

# Chapter 2. Forestwide Direction

## Introduction

This chapter sets forth plan decisions and other content that apply forestwide. See chapter 1 for descriptions of plan decisions and other content. In the event of conflicts with other sections of this plan, the more restrictive plan decision generally applies. However, a project or activity-level evaluation may be required to resolve the conflict.

Plan decisions for forestwide direction are displayed in shaded boxes to distinguish them from other sections of the plan.

Plan decisions and other content for management areas (chapter 3) and suitability (chapter 4) should also be consulted.

## Maintenance and Improvement of Ecosystem Health

Ecosystem diversity provides for the distribution, diversity, and complexity of watershed and landscape scale features, including [natural disturbance regimes](#) of terrestrial, aquatic, and riparian ecosystems. Communities, populations, and individual plant and animal species are uniquely adapted to and dependent upon ecosystem diversity.

The following desired conditions describe the characteristics of the Apache-Sitgreaves NFs that provide ecosystem diversity. Ecosystem diversity is the primary means by which this plan contributes to the maintenance and improvement of ecosystem health. Species diversity needs are accounted for in all aspects of this plan. Social and economic needs are also integrated into ecosystem desired conditions.

The ecological desired conditions are described at multiple [scales](#) and may only be achievable over a long timeframe (several hundred years). Descriptions at various scales are developed to provide detail and guidance for the design of future projects and activities that help achieve the desired conditions over time. Descriptions under the landscape scale provide the “big picture” desired conditions for terrestrial resources across the larger land area. Descriptions at the mid-scale and fine scale provide further details necessary for guiding future site-specific projects and activities. A combination of fine scale units add up to the mid-scale and a combination of mid-scale units add up to the landscape scale. Conversely, desired conditions for aquatic resources are described using watershed scales to help provide their relative importance or niche. Conditions for larger land areas are described under the 4<sup>th</sup> to 5<sup>th</sup> level [Hydrologic Unit Code \(HUC\)](#) watershed scale. More detailed descriptions for site-specific conditions are described at the 6<sup>th</sup> level HUC watershed scale. Not all resources require a description at each scale.

## Overall Ecosystem Health

### Background for Overall Ecosystem Health

Prior to the 1850s, the Apache-Sitgreaves NFs ecosystems were considered to be resilient. The landscape was filled with a wide variety of vegetation that provided habitat for a diverse array of plants and animals. Fire, disease, and climatic changes were natural components of these [functioning ecosystems](#).

Beginning in the mid-1800s, ranching, farming, and forest uses by settlers began making substantial changes to the ecological and species diversity of the landscape. In some cases, the

underlying ecological processes that sustained diversity have been altered from historic patterns (Forest Service, 2008b) and may not support the same native species distribution and abundance. Under current conditions, natural ecological processes (e.g., insects, disease, fire) are producing uncharacteristic outcomes (e.g., Rodeo-Chediski Fire of 2002, Wallow Fire of 2011) in many ecosystems.

Public needs as well as public expectations regarding management of the national forests and grasslands have changed. Congress directed the Forest Service to manage [National Forest System \(NFS\)](#) lands for multiple uses and benefits and for the sustained yield of renewable resources. Multiple use means managing resources, under the best combination, to benefit the American people, while ensuring the sustained productivity of the land and protecting the quality of the environment into the future. There is general recognition of the principle that every use cannot occur on every acre of NFS land.

The Forest Service has identified uncharacteristic fire and the buildup of fuels, unmanaged recreation, [invasive species](#), and the loss of open space as threats to the health and [sustainability](#) of the Nation's forests. In addition, climate change<sup>1</sup> has been added to the list of forces shaping the national forests and grasslands.

This plan provides a framework to contribute to ecological sustainability by identifying desired conditions that support diverse native plant and animal communities while protecting natural features and cultural resources. The needs for fish, wildlife, and rare plants are found throughout the plan, rather than in one specific section.

The intent of this plan is to guide management efforts in the [restoration](#) and/or maintenance of ecosystems. Sustainable supplies of resources such as timber, recreation, and forage are byproducts of healthy, functioning ecosystems.

## **Desired Conditions for Overall Ecosystem Health**

### **Landscape Scale Desired Conditions (10,000 acres or greater)**

- Ecological components are resilient to disturbances including human activities and climate variability.
- Natural ecological processes (e.g., fire, drought, wind, insects, disease, pathogens) return to their innate role within the ecosystem. Fire, in particular, is restored to a more natural function.

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<sup>1</sup> The state of knowledge needed to deal with climate change at the forest scale is evolving and the potential outcomes, as a result of climate change, are uncertain. Most global climate models are not yet precise enough to apply to land management at the ecoregional or forest scale. This limits regional and forest-specific analysis of potential effects of climate change (see appendix A). However, based on current climate model projections and research, climate change factors that appear most likely to affect southwestern national forests and affect desired conditions are ecological, weather-related disturbances, and socioeconomic demands and include increases in: (1) frequency of intense storms; (2) wildfire risks; (3) outbreaks of insects, diseases, and nonnative invasive species; (4) demand for decreasing water supplies; and (5) national forest socioeconomic uses and demands.

- Natural ecological processes allow for a shifting of plant communities, [structure](#), and ages across the landscape. [Ecotone](#) shifts are influenced at both the landscape and watershed scale by ecological processes. The [mosaic](#) of plant communities and the variety within the communities are resilient to disturbances.
- Ecological conditions for habitat quality, distribution, and abundance contribute to self-sustaining populations of native and desirable nonnative plants and animals that are healthy, well distributed, connected, and genetically diverse. Conditions provide for the life history, distribution, and natural population fluctuations of the species within the capability of the landscape.
- Large blocks of habitat are interconnected, allowing for behavioral and predator-prey interactions, and the persistence of [metapopulations](#) and [highly interactive wildlife species](#) across the landscape. Ecological [connectivity](#) extends through all plant communities and ecotones.
- Habitat configuration and availability allows wildlife populations to adjust their movements (e.g., seasonal migration, foraging) in response to climate change and promote genetic flow between wildlife populations.
- Habitat quality, distribution, and abundance exist to support the recovery of [federally listed species](#) and the continued existence of all native and desirable nonnative species.
- Healthy ecosystems provide a wide range of [ecosystem services](#).
- Watersheds exhibit high [geomorphic](#), [hydrologic](#), and biotic integrity relative to their natural potential condition.

### Objectives for Overall Ecosystem Health

- During the [planning period](#), improve the [condition class](#) on at least 10 [priority 6<sup>th</sup> level HUC watersheds](#) by removing or mitigating degrading factors<sup>2</sup>.

### Management Approaches for Overall Ecosystem Health

In order to achieve overall ecosystem health and provide for species diversity, management focus is on achieving satisfactory watershed conditions and restoring ecological functions, especially natural [fire regimes](#).

There is a concerted effort to restore priority 6<sup>th</sup> level HUC watersheds by reducing degrading factors. Priority 6<sup>th</sup> level watersheds are identified on an ongoing basis using the Watershed Condition Framework process. The 6-step “Watershed Condition Framework”<sup>3</sup> for improving watershed condition class includes: (1) rating watersheds for current condition; (2) prioritizing watersheds for treatment; (3) developing watershed action plans for the entire watershed (including non-NFS lands) that identify specific project level activities needed to change

<sup>2</sup> Degrading factors include, but are not limited to: high departure from historic vegetation conditions, poor soil condition, nonfunctioning riparian areas, impaired species habitat, occurrence of invasive species, unmanaged grazing, and sedimentation from roads or trails.

<sup>3</sup> Information from the Watershed Condition Framework, including condition class and prioritization information, is available at <http://apps.fs.usda.gov/WCFmapviewer/>.

condition classes; (4) implementing integrated suites of projects within priority watersheds; (5) tracking restoration accomplishments; and (6) monitoring the effectiveness of change in condition.

Highest priority treatments are those that remove risk factors that may threaten the integrity of the watershed; some of the risk factors include: low geomorphic, hydrologic, and biotic integrity relative to the watershed's natural potential condition; an unstable drainage network; and conditions which may not support [beneficial uses](#). Geomorphic integrity can be defined in terms of attributes such as slope stability, soil erosion, channel morphology, and other upslope, riparian, and aquatic habitat characteristics. Hydrologic integrity relates primarily to flow, sediment, and water quality attributes. Biological integrity is defined by the characteristics that influence the diversity and abundance of aquatic species, vegetation, and [soil productivity](#). Specific objectives to reduce degrading factors can be found below in the "Soil," "Water Resources," "Aquatic Habitat," and "All PNVTs" (vegetation) sections. Treatments include those that restore and then maintain natural fire regimes, improve riparian condition, restore meadows or [openings](#), repair gullies, and reduce erosion.

Forest managers utilize [planned](#) and [unplanned ignitions](#) to help reintroduce fire into the ecosystems, restore natural fire regimes, and remove excessive fuels. Fire may be used alone or in combination with other treatments.

## Air

### Background for Air

The Clean Air Act of 1972 (Public Law 92-500) and its subsequent amendments assign Federal land managers the responsibility to protect [air quality related values](#) in [Class I airsheds](#) and to protect human health and basic resource values in other areas.

Mount Baldy Wilderness (7,000 acres) is the only Class I airshed on the forests. This airshed is located directly above the wilderness. In Mount Baldy Wilderness, little to no deterioration of air quality is allowed. All other areas of the forests are [Class II airsheds](#) where only moderate deterioration of air quality is allowed.

Human health standards are defined in the National Ambient Air Quality Standards (NAAQS) set by the Environmental Protection Agency (EPA) for seven pollutants considered harmful to public health: carbon monoxide, lead, nitrogen dioxide, particulate matter 10 microns in size or smaller (PM<sub>10</sub>), particulate matter 2.5 microns in size or smaller (PM<sub>2.5</sub>), ozone, and sulfur dioxide. Population centers with the potential to be impacted from management activities on the Apache-Sitgreaves NFs are the Show Low-Pinetop area, Eagar-Springerville, Winslow, Holbrook, and Payson. The Show Low-Pinetop, Eagar-Springerville, Heber, and Payson areas are monitored continuously for fine particulates as they receive diurnal (daytime) air drainage from the forests and nearby Fort Apache Indian Reservation. There are no air quality nonattainment areas (areas that exceed NAAQS) within the Apache-Sitgreaves NFs.

Temporary decreases in air quality from management activities on the Apache-Sitgreaves NFs are primarily from prescribed burns. Wildfires originating on the forests also produce emissions. The NAAQS pollutant of concern from wildland fire is fine particulate matter, both PM<sub>10</sub> and PM<sub>2.5</sub>. Studies indicate that 90 percent of smoke particles emitted from wildland fires are PM<sub>10</sub>, and

about 90 percent of PM<sub>10</sub> is PM<sub>2.5</sub>. Because of its small size, PM<sub>2.5</sub> has an especially long residence time in the atmosphere and penetrates deeply into the lungs.

The same fine particulate matter that poses health risks is also largely responsible for visibility impairment. The State of Arizona has developed a State implementation plan with long-term strategies to make “reasonable progress: in improving visibility in Class I areas inside the state and in neighboring jurisdictions” (Environmental Protection Agency, 1999), and focuses on anthropogenic (human) sources of emissions. Smoke and visibility impairment from wildland fire that closely mimics what would occur naturally is generally acceptable.

Road dust has not been demonstrated to be a measurable contributor on a regional level to visibility in the 16 Class I areas located on the Colorado Plateau (Arizona Department of Environmental Quality, 2003). Although road dust has been a localized issue associated with implementation of some projects in the past, it has been addressed with site-specific mitigation measures.

### Desired Conditions for Air

#### Landscape Scale Desired Conditions (10,000 acres or greater)

- Air quality related values, including high quality visual conditions, are maintained within the Class I airshed over Mount Baldy Wilderness.
- Class II airsheds meet State of Arizona air quality standards including those for visibility and public health.

### Guidelines for Air

- During extended periods of burning, smoke should be monitored, in cooperation with the Arizona Department of Environmental Quality, for impacts to human health from fine particulates.

### Management Approach for Air

The Apache-Sitgreaves NFs participate with the State of Arizona in the air quality regulatory process. Specialists review air permit applications for new and modified industrial facilities to ensure that their air emissions do not adversely impact the air quality related values (e.g., visibility) of federally protected wilderness areas. Forest managers consider impacts to Class I and II areas and follow State of Arizona permit and regulatory requirements for smoke production to help determine the management response for planned and unplanned ignitions. Site-specific mitigation for [fugitive dust](#) is incorporated into ground-disturbing projects through implementation of [best management practices \(BMPs\)](#) and retention and replacement of ground cover.

### Related Plan Content for Air

See the following sections: [All PNVTs](#), [Wilderness](#).

