, and classified in Terrestrial Ecosystem Survey of the Cibola National Forest and National Grasslands (Strenger et al. 2007). Soils across the Plan Area are intricately linked to the climate, vegetation, and geology of the forest. Data collected during the TES was used to determine soil condition categories based on indicators for hydrology, stability, and nutrient cycling. Satisfactory soils sustain biological productivity, maintain environmental quality, and promote plant and animal health as described in the Technical Guidance for Assessing and Monitoring Soil Quality in the Southwestern Region.

Five of the nine mountain units in the Plan Area are considered to be at moderate risk for soil condition and one mountain unit, San Mateo Mountains is at least 25% unsatisfactory and considered to be at high risk. This risk is largely related to lack of ground cover. Lack of woody material on the ground is also a factor.

Desired Conditions

Soil condition is satisfactory. (Corresponds to Needs for Change III.B.a)

Vegetation contributes to soil condition, nutrient cycling, and hydrologic regimes at natural levels. (Corresponds to Needs for Change III.B.a)

Downed woody material occurs at levels (size, decay) sufficient to support soil productivity. (Corresponds to Needs for Change III.B.a)

Biological soil crusts (e.g., mosses, lichens, algae, liverworts) are present. (Corresponds to Needs for Change III.B.a)

Soils are free from pollutants that could alter ecosystem integrity or affect public health. (Corresponds to Needs for Change III.B.a)

Soils do not exhibit excessive rill, sheet, or gully erosion. (Corresponds to Needs for Change III.B.a)

The soil displays minimal pedestaling of plant, litter, and rocks with little exposure of roots. (Corresponds to Needs for Change III.B.a)

SPECIES

Aquatic Species and Habitats

Background and Description

Streams, springs, groundwater, and constructed waters are centers of high biological diversity in arid landscapes, and the ecological health of these resources is important for forest ecosystem sustainability. Wildlife is more concentrated around open water sources than in the general landscape, and obligate aquatic and semiaquatic species on the Cibola NF 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 (PL 86-517). 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 (PL 93-205). 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 Forest, per the 2012 Planning Rule.

Springs are highly productive habitats in otherwise low productivity arid landscapes. 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 humans 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 NF.

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

Desired Conditions

Streams and aquatic habitats support self-sustaining populations of native fish and/or other aquatic species and provide the quantity and quality of aquatic habitat within reference conditions. (Corresponds to Needs for Change III.E.a)

Streams, springs, and wetlands with the potential to support native fish and/or other aquatic species provide habitats that are resilient or adaptive to natural or anthropogenic disturbances and projected warmer and drier climatic conditions. (Corresponds to Needs for Change III.E.a, III.E.c)

Habitat conditions and compatible multiple uses contribute to the recovery of federally listed species and the persistence of species of conservation concern. (Corresponds to Needs for Change III.E.a, III.E. c)

Streamflows, habitat, and water quality support native aquatic and riparian-dependent species and habitat both on the Forest and downstream. (Corresponds to Needs for Change III.E.a, III.E.c)

Aquatic habitat conditions provide connectivity for species both on the Forest and downstream. (Corresponds to Needs for Change III.E.a, III.E.c)

All aquatic species populations are free from or minimally impacted by nonnative plants and animals. (Corresponds to Needs for Change II.b and III.E.a)

Desirable nonnative fish species provide recreational fishing in waters where those opportunities are not in conflict with the recovery of native species. (Corresponds to Needs for Change III.E.a, III.E.c)

Aquatic species habitat conditions provide the resiliency and redundancy necessary to maintain species biodiversity and metapopulations. (Corresponds to Needs for Change III.E.a, III.E.c)

All natural aquatic habitats are hydrologically functioning and have sufficient emergent vegetation and macroinvertebrate populations to support resident and migratory species. (Corresponds to Needs for Change III.E.a, III.E.c)

Constructed water features have escape ramps that provide safe access and egress for wildlife. (Corresponds to Needs for Change III.E.a, III.E.c)

Terrestrial Species and Habitats

Background and Description

The Cibola NF provides habitat for a wide variety of terrestrial wildlife and plant species. Topographical and geological conditions of the wide-ranging sky islands provide for variation in wildlife distribution and habitat use. The spatially disjunct nature of the four districts influences movement patterns of wide ranging mammal herds such as elk, mule deer, and pronghorn. The Cibola NF is primarily responsible for providing habitat to maintain species diversity on national forest lands. The Forest Service has ultimate responsibility over NFS lands, but the New Mexico Department of Game and Fish (NMDGF) and the U.S. Fish and Wildlife Service (USFWS) are the lead agencies responsible for managing wildlife populations in New Mexico. The USFSW is responsible for managing Federally-endangered and Federally-threatened species and migratory birds while the NMDGF 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 (PL 86-517). 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 (PL 93-205). 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 Forest, per the 2012 Planning Rule.

The needs of individual or groups of wildlife species include food, water, and shelter. Adequate amount and connectivity of habitat is also crucial to daily and seasonal movements, finding mates, and being able to utilize available habitat across the landscape. 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 (e.g., wildlife quiet areas, unroaded areas) are necessary to sustain other species.

Desired Conditions

Native ecosystems are within reference conditions, are distributed throughout their potential range and are sustainable across the Forest and are able to support a full complement of native species. (Corresponds to Needs for Change III.E.a)

There is a natural and nearly complete assemblage of native plants and animals, including important game species, distributed across the Forest. (Corresponds to Needs for Change III.E.a, III.E.b, III.E.c)

Habitat conditions and compatible multiple uses contribute to the recovery of federally listed species and the persistence species of conservation concern. (Corresponds to Needs for Change III.E.a, III.E.c)

Habitats and refugia are present for narrow endemics, rare plants, species with restricted distributions, and/or declining populations. These habitats are intact and functioning. (Corresponds to Needs for Change III.E.a, III.E.c)

Hunting, fishing, plant-gathering and other species-based recreation and cultural opportunities exist, but do not compromise species, populations or habitat. (Corresponds to Needs for Change III.E.a, III.E.b)

Habitats on the Forest allow for the maintenance and promotion of interspecific relationships (e.g. predator-prey relationships, keystone species relationships, etc.). (Corresponds to Needs for Change III.E.a, III.E.c)

Desirable nonnative species provide recreational opportunities where those opportunities are not in conflict with the recovery of native species. (Corresponds to Needs for Change III.E.a, III.E.b)

Habitat configuration and availability allow wildlife populations to adjust their movements in response to major disturbances (e.g. climate change, uncharacteristic fire) and promote genetic flow between wildlife populations across the Forest and beyond. (Corresponds to Needs for Change III.E.a, III.E.c)

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. (Corresponds to Needs for Change III.E.a, III.E.c)

Interconnected habitats within NFS lands allow for seasonal migrations, breeding, dispersal, foraging, and other movement patterns in order to promote genetic flow across the Forest. (Corresponds to Needs for Change III.E.a, III.E.c)

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. (Corresponds to Needs for Change III.E.a, and III.E.c)

Non-vegetative habitat features required for some species (e.g. cliffs, caves, cavities) are maintained with limited disturbance. Vegetative habitat features (e.g. snags, grasses, forbs, and shrubs) provide forage, cover, fawning, and nesting sites for species requiring them. (Corresponds to Needs for Change III.E.a, and III.E.c)

Species are free from harassment and anthropogenic disturbance at a scale that impacts vital functions (e.g., breeding, rearing young) that could affect persistence of the species. (Corresponds to Needs for Change III.E.a)

Nonnative Invasive Species

Background and Description

A native species is defined in the 2012 Planning Rule as "an organism that was historically 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." Species not meeting this definition are considered nonnative. Some nonnative species have invasive tendencies and threaten native species, ecosystem function, biodiversity, and the quantity and quality of forest goods and services (e.g. noxious weeds). Some nonnative species are desirable and/or not likely to cause ecosystem disruption, and are not addressed in this section. Invasive weeds have been documented to alter soil temperature, soil salinity, water availability, nutrient cycles and availability, native seed germination, infiltration and runoff of precipitation, and fire severity and frequency. The alteration of physical conditions and disturbance regimes allow the invasive species to spread farther. Nonnative invasive species currently known to be on the Cibola include but are not limited to: American bullfrog (*Lithobates catesbeianus*), Saltcedar (*Tamarix* spp.), Musk thistle (*Carduus nutans*), Cheatgrass (*Bromus tectorum*) and Hoary cress (*Cardaria draba*).

Management activities for aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens) will be based upon an integrated pest management approach on all areas within the National Forest System, and on areas managed outside of the National Forest System under the authority of the Wyden Amendment (P.L. 109-54, Section 434), prioritizing prevention and early detection and rapid response actions as necessary (Forest Service Manual 2900).

Similar to invasive plants, invasive animals have the potential to adversely affect native species and ecosystem function. They can outcompete and prey upon native animal species, alter food web interactions, and impact native vegetation. Feral animals, specifically trespass livestock, are an issue in some areas on the Cibola. These animals are managed by the New Mexico Livestock Board.

Desired Conditions

Invasive species do not disrupt the structure or function of ecosystems or impact native wildlife or plant species. (Corresponds to Needs for Change II.b)

Desirable non-native species are managed. (Corresponds to Needs for Change II.b)

AIR

Background and Description

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

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

While there are no air quality monitoring stations on the forest, nearby monitors indicate that ambient measurements of criteria pollutants are in attainment. However, there is some concern in the future

regarding particle pollution (particulate matter–PM10 and PM2.5) which is expected to increase from windblown dust and fires. Fugitive dust emanating from off the Forest, 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 Forest except for dust that occasionally emanates from vehicular use of unpaved National Forest System (NFS) roads during dry conditions. Also, ozone may become an issue as regulatory standards are tightened, particularly on the Sandia District outside of Albuquerque. In addition, nearby visibility monitoring, while not measured on the forest, indicates that while there is some impairment overall the trend is improving and remains on track to meet regulatory guidelines set by the EPA and the state of New Mexico. Lastly, in regards to atmospheric deposition, modeled data suggests that nitrogen deposition exceeds the critical loads for lichens on much of the mountain districts. However, the trend in nitrogen pollution is improving. Generally, where data is available, air quality on the 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 Forest-wide and possibly ozone on the Sandia District.