## Soil

### Background for Soil

The soil surface is the crucial area where plant and animal organic matter accumulate, begin to decompose, and eventually become incorporated into soil. It is also the zone of maximum biological activity and nutrient release. The presence and distribution of topsoil is critical to vegetation productivity. The physical condition of the soil surface plays a key role in soil stability, nutrient cycling, and water infiltration; the [soil condition rating](#) is based on these factors.

Apache-Sitgreaves NFs have areas with unsatisfactory soil condition. The current (2008) soil condition rating is satisfactory on 70 percent of the Apache-Sitgreaves NFs, compared to reference condition of at least 95 percent. In addition, naturally unstable geology (e.g., Datil formation, slow geologic landslides) contributes to sediment loads in downstream rivers.

### Desired Conditions for Soil

#### Landscape Scale Desired Conditions (10,000 acres or greater)

- Ecological and [hydrologic functions](#) are not impaired by soil compaction.

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

- Soil condition rating is satisfactory<sup>4</sup>.
- Soils are stable within their natural capability. Vegetation and [litter](#) limit accelerated erosion (e.g., rills, gullies, root exposure, topsoil loss) and contribute to soil deposition and development.
- Soils provide for diverse native plant species<sup>5</sup>. Vegetative ground cover is well distributed across the soil surface to promote nutrient cycling and water infiltration.
- Biological soil crusts (e.g., mosses, lichens, algae, liverworts) are present and reestablished if potential exists.

#### Fine Scale Desired Conditions (less than 10 acres)

- Soil loss rates do not exceed tolerance soil loss rates<sup>6</sup>.
- Logs and other woody material are distributed across the surface to maintain soil productivity<sup>7</sup>.

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<sup>4</sup> As described in the Southwestern Region FSH 2509.18 Soil Management Handbook, satisfactory soil condition exists when indicators signify that soil function is being sustained and soil is functioning properly and normally. The ability of soil to maintain resource values and sustain outputs is high.

<sup>5</sup> Potential plant communities' species composition and cover amounts and the amount of vegetation and litter needed for soil protection are described by ecological unit in the "Terrestrial Ecosystem Survey for the Apache-Sitgreaves National Forests" (Laing et al., 1987).

<sup>6</sup> The maximum rates that soil can erode and not reduce long-term soil productivity. These were established for each terrestrial ecosystem mapping unit component and are described in the Terrestrial Ecosystem Survey for the Apache-Sitgreaves National Forests (Laing et al., 1987).

- Vegetation and litter is sufficient to maintain and improve water infiltration, nutrient cycling, and soil stability.

### Objectives for Soil

- During the planning period, enhance or restore an average of 350 acres per year within priority 6<sup>th</sup> level HUC watersheds, including treating the causes of State designated impaired or threatened waters (Arizona Department of Environmental Quality, 2007) to improve watershed condition and water quality.

### Guidelines for Soil

- Projects with ground-disturbing activities should be designed to minimize long- and short-term impacts to soil resources. Where disturbance cannot be avoided, project specific soil and water conservation practices should be developed.
- Severely disturbed sites should be revegetated with native plant species when loss of long term soil productivity is evident.
- Locally collected seed should be used where available and cost effective. Seeds should be tested to ensure they are free from [noxious weeds](#) and invasive nonnative plants at a State certified seed testing laboratory before acceptance and mixing.
- [Coarse woody debris](#) retention and/or creation should be used as needed to help retain long term soil productivity.

### Other Sources of Information for Soil

- Southwestern Region FSH 2509.22-90-1, Chapters 10-40, Soil and Watershed Conservation Practices Handbook (Section: Process for Identifying Best Management Practices)
- Southwestern Region FSH 2509.18-99-1, Soil Management Handbook (Sections: Soil Quality Standards, Monitoring Methods)

### Management Approaches for Soil

The forests emphasize restoration treatments in priority 6<sup>th</sup> level HUC watersheds that have the highest risk to ecologic sustainability. There is also an effort to improve water quality impaired streams and water bodies. Restoration treatments may include seeding, mulching, stabilization of gullies, or obliteration of unauthorized routes.

### Related Plan Content for Soil

See the following sections: [Overall Ecosystem Health](#), [All PNVTs](#), [Water Resources](#), [Dispersed Recreation Opportunities](#), [Motorized Opportunities](#), and [Nonmotorized Opportunities](#).

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<sup>7</sup> The amount of woody material varies by PNVT; see vegetation desired conditions.

## Water Resources

### Background for Water Resources

Lands within the forests form the headwaters for the Little Colorado, Black, Blue, and San Francisco Rivers which produce water for many uses throughout the State of Arizona. Streams and [riparian areas](#) occur at a higher density than any other area in the State. Watersheds and aquatic ecosystems have changed from reference conditions, but the location of stream channels has generally not changed. The demand for water resources is increasing.

Many riparian areas are not in [proper functioning condition](#). Diversions, impoundments, unnaturally dense forests, grazing, and prolonged drought have altered streamflow and riparian condition. In addition, pumping from the Little Colorado and Morenci groundwater aquifers associated with the forests is greater than the estimated recharge, resulting in reduced water availability and affecting some streamflows.

Water quality is generally good, but there are some impaired streams and lakes. Suspended sediment is a potential [nonpoint source](#) water quality problem throughout the forests. There are nine Outstanding Arizona Waters on the forests.



Figure 2. Eagle Creek, Clifton Ranger District

Preserving streamflows is a challenge due to increased water demand and legal mandates for natural resources. Currently, the only avenue available to the Forest Service to preserve streamflows is to obtain water rights from the State of Arizona for [instream flows](#). Arizona instream flow water rights are unique and provide the Forest Service with an opportunity to maintain and protect flow within streams so that fish and wildlife habitat and water-based recreation can be sustained. The Organic Administration Act<sup>8</sup> provided for the establishment of national forest lands for the purpose of securing favorable conditions of waterflow, consistent with existing Federal or state water rights laws. Other Federal law<sup>9</sup> allows for diversions or impoundments of water as long as the environment is protected and damage to fish and wildlife habitat is minimized.

### Desired Conditions for Water Resources

#### 4<sup>th</sup> to 5<sup>th</sup> Level HUC Watershed Scale Desired Conditions

- Water quality, stream channel stability, and aquatic habitats retain their inherent resilience to natural and other disturbances.
- Water resources maintain the capability to respond and adjust to disturbances without long term adverse changes.

<sup>8</sup> Organic Administration Act, 1887 (16 U.S.C. 4751, 16 U.S.C. 481).

<sup>9</sup> Federal Land Policy and Management Act, 1976. Sec 505 (43 U.S.C. 1765).

- Vegetation and soil conditions above the floodplain contribute to downstream water quality, quantity, and aquatic habitat.

### 6<sup>th</sup> Level HUC Watershed Scale Desired Conditions

- Instream flows provide for channel and floodplain maintenance, recharge of riparian aquifers, water quality, and minimal temperature fluctuations.
- Streamflows provide connectivity among fish populations and provide unobstructed routes critical for fulfilling needs of aquatic, riparian dependent, and many upland species of plants and animals.
- Water quantity meets the needs for forest administration and authorized activities (e.g., [livestock grazing](#), recreation, firefighting, domestic use, road maintenance).
- Stream channels and floodplains are dynamic and resilient to disturbances. The water and sediment balance between streams and their watersheds allow a natural frequency of low and high flows.
- Flooding does not disrupt normal stream characteristics (e.g., water transport, sediment, woody material) or alter stream dimensions (e.g., bankfull width, depth, slope, sinuosity).
- Floodplains are functioning and lessen the impacts of floods on human safety, health, and welfare.
- Water quality meets or exceeds Arizona State standards<sup>10</sup> or Environmental Protection Agency water quality standards for designated uses.
- Water quality meets the needs of aquatic species such as the California floater, northern and Chiricahua leopard frog, and invertebrates that support fish populations.

### Standards for Water Resources

- Consistent with existing water rights, water diversions or obstructions shall at all times allow sufficient water to pass downstream to preserve minimum levels of waterflow that maintain aquatic life and other purposes of national forest establishment.

### Guidelines for Water Resources

- Projects with ground-disturbing activities should be designed to minimize long- and short-term impacts to water resources. Where disturbance cannot be avoided, project specific soil and water conservation practices should be developed.
- Streams, streambanks, shorelines, lakes, wetlands, and other bodies of water should be protected from detrimental changes<sup>11</sup> in water temperature and sediment to protect aquatic species and riparian habitat.

<sup>10</sup> Arizona Administrative Code Title 18. Chapter 11 Arizona Water Quality Standards.

- [Streamside management zones](#) should be in place between streams and disturbed areas and/or road locations to maintain water quality and suitable stream temperatures for aquatic species.
- As State of Arizona water rights permits (e.g., water impoundments, diversions) are issued, the base level of instream flow should be retained by the Apache-Sitgreaves NFs.
- Constraints (e.g., maximum limit to which water level can be drawn down or minimum distance from a connected river, stream, wetland, or groundwater-dependent ecosystem) should be established for new groundwater pumping sites permitted on NFS lands in order to protect the character and function of water resources.
- Short-term impacts in watersheds containing Outstanding Arizona Waters may be allowed when long-term benefits to water quality, riparian areas, and aquatic resources would occur.
- Treated wastewater may be used to provide wetland habitats.
- To protect water quality and aquatic species, heavy equipment and vehicles driven into a water body to accomplish work should be completely clean of petroleum residue. Water levels should be below the gear boxes of the equipment in use. Lubricants and fuels should be sealed such that inundation by water should not result in leaks.

### **Other Sources of Information for Water Resources**

- Southwestern Region FSH 2509.22, Chapters 20–40 (Soil and Watershed Conservation Practices Handbook)
- Arizona Administrative Code Title 18 Chapter 11 (Arizona Water Quality Standards)
- U.S. Forest Service (FS 881) Technical Guide to Managing Groundwater Resources Part 2 (Section: Overview of National Groundwater Policy)
- Memorandum of Understanding between Forest Service, Southwestern Region, and the State of Arizona Department of Environmental Quality

### **Management Approaches for Water Resources**

The width of streamside management zones—generally 50 to 300 feet—is determined at the project level based on stream attributes (e.g., class and type, channel condition, aspect, side slope steepness). The streamside management zone for waters with high resource value and quality would be at the greater width of this range.

### **Related Plan Content for Water Resources**

See the following sections: [Soil](#), [Aquatic Habitat and Species](#), [Riparian Areas](#), [Dispersed Recreation Opportunities](#), [Motorized Opportunities](#), [Nonmotorized Opportunities](#), [Special Uses](#), and [Water Uses](#).

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<sup>11</sup> Detrimental changes are described in species-specific literature (e.g., recovery plans, critical habitat designations, conservation strategies).

## Aquatic Habitat and Species

### Background for Aquatic Habitat and Species

The forests are home to 14 native and 25 nonnative fish species. Fish habitats range from high elevation cold water trout streams to the lower elevation warm water cyprinid (minnow family) streams. Other aquatic species include Chiricahua leopard frog, narrow-headed gartersnake, springsnails, and aquatic invertebrates.

Most streams have been altered from reference conditions, resulting in reduced quality of fish habitat. Inventoried streams have exhibited reduced habitat capabilities. Native fish populations and distributions are decreasing rangewide, and the resiliency of all fish species has been impacted. The alteration of habitats, isolation of populations, and introduction of nonnative species have contributed to the decline of native fish habitat and populations. Almost all of the forests' fish-bearing streams have been impacted by diversions. Some streams, including portions of the Blue River, Little Colorado River, Dix Creek, San Francisco River, Eagle Creek, and Show Low Creek, are totally diverted for several months of the year which effectively eliminates or isolates viable aquatic habitat and diminishes fish populations.

Invasive species are a serious and growing threat to native species. Nonnative invasive animals and plants, such as fish, crayfish, and Eurasian watermilfoil, prey on, out-compete, and degrade habitats that many native species depend on. In some cases, nonnative species are able to hybridize (crossbreed) with native species.

If climate change predictions become reality, a warmer and drier climate may further reduce the quality and quantity of wetlands that provide habitat for resident and migratory waterfowl and associated mammals, reptiles, and amphibians. Destruction of historic waterfowl congregation areas along the Colorado River and changes in migratory patterns have added to the importance of maintaining forest wetlands.

### Desired Conditions for Aquatic Habitat and Species

#### 4<sup>th</sup> to 5<sup>th</sup> Level HUC Watershed Scale Desired Conditions

- Streams and aquatic habitats support native fish and/or other aquatic species providing the quantity and quality of aquatic habitat within reference conditions.
- Federally listed species are trending toward recovery.
- Streamflows, habitat, and water quality support native aquatic and riparian-dependent species and habitat.