Desired Conditions

Air quality meets or surpasses State and Federal ambient air quality standards (Corresponds to Needs for Change III.D.a and III.D.b)

Management activities on the Cibola National Forest do not adversely impact Class I airshed visibility as established in the Clean Air Act (Corresponds to Needs for Change III.D.a and III.D.b)

FIRE AND FUELS

Background and Description

The National Interagency Fire Center (NIFC) "Guidance for the Implementation of Federal Wildland Fire Management Policy" provides much of the current direction for managing wildland fire on federal lands. This document provides definition of wildland fire used in this plan. Wildland fire describes any non-structure fire that occurs in the wildland. Wildland fires are categorized into two distinct types:

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

Most of the Cibola's vegetation is adapted to recurring wildfires started by lightning from spring and summer thunderstorms. Frequent, low-intensity fire plays a vital role in maintaining ecosystem 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 fire. Other vegetation types, such as Mixed Conifer with Aspen and Spruce-Fir, are also fire dependent but have a historic fire regime of less frequent, mixed-severity fires.

Today, 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. With the denser, more continuous canopy cover and accumulated live and dead woody material, the probability and occurrence of large, uncharacteristic, stand-replacing fires continues to increase. These fires burn with more intensity, have higher tree and seed mortality,

degrade watersheds, kill seeds, change soil chemistry and structure, and threaten homes and communities.

Wildfire (managed for multiple resource benefit) and prescribed fire (during appropriate weather and fuel-moisture conditions) are the most cost-effective way to reduce the likelihood of a high-severity fire. 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 fire, thinning and tree harvesting can reduce tree density and canopy cover and promote the natural fire regime. The goal is to improve ecosystem health by restoring fire to the landscape in the form of planned and unplanned ignitions.

Desired conditions

Wildland fire maintains and enhances resources and, as nearly as possible, is allowed to function in its natural ecological role. (Corresponds to Need-for-Change statement II.c.)

Thinning and fire protect social, economic, and ecological values at risk from high-severity disturbance effects. (Corresponds to Need-for-Change statement II.c.)

Wildland fires burn within the range of intensity and frequency of the historic fire regime of the vegetation community. Uncharacteristic high-severity fires rarely occur, and do not burn at the landscape scale. (Corresponds to Need-for-Change statement II.c.)

Wildfire is understood, both internally and by the public, as a necessary disturbance process integral to the sustainability of the Cibola NF's fire-adapted vegetation types. (Corresponds to Need-for-Change statement II.c.)

Information and education programs result in children and adults who recognize their responsibility for preventing human-caused wildfires. (Corresponds to Need-for-Change statement II.c.)

Wildfires are detected early. (Corresponds to Need-for-Change statement II.c.)

RANGE AND GRAZING

Background

There is Congressional intent to allow grazing on suitable lands (Multiple Use and Sustained Yield Act of 1960, Forest and Rangeland Renewable Resource Planning Act of 1974, Federal Land Policy and Management Act of 1976, 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 (36 CFR 222.2). Unless otherwise specified by the Chief, 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 (36 CFR 222.3).

The Cibola administers a total of 86 active grazing allotments on the Mount Taylor, Magdalena, and Mountainair Ranger Districts. (There are no allotments on the Sandia district.) Livestock grazing contributes to the livelihood of the permittees and to the economy of local communities and counties. Livestock management on national forest lands has shifted to an adaptive management philosophy that allows timely changes in livestock numbers or time to be made in response to changing conditions

involving changes in forage production, water availability, and precipitation patterns. As a result of this, livestock numbers have declined over the last 20 years, as the forest has balanced permitted numbers with the capacity of the land while responding to environmental changes such as but not limited to drought, shrub and encroachment. Over the last decade, the forests have worked with partners and permittees to reduce grazing pressure on sensitive areas (e.g., critical areas, riparian areas).

Desired Conditions

Sustainable livestock grazing contributes to the long-term socioeconomic and traditional cultural diversity and stability of rural communities. (Corresponds to Need-for-Change statement IV.C.2.a.)

Proper livestock stocking rates and associated management activities contribute to healthy, diverse plant communities, soil stability, and wildlife habitat. (Corresponds to Need-for-Change statement IV.C.2.a.)

Livestock management includes range improvements such as but not limited to fences and water developments. (Corresponds to Need-for-Change statement IV.C.2.a.)

Range improvements minimize impacts to soil, watershed, wildlife resources. (Corresponds to Need-for-Change statement IV.C.2.a.)

Livestock grazing and associated management activities are in balance with the needs of wildlife forage, watershed ground cover, natural fire regime, and resilience to climate variability. (Corresponds to Need-for-Change statement IV.C.2.a.)

Herbaceous native plant communities occur within the natural range of variability (NRV).[10] (Corresponds to Need-for-Change statement IV.C.2.a.)

FOREST PRODUCTS

Background and Description

There is Congressional intent to allow forest products to be removed from National Forest system lands (Multiple use and Sustained Yield Act of 1960, Federal Land Policy and Management Act of 1976, National forest management Act of 1976). On the Cibola, forest products include but are not limited to posts, poles, latillas, vigas, fuelwood, pellets, and rough-cut dimensional lumber (typically used for pallet production). This material primarily provides local subsistence and livelihood to rural communities, with small quantities sold across state lines and a portion of the dimensional lumber sold to Mexico for pallet production. Authority to transfer title of forest products from the Government to individual or entities is provided by a delegated Forest Service line officers via contract or permit (36 CFR 223.2).

Desired Conditions

Forest products (e.g., wood pellets for home and industrial heating, oriented strand board, animal bedding, wood moulding, pallets, structural lumber, firewood, posts, poles, biomass for electricity) and other forest products (e.g., medicinal herbs, Christmas trees, boughs, wildflowers, mushrooms, grasses,

[10] NRV refers to the spatial and temporal variation in ecosystem characteristics under historic disturbance regimes during a reference period. The reference period considered typically includes the full range of variation produced by dominant natural disturbance regimes, often several centuries, for such disturbances as fire and flooding and also includes short-term variation and cycles in climate.

seeds, nuts, cones, etc.) are available to businesses and individuals in a manner that is consistent with other desired conditions on a sustainable basis within the capacity of the land. (Corresponds to Needs for Change IV.C.1.b.)

A sustainable supply of wood is available to support a wood harvesting and utilization industry of a size and diversity that can effectively and efficiently restore and maintain the desired conditions for forest and woodland communities. (Corresponds to Needs for Change IV.C.1.b.)

Forest products are available to the public, including tribal and land grant communities, for traditional and culturally important activities. (Corresponds to Needs for Change IV.C.1.b.)

Forest products are available through either personal use permits or commercial sales. (Corresponds to Needs for Change IV.C.1.b.)

Forest products are available as plant communities successfully adapt to a changing and variable climate. (Corresponds to Needs for Change IV.C.1.b.)

Management practices mimic their ecological processes within the ecosystem to allow socioeconomic benefit and existing infrastructure to continue. Natural processes that affect forest conditions and structure are natural wildfire regimes, drought, wind, insects and diseases. (Corresponds to Needs for Change IV.C.1.a and IV.C.1.b)

AREAS OF TRIBAL IMPORTANCE

Background and Description

The Cibola National Forest maintains a governmental relationship with seventeen federally recognized Tribes and Pueblos that have aboriginal territories and traditional ties to the land now administered by the Cibola National Forest. These include: the Hopi Tribe, the Pueblos of Acoma, Laguna, Zuni, Isleta, Sandia, Santa Ana, Santo Domingo, San Felipe, Cochiti, Zia, Jemez, and San Ildefonso, the Navajo Nation, Jicarilla Apache Nation, Mescalero Apache Tribe, and Ft. Sill Apache Tribe. The Forest routinely consults with these Tribes and Pueblos on policy development, and proposed plans, projects, programs, and Forest activities that have a potential to affect tribal interests, or natural or cultural resources of importance. The Cibola National Forest developed a robust consultation program in the late 1990s and continues to build and enhance its working relationships with these Tribes and Pueblos.

The Cibola National Forest shares boundaries 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 in close proximity to numerous tribal communities. Tribal members visit the Cibola National Forest to gather forest products and for other traditional and cultural purposes. The Cibola National Forest recognizes the importance to area Tribes and Pueblos of maintaining these traditions and accommodates traditional use on National Forest System lands.

For more background and description information on areas of tribal importance, see Chapter 2 of Volume II of the Assessment (online), pages 42-54.

Desired Conditions

Forest programs and activities fulfill the Federal Government's legally mandated trust responsibilities. (Corresponds to Needs for Change IV.B.a)

Forest Service and tribal restoration activities complement one another to meet common objectives across shared boundaries. (Corresponds to Needs for Change IV.B.b)

Sacred sites are considered during the planning, and are protected during the implementation of management activities. (Corresponds to Needs for Change IV.B.c and d)

Requests for the reburial of American Indian human remains and cultural items by tribes are honored and facilitated. (Corresponds to Needs for change IV.B.e)

Requests for temporary closure orders for cultural and traditional purposes are accommodated and facilitated. (Corresponds to Needs for Change IV.B.f)

The approval, design, location, installation, maintenance, removal, and abandonment of electronic communications sites is done in harmony with the value and importance of high places as sacred sites or as parts of important cultural landscapes. (Corresponds to Needs for Change IV.B.h)

Areas with a primary management emphasis on the protection of natural and cultural resources important to tribes, based upon their value as traditional places of tribal importance and tribal contemporary use, are designated as management areas. (Corresponds to Needs for Change IV.B.g).

CULTURAL AND HISTORIC RESOURCES AND USES

Background and Description

Cultural and historic resources and uses in the plan area are critical to the social, economic, and ecological sustainability of the plan area, the southwestern region, and the nation. Historic properties within the plan area are a record of historic processes and events important in the identity of local communities, the state of New Mexico, the region, and the nation. Contemporary uses of resources and characteristics of the plan area by Native American, Hispanic, and Anglo-American traditional communities are critical to maintaining the identity of these communities. 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 the resources and uses of the plan area.

The desired conditions address the need for inventory to be conducted at a broad scale to assist planning that transcend individual undertakings. The 1985 amended Forest Plan identifies the need for additional inventory for planning purposes but does not identify the need for such inventory at a broad scale. The vast majority of inventory for historic properties, and for other cultural and historic resources and uses, is conducted at the level of the undertaking for compliance with Section 106 of the National Historic Preservation Act. Inventory by the agency for planning purposes beyond the scope of individual undertakings is currently extremely limited (it is currently limited to 200 acres per year by Heritage Resources target accounting).

The desired conditions also address the need to align management objectives among cultural and historic resources and uses and other resources. The 1985 amended Forest Plan direction is centered on resolving conflicts between historic and cultural resources and uses and the management of other resources (see pp. 62-63). It does not recognize overlap between cultural historic and cultural resources and uses and other resources (such as facilities and infrastructure). It also fails to recognize that the avoidance of historic properties and other cultural and historic resources during undertakings can be inconsistent with the sustainable management of the resources. This is particularly the case for

restoration undertakings that ameliorate large-scale and long-term landscape impacts such as catastrophic wildfire and erosion that have the potential to damage or destroy historic properties and other cultural and historic resources.

The desired conditions respond to the need to allow and resolve adverse effects to historic properties consistent with law and regulation. The 1985 amended Forest Plan currently prohibits adverse effects to historic properties, unless such effects can be resolved through archeological data recovery (see p. 63). The 1985 Forest Plan also fails to acknowledge that there can be a resolution of adverse effects to the values of historic properties other than scientific information potential. The 1985 amended Forest Plan currently prohibits the Forest from weighing the value of an undertaking relative to the value of the historic property or properties that the undertaking may adversely affect. The current Plan also prevents the Forest from complying with other laws that prohibit the Forest from redesigning, relocating, or cancelling an undertaking if it is to have an adverse effect on historic properties (such as the 1872 Mining Law). As such, the Forest has been required to draft site-specific Forest Plan amendments in order to allow adverse effects to properties from undertakings governed by statutes that have precedence over the current Plan. The proposed desired condition will resolve this conflict, and will restore balance to weighing the objectives of an undertaking relative to the value of historic properties.

Desired Conditions

All historic properties (including archeological sites, historic structures, and traditional cultural properties) are stable, and their significant values protected, except where such protection is not possible or not feasible. (Corresponds to Needs for Change IV.A.a)

Appropriate historic cultural and historic resources and characteristics are interpreted for the public's understanding of the cultural and historic heritage of the plan area. (Corresponds to Needs for Change IV.D.a)

Management of forest resources is harmonious with economic and non-economic historic and contemporary cultural uses by tribes and other traditional communities (traditional Hispanic and Anglo communities). (Corresponds to Needs for Change IV.A.d)

Historic properties and other historic and cultural resources and uses are inventoried at the management unit scale, in addition to being inventoried at the scale of the individual project. (Corresponds to Needs for Change IV.A.e)

Where recreation areas or infrastructure incorporate historic properties, or have historic and/or cultural values, the historic and cultural qualities contribute to and enhance the recreation experience. (Corresponds to Needs for Change IV.A.f)

The management objectives for other resources align with the affirmative management (including protection) of historic properties and other historic cultural resources and uses (including sacred sites, cultural and historic landscapes, and contemporary cultural uses and values. (Corresponds to Needs for Change IV.A.f)

Adverse effects to historic properties, regardless of the nature of the properties' significance, occur and are resolved when it is not possible or feasible to avoid such adverse effects during undertakings. (Corresponds to Needs for Change IV.A.h)

Areas of Community Land Grant and Acequia Importance

Background and Description

The Cibola National Forest maintains a relationship with 12 land grant communities, some of which are recognized as subdivisions of New Mexico State Government. Community lands grants have former common lands and/or traditional ties (traditional communities are generally recognized as "groups that are native to [an] area or have resided there for a long time ;" the National Historic Preservation Act correlates, "a long time" as 50 years or more) to land now administered by the Cibola National Forest. These include: in the Mt. Taylor Ranger District - Cubero and Cebolleta land grants; in the Sandia Ranger District- San Antonio de Las Huertas, Cañon de Carnué, and San Pedro; in the Manzano Ranger District - Chililí, Tajique, Torreón, Manzano and Tomé; additional community land grants in the region include Sevilleta de la Hoya and Atrisco. These land grants can share common boundaries with the USFS, have former common lands now managed by the USFS, or have a general interest in the USFS lands. For more information on the history of land grant communities in the Cibola National Forest area of influence, please see chapter 1 of Volume 2 of the Assessment, pages 13-15 and 32-33.

Desired Conditions

Forest Service and community land grant restoration activities complement one another to meet common objectives across shared boundaries. (Corresponds to Needs for Change I.d)

Traditional uses and sacred sites are considered during the planning and are protected during the implementation of management activities. (Corresponds to Needs for Change I.d)

Community land grants have appropriate access for traditional uses as needed throughout the year. (Corresponds to Needs for Change I.d)

Annual fuel wood collection opportunities are available for adjacent community land grants. (Corresponds to Needs for Change I.d)

LANDS

Background and Description

The two primary functions of the lands program are 1) the identification and maintenance of boundary line locations of 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 nation and have never left Federal ownership and land of other ownership); and 2)land adjustment. Boundary Management needs a great deal of maintenance to ensure that no management activity near or adjacent to a property line creates a false or misleading boundary line. Land adjustments consolidate and improve management efficiency thorough real estate transactions including sales, purchases, exchanges, conveyances, and rights-of-way within the proclaimed Cibola National Forest boundaries.

Desired Conditions

Right-of-Ways and Easements provide for broader access to lands within the Cibola NF without impacting private inholding rights-of-way and easements. (Corresponds to Needs for Change IV.G.a)

Acquisition of lands facilitate efficient management strategies for the Cibola NF. (Corresponds to Needs for Change IV.G.b.)

Encroachment issues are resolved equitably for both adjacentlandowners and the Cibola NF. (Corresponds to Needs for Change IV.G.a)

National Forest System (NFS) lands exists in a pattern that promotes more well-organized management of various lands in and around the national forest as well as provide efficient and effective resource management within and across NFS lands. (Corresponds to Needs for Change IV.G.a.)

MINERALS AND GEOLOGY

Background and Description

The Cibola Mountain Districts host occurrences of important mineral resources. Minerals are important as a raw materials source: useful in a native or refined state. As economic and political conditions fluctuate, certain mineral commodities can become more valuable, prompting interest in prospecting, exploration and mining of these minerals. The purpose of the Cibola NF minerals and geology program is to provide appropriate access to mineral resources in accordance with the law; while facilitating mineral development in a manner that minimizes adverse impacts to surface resources. Valuable mineral resources on the Cibola NF range from soil for traditional uses such as for making adobes, and limestone for cement, to rare-earth minerals used in hi-tech applications such as battery-operated cars and aerospace components, to uranium as an energy fuel in itself.

There are various laws in place which prescribe the rights of individuals who wish to hunt for or remove minerals. This affects whether the Forest Service has the discretion to refuse a mineral operation proposal. Minerals subject to the 1872 Mining Law, as amended, can be obtained by a mining claim, as long as the claimants are following applicable rules and regulations. These minerals include metals such as gold, silver, copper or uranium. Raw materials such as rock, gravel, soil, etc. (mineral materials) are sold at the discretion of the District Ranger. Some types of minerals are managed by lease, such as oil, gas and coal. The Cibola does not have the geologic environment in the mountain districts to host oil or gas resources. Although coal does occur in very limited amounts in many locations, there is no interest in leasing.

The Mount Taylor RD includes an area of world-class uranium deposits which were widely explored during a period of previous mining from the 1950s through the late 1970s. In an area of known deposits, interest for exploration and mining of the mineral resource is expected to continue. There are also uranium deposits on the Magdalena RD. There are areas of historic gold and silver mining on all of the Ranger Districts. Interest in these mineral areas continues as gold panning has been increasingly popular. It is expected that '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 that all of these gold operations are regulated by the same minerals regulations at 36 CFR 228.4.

Desired Conditions

Mineral and mining activities facilitate the development of minerals on the Cibola in a manner that minimizes adverse impacts to surface and groundwater resources, meet legal mandates, and complement desired conditions of other resources in the area. (Corresponds to Need for Change III.C.c, IV.H.b.)

Operations at mineral sites minimize the disturbance area footprint. (Corresponds to Need for Change II.e, III.B.a, IV.H.b)

Reclamation is carried out concurrently with mining; restoration of the environment takes place at the earliest opportunity for each area on a mine site. (Corresponds to Need for Change III.A., III.C.c, IV.H.b)

Interim and post-mining operation surface water and groundwater monitoring occurs where needed to detect adverse changes at the earliest practicable time. (Corresponds to Need for Change II.d., IV.H.b.)