#### 6<sup>th</sup> Level HUC Watershed Scale Desired Conditions

- Habitat and ecological conditions are capable of providing for self-sustaining populations of native, riparian dependent plant and animal species.
- Native fish, reptile, and amphibian populations are free from or minimally impacted by nonnative plants and animals.
- Aquatic species habitat conditions provide the resiliency and [redundancy](#) necessary to maintain species diversity and metapopulations.

- Desirable nonnative fish species provide recreational fishing in waters where those opportunities are not in conflict with the recovery of native species.
- Wetlands are hydrologically functioning and have sufficient (composing 50 percent of the wetland) [emergent vegetation](#) and macroinvertebrate populations to support resident and migratory wetland dependent species.

### Objectives for Aquatic Habitat and Species

- Annually, enhance or restore 5 to 15 miles of stream and riparian habitat to restore structure, composition, and function of physical habitat for native fisheries and riparian-dependent species.
- During the planning period, complete at least five projects (e.g., remove barriers, restore dewatered stream segments, or connect fragmented habitat) to provide for aquatic and riparian associated species and migratory species.

### Standards for Aquatic Habitat and Species

- When drafting (withdrawing) water from streams or other water bodies, measures will be taken to prevent entrapment of fish and aquatic organisms and the spread of parasites or disease (e.g., Asian tapeworm, chytrid fungus, whirling disease).

### Guidelines for Aquatic Habitat and Species

- To prevent degradation of native species habitat and the incidental or accidental introduction of diseases or nonnative species, aquatic species should not be transferred through management activities from one 6<sup>th</sup> level HUC watershed to another.
- Sufficient water should be left in streams to provide for aquatic species and riparian vegetation.
- Projects and activities should avoid damming or impounding [free-flowing](#) waters to provide streamflows needed for aquatic and riparian-dependent species.
- The needs of rare and unique species associated with wetlands, fens, bogs, and springs should be given priority consideration when developing these areas for waterfowl habitat and other uses.
- When new water diversions are created or existing water diversions are reanalyzed, measures should be taken to prevent entrapment of fish and aquatic organisms.

### Management Approaches for Aquatic Habitat and Species

Proactive management of aquatic habitats and populations is critical to reversing downward population trends in several federally listed species. Physical barriers or habitat alterations like temperature changes, loss of streamflow, nonnative species predation, and nonnative hybridization can be threats to these species. Habitat improvement projects are prioritized with an emphasis on federally listed species and other species with population or habitat concerns. Managers work to ensure native species can be found in their historic habitat.

The Apache-Sitgreaves NFs cooperate with the Arizona Game and Fish Department (AZGFD) to protect and reintroduce native aquatic species where appropriate and control or eradicate nonnative species. The forests support efforts to develop effective methods to eradicate crayfish and other undesirable nonnative species.

Enhancement or restoration treatments may include stabilization of streambanks and road crossings, facilitation of aquatic species passage and movement, restoration of perennial flows and native vegetation, or removal of unneeded impoundments. [Ephemeral](#) and seasonal wetlands are managed to lengthen wet periods. Wetlands are protected from activities that reduce habitat quality or size such as dewatering or loss of emergent vegetation.

### **Related Plan Content for Aquatic Habitat and Species**

See the following sections: [Overall Ecosystem Health](#), [Water Resources](#), [Riparian Areas](#), [Invasive Species](#), [Livestock Grazing](#), and [Water Uses](#).

## **All PNVTs**

### **Background for All PNVTs**

The 14 major PNVTs<sup>12</sup> can be assembled into 5 groupings: riparian, forest, woodland, grassland, and chaparral. This section pertains to all 5 vegetation groupings and all 14 PNVTs. Each PNVT consists of one or more subtypes depending on local environmental characteristics. These subtypes (e.g., pine-Gambel oak is a subtype of the ponderosa pine PNVT) are not described in detail in this plan but may be evaluated at the project or activity level.

Riparian PNVTs include wetland/cienegas and three riparian forested PNVTs: mixed broadleaf deciduous, montane willow, and cottonwood-willow. There are four forested PNVTs: ponderosa pine, dry mixed conifer, wet mixed conifer, and spruce-fir. Madrean pine-oak and piñon-juniper make up the woodland PNVTs. The three grassland PNVTs are Great Basin, semi-desert, and montane/subalpine. Interior chaparral is the only chaparral PNVT.

All of these PNVTs vary, to some degree, in structure, composition, function, and natural ecological processes from what they were historically. Fire is among the most important natural ecological processes that shaped these vegetation communities.

The variety of habitat conditions provides for a wide diversity of plant species. Preliminary estimates include over 2,500 species and varieties. Vegetation conditions for Mexican spotted owl (MSO) and other federally listed species, although not described in detail below, are managed consistent with the habitat requirements specified in the appropriate species recovery plan.

Ranges of values presented in desired conditions reflect the natural variation in the composition and structure within a PNVT. Desired conditions may differ within a PNVT due to spatial variability in soils, elevation, aspect, or varying multiple-use needs. Site-specific areas may be managed for different desired conditions because of particular resource and species needs. The desired conditions do not necessarily represent reference conditions, since it may not be possible, nor desirable, to return to that condition.

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<sup>12</sup> This plan refers to PNVT, meaning the potential natural vegetation type. Refer to appendix B for more information.

Desired conditions are described at multiple scales when possible. **Fine scale** is a 10-acre area or less at which the distribution of individual trees (single, grouped, or aggregates of [groups](#)) is described. **Mid-scale** is a unit of 100 to 1,000 acres and is composed of assemblages of fine scale units which have similar biophysical conditions. **Landscape scale** is an assemblage of mid-scale units, typically composed of variable elevations, slopes, aspects, soils, plant associations, and ecological processes. An area at this scale is comprised of multiple mid-scale units, most often 10 or more.

## Desired Conditions for All PNVTs

### Landscape Scale Desired Conditions (10,000 acres or greater)

- Each PNVT contains a mosaic of vegetative conditions, densities, and structures. This mosaic occurs at a variety of scales across landscapes and watersheds. The distribution of physical and biological conditions is appropriate to the natural disturbance regimes affecting the area.
- The vegetative conditions and functions are resilient to the frequency, extent, and severity of ecological processes, especially fire, insects and disease, and climate variability. The landscape is a functioning ecosystem that contains all its components, processes, and functions.
- Natural processes and human disturbances (e.g., planned and unplanned fire ignitions, mechanical vegetation treatments) provide desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling. Natural fire regimes are restored. Uncharacteristic fire behavior is minimal or absent on the landscape.
- Fire (planned and unplanned ignitions) maintains and enhances resources and, as nearly as possible, is allowed to function in its natural ecological role.
- Native plant communities dominate the landscape.
- The range of species genetic diversity remains within native vegetation and animal populations, thus enabling species to adapt to changing environmental and climatic conditions.
- Vegetative connectivity provides for species dispersal, [genetic exchange](#), and daily and seasonal movements across multiple spatial scales.
- Vegetation characteristics (e.g., density, litter) provide favorable conditions for waterflow and quality.
- Organic soil cover and [herbaceous](#) vegetation protect soil, facilitate moisture infiltration, and contribute to plant and animal diversity and ecosystem function.
- Diverse vegetation structure, species composition, densities, and [seral states](#) provide quality habitat for native and desirable nonnative plant and animal species throughout their life cycle and at multiple spatial scales. Landscapes provide for the full range of ecosystem diversity at multiple scales, including habitats for those species associated with late seral states and [old growth](#) forests.
- Old growth is dynamic in nature and occurs in well-distributed [patches](#) that spatially shift across forest and woodland landscapes over time.

- Old or large trees, multistoried canopies, large coarse woody debris, and [snags](#) provide the structure, function, and associated vegetation composition as appropriate for each forested and woodland PNVT.
- Vegetation conditions allow for transition zones or ecotones between riparian areas, forests, woodlands, shrublands, and grasslands. Transition zones may shift in time and space due to changing site conditions (e.g., fire, climate).
- Insect and disease populations are at [endemic](#) levels with occasional outbreaks. A variety of seral states usually restricts the scale of localized insect and disease outbreaks.
- Disjunct populations of Chihuahua pine, Arizona cypress, and Rocky Mountain maple are present with the ability to reproduce on capable sites.
- [Herbivory](#) is in balance with [available forage](#) (i.e., grazing and browsing by authorized livestock, [wild horses](#), and wildlife do not exceed available forage production within established use levels).
- Shrub components contain a diverse array of native vegetation that is well distributed across the landscape to provide nutritional needs for [browsers](#).
- Vegetation provides products—such as wood fiber or forage—to help meet local and regional needs in a manner that is consistent with other desired conditions on a sustainable basis within the capacity of the land.
- Ecosystem services are available as forests, woodlands, grasslands, and riparian communities successfully adapt to a changing and variable climate.

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

- [Stand](#) densities and species compositions are such that vegetation conditions are resilient under a variety of potential future climates.
- Vegetation conditions provide hiding and thermal cover in contiguous blocks for wildlife. Native plant species are present in all [age classes](#) and are healthy, reproducing, and persisting.
- Ground cover, density, and height of vegetation exist to protect the soil and support water infiltration. There is a diverse mix of cool and warm season grass and desirable forb species. Plant canopy cover and composition are within or moving closer to [reference conditions](#)<sup>13</sup>.
- Grasses, forbs, shrubs, and litter are abundant and continuous to maintain and support natural fire regimes.
- The composition, density, structure, and mosaic of vegetative conditions reduce uncharacteristic [wildfire hazard](#) to local communities and forest ecosystems.

<sup>13</sup> As described in the “Terrestrial Ecosystem Survey for the Apache-Sitgreaves National Forests” (Laing et al., 1987).

### **Fine Scale Desired Conditions (less than 10 acres)**

- Rare or unique plant communities are intact and persisting.
- Herbaceous vegetation amount and structure (e.g., plant density, height, litter, seed heads) provides habitat to support prey species.
- Some isolated infestations of mistletoe provide for a diversity of habitat components (e.g., food, nesting, cover) for a variety of species such as owls, squirrels, and some birds and insects.

### **Standards for All PNVTs**

- Vegetation treatments shall include measures to reduce the potential for introduction of invasive plants and animals and damage from nonnative insects and diseases.

### **Guidelines for All PNVTs**

- During project design and implementation, precautions should be taken to reduce the potential for damage to residual vegetation in order to prevent premature or excessive mortality.
- Landscape scale restoration projects should be designed to spread out treatments spatially and/or temporally to reduce implementation impacts and allow reestablishment of vegetation and soil cover.
- Restoration methods, such as thinning or burning, should leave a mosaic of undisturbed areas within the larger treated project area, especially within meadows, openings, and swales, to retain or allow recolonization of small mammals and insects (e.g., long-tailed voles, fritillary butterflies).
- Planned ignitions (prescribed fire) and unplanned ignitions (wildfires) may be used to meet desired resource conditions, maintain desired vegetation species, and enable natural fires to return to their historic role.
- Insect and disease infected trees should be removed to prevent spread beyond endemic levels.
- Green [slash](#) and decked logs should be managed, in a timely manner, to make them unfavorable bark beetle habitat.
- Project implementation should include bark beetle monitoring within and adjacent to all active slash-creating projects to help prevent beetle outbreak.

### **Other Sources of Information for All PNVTs**

- Interagency Prescribed Fire Planning and Implementation Procedures Guide (Section: Prescribed Fire Planning Process)
- Interagency Standards for Fire and Aviation Operations (Red Book), U.S. Forest Service Wildland Fire and Aviation Program Organization and Responsibilities (Section: Fuels Management)

## Management Approaches for All PNVTs

Vegetation treatments are concentrated in priority 6<sup>th</sup> level HUC watersheds and areas identified in [community wildfire protection plans](#), including regular treatments to maintain desired conditions in the Community-Forest Intermix Management Area<sup>14</sup>. The PNVTs (see specific PNVTs and appendix B) are validated at the project or activity level for application of plan desired conditions. The Apache-Sitgreaves NFs work to update and refine the [terrestrial ecosystem survey](#).

As treatments are planned, forest managers consider native species resiliency in order to avoid loss of genetic diversity, including the widespread elimination of a particular native woody species and/or certain genotypes/phenotypes of any species. Local plant materials are collected, stored, propagated, and used to provide for continued genetic diversity. Those species lacking in the tree seed inventory, as well as other key plant species at risk from uncharacteristic disturbance, are collected from diverse locations within their natural ranges as opportunities arise.

Managers also consider the impacts of insects and disease. Appropriate cutting methods and/or fire are used to manage mistletoe and other insect and disease infestations. Large project areas (generally larger than 500 to 1,000 acres) creating green slash for 2 or more consecutive years are generally spaced over 2 miles apart from each other to help prevent bark beetle population buildup. To further reduce bark beetle occurrence, managers attempt to effectively treat slash within approximately 30 days of slash creation.