Development of mineral resources on the Cibola National Forest mountain districts contribute to meeting local, national and global markets for valuable commodities. (Corresponds to Need for Change I.d.)

Post-mining restoration areas contribute to the sustainability of other forest resources, goods, and services. (Corresponds to Need for Change II.e.,III.A.a., III.B.a.)

Geologic field investigations such as studies of fossils and volcanic rock specimens and other learning opportunities occur on the Cibola National Forest. (Corresponds to Need for Change IV.A.f.)

Although non-renewable resources, minerals provide important raw material for traditional uses, manufacturing, energy production, and/or important chemical compounds. (Corresponds to Need for Change I.d., IV.H.c.)

The public has access to understandable gold prospecting information. (Corresponds to Need for Change IV.H.a.)

Abandoned mine lands are appropriately remediated and do not endanger people or the environment. (Corresponds to Need for Change IV.H.b.)

Mineral developments, including pits, mines, equipment, and associated structures, are located so as to blend with the natural environment, complement the scenic character, and remain visually subordinate to the surrounding landscape to the extent practicable. (Corresponds to Need for Change IV.H.b., IV.D.j.)

Mineral materials (e.g., gravel, borrow) are available for road maintenance activities for the Forest Service transportation system, public road system, and road maintenance agencies. (Corresponds to Need for Change IV.H.c.)

Mineral materials (e.g., moss rock, boulders) are available to support resource management needs, personal use, and commercial pursuits. (Corresponds to Need for Change IV.H.c.)

Lands where past mineral development or exploration has occurred are stable and vegetated with native species. (Corresponds to Need for Change III.A.a., III.B.a., III.C.c., IV.H.b.)

Naturally occurring geological features (e.g., caves) and historic mines retain their archaeological, geological, and biological integrity. (Corresponds to Need for Change III.E.a., IV.A.f., IV.B.g. IV.D.f.)

Caves and appropriately remediated abandoned mines are available for roosting bats . (Corresponds to Need for Change III.E.a.)

Caves provide a setting for educational opportunities and/or for cultural uses. (Corresponds to Need for Change IV.A.f. IV.B.g. IV.D.f)

RENEWABLE AND NON-RENEWABLE ENERGY

Background and Description

Energy development and transmission on the Cibola NF must meet legal mandates to facilitate renewable energy projects while minimizing adverse impacts and sustaining other desired conditions applicable to the area; for example, scenic integrity and protecting important habitat.

Renewable energy source potential on the Cibola NF include wind and solar power, as well as geothermal and biomass. The Cibola NF has the potential for solar and wind energy production, but their development would depend on future facilities and utility corridors needed to capture and transmit these power sources. No wind farms currently occur on the Cibola. Geothermal uses to date include heating greenhouses with the geothermal fluids associated with the Mount Taylor volcanic field. The generation of energy with traditional geothermal methods is not likely, but may be possible with future increases in technology. Biomass potential on the Cibola NF is high.

Non-renewable energy source potential is associated with fossil fuels or mineral resources. Due to geologic conditions the Cibola NF mountain ranger districts have no potential for oil or gas resources, or known potential for utilization of CO2 for energy. Since coal occurs only in very small quantities, and is widely dispersed on several districts, it is not at all likely to be mined under current technology and economic conditions. Uranium is present in known mineable quantities on the Cibola NF. Uranium is a non-renewable mineral resource which can be mined, concentrated and used as an extremely powerful and compact fuel source. Although uranium mining and its use and implications for disposal is controversial, uranium is sometimes characterized as an 'alternative' fuel source because its use in nuclear power generation does not emit the greenhouse gasses associated with fossil fuels. Continued interest in uranium mining is expected to continue on the Mount Taylor Ranger District and on the Magdalena Ranger District to a lesser degree.

Sustainability: Regarding implications for sustainability, minerals themselves are not a sustainable forest resource. Once a mineral resource is removed, it is no longer available. However, a major function of the Minerals Program is to insure that reclamation of surface resources impacted by mining takes place and is completed to agency standards. The restoration of areas that have experienced mining activity is an important contribution to the sustainability of other forest resources.

Desired Conditions

Energy transmission and development on the Cibola NF meet the legal mandates to facilitate the transmission and development of energy resources in a manner that minimizes adverse impacts to natural, cultural, and scenic resources, and does not detract from meeting other desired conditions applicable to the area. Need for Change IV.H.d., IV.H.e.

Energy corridors are maintained provide a reliable supply of energy essential to meet local, regional, and national economic demands. (Corresponds to Need for Change IV.H.e.)

Special use authorizations for development of renewable and non-renewable energy on FS lands facilitate economic benefits for the citizens of the counties in the Cibola NF area of influence. (Corresponds to Need for Change I.d.)

New energy facilities/transmission lines are located in areas of low risk to wildlife, water resources, historical sites and do not hinder agricultural land uses. (Corresponds to Need for Change IV.H.d.)

Energy transmission corridors have low impact upon riparian zones, surface water, shallow groundwater, unstable areas, hydric soils or wetlands. (Corresponds to Needs for Change III.C.a., IV.H.d.)

Site-specific reclamation plans for energy developments are appropriate for the soils, vegetation, scenery, and climate. (Corresponds to Needs for Change II.a., III.a., III.B.a.)

Introduction and spread of non-native invasive species does not occur during development of energy projects. (Corresponds to Need for Change II.b)

Joint use of rights-of-way is provided to concentrate uses to the extent possible. *This was not a need for change to the 1985 Plan, as this is stated in that plan and will be carried forward.*

Vegetative conditions and land uses within energy rights-of-way are compatible with the operation and maintenance of the associated facilities and infrastructure, in order to ensure integrity of other forest resources, goods, and services. (Corresponds to Needs for Change IV.H.e.)

Energy developments and other special use authorizations, for example transmission towers, are designed to minimize impacts on the landscape, complement the scenic character, and remain visually subordinate to the surrounding landscape to the extent practicable. (Corresponds to Need for Change IV.H.d.)

GENERAL RECREATION

Background and Description[11]

The Cibola National Forest provides a diversity of outdoor recreation opportunities, connecting people with nature in an unmatched variety of diverse settings and activities. Participation in recreational activities is what draws most people to the 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.

The natural, cultural, and scenic environments of the 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 National Forest include non-motorized, 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. The Cibola National Forest uses the recreation opportunity spectrum (ROS) to define the types of outdoor recreation opportunities, settings, and experiences the public might desire, and identifies that portion of the spectrum the 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 non-motorized, semi-primitive motorized, roaded natural, rural, and urban.

[11] For a detailed description of the Cibola National Forest's existing recreation program, please see The Cibola National Forest Mountain Ranger Districts Assessment Report, Volume I, Chapter 5, pages 152-190.

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

The Cibola National Forest welcomes a diverse group of visitors by providing a variety of developed and dispersed recreation and tourism opportunities (e.g. camping, picnicking, hiking, mountain biking, hunting, fishing, wildlife viewing, driving for pleasure, and so forth) that are appropriate for the recreation setting and other resource values. (Corresponds to Needs for Change IV.D.a, IV.D.b, IV.D.g, IV.D.i)

The Cibola National Forest provides sustainable recreation consistent with public demand, management needs, and other natural and cultural resource values. (Corresponds to Needs for Change IV.D.a, IV.D.b,)

The Cibola National Forest provides a range of high quality recreation settings and year-round opportunities. (Corresponds to Need for Change IV.D.i)

Visitors respect a diversity of recreation uses, activities, and settings on the same landscape so conflicts are minimized. (Corresponds to Need for Change IV.D.a, IV.D.d)

Visitors respect the recreation resources and facilities and there is no vandalism, theft, illegal activity, or resource damage on the Forest from recreation activities. (Corresponds to Needs for Change IV.D.b, IV.D.k)

The recreation program is integrated into all forest resource management decisions and activities and is adaptable to changes in recreation use and trends. (Corresponds to Needs for Change IV.D.a, IV.D.e)

Historical and cultural heritage is recognized and emphasized through the recreation program and connects the public to the importance of the past. The unique ecological resources of the Forest are featured through recreation opportunities, education, and interpretation. (Corresponds to Need for Change IV.D.a)

The Cibola NF recreation program enhances the economic, cultural, and social vitality and well-being of surrounding communities. Local communities are involved in partnerships to facilitate and participate in the management of the Forest. (Corresponds to Need for Change IV.D.h)

Conservation education, visitor information, and interpretation inform and engage visitors and local communities. These resources are readily available and encourage increased forest stewardship, ecological awareness, visitor orientation, and knowledge of recreation opportunities. (Corresponds to Need for Change IV.D.b, IV.D.k)

Forest Service presence, services, and high quality recreation sites are provided as appropriate to the setting, and contribute to a sense of safety, enjoyment and satisfaction for Forest users. (Corresponds to Need for Change IV.D.i)

Special cultural and natural areas, including caves and heritage sites, are protected and managed using Forest Service best management practices. (Corresponds to Need for Change IV.D.f)

Developed Recreation

Background and Description[12]

Developed recreation includes management of campgrounds, picnic areas trailheads, ski areas, and other day use sites. 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 trailheads remain open year-round.

Desired Conditions

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. (Corresponds to Needs for Change IV.D.i)

Recreation sites are designed and maintained to complement the forests' scenery resources and scenic character[13] and to ensure universal accessibility, health and safety, and a variety of other needs (e.g. group size). Facilities range from primitive to highly developed, with an emphasis on blending the facilities with the natural landscape. (Corresponds to Needs for Change IV.D.i, IV.D.j)

Healthy forest vegetation (species, size, and age) in developed sites complements recreational activities, scenery, and safety. (Corresponds to Needs for Change IV.D.a)

Resource and facility deterioration and damage is mitigated, and changes in recreational use are managed as appropriate within the setting. (Corresponds to Needs for Change IV.D.b, IV.D.i)

Dispersed Recreation

Background and Description

Dispersed recreation is outdoor recreation occurring over broad expanses of the Cibola National Forest and includes management of a variety of motorized and non-motorized recreation opportunities. Examples of popular dispersed recreation include trail use, dispersed camping, wildlife viewing, hunting, fishing, plant gathering, and photography.[14]

Desired Conditions Non-Motorized Recreation

Dispersed recreation occurs in mostly undeveloped, natural areas. Management controls are limited and emphasize resource protection. Visitors rely on their outdoor skills and provide their own equipment for their recreation activities. (Corresponds to Needs for Change IV.D.b)

Facilities for dispersed recreation activities are minimal, consist of simple construction designs and materials that blend in with the surrounding area and are provided primarily for resource protection. (Corresponds to Needs for Change IV.D.b)

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[12] For a detailed description of the Cibola National Forest's existing developed recreation program, please see The Cibola National Forest Mountain ranger Districts Assessment Report, Volume I, Chapter 5, pages 161-165, and pages 173-176.

[13] Scenic character is defined as the combination of physical, biological, and cultural images that gives an area its scenic identity and contributes to its sense of place.

[14] For a detailed description of the Cibola National Forest's existing dispersed recreation program, please see The Cibola National Forest Mountain Ranger Districts Assessment Report, Volume I, Chapter 5, pages 161-165 and 173-177. For a description of existing trail resources on the Forest, please see pages 173-177and 185-187.

A system of well-marked and well-maintained non-motorized trails provides opportunities for visitors to explore the forest. The system is sustainable and the design, construction, and maintenance of trails minimize user conflict and damage to Forest environmental resources. (Corresponds to Needs for Change IV.D.d)

The non-motorized trail system accommodates use levels compatible with other resource values and is consistent with public demand. (Corresponds to Needs for Change IV.D.b, IV.D.d)

Trail and trailhead level of development is appropriate to the site conditions, use, and setting. (Corresponds to Needs for Change IV.D.d, IV.D.i)

Trails vary in length and challenge and provide linkages to local neighborhoods, communities, and other public lands. (Corresponds to Need for Change IV.D.d, IV.D.h)

Desired Conditions - Motorized Recreation

Opportunities for off-highway vehicle (OHV) riding, driving for pleasure, motorized dispersed camping and motorized big game retrieval are provided on the designated system of NFS roads and motorized trails in accordance with the motor vehicle use maps (MVUMs). Visitors understand and comply with the designations shown on the MVUMs. (Corresponds to Need for Change IV.D.a)

The designation of NFS roads and trails and areas on NFS lands for motor vehicle use and over-snow vehicles is consistent with the Travel Management Rule at 36 CFR 212 and with desired recreation settings. (Corresponds to Need for Change IV.D.i and IV.D.l)

DESIGNATED AREAS

Background and Description[15]

A designated area is an area or feature identified and managed to maintain its unique special character or purpose. Designated areas may be designated administratively or by Congress. Examples of administratively designated areas are experimental forests, research natural areas, scenic byways, botanical areas, and significant caves. Examples of Congressionally designated areas are national heritage areas, national recreational areas, national scenic trails, wild and scenic rivers, wilderness areas, and wilderness study areas.

Current types of designated areas on the four mountain districts include wilderness, research natural areas, inventoried roadless areas, national historic landmarks, critical habitat for federally threatened and endangered species, state or nationally designated scenic byways, national scenic trails, etc.

Desired Conditions- General

Forest Service best management practices, regulation, and policies are used to manage all designated and recommended areas including research natural areas, special interest areas, eligible wild and scenic rivers, national historic, scenic, and recreation trails, and scenic byways. (Corresponds to Need for Change IV.E.d)

[15] For a detailed description of the Cibola National Forest's existing designated areas, please see The Cibola National Forest Mountain Ranger Districts Assessment Report, Volume I, Chapter 6, pages 191-210.

The location, setting and management of the Continental Divide National Scenic Trail comply with the 2009 Comprehensive Plan and other Forest Service policies for National Scenic and Recreation trails. (Corresponds to Needs for Change IV.D.c)

Viewsheds from scenic byways and national scenic and recreation trails are consistent with desired conditions for scenery, and have high scenic values. The immediate foreground of these travelways is natural-appearing, and generally appears unaltered by human activities. (Corresponds to Needs for Change IV.D.c, IV.D.j, and IV.E.d)

Inventoried roadless areas are managed to protect and conserve their roadless character consistent with 2001 Roadless Area Conservation Rule. (Corresponds to Needs for Change IV.E.a)

Wild and scenic river study areas are managed to protect existing characteristics and their associated outstanding values until designated or released from consideration. Outstandingly remarkable values of the identified river areas are protected and, to the extent practicable, enhanced. (Corresponds to Need for Change IV.E.d)

Desired Conditions- Wilderness

Recommended wilderness areas are managed to protect and enhance the wilderness character that exists at the time of recommendation. (Corresponds to Need for Change IV.E.c)

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. (Corresponds to Need for Change IV.E.b)

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. (Corresponds to Need for Change IV.E.b)

Natural processes are maintained within wilderness. Fires function in their natural ecological role. (Corresponds to Need for Change IV.E.b)

Wilderness areas use best management practices to manage and control nonnative invasive species. (Corresponds to Need for Change IV.E.b)

Visitors are readily aware of when they enter or leave wilderness. (Corresponds to Need for Change IV.E.b)

Ecological and social benefits of wilderness and wilderness philosophy are understood by managers and the public. (Corresponds to Need for Change IV.E.b)

SCENIC RESOURCES

Background and Description: [16]

The Cibola National Forest provides high quality scenery for present and future generations, and the public values the scenic character of the 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 National Forest mountain districts contain diverse 'sky island' landscapes, ranging 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.

The Cibola National Forest uses the Forest Service Scenery Management System (SMS) 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 forest is divided into levels of desired scenic integrity: very high, high, moderate, low and very low. These levels set objectives for the amount of variation from the existing scenic character that is permissible within the scenic integrity level.17

Desired Conditions

Scenery management, scenic character, and scenery values are integrated into the design, planning, and implementation of all resource management decisions. (Corresponds to Needs for Change IV.D.j)

Scenery management reflects the benefits, values, desires, and preferences regarding aesthetics and scenery for the Cibola National Forest. (Corresponds to Needs for Change IV.D.j)

The Cibola National Forest is characterized by a predominately natural appearing landscape and valued cultural landscape, which reflect the Forest's sense of place. (Corresponds to Needs for Change IV.D.j)

The scenic quality of landscapes is restored, maintained or enhanced across the Forest. (Corresponds to Needs for Change IV.D.j)

High quality scenery and scenic values are protected in areas of high public use, such as scenic byways, major roads and trails, and developed recreation sites. (Corresponds to Needs for Change IV.D.j)

Scenic resources reflect ecosystem diversity, enhance the recreation settings, and contribute to the quality of life of local residents and communities. (Corresponds to Needs for Change IV.D.j)

Constructed features, facilities, and management activities closely follow the form, line, color, texture, and pattern common to the 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

[16] For a detailed description of the Cibola National Forest's existing condition for scenery, please see The Cibola National Forest Mountain ranger Districts Assessment Report, Volume I, Chapter 5, pages 168-172.
[17] U.S. Department of Agriculture, Forest Service. 1995. Landscape Aesthetics: A handbook for scenery management. Agriculture Handbook Number 701.

landscape. For those exceptions, the structures complement the desired scenic character. (Corresponds to Needs for Change IV.D.j)

SPECIAL USES

Background and Description

Several acts of Congress authorize occupancy and use of National Forest System Lands and interests in lands administered by the Forest Service. The applicable statutory authority determines the appropriate special use authorization. Authorizations are issued when the proposed activities support the Forest Service mission, are in the public interest, and are consistent with Forest land and resource management plans. Authorizations are legal documents capturing the agreement to terms and conditions between the Forest Service and the individual or entity requesting occupancy and use of National Forest System Lands.

Special use authorizations are divided into two categories: recreation and non-recreation. Recreation special uses include activities related to resorts, ski areas, outfitting and guiding services, recreation events, commercial filming and still photography, and recreation residences. Recreation special uses are commercial in nature and generate revenue for the Forest Service as well as the local community.

Non-recreation special uses include activities related to telecommunication sites, right-of-ways / road access, research and utilities including powerlines, oil and gas pipelines, telephone lines and water transmission pipelines, and military training. Special uses authorizations are administered in a manner to protect the environment, promote health and safety and serve the public.

Telecommunication sites have been developed on the Cibola National Forest, and play a critically important role in ensuring electronic connections across the nation. Requests for use of Federal lands for telecommunications 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

Activities authorized as special uses provide goods and services that support the public's enjoyment of the Forest and nearby communities, and have a minimal impact on the opportunities for other forest users to participate in outdoor recreation activities. Authorizations are administered to agency standards. (Corresponds to Need for Change IV.H.d.)

Environmental impacts of emerging technology, telecommunication sites, utility corridors, and other permitted infrastructure are minimized through coordination and co-location, and are in harmony with the surrounding landscape. Large vertical structures do not dominate the views in high scenic integrity areas and developed recreation sites. (Corresponds to Need for Change IV.H.e.)

Telecommunications sites are secured to restrict access to the authorized lease holder use only. (Corresponds to Need for Change IV.H.e.)

Telecommunication sites have user associations for medium to large sites to assist in site administration. (Corresponds to Need for Change IV.H.e.)