Wildfires (unplanned ignitions) are evaluated to determine if resource objectives can be achieved. If resource objectives can be achieved, appropriate strategies are determined at the time of the fire. When managing ignitions to achieve resource objectives, forest managers consider the needs and values of all resources (e.g., cultural resources, vegetation, recreation, public safety).

A protection objective or a combination of protection and resource objectives are assigned to all wildfires. The protection objective(s) may include the protection of people, private property, manmade infrastructure, or natural resources. Uncharacteristic or undesirable fire behavior due to unnatural fuel buildup, unusual environmental conditions, or proximity to infrastructure or sensitive natural resources may dictate a need for a protection objective(s) for wildfires.

## Related Plan Content for All PNVTs

See the following sections: [Air](#), [Soil](#), [Wildlife and Rare Plants](#), [Landscape Scale Disturbance Events](#), [Motorized Opportunities](#), [Forest Products](#), and [Community-Forest Intermix](#).

## Riparian Areas

### Background for Riparian Areas

Riparian areas include plant communities associated with springs, streams, ponds, lakes, and other wet areas. These areas collect and transport water, soil, and organic material from upslope and upstream. They make up the most biologically productive and diverse components of the forests' ecosystems. Fish, most wildlife, and many plant species depend on riparian areas for their existence. Riparian areas provide important habitat connectivity for terrestrial and aquatic

<sup>14</sup> The Community-Forest Intermix Management Area makes up a portion of the wildland-urban interface. See chapter 3 for information on management areas.

species. Some wildlife, such as otter and beaver, historically contributed to the maintenance of riparian areas.

Riparian areas are important because water is rare in the Southwest. Four specific PNVTs occur on the Apache-Sitgreaves NFs: montane willow riparian forest, cottonwood-willow riparian forest, mixed broadleaf deciduous riparian forest, and wetland/cienega. These riparian areas cover less than 3 percent of the forests; however, they represent a major portion of the riparian areas within the ecoregion<sup>15</sup>. Because they cover such a small area and have a shallow saturated zone beneath them, they are vulnerable to disturbance. The interface between riparian areas and uplands provides important wildlife habitat and helps filter sediment. Compared to surrounding uplands, riparian areas have characteristics (e.g., surface water, saturated soils) that reduce the frequency and [severity](#) of fire.

Montane willow riparian forested PNV, at roughly 4,800 acres, is found along approximately 1,130 miles of rivers and streams starting at about 5,000 feet in elevation and extending up to approximately 11,000 feet. At lower elevations, this riparian PNV can be found along perennial streams and seasonal or intermittent drainages. Dominant woody vegetation includes a variety of willows, narrowleaf cottonwood, and Arizona alder. Shrubs include skunkbush sumac, chokecherry, and redosier dogwood. An assortment of herbaceous species is usually present. At higher elevations, montane willow riparian areas are found along streambanks, seeps, fens, and isolated springs. Dominant woody vegetation includes a variety of willows, thinleaf alder, and currant. In many high elevation sites, nonnative Kentucky and Canada bluegrasses are the dominant herbaceous species.

Cottonwood-willow riparian forested PNV covers approximately 15,900 acres and is typically found at elevations from 5,500 to 7,500 feet along roughly 800 miles of rivers and streams in wider valley bottoms. This riparian PNV is found primarily on the Sitgreaves NF. Dominant woody species include narrowleaf cottonwood and a variety of willows. An assortment of herbaceous species is usually present.

Mixed broadleaf deciduous riparian forested PNV, at roughly 9,700 acres, is found along approximately 860 miles of rivers and streams. Elevations start around 3,500 feet and range up to approximately 6,500 feet. The vegetation is a mix of riparian woodlands and shrublands with a variety of vegetation associations. The dominant vegetation depends on a mixture of site-specific characteristics including elevation, soil type, stream gradient, and depth to groundwater. For example, one vegetation association is dominated by bigtooth maple with mixed stands of Emory oak and scattered conifers (pines and junipers). Other sites can be dominated by a mixture of woody species including: boxelder, Fremont cottonwood, Arizona sycamore, velvet ash, Arizona walnut, desert willow, and true willow species, as well as numerous shrub, grass, and forb species.

Wetland/cienega riparian areas generally occur between 5,500 and 11,000 feet elevation and cover roughly 17,900 acres. This PNV is associated with perennial springs or headwater streams, bogs, and fens where groundwater intersects the surface and creates pools of standing

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<sup>15</sup> Ecoregion sections and subsections are units in the National Hierarchy of Ecological Units ranging in size from 13 million acres (section) down to 10,000 acres (subsection) that describe areas of similar environmental and biological features. The Apache-Sitgreaves NFs is located in the White Mountains-San Francisco Peaks-Mogollon Rim ecoregion section.

water, sometimes with channels flowing between pools. Wetland/cienegas may also include high elevation meadows with subsurface flows. Vegetation composition is diverse, varies with elevation, and includes saltgrass, bentgrasses, sacaton, and bog alkaligrass at lower elevations and tufted hairgrass, mannagrasses, sedges, and spikerushes, among others, at middle and higher elevations.

All of the riparian PNVTs, except for the cottonwood-willow riparian forested PNVT, are considered departed from reference conditions. Most of this departure has occurred in response to past grazing and water diversions for agriculture. Changes in watershed conditions have resulted in altered canopy cover, including a loss of mature trees and saplings; a change in vegetation species composition, including a shift toward increasing conifer dominance; and a reduction in the amount and composition of herbaceous vegetation. In addition, riparian tree species are not successfully reproducing in many areas. During drought conditions, riparian areas are more susceptible to damage from wildfire than under normal conditions. The montane willow fire regime is severely departed from reference condition. The wetland/cienega and cottonwood-willow fire regimes are moderately departed. The mixed broadleaf deciduous riparian forest is generally within the historic fire regime.

## Desired Conditions for Riparian Areas

### Landscape Scale Desired Conditions (10,000 acres or greater)

- Natural ecological processes (e.g., flooding, scouring) promote a diverse plant structure consisting of herbaceous, shrub, and tree species of all ages and size classes necessary for the recruitment of riparian-dependent species.
- Riparian-wetland conditions maintain water-related processes (e.g., hydrologic, [hydraulic](#), geomorphic). They also maintain the physical and biological community characteristics, functions, and processes.

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

- Stream ([lotic](#)) riparian-wetland areas have vegetation, landform, or large coarse woody debris to dissipate stream energy associated with high waterflow.
- Streams and their adjacent floodplains are capable of filtering, processing, and storing sediment; aiding floodplain development; improving floodwater retention; and increasing groundwater recharge.
- Vegetation and root masses stabilize streambanks, islands, and shoreline features against the cutting action of water.
- Ponding and channel characteristics provide habitat, water depth, water duration, and the temperatures necessary for maintaining populations of riparian-dependent species and for their dispersal.
- Beavers occupy capable stream reaches and help promote the function and stability of riparian areas.
- [Lentic](#) riparian areas (e.g., wet meadows, fens, bogs) have vegetation and landform present to dissipate wind action, wave action, and overland flow from uplands.

- Wetland riparian areas are capable of filtering sediment and aiding floodplain development that contribute to water retention and groundwater recharge.
- Willows (e.g., Bebb, Geyer, Arizona) are reproducing with all age classes present.
- The spatial extent of wetlands is maintained<sup>16</sup>.
- Sedimentation and soil compaction do not negatively impact riparian areas.
- Riparian vegetation consists mostly of native species that support a wide range of vertebrate and invertebrate species and are free of invasive plant and animal species.
- Diversity and density of riparian forest vegetation provides for escape, hiding, and resting cover for wildlife and provides travelways between other habitat areas and seasonal ranges.

#### **Fine Scale Desired Conditions (less than 10 acres)**

- The ecological function of riparian areas is resilient to animal and human use.
- Floodplains and wet meadows provide sufficient herbaceous cover (55 percent or greater) and height (9 inches or longer) to trap sediment, mitigate flood energy, and provide wildlife habitat.
- Riparian areas that do not depend on geologic control features for stability have large, coarse woody debris that provides key habitat for riparian-dependent species.
- Stream bottoms that are predominantly composed of sand and gravel have large coarse woody debris which provides habitat and food and helps dissipate hydraulic energy.
- Vegetation is structurally diverse, often dense, providing for high bird species diversity and abundance, especially neotropical migratory birds. It includes large trees and snags in the cottonwood-willow and mixed broadleaf deciduous riparian forests to support species such as beaver, yellow-billed cuckoo, bald eagles, Arizona gray squirrel, and various bat species.

#### **Objectives for Riparian Areas**

- Annually, restore 200 to 500 acres toward desired composition, structure, and function of streams, floodplains, and riparian vegetation.
- Within the planning period, relocate, repair, improve, or [decommission](#) a minimum of 4 miles of [National Forest System roads](#) or [trails](#) that add sediment to streams, damage riparian vegetation, erode streambanks, cause gullies, and/or compact floodplain soils.
- Annually, [remove](#) an average of 2 miles of [unauthorized roads or trails](#) that add sediment to streams, damage riparian vegetation, erode streambanks, cause gullies, and/or compact floodplain soils.

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<sup>16</sup> The spatial extent of wetlands is delineated in the 2011 RMAP (Regional Riparian Mapping Project) found in the forests' GIS database.

- Within the planning period, enhance or restore 5 to 25 wet meadows or cienegas to proper hydrologic function and native plant and animal species composition.
- Annually, work with partners to reduce animal damage to native willows and other riparian species on an average of 5 miles of riparian habitat.

### Guidelines for Riparian Areas

- Wet meadows and active floodplains with riparian-obligate species should provide sufficient herbaceous cover (55 percent or greater) and height (6 to 9 inches or longer) to trap sediment, mitigate flood energy, stabilize banks, and provide for wildlife and plant needs.
- Ground-disturbing projects (including planned ignitions) which may degrade long term riparian conditions should be avoided.
- Wet meadows and cienegas should not be used for concentrated activities (e.g., equipment storage, forest product or mineral stockpiling, livestock handling facilities, special uses) that cause damage to soil and vegetation.
- Active grazing allotments should be managed to maintain or improve to desired riparian conditions.
- Storage of fuels and other toxicants should be located outside of riparian areas to prevent spills that could impair water quality or harm aquatic species.
- Equipment should be fueled or serviced outside of riparian areas to prevent spills that could impair water quality or harm aquatic species.
- Construction or maintenance equipment service areas should be located and treated to prevent gas, oil, or other contaminants from washing or leaching into streams.

### Other Sources of Information for Riparian Areas

- Southwestern Region FSH 2509.23, Riparian Area Handbook (Section: Standards for Riparian Dependent Resources)

### Management Approaches for Riparian Areas

Riparian areas that are emphasized for treatment occur within priority 6<sup>th</sup> level HUC watersheds and have native fish and aquatic species concerns. Riparian conditions may be improved by such techniques as removing non-riparian species, planting or restoring native species, stabilizing or eliminating roads, encouraging beaver colonization, or constructing fencing. Treatments may include restoration of hardwood and cottonwood galleries, restoration of upland conditions by removing encroaching trees and/or reducing tree densities, and restoration of infrequent fire. Large human constructed dams may be altered or removed to restore and/or improve riparian and wetland functionality. The forests maintain an inventory and assessment of wetlands.

The Apache-Sitgreaves NFs work with the Arizona Game and Fish Department (AZGFD) to minimize elk impacts to riparian vegetation and structure and to develop project design criteria to protect important habitat features such as springs, bogs, seeps, and fens. In high impact areas, partnerships may be formed to construct and maintain elk-proof fencing. The Apache-Sitgreaves

NFs work with the U.S. Fish and Wildlife Service to update existing conservation agreements (e.g., Arizona willow) and develop new ones as needed.

### **Related Plan Content for Riparian Areas**

See the following sections: [Overall Ecosystem Health](#), [Soil, Water Resources](#), [Aquatic Habitat and Species](#), [All PNVTs](#), [Wildlife and Rare Plants](#), [Dispersed Recreation Opportunities](#), [Motorized Opportunities](#), and [Nonmotorized Opportunities](#).

### **Forests: All Forested PNVTs**

#### **Background for Forests: All Forested PNVTs**

The following objectives, guidelines, and management approaches apply to ponderosa pine, dry mixed conifer, wet mixed conifer, spruce-fir, and aspen in addition to the specific direction listed in those sections.

#### **Desired Conditions for Forests: All Forested PNVTs**

See the desired conditions for ponderosa pine, dry mixed conifer, wet mixed conifer, spruce-fir, and aspen.

#### **Objectives for Forests: All Forested PNVTs**

- Annually, treat 5,000 to 35,000 acres to reduce tree densities, restore natural fire regimes, promote species habitat and ecosystem health, reduce fire hazard, maintain desired conditions, initiate recovery from uncharacteristic disturbance, and provide forest products, leaving a desired mix of species with the range of desired densities that are resilient to changing climatic conditions.