Research authorized on the Forest is focused on improving the general scientific understanding of natural and social systems. Research on the Forest does not negatively impact long-term vegetation

structure and composition and does not introduce new invasive plants or animals. *This is management direction carried over from the 1985 Cibola Forest Plan.*

ROADS, FACILITIES, AND OTHER INFRASTRUCTURE

Background and Description

Roads

The road system provides access to private land, recreational opportunities, research sites, management activities and facilities that support resource management.

Facilities and other Infrastructure

The forest manages administrative facilities and sites for a variety of purposes, from office buildings and storage facilities to bathrooms, developed campgrounds and trails (see recreation desired conditions section), lookout towers and fire facilities. The forest uses administrative facilities and sites for the implementation and management of natural resources in the forest. There must be office areas for specialists to work and storage areas for consumables and necessary equipment. Fire facilities must be provided to enable staging and maintenance of fire fighting equipment and personnel. Other infrastructure may include water and wastewater systems, dams, communications towers, etc.

For roads, facilities, and other infrastructure, safety of the using public is of paramount importance to and a core value of the Forest Service.

Desired Conditions

Roads

The Forest's transportation system and infrastructure are sufficient to support the multiple uses of the Forest. (Corresponds to Need for Change IV.F.a.)

Infrastructure is functional, appropriate to the setting, and is designed and maintained to blend with the natural environment. (Corresponds to Need for Change IV.D.j., IV.F.a)

The Cibola National Forest promotes public enjoyment and access through safe and well-maintained infrastructure. (Corresponds to Need for Change IV.F.a)

National Forest System (NFS) roads and bridges provide safe and efficient access for recreation opportunities and resource management and are maintained in good condition to prevent resource damage. (Corresponds to Need for Change IV.D.a., IV.F.a)

The maintenance program for the Cibola National Forest road system is financially sustainable. (Corresponds to Need for Change IV.F.a)

Undesirable impacts to water resources, soils, heritage sites, wildlife, and vegetation from Cibola National Forest system roads are adequately mitigated. (Corresponds to Needs for Change IV.F.a., IV.F.b.)

Open NFS roads are well marked through the proper use of signage, making them easy to locate for all users. (Corresponds to Need for Change IV.D.h., IV.F.a)

NFS roads intended for use by high clearance vehicles are clearly distinguished from those intended for standard passenger cars, through proper use of road entrance treatments and/or signage. (Corresponds to Need for Change IV.D.h., IV.F.a)

NFS roads decommissioned per a travel management decision are either converted to other uses in a timely manner, or treated in an effective way to eliminate motor vehicle traffic use. (Corresponds to Need for Change IV.D.b., IV.F.b)

Education is effective, in partnership with local users, in informing the public of open areas and roads. Open NFS roads not presently needed are closed (all motor vehicle traffic prohibited) until they are needed again, and road closure methods are effective in eliminating motor vehicle traffic. (Corresponds to Need for Change IV.D.b., IV.F.b)

Unauthorized roads that are causing environmental impacts are rehabilitated in a timely manner. (Corresponds to Need for Change IV.D.b., IV.F.b.)

Easements are obtained or relinquished to facilitate access to National Forest System lands. (Corresponds to Need for Change IV.F.a., IV.G.a.)

Stream crossings on NFS roads allow for safe passage of aquatic organisms. (Corresponds to Need for Change IV.D.b., IV.F.b.)

Temporary roads constructed for short-term projects are decommissioned in a timely manner. (Corresponds to Need for Change IV.F.b.)

Travel restrictions are clearly understood by Forest visitors. Maps are readily available to the public to inform of open road system. (Corresponds to Need for Change IV.D.h., IV.F.a)

Desired Conditions

Facilities

Recreation sites, administrative buildings, quarters, dams, and other infrastructure operate as intended, and provide a safe environment for people, while avoiding or minimizing negative impacts to natural resources. (Corresponds to Need for Change IV.F.a.)

Facilities are right sized based on need through active management and continual evaluation of space utilization. Current and future facilities fully comply with applicable accessibility guidelines (Architectural Barriers Act [ABA] and take into consideration possible opportunities to provide easy access and maneuverability for larger recreational vehicles. Unused facilities and other infrastructure are decommissioned and demolished where practical. (Corresponds to Need for Change IV.F.a.)

Emerging technologies and sustainable concepts are incorporated in facility design, maintenance, and renovation in order to improve energy efficiency, improve economy, conserve natural resources and improve functionality. (Corresponds to Need for Change IV.F.a.)

Forest facilities that are eligible for the National Register of Historic Places are available for forest administration, public recreation and interpretation, tribal events, and other uses, unless prevented by concerns for health and safety. (Corresponds to Need for Change IV.F.a.)

Potable water systems effectively and efficiently deliver water resources and all systems are justifiable from a need perspective. (Corresponds to Need for Change IV.F.a.A)

Major unplanned repairs or replacements are reduced through a comprehensive preventive maintenance program and long range management objectives. (Corresponds to Need for Change IV.F.a.)

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Appendix A. Glossary of Terms

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)

All-Terrain Vehicle (ATV). A type of off-highway vehicle that travels on three or more low-pressure tires; has handle-bar steering; is less than or equal to 50 inches in width; and has a seat designed to be straddled by the operator. (FSH 2309.18.05)

Annual Maintenance. Work performed to maintain serviceability, or repair failures during the year in which they occur. Includes preventive and/or cyclic maintenance performed in the year in which it is scheduled to occur. Unscheduled or catastrophic failures of components or assets may need to be repaired as a part of annual maintenance. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Assessment. For the purposes of forest 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.

Best management practices for water quality (BMPs). Methods, measures, or practices selected by an agency to meet its nonpoint source control needs. BMPs include but are not limited to structural and nonstructural controls and operation and maintenance procedures. MPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters.

Candidate species. (1) For U.S. Fish and Wildlife Service candidate species, a species for which the U.S. Fish and Wildlife 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 U.S. Fish and Wildlife 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 section4(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 refers to the ability of plants to remove carbon dioxide from the atmosphere and sequester or store it as carbon in the plant. Forests are by far the best land cover for storing carbon since a high percentage of wood fiber is made up of carbon.

Carbon stocks. Carbon stocks are the amount of carbon stored in the ecosystem, in living biomass, soil, dead wood, and litter. For purposes of carbon assessment for National Forest System (NFS) land management planning, carbon in fossil fuel resources, lakes or rivers, emissions from agency operations, or public use of NFS lands (such as emissions from vehicles and facilities) is not included.

Collaboration or collaborative process. A structured manner in which a collection of people with diverse interests share knowledge, ideas, and resources while working together in an inclusive and cooperative manner toward a common purpose. Collaboration, in the context of this part, falls within the full

spectrum of public engagement described in the Council on Environmental Quality's publication of October, 2007: Collaboration in NEPA—A Handbook for NEPA Practitioners.

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 Planning Rule § 219.9, to protect, preserve, manage, or restore natural environments and ecological communities to potentially avoid federally listing of proposed and candidate species.

Culmination of mean annual increment of growth. See mean annual increment of growth.

Cyclic Maintenance. Preventive maintenance activities that recur on a periodic and scheduled cycle. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Decommission. Demolition, dismantling, removal, obliteration and/or disposal of a deteriorated or otherwise unneeded asset or component, including necessary cleanup work. This action eliminates the deferred maintenance needs for the fixed asset. Portions of an asset or component may remain if they do not cause problems nor require maintenance. (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998)

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.

Decision memo. A concise written record of the responsible official's decision to implement an action that is categorically excluded from further analysis and documentation in an environmental impact statement (EIS) or environmental assessment (EA), where the action is one of a category of actions which do not individually or cumulatively have a significant effect on the human environment, and does not give rise to extraordinary circumstances in which a normally excluded action may have a significant environmental effect.

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 non-critical at any point in time. Continued deferral of non-critical maintenance will normally result in an increase in critical deferred maintenance. Code compliance (e.g. life safety, ADA, OSHA, environmental, etc.), Forest 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 (MVUM). (36 CFR 212.1)

Disturbance. Any relatively discrete event in time that disrupts ecosystem, watershed, community, or species population structure and/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.

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 systems. 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 (SRM 1998).

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.(4) Connectivity. (see connectivity above).

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.

Environmental assessment (EA). A public document that provides sufficient evidence and analysis for determining whether to prepare an EIS or a finding of no significant impact, aids an agency's compliance with the National Environmental Policy Act (NEPA) when no EIS is necessary, and facilitates preparation of a statement when one is necessary (40 CFR 1508.9; FSH 1909.15, Chapter 40).

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 (EIS). A detailed written statement as required by section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969 (40 CFR 1508.11; 36 CFR 220)..

Even-aged stand. A stand of trees composed of a single age class.

Federally recognized Indian 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 (PL 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 on the basis of their functional role in ecosystems.

Forb. An herbaceous dicotyledonous ("broadleaf") plant. Forbs may be annual or perennial. (Grasses are herbaceous *mono*cotyledonous plants.)

Forest land. Land at least 10% occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest uses. Lands developed for non-forest 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. 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 or the National Forest System and the use and development of its resources. (36CFR 212.1, 36 CFR 251.5, 36 CFR 261.2)

Forest Transportation System. The system of National Forest System roads, National Forest System Trails, and airfields on National Forest System lands. (36 CFR 212.1)

Formal comments. See substantive formal comments.

Geographic area. A spatially contiguous land area identified within the planning area. A geographic area may overlap with a management area.

INFRA. The Agency's infrastructure database used to store and manage information related to constructed features, such as buildings, dams, bridges, water systems, roads, trails, developed recreation sites, range improvements, administrative sites, heritage sites, as well as general forest areas and wilderness areas.

Inherent capability of the plan area. The ecological capacity or ecological potential of an area characterized by the interrelationship of its physical elements, its climatic regime, and natural disturbances.