#### **Standards for Forests: All Forested PNVTs**

- [Regulated](#) timber harvest activities shall occur only on those lands classified as suitable for [timber production](#).
- If individual harvest openings created by [even-aged](#) silvicultural practices are proposed that would exceed 40 acres, then National Forest Management Act (NFMA) requirements regarding public notification and regional forester approval shall be followed. These requirements do not apply to the size of areas harvested because of catastrophes such as, but not limited to, fire, insect and disease attacks, or windstorms.
- On lands suitable for timber production, timber harvest activities shall only be used when there is reasonable assurance of restocking within 5 years after final regeneration harvest. Restocking level is prescribed in a site specific [silviculture](#) prescription for a project treatment unit and is determined to be adequate depending on the objectives and desired conditions for the plan area. In some instances, such as when lands are harvested to create openings for firebreaks and vistas or to prevent encroaching trees, it is appropriate not to restock.

- On lands suitable for timber production, [even-aged stands](#) shall have reached or surpassed [culmination of mean annual increment](#) (95 percent of culmination of mean annual increment of growth, as measured by cubic volume) prior to regeneration harvest, unless the following conditions have been identified during project development: (1) when such harvesting would assist in reducing fire hazard within the [wildland-urban interface](#), or (2) when harvesting of stands will trend landscapes toward vegetation desired conditions (e.g., uneven-aged structure).
- Harvesting systems shall be selected based on their ability to meet desired conditions and not strictly on their ability to provide the greatest dollar return.
- [Clearcutting](#) shall be used only where it is the optimum method for meeting desired conditions.

### Guidelines for Forests: All Forested PNVTs

- Where current forests are lacking proportional representation of late seral states and species composition on a landscape scale, old growth characteristics should be retained or encouraged to the greatest extent possible within the scope of meeting other desired conditions (e.g., reduce impacts from insects and disease, reduce the threat of uncharacteristic wildfire).
- Healthy southwestern white pine should be retained to maintain the wide range of genetic variability that contributes to resistance against the nonnative white pine blister rust disease.
- Tree species that are less susceptible to root disease should be retained within areas of root disease infection to reduce spread of disease.
- On single species dominated sites, [uneven-aged management](#) may be used where less than 20 percent of the host tree species—or less than 25 percent of the area—is infected by dwarf mistletoe. [Thinning](#) and under-burning may be used to keep dwarf mistletoe levels from increasing. Even-aged management or deferral should be considered when greater than 20 percent of the host species, or 25 percent of the area, is infected with dwarf mistletoe.
- On single species dominated sites, thinning should not be attempted where more than 80 percent of the host species—or 90 percent of the area—is infected with dwarf mistletoe. Regeneration and/or deferral may be used in these cases. However, in the Community-Forest Intermix Management Area additional treatment options may be used.
- On mixed species dominated sites, even-aged management or deferral should be used instead of uneven-aged management where more than 50 percent of conifer trees (excluding white fir) are infected by dwarf mistletoe.
- When thinning dwarf mistletoe infected sites, as much mistletoe should be removed as possible without sacrificing the healthiest, most desirable trees for the particular site (in some situations, this may involve retaining some lightly infected trees in the upper canopy to meet multiple resource objectives).

- Where a [seed cut](#) treatment (even-aged method to promote natural seedling establishment) is applied for dwarf mistletoe control, it should be followed within 10 years of seedling establishment by a final removal treatment or other effective means to prevent further infection.
- Where a site-specific analysis indicates the need to reduce fire-kill of desired residual trees, fuel continuity and/or loading should be reduced before use of planned ignitions.
- Trees, snags, and logs immediately adjacent to active red squirrel cone caches, Abert's squirrel nests, and raptor nests should be retained to maintain needed habitat components and provide tree groupings.
- Hiding cover, approach cover (by waters), and travel corridor cover should be provided where needed by wildlife.

### Management Approaches for Forests: All Forested PNVTs

Forest treatments occur predominantly in ponderosa pine and dry and wet mixed conifer. There is an emphasis on restoring natural fire regimes, providing wildlife species habitat needs, obtaining sustainable forest products, and/or achieving ecosystem health within priority 6<sup>th</sup> level HUC watersheds. Treatment methods (see appendix B) may include fire (using both planned and unplanned ignitions), fencing, mechanical thinning, hand thinning, planting, chemical treatments, and other silvicultural treatments. Cone-collection, tree planting, and natural regeneration are used to ensure the perpetuation of desired tree species. Mexican spotted owl and northern goshawk are management indicator species (MIS) of forest density and structure. The treatment objective listed above would contribute to species viability.

When salvaging timber where high severity fire occurred, an adequate number of trees for snag recruitment and coarse woody debris would be left to maintain long term soil productivity and to meet wildlife needs. The desired amount of snags and debris is described in the specific forested PNVt desired conditions section.

Considerations are made so that remaining trees following thinning projects are less subject to [windthrow](#). To help prevent windthrow, project managers consider : (1) soils with windthrow potential, (2) species [silvics](#) (windthrow prone), and (3) avoiding cuts which would reduce existing tree density by generally more than 66 percent in one entry, unless the remaining trees are kept in windfirm groups.

The use of fire to burn large areas is expected to be an important tool to manage some aspen and insect and disease populations. Uneven-aged management techniques are used primarily, and some even-aged management is used especially when managing species such as aspen and spruce. Even-aged treatments may be applied in the short



**Figure 3. Horton Prescribed Fire, Alpine Ranger District**

term for forest health concerns (e.g., heavy dwarf mistletoe infections) to facilitate a transition to uneven-aged management. The Apache-Sitgreaves NFs work with partners to reduce browse impacts on woody species.

### **Related Plan Content for Forests: All Forested PNVTs**

See the following sections: [All PNVTs](#), [Forests: Ponderosa Pine](#), [Forests: Dry Mixed Conifer](#), [Forests: Wet Mixed Conifer](#), [Forests: Spruce-Fir](#), [Forests: Aspen](#), [Forest Products](#), and [Community-Forest Intermix Management Area](#).

## **Forests: Ponderosa Pine**

### **Background for Forests: Ponderosa Pine**

Ponderosa pine at approximately 602,200 acres represents the largest PNVT on the Apache-Sitgreaves NFs. This PNVT generally occurs at elevations ranging from 6,000 to 9,000 feet. It is dominated by ponderosa pine and commonly includes other species such as Gambel oak, New Mexico locust, juniper, and piñon at lower elevations and more southerly aspects. Occasionally, species such as quaking aspen (aspen), southwestern white pine, Rocky Mountain Douglas-fir, white fir, and blue spruce may be present and may occur as individual trees or in small groups at higher elevations and more northerly aspects. There is typically an understory of grasses and forbs with occasional shrubs. This PNVT sometimes appears savanna-like with extensive grasslands interspersed between widely spaced [clumps](#) or individual trees. Approximately 6,000 acres of aspen are scattered across this PNVT.

This PNVT is currently (2011) severely departed from reference conditions. There are too many stands in all diameter classes with a closed canopy characteristic, and there are too few large to very large size trees with an open canopy character. Approximately 11 percent of this PNVT was reset to an early developmental state because of the 2011 Wallow Fire. The natural fire regime is also severely departed from reference conditions. Historically, fire burned relatively frequently (every 2 to 17 years) and at low intensities that kept the forest open with abundant herbaceous cover.

Some areas that appear to be ponderosa pine forest are actually historic montane/subalpine or Great Basin grasslands that have been encroached by conifer species.

### **Desired Conditions for Forests: Ponderosa Pine**

#### **Landscape Scale Desired Conditions (10,000 acres or greater)**

- The ponderosa pine forest is a mosaic of structural states ranging from young to [old trees](#). Forest structure is variable but [uneven-aged](#) and open in appearance. Sporadic areas of even-aged structure may be present on 10 percent or less of the landscape to provide structural diversity.

- The forest arrangement consists of individual trees, small clumps, and groups of trees interspersed within variably-sized openings of grasses, forbs, and shrubs. Vegetation associations are similar to reference conditions. Openings typically range from 10 percent of the area in more biologically productive sites to 70 percent in less productive sites. The size, shape, and number of trees per group and the number of groups per area vary across the landscape. Tree density may be greater in some locations, such as north-facing slopes and canyon bottoms.
- The ponderosa pine forest is composed predominantly of vigorous trees, but [declining](#), top-killed, lightning-scarred, and fire-scarred trees provide snags and coarse woody debris. Snags and coarse woody debris are well distributed throughout the landscape. Ponderosa pine snags are typically 18 inches or greater in [diameter](#) and average 1 to 2 per acre.
- Coarse woody debris, including logs, ranges from 3 to 10 tons per acre. Logs average 3 per acre within the forested area of the landscape.
- Where it naturally occurs, Gambel oak is present with all age classes represented. It is reproducing to maintain or expand its presence on capable sites across the landscape. Large Gambel oak snags are typically 10 inches or larger in diameter and are well distributed.
- Grasses, forbs, shrubs, needles, leaves, and small trees support the natural fire regime. The greater proportion (60 to 85 percent or greater) of soil cover is composed of grasses and forbs as opposed to needles and leaves.
- Old growth occurs throughout the landscape, in small, discontinuous areas consisting of clumps of old trees, or occasionally individual old trees. Other [old growth components](#) are also present including dead trees (snags), downed wood (coarse woody debris), and/or structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- Frequent, low to mixed severity fires (fire regime I), occurring approximately every 2 to 17 years, are characteristic in this PNVT.

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

- Ponderosa pine 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, resulting in less space between groups. Openings typically range from 10 percent in more productive sites to 70 percent in the less productive sites. Tree density within forested areas ranges from 20 to 80 square feet [basal area](#) per acre.
- The tree group mosaic comprises an uneven-aged forest with all age classes, size classes, and structural stages present. Occasionally, patches of even-aged forest structure are present (less than 50 acres). 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 structure in the wildland-urban interface (WUI) may have smaller, more widely spaced groups of trees than in the non-WUI areas.
- Northern [goshawk post-fledgling family areas \(PFAs\)](#) may contain 10 to 20 percent higher basal area in mid-aged to old tree groups than northern [goshawk foraging areas](#) and the surrounding forest.
- Northern [goshawk nest areas](#) have forest conditions that are multi-aged and dominated by large trees with relatively denser canopies than the surrounding forest.

#### **Fine Scale Desired Conditions (less than 10 acres)**

- Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns in the mid- to old-aged groups are interlocking or nearly interlocking providing for species such as Abert's squirrel.
- Openings surrounding tree groups are variably shaped and composed of a grass, forb, and shrub mix. Some openings may contain individual trees.
- Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Tree groups are typically less than 1 acre and average ½ acre. Mid- to old-aged tree groups consist of approximately 2 to 40 trees with interlocking canopies.
- Where Gambel oak occurs, the majority are single trunk trees over 8 inches in diameter with full crowns.

#### **Guidelines for Forests: Ponderosa Pine**

- Where Gambel oak or other native hardwood trees and shrubs are desirable to retain for diversity, treatments should improve vigor and growth of these species.
- Where consistent with project or activity objectives, canopy cover should be retained on the south and southwest sides of small, existing forest openings that are naturally cooler and moister. These small (generally one-tenth to one-quarter acre) shaded openings provide habitat conditions needed by small mammals, plants, and insects (e.g., Merriam's shrew, Mogollon clover, four-spotted skipperling butterfly). Where these openings naturally occur across a project area, these conditions should be maintained on an average of 2 or more such openings per 100 acres.

#### **Related Plan Content for Forests: Ponderosa Pine**

See the following sections: [Overall Ecosystem Health](#), [Soil](#), [All PNVTs](#), [Forests: All Forested PNVTs](#), [Forests: Aspen](#), [Wildlife and Rare Plants](#), and [Community-Forest Intermix Management Area](#).

## **Forests: Dry Mixed Conifer**

### **Background for Forests: Dry Mixed Conifer**

The forests contain two mixed conifer forested PNVTs. The dry mixed conifer PNVT burns on a more frequent cycle than the wet mixed conifer PNVT, due to the presence of shade-intolerant (fire and dry site adapted) species in the mix.

Dry mixed conifer, covering approximately 147,900 acres, typically occurs between the ponderosa pine and wet mixed conifer forests. Dry mixed conifer generally occurs at elevations between 7,000 and 10,000 feet on flat ridgetops and upper slopes of drainages and knolls. Species vary in relation to elevation and moisture availability and are mainly shade intolerant trees. In lower elevations and drier areas, Rocky Mountain Douglas-fir, Gambel oak, ponderosa pine, piñon, and juniper may codominate. In higher elevations and moister areas, ponderosa pine may codominate with Rocky Mountain Douglas-fir, aspen, white fir, southwestern white pine, and Rocky Mountain juniper. The understory can be composed of a wide variety of shrubs, grasses, sedges, rushes, and forbs depending on the soil type, aspect, elevation, disturbance history, and other factors. Over 14,000 acres of aspen are scattered across this PNVT.