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.

Landscape. A defined area irrespective of ownership or other artificial boundaries, such as a spatial mosaic of terrestrial and aquatic ecosystems, landforms, and plant communities, repeated in similar form throughout such a defined area.

Lead objector. For an objection submitted with multiple individuals, multiple entities, or combination of individuals and entities listed, the individual or entity identified to represent all other objectors for the purposes of communication, written or otherwise, regarding the objection.

Line officer. A Forest Service official who serves in a direct line of command from the Chief.

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. 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.

Mean annual increment of growth and culmination of mean annual increment of growth. Mean annual increment of growth is the total increment of increase of volume of a stand (standing crop plus thinnings) up to a given age divided by that age. Culmination of mean annual increment of growth is the age in the growth cycle of an even-aged stand at which the average annual rate of increase of volume is at a maximum. Inland management plans, mean annual increment is expressed in cubic measure and is based on the expected growth of stands, according to intensities and utilization guidelines in the plan.

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:

- A vehicle operated on rails; and
- 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 (MVUM). 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 uses. The management of all the various renewable surface resources of the NFS 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 (16U.S.C. 528–531).

Name. The first and last name of an individual or the name of an entity. An electronic username is insufficient for identification of an individual or entity.

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. A forest road other than a road which has been authorized by a legally documented right-of-way held by a State, county or other local public road authority. (36 CFR 212.1, 36 CFR 251.51, 36 CFR 261.2)

National Forest System Trail. A forest trail other than a trail which has been authorized by a legally documented right-of-way held by a State, county or other local public road authority. (36 CFR 212.1)

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.

Native species. An organism that was historically 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 Variability- Natural Range of Variation. Spatial and temporal variation in ecosystem characteristics under historic disturbance regimes 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" (NRV) is a term used synonymously with historic range of variation or range of natural variation. The NRV is a tool for assessing ecological integrity, and does not necessarily constitute a management target or desired condition. The NRV 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.

NEPA. The National Environmental Policy Act (NEPA) 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.

Newspaper(s) of record. The newspaper(s) of record is (are) the principal newspaper(s) of general circulation annually identified and published in the **Federal Register** by each regional forester to be used for publishing notices as required by 36 CFR 215.5. The newspaper(s) of record for projects in a plan area is (are) the newspaper(s) of record for notices related to planning.

Objection. The written document filed with a reviewing officer by an individual or entity seeking pre-decisional administrative review of a plan, plan amendment, or plan revision.

Objection period. The allotted filing period following publication of a public notice in the applicable newspaper of record (or the **Federal Register**, if the responsible official is the Chief) of the availability of the appropriate environmental documents and draft decision document, including a plan, plan amendment, or plan revision during which an objection may be filed with the reviewing officer.

Objection process. Those procedures established for pre-decisional administrative review of a plan, plan amendment, or plan revision.

Objector. An individual or entity who meets the requirements of § 219.53, and files an objection that meets the requirements of §§ 219.54 and 219.56.

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. (EO 116-44 as amended by EO 11989). See also FSM 2355. 01 - Exhibit 01.

Online. Refers to the appropriate Forest Service Web site or future electronic equivalent.

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)

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/utility vehicles, minivans, vans and pickup trucks. (AASHTO, 2001, A Policy on Geometric Design of Highways and Streets)

Persistence. Continued existence. *Plan area.* The NFS lands covered by a plan.

Plan or land management plan. A document or set of documents that provide management direction for an administrative unit of the NFS developed under the requirements of this part or a prior planning rule.

Plant and animal community. A naturally occurring assemblage of plant and animal species living within a defined area or habitat.

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 NFS lands and their ecological systems 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 NFS 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.

Public Agency. Any organization with administrative or functional responsibilities which are directly or indirectly affiliated with a governmental body of any nation, State, or local jurisdiction. (23 CFR 635.102)

Public Authority. A Federal, State, county, town or township, Indian tribe, municipal or other local government or instrumentality thereof, with authority to finance, build, operate or maintain toll or toll-free highway facilities. (23 CFR 460.2)

Public Road. Any road or street under the jurisdiction of and maintained by a public authority and open to public travel. (23 USC 101)

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***.** These include motor homes, cars with camper trailers, cars with boat trailers, motor homes with boat trailers and motor homes pulling cars. (AASHTO, 2001, A Policy on Geometric Design of Highways and Streets)

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 non-motorized, motorized, developed, and dispersed recreation on land, water, and in the air.

Recreation setting. The social, managerial, and physical attributes of a place that, when combined, provide a distinct set of recreation opportunities. The Forest Service uses the recreation opportunity spectrum to define recreation settings and categorize them into six distinct classes: primitive, semi primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban.

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).

Reviewing officer. The USDA or Forest Service official having the delegated authority and responsibility to review an objection filed on a plan or amendment.

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. (FSM 5460.5)

Riparian Areas. Three-dimensional ecotones of interaction that include terrestrial and aquatic ecosystems that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain to the water, laterally into the terrestrial ecosystem, and along the water course at variable widths.

Riparian management zone. Portions of a watershed where riparian dependent resources receive primary emphasis, and for which plans include plan components to maintain or restore riparian functions and ecological functions.

Risk. A combination of the likelihood that a negative outcome will occur and the severity of the subsequent negative consequences.

Road (1). A motor vehicle route over 50 inches wide, unless identified and managed as a trail. (36 CFR 212.1)

Road Maintenance Levels (ML):

ML1. Roads that are closed to vehicular traffic intermittently for periods that exceed 1 year. Can be operated at any other maintenance level during periods of use.

ML2. Roads that are 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).

ML3. Roads that are open and maintained for use by standard passenger cars. Most have gravel surface.

ML4. Roads that are 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.

ML5. Roads that are open and maintained for use by standard passenger cars and to provide a high degree of user comfort and convenience. Most are paved.

*Routine Maintenance***.** Work that is planned to be accomplished on a continuing basis, generally annually or more frequently. (FSH 7709.58, 13.41)

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.

Seral stage. See Succession.

Social sustainability. See Sustainability.

Sole source aquifer. Underground water supply designated by the Environmental Protection Agency (EPA)as the ''sole or principle'' source of drinking water for an area as established under section 1424(e) of the Safe Drinking Water Act (42 U.S.C. 300h–3(e)).

Source water protection areas. The area delineated by a State or Tribe for a public water system (PWS) or including numerous PWSs, whether the source is ground water or surface water or both, as part of a State or tribal source water assessment and protection program (SWAP) approved by Environmental Protection Agency under section 1453 of the Safe Drinking Water Act (42 U.S.C. 300h–3(e)).

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, or candidate species, that 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.

Stressors. For the purposes of the 2012 Planning Rule: Factors 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.

Substantive formal comments. Written comments submitted to, or oral comments recorded by, the responsible official or his designee during an opportunity for public participation provided during the planning process (§§ 219.4 and 219.16), and attributed to the individual or entity providing them. Comments are considered substantive when they are within the scope of the proposal, are specific to the proposal, have a direct relationship to the proposal, and include supporting reasons for the responsible official to consider.

Succession. The progressive change in species composition and structure over time. Early successional stages ("seres" or "states") are often dominated by small, short-lived, poorly competitive, non-woody 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. Disturbances like wildfire, drought, invasive species, and herbivory can interrupt or reverse succession.

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 ecosystems 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.

System drivers. Generally refers to a set dominant ecological processes, disturbance regimes, and stressors, such as natural succession, wildland fire, invasive species, and climate change; and the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change.

Temporary road or trail. A road or trail necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road or trail and that is not included in a forest transportation atlas. (36 CFR 212.1)

Timber harvest. The removal of trees for wood fiber use and 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.

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. (FSM 2353.05)

*Transportation Facility Jurisdiction***.** The legal right or authority to control, operate, regulate use of, maintain, or cause to be maintained, a transportation facility, through ownership or delegated authority. The authority to construct or maintain such a facility may be derived from fee title, easement, written authorization, or permit from a Federal agency, or some similar method. (23 CFR 660.103)

Travel Route. A road, river or trail, that is open for use by members of the general public. (36 CFR 292.21)

Unauthorized Road or Trail. A road or trail that is not a forest road or trail or a temporary road or trail and that is not included in a forest transportation atlas. (36 CFR 212.1)

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).

Woodland. A plant community in which the dominant trees are typically small and short-boled, usually with little crown overlap.