This PNVT is currently (2011) highly departed from reference conditions. The forest composition has shifted toward more shade-tolerant species that are not adapted to fire, such as true firs. It also has too many stands with a closed canopy characteristic, and there is an underrepresentation of medium to very large size trees with an open canopy character. Approximately 25 percent of this PNVT was reset to an early developmental state because of the 2011 Wallow Fire. The natural fire regime is also severely departed from reference conditions. Historically, fire burned relatively frequently (every 10 to 22 years) and at low intensities. This historic regime kept the forest open and maintained fire-resistant species and an abundant herbaceous understory.

### **Desired Conditions for Forests: Dry Mixed Conifer**

#### **Landscape Scale Desired Conditions (10,000 acres or greater)**

- The dry mixed conifer forest is a mosaic of conditions composed of structural states ranging from young to old trees. Forest structure and density are similar to ponderosa pine forest. Forest appearance is variable but uneven-aged and open. Sporadic areas of even-aged structure may be present on 10 percent or less of the landscape to provide structural diversity.
- The forest arrangement consists of small clumps and groups of trees interspersed within variably-sized openings of grass, forb, and shrub vegetation associations similar to reference conditions. Openings typically range from 10 percent of the area in more biologically productive sites to 50 percent in less productive sites. Size, shape, number of trees per group, and number of groups per area are variable across the landscape. Where they naturally occur, groups of Gambel oak are healthy and maintained or increased. Tree density may be greater in some locations, such as north-facing slopes and canyon bottoms.
- The dry mixed conifer forest is composed predominantly of vigorous trees, but declining, top-killed, lightning-scarred, and fire-scarred trees provide snags and coarse woody debris. Snags and coarse woody debris are well distributed throughout the landscape. Snags are typically 18 inches in diameter or greater and average 3 per acre.

- Coarse woody debris, including logs, ranges from 5 to 15 tons per acre. Logs average three per acre within the forested area of the landscape.
- Southwestern white pine is present with the ability to reproduce on capable sites.
- Grasses, forbs, shrubs, needles, leaves, and small trees maintain the natural fire regime with a greater proportion of the soil cover as grasses and forbs as opposed to needles and leaves.
- Old growth occurs throughout the landscape, in small, discontinuous areas consisting of clumps of old trees, or occasionally individual old trees. Other old growth components are also present including dead trees (snags), downed wood (coarse woody debris), and/or structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- Frequent, low to mixed severity fires (fire regime I) occurring every 10 to 22 years are characteristic in this PNVF.

#### **Mid-Scale Desired Conditions (100 to 1,000 acres)**

- The dry mixed conifer forest is characterized by a variety of 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. Openings typically range from 10 percent in more productive sites to 50 percent in less productive sites. Tree density within forested areas ranges from 30 to 100 square feet basal area per acre.
- The mosaic of tree groups is composed of uneven-aged forest. All age classes and structural stages are present. Occasionally, there are small patches (less than 50 acres) of even-aged forest present. Disturbances sustain the overall age and structural distribution.
- Fire burns primarily on the forest floor and does not spread between tree groups as crown fire.
- Forest structure in the wildland-urban interface (WUI) may have smaller, more widely spaced groups of trees than in the non-WUI areas.
- Northern goshawk post-fledgling family areas (PFAs) may contain 10 to 20 percent higher basal area in mid-aged to old tree groups than northern goshawk foraging areas and the surrounding forest.
- Northern goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than the surrounding forest.

#### **Fine Scale Desired Conditions (less than 10 acres)**

- Trees typically occur in irregularly-shaped groups and are variably spaced with some tight clumps with crowns of mid- to old-aged trees interlocking (clumped trees) or nearly interlocking providing for species such as Abert's squirrel.

- Openings surrounding tree groups are composed of a grass, forb, and shrub mix. Some openings may contain individual trees or snags.
- Trees within groups are of similar or variable ages and one or more species. Tree group sizes typically are less than 5 acres, but often less than 1 acre, and at the mature and old stages consist of approximately 2 to 50 trees.
- Where Gambel oak occurs, the majority are single trunk trees over 8 inches in diameter with full crowns.

### **Guidelines for Forests: Dry Mixed Conifer**

- Where Gambel oak or other native hardwood trees and shrubs are desirable to retain for diversity, treatments should improve vigor and growth of these species.
  - Where consistent with project or activity objectives, canopy cover should be retained on the south and southwest sides of small, existing forest openings that are naturally cooler and moister. These small (generally one-tenth to one-quarter acre) shaded openings provide habitat conditions needed by small mammals, plants, and insects (e.g., Merriam's shrew, Mogollon clover, four-spotted skipperling butterfly). Where these openings naturally occur across a project area, these conditions should be maintained on an average of 2 or more such openings per 100 acres.
- Related Plan Content for Forests: Dry Mixed Conifer

See the following sections: [Overall Ecosystem Health](#), [Soil](#), [All PNVTs](#), [Forests: All Forested PNVTs](#), [Forests: Aspen](#), [Wildlife and Rare Plants](#), and [Community-Forest Intermix Management Area](#).

### **Forests: Wet Mixed Conifer**

#### **Background for Forests: Wet Mixed Conifer**

The forests contain two mixed conifer forested PNVTs. The wet mixed conifer PNVT burns on a less frequent cycle than the dry mixed conifer PNVT.

Wet mixed conifer, at approximately 178,000 acres, occurs at elevations between 8,500 to 10,000 feet on gentle to very steep slopes. Tree species composition varies depending on seral state, elevation, and moisture availability. This PNVT can be composed of early seral species such as aspen, Rocky Mountain Douglas-fir, New Mexico locust, southwestern white pine, and late seral species such as maple, white fir, and blue spruce. Ponderosa pine may be a minor component or absent on some locations. The absence of Engelmann spruce distinguishes this PNVT from spruce-fir. This PNVT has an understory of a wide variety of shrubs, grasses, and forbs depending on soil type, aspect, elevation, disturbance, and other factors. Herbaceous species may include, but are not limited to, red baneberry, starry false Solomon's seal, and subalpine lupine. Over 50,000 acres of aspen are scattered across this PNVT.

Natural ecological processes in this PNVT typically occur at two spatial and temporal scales: large scale infrequent ecological processes (mostly fire) and small scale frequent ecological processes (e.g., fire, insects, disease, wind).

Wet mixed conifer is currently (2011) highly departed from reference conditions. There is a lack of aspen regeneration and too few large to very large shade tolerant trees with a closed canopy characteristic. The natural fire regime is also moderately departed from reference conditions. Historic fire regimes were typically of mixed severity fires (every 35 to 50 years) and occasional high severity, stand replacing, crown fires (every 120 to 400 or more years).

### **Desired Conditions for Forests: Wet Mixed Conifer**

#### **Landscape Scale Desired Conditions (10,000 acres or greater)**

- The wet mixed conifer forest is a mosaic of structural stages and seral states ranging from young to old trees. The landscape arrangement is an assemblage of variably sized and aged groups and patches of trees and other vegetation associations similar to reference conditions.
- All seral states are present across the landscape, with each state characterized by distinct dominant species composition, biological and physical conditions, and enough of each state is present to develop into the next state progressively over time.
- Canopies are more closed than dry mixed conifer. An understory, consisting of native grass, forbs, and/or shrubs, is present.
- The wet mixed conifer forest is composed predominantly of vigorous trees, but declining, top-killed, lightning-scarred, and fire-scarred trees provide snags and coarse woody debris. Snags and coarse woody debris are well distributed throughout the landscape. The number of snags and logs and amount of coarse woody debris varies by seral state ranging from 8 to more than 16 tons per acre.
- Old growth occurs over large, continuous areas. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris), and/or structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- Mixed severity fire (fire regime III) is characteristic of this forest. High severity fires (fire regimes IV and V) rarely occur.

#### **Mid-Scale Desired Conditions (100 to 1,000 acres)**

- The size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary but are frequently hundreds of acres and rarely thousands of acres. Groups of tens of acres or less are relatively common. There is a mosaic of primarily even-aged groups and patches, which vary in size, species composition, and age. Grass, forb, and shrub openings created by disturbances may comprise 10 to 100 percent of the area depending on the type of disturbance.
- Uneven-aged groups and patches, comprising about 20 percent of this PNVT, provide for species such as the black bear and red-faced warbler that need multistoried canopies with dense low- to mid-canopy layers.
- Tree density ranges from 20 to 180 square feet basal area per acre depending upon time since disturbance and seral states of groups and patches.

- There are 20 or more snags greater than 8 inches in diameter per acre and 1 to 5 of those snags are 18 inches or greater in diameter.
- Coarse woody debris, including logs, varies by seral state, ranging from 5 to 20 tons per acre for early-seral states; 20 to 40 tons per acre for mid-seral states; and may be as high as 35 tons per acre, or greater, for late-seral states. These conditions also provide an abundance of fungi including mushrooms and truffles used by small mammals.
- Forested PNVTs in the wildland-urban interface (WUI) are dominated by early-seral, fire-adapted species growing in an overall more open condition than the surrounding forest. These conditions result in fires that burn primarily on the forest floor and rarely spread as crown fire.
- Mixed (fire regime III) and high (fire regime IV) severity fires in this PNVT, occurring every 22 to 150 years along with other disturbances, maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling. High severity fires do not exceed patches of 1,000 acres of mortality. Other smaller disturbances occur more frequently.
- Northern goshawk post-fledgling family areas (PFAs) may contain 10 to 20 percent higher basal area in mid-aged to old tree groups than northern goshawk foraging areas and the surrounding forest.
- Northern goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than the surrounding forest.

#### **Fine Scale Desired Conditions (less than 10 acres)**

- Mid-aged and older trees are typically variably spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking providing for species such as red squirrel. Trees within groups can be of similar or variable species and ages. Small openings are present as a result of disturbances.

#### **Related Plan Content for Forests: Wet Mixed Conifer**

See the following sections: [Overall Ecosystem Health](#), [Soil](#), [All PNVTs](#), [Forests: All Forested PNVTs](#), [Forests: Aspen](#), [Wildlife and Rare Plants](#), and [Community-Forest Intermix Management Area](#).

#### **Forests: Spruce-Fir**

##### **Background for Forests: Spruce-Fir**

The spruce-fir forested PNVT, at approximately 17,700 acres, is found on the coldest, wettest high elevation sites (approximately 9,500 to 11,400 feet) and within cold-air drainages at lower elevations on the Apache NF portion of the forests. The majority of this forested PNVT lies within designated wilderness areas. Spruce-fir intergrades with the wet mixed conifer PNVT at lower elevations. It is dominated by Engelmann spruce but contains other species depending on elevation. The understory commonly includes currant, Scouler's willow, honeysuckle, common juniper, huckleberry, alpine clover, and sedges. Approximately 6,000 acres of aspen are scattered across this PNVT.

Spruce-fir is currently (2011) highly departed from reference conditions. There is a lack of aspen regeneration and too few large to very shade tolerant, large size trees with closed canopies. The natural fire regime is also moderately departed from reference conditions. Historically, principal ecological process factors were insects, disease, and wind followed by infrequent high severity fires. Natural ecological processes in this PNVF typically occur at two temporal and spatial scales: large scale infrequent disturbances (mostly fire, which occurred every 150 to 400 years) and small scale frequent disturbances (e.g., fire, insects, disease, wind).

### **Desired Conditions for Forests: Spruce-Fir**

#### **Landscape Scale Desired Conditions (10,000 acres or greater)**

- The spruce-fir forest is a mosaic of structural stages and seral states ranging from young to old trees and is composed of multiple species. The landscape arrangement is an assemblage of variably sized and aged groups and patches of trees and other vegetation similar to reference conditions.
- Tree canopies in this forest are closed. An understory, consisting of native grass, forbs, and/or shrubs, is present in early seral states and is replaced by trees in later seral states.
- The spruce-fir forest is composed predominantly of vigorous trees, but declining top-killed, lightning-scarred, and fire-scarred trees provide snags and coarse woody debris. Snags and coarse woody debris are well distributed throughout the landscape.
- Corkbark fir is present with the ability to reproduce on late-seral sites appropriate for the species.
- Old growth occurs over large, continuous areas. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris), and/or structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- In the spruce-fir PNVF, mixed to high severity fires (fire regimes III and IV) occur infrequently.

#### **Mid-Scale Desired Conditions (100 to 1,000 acres)**

- The size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary but are mostly hundreds of acres and rarely thousands of acres. There may be frequent small disturbances resulting in groups of tens of acres or less. A mosaic of primarily even-aged groups and patches, which vary in size, species composition, and age is present. Grass, forb, and shrub openings created by disturbances may comprise 10 to 100 percent of the area depending on time since disturbances. Aspen is occasionally present in large patches.
- Uneven-aged groups and patches, comprising about 20 percent of this PNVF, provide for species such as the MacGillivray's warbler and Swainson's thrush that need multistoried canopies with dense low- to mid-canopy layers.
- Tree density ranges from 20 to 250 square feet basal area per acre, depending upon disturbance and seral states of the groups and patches.

- In general, there are 13 to 30 snags greater than 8 inches in diameter per acre and 1 to 3 of those snags are 18 inches or greater in diameter.
- Coarse woody debris, including logs, varies by seral state, ranging from 5 to 30 tons per acre for early-seral states; 30 to 40 tons per acre for mid-seral states; and 40 tons per acre or greater for late-seral states. These conditions also provide an abundance of fungi including mushrooms and truffles used by small mammals.
- The wildland-urban interface (WUI) is comprised primarily of grass/forb/shrub vegetation. Structures in the WUI are surrounded by grassy openings with very few or no trees. These conditions result in ground fires.
- Mixed and high severity fires (fire regime III and IV)—occurring every 150 to 400 years—along with other disturbances maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.
- Northern goshawk post-fledgling family areas (PFAs) may contain 10 to 20 percent higher basal area in mid-aged to old tree groups than northern goshawk foraging areas and the surrounding forest.
- Northern goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than the surrounding forest.

#### **Fine Scale Desired Conditions (less than 10 acres)**

- Mid-aged to old trees grow tightly together with interlocking crowns. They are of the same size and/or age class in early group/patch development. In late development, they may be multilayered. Small openings are present as a result of localized disturbances (e.g., wind, disease).

#### **Related Plan Content for Forests: Spruce-Fir**

See the following sections: [Overall Ecosystem Health](#), [Soil](#), [All PNVTs](#), [Forests: All Forested PNVTs](#), [Forests: Aspen](#), [Wildlife and Rare Plants](#), and [Community-Forest Intermix Management Area](#).

### **Forests: Aspen**

#### **Background for Forests: Aspen**

Aspen (quaking aspen) occurs as a species within the conifer forested PNVTs. As a species, aspen is adapted to a much broader range of environmental conditions than most plant species associated with it. This highly variable ecological community can be comprised mostly of aspen (roughly 24,000 acres) or aspen codominating with few to several conifer species (roughly 52,000 acres). At lower elevations, conifers include ponderosa pine, Rocky Mountain Douglas-fir, and white fir. At middle elevations, conifers include Rocky Mountain Douglas-fir, white fir, blue spruce, southwestern white pine, and ponderosa pine. Rocky Mountain juniper can also be present. At higher elevations, conifers include Rocky Mountain Douglas-fir, southwestern white pine, subalpine fir, corkbark fir, and Engelmann spruce.

Although approximately one-third of aspen is comprised of seedlings and saplings, the majority are 10 inches or greater in diameter and exist in a closed canopy situation. This would indicate that most of the aspen on forests are mature trees and are being over-topped by conifers within the individual forested PNVTs. This situation, coupled with other factors such as fire suppression, herbivory, and natural forest succession, places aspen at risk.

Aspen may exist in single storied or, more commonly, multistoried stands depending on disturbance history and local stand dynamics. Historically, aspen suckers were common. Aspen stands are usually closed canopied. The understory structure may be complex with multiple shrub and herbaceous layers, or simple with just an herbaceous layer. The herbaceous layer may be dense or sparse, dominated by grasses and grass-like plants or forbs. Some of the species typically found associated with aspen include: bracken fern, Arizona peavine, meadow rue, deer's ears, yarrow, violet, paintbrush, arnica, and several grasses and sedges. Decaying coarse woody debris is common.



**Figure 4. Ecological diversity provided by a healthy, mature aspen stand**

Aspen stands are typically moister and cooler, supporting a greater abundance of plants, fungi, invertebrates, mammals, and cavity-nesting bird species than the surrounding forest. Even small aspen groups provide this unique habitat. Aspen is second only to riparian ecosystems in biological diversity and supports more bird species than other forested areas in the Southwest. Relatively pure aspen stands may function as natural firebreaks across the landscape, support watershed stability, and contribute to scenic landscapes.

Aspen is a disturbance dependent species adapted to fire. Without regular fire or with high levels of herbivory, conifers will replace the aspen. As a result, this type is significantly altered today and is very difficult to identify because of conifer encroachment. The presence of even a single aspen tree in a conifer stand provides strong evidence that the area historically supported aspen.

Fire regimes for aspen are determined by the adjacent forested PNVT, with fire return intervals ranging from 2 to 20 years at low elevation in ponderosa pine, to 10 to 30 years for mixed conifer at middle elevations, and up to 30 to 400 years for spruce-fir. Both spruce-fir and mixed conifer forested PNVTs have mixed severity fire regimes, experiencing both frequent, low intensity surface fires, as well as infrequent, stand replacing crown fires. Overall, aspen is an important successional community in ponderosa pine, mixed conifer, and spruce-fir PNVTs. Aspen is primarily affected by fire, wind, insects, disease, pathogens, herbivores, and climate interactions.

The decline in aspen throughout its western range is an ecological concern. This declining trend has been noted for the past 50 years, but aspen mortality has become more pronounced since about 2002. Not only are trees dying, but their clonal root systems are dying as well. Several factors have been hypothesized as causal agents in the decline of aspen: fire suppression, conifer competition, ungulate browsing, drought, insects, pathogens, and climate change.

## Desired Conditions for Forests: Aspen

### Landscape Scale Desired Conditions (10,000 acres or greater)

- Areas of aspen occur across the forested landscape and are successfully regenerating and being recruited into older and larger size classes. Size classes have a natural distribution, with the greatest number of stems in the smaller size classes.

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

- Aspen may comprise 10 to 100 percent of the area depending on disturbance (e.g., fire, insects, silvicultural treatments) in multistoried patches.
- As an early seral species, aspen reproduction and recruitment benefit from low severity surface fires in association with ponderosa pine and dry mixed conifer PNVTs, and mixed-severity fires in association with wet mixed conifer and spruce-fir PNVTs.

### Objectives for Forests: Aspen

- Aspen dominated and codominated acres within forested PNVTs, representing a range of age classes, are maintained on at least 50,000 acres during the planning period.

### Guidelines for Forests: Aspen

- To preclude concentrated herbivore impacts, new surface water development should not be constructed within proximity to aspen stands (approximately ¼ mile).
- Restoration of [aspen clones](#) should occur where aspen is over mature or in decline to maintain a sustainable presence of this species at the landscape level.
- When managing for early seral states, competing conifers should be removed from aspen stands when needed to increase aspen longevity and increase diversity of aspen age classes.
- Aspen restoration and retention efforts should include measures to ensure viability of the aspen stand.

### Management Approaches for Forests: Aspen

The forests work with the AZGFD to address concerns about aspen reestablishment in both the short and long term. Where appropriate, aspen may be seeded, planted, or transplanted. Both planned and unplanned ignitions, sometimes over large acreages, may be used for regeneration or maintenance of aspen. Management activities that kill or stress overstory trees (e.g., clearcutting, fire) may be used since they mimic natural disturbances and enhance aspen regeneration. Aspen restoration efforts may include providing/improving substitute forage away from aspen, removing conifer competition, fencing to exclude ungulates, and range management practices (e.g., salt locations, herding).

### **Related Plan Content for Forests: Aspen**

See the following sections: [Overall Ecosystem Health](#), [Soil](#), [All PNVTs](#), [Forests: All Forested PNVTs](#), [Forests: Ponderosa Pine](#), [Forests: Dry Mixed Conifer](#), [Forests: Wet Mixed Conifer](#), [Forests: Spruce-Fir](#), [Wildlife and Rare Plants](#), and [Livestock Grazing](#).

### **Woodlands: All Woodland PNVTs**

#### **Background for Woodlands: All Woodland PNVTs**

The following objectives, guidelines, and management approaches apply to Madrean pine-oak and piñon-juniper woodland PNVTs in addition to the specific direction listed in those sections.

#### **Desired Conditions for Woodlands: All Woodland PNVTs**

See the desired conditions for Madrean pine-oak and piñon-juniper woodland PNVTs.

#### **Objectives for Woodlands: All Woodland PNVTs**

- Annually, treat or maintain 5,000 to 15,000 acres to promote a highly diverse structure.

#### **Guidelines for Woodlands: All Woodland PNVTs**

- Mechanical restoration of woodlands should emphasize individual tree removal to limit ground disturbance.
- Tree species that are less susceptible to root disease should be retained within areas of root disease infection to reduce spread of disease.
- Treatments should leave single or small groups of medium to large trees that are widely spaced with expanses of herbaceous vegetation and coarse woody debris to provide for soil productivity and wildlife needs.
- Hiding cover, approach cover (by waters), and travel corridor cover should be provided where needed by wildlife.

#### **Management Approaches for Woodlands: All Woodland PNVTs**

Treatment methods may include burning, mechanical thinning, hand thinning, leaving woody debris scattered across the ground, soil erosion control, stabilizing gullies to restore water tables, planting grass, and chemical treatments. The majority of treatments are focused in the Madrean pine-oak woodlands (primarily burning) with some treatments occurring in piñon-juniper.

Treated (cut, burned) alligator juniper and other resprouting species may require followup and possibly repeat treatments in order to meet project objectives. Terrestrial ecosystem survey information is useful to identify areas where burning is the most effective management tool.

## **Woodlands: Madrean Pine-Oak**

### **Background for Woodlands: Madrean Pine-Oak**

Madrean pine-oak woodlands, at roughly 394,900 acres, cover nearly 20 percent of the Apache-Sitgreaves NFs and usually occupy foothills and mountain slopes. Elevations range from approximately 4,000 to 7,000 feet. These woodlands consist of an open to closed canopy of evergreen oaks and various conifers, including gray oak, Emory oak, and alligator juniper. Beneath the canopy, there are annual and perennial grasses, forbs, shrubs, and [half-shrubs](#).

Currently (2011), the Madrean pine-oak woodland is highly departed from reference conditions. There are too many acres of closed canopy conditions consisting of small, medium, or large trees. Medium to very large trees with herbaceous understory and open canopy are lacking. The fire regime is also severely departed from reference conditions. Low severity surface fires frequently (every 3 to 8 years) burned through this PNVNT maintaining an open stand structure.

Some areas that appear to be Madrean pine-oak woodlands are actually historic semi-desert grasslands that have been encroached by woody species.

### **Desired Conditions for Woodlands: Madrean Pine-Oak**

#### **Landscape Scale Desired Conditions (10,000 acres or greater)**

- A mix of ages, heights, and groupings of trees create a mosaic across the landscape.
- This woodland has an open canopy consisting of large trees and an herbaceous understory, with some groups of closed canopy. Overall, canopy cover is 10 to 50 percent.
- Snags, averaging 1 to 2 per acre, and older trees are scattered across the landscape. Coarse woody debris averages 1 to 5 tons per acre.
- Understory vegetation includes evergreen oaks, mountain mahogany, grasses, and forbs.
- Ground cover consists of perennial grasses and forbs that frequently carry fire through the landscape.
- Fires are typically of low or occasionally moderate severity (fire regime I) and occur every 5 to 20 years.

#### **Mid-Scale Desired Conditions (100 to 1,000 acres)**

- Some large patches in the Madrean pine-oak woodland are closed canopy, have multiple age classes, and old growth-like characteristics (e.g., numerous snags, large coarse woody debris) in order to provide for wildlife such as Mexican spotted owl and black bear that need denser habitat.

- The size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary but are mostly tens of acres, with rare disturbances of hundreds of acres. There may be frequent small disturbances resulting in groups and patches of tens of acres or less. A mosaic of groups and patches of trees, primarily even-aged, that are variable in size, species composition, and age, is present. Grass, forb, and shrub openings created by disturbance may comprise 10 to 100 percent of the area depending on the disturbances.
- Woodland densities range from 15 to 50 square feet basal area per acre.
- Grasses, forbs, shrubs, leaves, needles, and small trees maintain the natural fire regime with a greater proportion of the soil cover as grasses and forbs as opposed to leaves and needles.

#### **Fine Scale Desired Conditions (less than 10 acres)**

- Single large trees or small groups are widely spaced between large expanses of herbaceous vegetation and shrubs.

#### **Guidelines for Woodlands: Madrean Pine-Oak**

- Where Mexican spotted owls are found nesting in canyons or on north slopes within the Madrean pine-oak woodland, adjacent treatments should be modified to meet the needs of foraging owls consistent with the species' recovery plan.