Appendix B. Plant Names: Common, Latin, and Spanish

Common Name	Latin Name	Spanish Names
Agave, Century Plant	*Agave spp.*	Lechuguilla, maguey
Alpine Clover	*Trifolium dasyphyllum*	Trébol
Arizona Alder	*Alnus oblongifolia*	Alamillo, aliso, júcaro
Arizona cottontop	*Digitaria californica*	Plumero blanco, zacate punta blanca
Arizona Cypress	*Cupressus arizonica*	Cedro, cipres
Arizona fescue	*Festuca arizonica*	Cañuela arizonica
Arizona Sycamore	*Platanus wrightii*	Lamo blanco, aliso, ciclamor
Arizona Walnut	*Juglans major*	Nogal
Big bluestem	*Andropogon gerardii*	
Bigelow sage	*Artemisia bigelovii*	Chamiso
Birchleaf buckthorn	*Condalia spathulata*	Teconblate
Black grama	*Bouteloua eripoda*	Navillta
Blue grama	*Bouteloua gracilis*	Artiguilla, navajita
Blue Spruce	*Picea pungens*	Abeto azul, picea azul
Bluegrass	*Poa spp.*	Epsinguilla, pasto azul
Box Elder	*Acer negundo*	Acer, acecinte, acer negundo, el palo blanco
Bristlecone Pine	*Pinus longaeva*	Pino de cola de zorro, pino de piñas aritadas de las rocosas
Bulrush	*Cyperus papyrus*	Cyperus, papiro
Burrow Weed	*Scleropogon brevifolius*	Cola de zorra, zacate de burro
Bush muhly	*Muhlenbergia porteri*	Liendrilla, zacate aparejo, amacollada, teleraña
Cactus Apple	*Opuntia englemannii*	Abrojo, coyonoxtle, cuija, joconstle
California false hellebore	*Veratuim album*	Ballestera, cebadilla
Corkbark Fir, Subalpine Fir	*Abies lasiocarpa*	Abeto blanco, pino real blanco
Creosote Bush, Greasewood	*Larrea tridentate*	Chaparral, hediondilla, gobernadora
Curly mesquite	*Pleuraphis belangeri*	Rizado, tobosa, zacate chino
Currant (wax currant)	*Ribes spp.*	Capulincillo, ciruelillo
Desert willow	*Chilopsis linearis*	Mimbre, sauce, flor de mimbres
Douglas Fir	*Pseudotsuga menziesii*	Abeto, acahuite, cahuite, el pino real colorado
Ear muhly	*Muhlenbergia arenacea*	Liendrilla
Engelmann Spruce	*Picea engelmanii*	Picea, pino real
Fluffgrass	*Dasyochloa pulchela*	
Fowl manna grass	*Glyceria striata*	Gliceria estriada
Fremont Cottonwood	*Populous fremontii*	Alamo
Gambel Oak	*Quercus gambellii*	Encino, Encino de hojas anchas
Giant dropseed	*Sporobolus giganteus*	Zacate gigante
Giant sacaton	*Sporobolus wrightii*	Zacate
Goldenrod	*Solidago spp.*	Vara de oro
Gyp grama	*Bouteloua breviseta*	Chino grama, navijita china
Hairy grama	*Bouteloua hirsute*	Grama, navijita, navajita velluda
Honeysuckle	*Lonicera spp.*	Madreselva
Huckleberry	*Vaccinium myrtillus*	Ráspano
Indian grass	*Sorghastum nutans*	Zacate indio
Indian ricegrass	*Achnatherum hymenoides*	Arroz indio
James'galleta	*Pleuraphis jamesii*	Galleta
Jointfir, Mormon Tea	*Ephedra spp.*	Canutillo, popotillo, tepopote
Juniper	*Juniperus spp.*	Cedar, sabina, cedron
Kentucky bluegrass	*Poa pratensis*	Cañuela, espiguilla, gramade prados
Lanceleaf Cottonwood	*Populous x acuminate*	Alamo

Common Name	Latin Name	Spanish Names
Lehmann's lovegrass	*Eragrostis lehmanniana*	Amorseco africano, pasto africano, zacate africano
Limber Pine	*Pinus flexilis*	Ayacahuite, pino enano
Little bluestem	*Schizachyrium scoparium*	Poptillo azul, popotillo cañuelo
Low woolly grass	*Dasyochloa pulchella*	
Lupine	*Lupines spp.*	Altramuz, cola de zorra, lupino
Manzanita	*Arctostaphylos manzanita*	Manzanilla, coralillo, madrone borracho, pinguica
Maple (Rocky Mt Maple)	*Acer saccarum*	Palo de azucar
Mariola	*Parthenium incanum*	Copalillo, guayule, guayuchemara
Mat Rock Spiraea	*Petrophyton caespitosum*	
Mequite	*Prosopis spp.*	Tonillo
Mesa dropseed	*Sprobolus flexuosus*	Zacatón
Mountain Mahogany	*Cerococarpus spp.*	Palo duro, palo ludo
Narrowleaf Cottonwood	*Populous angustifolia*	Alamo
Narrowleaf Willow	*Saliz exigua*	Coyote Willow, Acequia Willow
Needle and thread	*Hesperostipa comate*	
Needlegrass	*Stipa tenacisima*	Esparto, raigon
New Mexico bluestem	*Schizachyrium neomexicanum*	Popotillo azul
New Mexico feather grass	*Stipa neomexicana*	Barba blanca, flechilla neomexicana
New Mexico Locust	*Robina neomexicana*	Garrobo, hojalito, uña de gato
Oak (general)	*Quercus spp.*	Encino, encinillo
Ocotillo (candlewood, couchwhip)	*Fouquieria spledus*	Ocotillo
Parry's bellflower	*Campanula parryi*	Campanula, aguinaldo, rapónchigo
Parry's oatgrass	*Danthonia parryi*	
Pine dropseed	*Blepharoneuron tricholepis*	Pastille del pinar, popotillo del pinar
Pinyon Pine	*Pinus edulis*	Piñon, ocote
Plains lovegrass	*Eragrostis intermedia*	Zacate llanero
Plumed Crinklemat	*Tiquilia greggii*	Cenizo, herba del cenizo
Ponderosa Pine (yellow pine)	*Pinus ponderosa*	Pino ponderosa, el pinabete amarillo, pinabete, pino blanco, pino real, pino real americano
Pricklyleaf Dogweed	*Dyssodia acerosa*	Parralena, pagué
Purple threeawn	*Artistida purpurea*	Tres aristas
Quaking Aspen	*Populous tremuloides*	Alamillo
Red grama	*Bouteloua trifida*	Navillta
Rio Grande Cottonwood	*Populous wislizenii*	Alamo, guerigo
Rio Grande Saddlebush	*Mortonia scabrella*	Afinador
Rocky Mountain Iris (blue flag)	*Iris missourienis*	Lirio
Saddlebush	*Mortonia scabrella*	Afinador
Sagebrush (wormwood)	*Artemisia spp.*	Chamiso, altamisa, estafiate, mariola, alcanfor
Saltbush	*Atriplex spp.*	Chamiso, cenizo
Sand dropseed	*Sporobolus cryptandrus*	Zacate encubierto
Sand muhly	*Muhlenbergia arenicola*	Liendrilla
Sandberg bluegrass	*Poa secunda*	
Sandhill muhly	*Muhlenbergia pungens*	Liendrilla
Sedges (general)	*Carex spp.*	Carrizo
Serviceberry	*Amelanchier*	Cornillo, corniluelo

Common Name	Latin Name	Spanish Names
Shadscale	*Atriplex canescens*	Chamizo
Shooting star	*Dodecatheon spp.*	Sarapico
Sideoats grama	*Bouteloua curtipendula*	Banderilla
Sierra rush	*Juncus nevadensis*	Junco
Silktassel (quinine bush)	*Garrya flavescens*	Guachichi, cuauchichic
Snakebroom (broomweed)	*Gutierrezia spp.*	Yerba de la Vibora, Escoba de la Vibora, collálle
Snowberry	*Chiococca alba*	Aceitilla, cahinca, cainia
Southwestern White Pine	*Pinus strobiformis*	Acahuite, acamita, acanita, huiyoco, ocote
Spike dropseed	*Sprobolus contractus*	Zacate alcalino espigado
Spike fescue	*Festuca kingii*	Cañuela
Spruce (general)	*Picea spp.*	Pinabete
Sumac (lemonadeberry)	*Rhus spp.*	Pajul del norte, lemonita
Tarbush	*Flourensia cernua*	Hojase, ojasé, hojansen
Thinleaf Alder	*Alnus tenuifolia*	Aliso, aliso cano, baraña
Threeawn	*Aristida spp.*	Tres aristas
Thurber's fescue	*Festuca thurberi*	Cañuela
Tobosagrass	*Pleutaphis mutica*	Toboso
Velvet ash	*Fraxinus velutina*	Fresno
Velvet Mesquite	*Prosopis veluntina*	Mesquite, algarroba, chachuaca
Viscid Acacia	*Acacia neovernicos*	
White Fir	*Abies concolor*	Abeto, pinabete, pino blanco, pino real blanco
Whitethorn Acacia	*Acacia constricta*	Chabarroprieto, gigantillo, juisache
Willow (general)	*Salix spp.*	Jara, jarita
Winterfat	*Krascheninnikovia lanata*	Lanata
Woody Crinklemat	*Tiquilia canescens*	Hierba de la Virgen, orejade perro
Wright's Beebrush	*Aloysia wrighttii*	Altamisa, oreganillo, vara dulce
Yarrow	*Achillea lanulosa*	Plumajillo, milfoil
Yucca (Spanish bayonet/dagger)	*Yucca spp.*	Amole, datil

A variety of sources were used to compile this list:

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Appendix C. Comment Form for Draft Desired Conditions and Vision Statements

See next page

Cibola National Forest Mountain Ranger Districts

Comment Form for Draft Desired Conditions and Vision Statements

Public comments submitted, including names and street addresses of commenters will be available for public review as part of the planning record. Individual commenters may request the Forest Service to withhold their name or address from public review or from disclosure under the Freedom of Information Act by checking the box below. We will accept anonymous comments.

I wish to withhold my name or address from public review or from disclosure under the Freedom of Information Act. ↑Yes

Date:	**Name:**

Phone (with area code):

Email:

Address:

Please use the table below to make comments on the draft Desired Conditions and Vision Statements document. Please be as specific as you can and include the page and line numbers; the resource topic; the management area involved; and your comment.

Page #	Line #	Subject of Comment	Comment

Cibola National Forest Mountain Ranger Districts

Comment Form for Draft Desired Conditions and Vision Statements

Page #	Line #	Subject of Comment	Comment

Comments are most useful to the Cibola if received by September 25, 2015. Comment forms can be delivered to the local Ranger District Office or mailed to: Forest Planner, 2113 Osuna Rd. NE, Albuquerque, NM 87113; or emailed electronically to comments-southwestern-Cibola@fs.fed.us or entered on our webform at https://cara.ecosystem-management.org/Public/CommentInput?project=46268.