#### **Related Plan Content for Woodlands: Madrean Pine-Oak**

See the following sections: [Overall Ecosystem Health](#), [Soil](#), [All PNVTs](#), [Woodlands: All Woodland PNVTs](#), [Wildlife and Rare Plants](#), and [Forest Products](#).

### **Woodlands: Piñon-Juniper**

#### **Background for Woodlands: Piñon-Juniper**

At roughly 222,200 acres, this woodland PNVT is mostly found on lower slopes of mountains and upland rolling hills at approximately 4,500 to 7,500 feet in elevation. The most common pine is the piñon. The juniper component is a variable mix of one-seed, Utah, alligator, and Rocky Mountain. In addition, annual and perennial grasses, forbs, shrubs, and half-shrubs can be found beneath the more open woodland canopy. Species composition and stand structure vary by location primarily due to precipitation, natural ecological processes, elevation, temperature, and soil type.

The piñon-juniper woodland can be divided into two subgroups: savanna and persistent woodland. Savanna, with an herbaceous-dominated understory, generally occurs on flats, basins, gentler east-, south-, and west-facing foothills, gentle uplands, and transitional valleys at generally lower elevations. The soils associated with savanna are moderately deep to deep and biologically productive. The persistent woodland, having a sparse discontinuous understory of some grasses and/or shrubs, generally occurs on flats, ridgetops, rugged uplands, and steep slopes at various elevations, and occurs on soils that are shallow and rocky.

Current (2011) conditions within the piñon-juniper woodland are slightly departed from reference conditions. There are too many medium to very large trees with open canopies and a lack of herbaceous species and small to medium size trees with open or closed canopies. The current fire regime is similar to reference conditions.

Many areas that appear to be piñon-juniper woodland are actually historic Great Basin grassland that has been encroached by woody species.

### **Desired Conditions for Woodlands: Piñon-Juniper – Savanna**

#### **Landscape Scale Desired Conditions (10,000 acres or greater)**

- The piñon-juniper savanna is open in appearance with trees occurring as individuals or in small groups and ranging from young to old. Overall, tree canopy cover is 10 to 15 percent, but may range up to 30 percent.
- Scattered shrubs and a continuous herbaceous understory, including native grasses, forbs, and annuals, are present to support a [natural fire regime](#).
- Most areas provide dense herbaceous vegetation cover (55 percent or more). Locations with Gunnison’s prairie dog colonies have less ground cover.
- Old growth occurs in isolated locations scattered throughout the landscape, as individual old trees or as clumps of old trees. Other old growth components may also be present including dead trees (snags), downed wood (coarse woody debris), and/or structural diversity.
- Fires are low to mixed severity (fire regime I), occurring every 1 to 35 years.

### **Desired Conditions for Woodlands: Piñon-Juniper – Persistent Woodland**

#### **Landscape Scale Desired Conditions (10,000 acres or greater)**

- A mix of ages, heights, and groupings of trees create a mosaic across the landscape.
- Tree density (350 to 1,600 trees per acre) and canopy cover is closed (30 to 65 percent), shrubs are sparse to moderate, and herbaceous cover is patchy.
- Snags, averaging one to two per acre, and older trees with dead limbs and tops are scattered across the landscape. Coarse woody debris averages 2 to 5 tons per acre.
- Old growth includes old trees, dead trees (snags), downed wood (coarse woody debris), and/or structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- Fire is less frequent and more variable than in the savanna due to patchiness of ground cover. The fires that do occur are mixed to high severity (fire regimes III, IV, and V).

#### **Mid-Scale Desired Conditions (100 to 1,000 acres)**

- Grass and forb cover is maximized, based on site capability, to protect and enrich soils.

## Related Plan Content for Woodlands: Piñon-Juniper

See the following sections: [Overall Ecosystem Health](#), [Soil](#), [All PNVTs](#), [Woodlands: All Woodland PNVTs](#), [Wildlife and Rare Plants](#), and [Community-Forest Intermix Management Area](#).

## Grasslands

### Background for Grasslands

There are three grassland PNVTs: semi-desert, Great Basin, and montane/subalpine. Grasslands are characterized by less than 10 percent tree and/or shrub cover.

The semi-desert grassland PNVT encompasses roughly 107,000 acres and occurs below the Mogollon Rim at elevations ranging from approximately 3,200 to 4,500 feet. They are bounded by Chihuahuan Desert at the lowest elevations and Madrean pine-oak woodland or interior chaparral at the higher elevations. Species composition and dominance varies based on soils and topography. Dominant grassland species include: black grama, blue grama, hairy grama, tobosa, threeawns, and mixed native perennial forbs. Shrubs also inhabit these grasslands, and their abundance and species composition also varies; however, juniper and mesquite are the most common woody species.

The Great Basin grassland PNVT encompasses roughly 185,500 acres and is limited to lower elevations above the Mogollon Rim. It is higher in elevation (approximately 5,500 to 7,500 feet) and climatically cooler and moister than semi-desert grasslands and is adjacent to and intermingles with piñon-juniper savanna ecosystems. Vegetation consists mostly of grasses and forbs with interspersed shrubs. Grass species may include, but are not limited to, Indian ricegrass, threeawns, blue grama, needle and thread, New Mexico feathergrass, green needlegrass, *Muhlenbergia* species, James' galleta, little bluestem, western wheatgrass, and sand dropseed. Shrub and half-shrub species may include, but are not limited to, fourwing saltbush, winterfat, serviceberry, rabbitbrush, fringed sage, and snakeweed. Piñon pines and junipers are the most commonly encroaching trees.

The montane/subalpine grassland PNVTs, at roughly 51,600 acres, typically occur at elevations ranging from approximately 7,500 to 11,400 feet on gentle to steep slopes. These grasslands contain a mix of species that varies based on moisture. Common species at higher elevations in more moist sites include tufted hairgrass, southwest fescue, Nebraska sedge, yarrow, dryspike sedge, Baltic rush, and nonnative Canada and Kentucky bluegrasses. The more dry upland sites are dominated by mutton bluegrass, Arizona fescue, pine dropseed, mountain muhly, White Mountain sedge, southwest fescue, woolly cinquefoil, and small-leaf pussytoes. Common species at lower elevations in more moist sites include Canada and Kentucky bluegrasses, spike muhly, spreading fleabane, annual *Muhlenbergia* species, white clover, yarrow, and dandelion. The more dry upland sites at lower elevations are dominated by pine dropseed, blue grama, spreading fleabane, prairie junegrass, White Mountain sedge, annual *Muhlenbergia* species, and Fendler's sandwort. Trees may occur along the periphery of these grasslands, primarily ponderosa pine, southwestern white pine, aspen, Engelmann spruce, and subalpine fir, depending on elevation and moisture gradient. Some shrubs may also be present.

Healthy grasslands are important habitat for a variety of wildlife species and are essential to maintain pronghorn antelope populations. Grasslands of the Apache-Sitgreaves NFs have undergone dramatic changes over the last 130 years. Changes include: encroachment by trees and shrubs, loss of perennial grass cover, loss of cool season species, increase in exposed soil surface,

and the spread of nonnative species. Over 75 percent of the semi-desert and 65 percent of the Great Basin grasslands have been encroached by woody species. Fire plays a key role in the maintenance of the forests' grasslands. Currently (2011), the three grasslands all show departure from reference conditions in structure and composition, with both semi-desert and Great Basin highly departed, and montane/subalpine grasslands moderately departed. Fire historically occurred every 10 to 30 years in the Great Basin and 2 to 10 years in the semi-desert. In the montane/subalpine grasslands, fire occurred every 2 to 400 years (depending on the adjacent forested PNVT).

Many areas that appear to be forest or woodland are actually historic grassland that has been encroached by woody species.

## Desired Conditions for Grasslands

### Landscape Scale Desired Conditions (10,000 acres or greater)

- Perennial herbaceous species dominate and include native grasses, grass-like plants (sedges and rushes), and forbs, and in some locations, a diversity of shrubs.
- The extent, abundance, cover, and composition of grasslands is maintained or reestablished and moving closer to reference conditions. Ground cover is 35 percent or greater and herbaceous vegetation height ranges from 10 to 31 inches<sup>17</sup> depending on grassland type.
- Prairie dogs are present and support healthy grassland soil development and the diversity of other species associated with them such as the western burrowing owl.
- Litter provides for and maintains the natural fire regime (fire regime I). In semi-desert grasslands, the natural fire return interval is approximately every 2 to 10 years. In Great Basin grasslands the natural fire return interval is approximately every 10 to 30 years. In montane/subalpine grasslands it ranges from approximately 2 to 400 years, depending on the adjacent forested PNVT.
- Landscapes associated with montane/subalpine grasslands vary from natural appearing where human activities do not stand out (high [scenic integrity](#)) to unaltered where only natural ecological changes occur (very high scenic integrity).

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

- Woody (tree and shrub) canopy cover is less than 10 percent.
- Vegetative cover (herbaceous ground cover and litter) is between 45 and 80 percent in Great Basin grasslands, 35 to 70 percent in semi-desert grasslands, and 60 to 100 percent in montane/subalpine grasslands. These percentages may vary depending on the amount of surface rock as described in each ecological mapping unit<sup>18</sup>.

<sup>17</sup> Measured on ungrazed plants as an indicator of vigor.

<sup>18</sup> As described in the "Terrestrial Ecosystem Survey for the Apache-Sitgreaves National Forests" (Laing et al., 1987).

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

- Average ungrazed grass height varies by grassland PNVT and yearly weather conditions. Grass heights range from 11 to 26 inches in Great Basin grasslands, 10 to 25 inches in montane/subalpine grasslands, and 13 to 31 inches in semi-desert grasslands.
- During the critical pronghorn fawning period (May through June<sup>19</sup>), cool season grasses and forbs provide nutritional forage; while shrubs and standing grass growth from the previous year provide adequate hiding cover (10 to 18 inches) to protect fawns from predation.

**Objectives for Grasslands**

- Decrease or maintain the woody canopy cover at less than 10 percent by treating up to 25,000 acres annually.

**Standards for Grasslands**

- A moderate to high similarity<sup>20</sup> to vegetation climax conditions for plant canopy cover and composition as described in each ecological mapping unit shall be achieved and/or maintained.

**Guidelines for Grasslands**

- Restoration treatment of grasslands should result in a woody canopy cover of less than 10 percent; more than one treatment may be required.
- Grasslands and openings should provide for sufficient vegetative ground cover (45 percent or greater in Great Basin grasslands, 35 percent or greater in semi-desert grasslands, and 60 percent or greater in montane/subalpine grasslands) to prevent accelerated erosion, dissipate rainfall, facilitate the natural fire regime, and provide wildlife and insect habitat.
- Mechanical restoration of grasslands should emphasize individual tree removal to limit soil disturbance.
- New fence construction or reconstruction where pronghorn antelope may be present should have a barbless bottom wire which is 18 inches from the ground to facilitate movement between pastures and other fenced areas. Pole and other types of fences should also provide for pronghorn antelope passage where they are present.

<sup>19</sup> Fawning may extend through mid-July in the high elevation montane/subalpine grasslands.

<sup>20</sup> Similarity refers to a method of comparing plant canopy cover and composition of the existing plant community to the potential or climax plant community as described by ecological unit in the “Terrestrial Ecosystem Survey for the Apache-Sitgreaves National Forests” (Laing et al., 1987). Similarity is further described in FSH 2090.11 (1.47a - Ecological Status). Methodology for estimating similarity is found in the Region 3 Rangeland Analysis and Management Training Guide, July 1999.

- Pronghorn antelope fence and other crossings should be installed along known movement corridors to prevent habitat fragmentation.

### **Management Approaches for Grasslands**

The management approach is to maintain and improve grasslands by eliminating competing conifers, leaving woody debris scattered across the ground, stabilizing gullies to restore water tables, and reseeding with native species. Treatments are located in restorable and treatable grasslands, primarily in the Great Basin and semi-desert grassland PNVTs. Obliteration and rehabilitation of unauthorized roads and trails may be needed. There is an emphasis to provide enough grass to reduce topsoil loss and allow fire to spread and resume its role in maintaining grasslands. Pronghorn antelope is a management indicator species (MIS) for grassland restoration. The treatment objective listed above would contribute to their viability.

### **Related Plan Content for Grasslands**

See the following sections: [Overall Ecosystem Health](#), [Soil](#), [All PNVTs](#), [Wildlife and Rare Plants](#), [Scenic Resources](#), and [Livestock Grazing](#).

## **Interior Chaparral**

### **Background for Interior Chaparral**

The interior chaparral PNVT, at roughly 56,000 acres, is typically found on mountain foothills and lower slopes where desert landscapes transition into Madrean pine-oak woodlands. Typically, interior chaparral is structurally uniform and dominated by shrubs with thick, stiff, waxy evergreen leaves. Mixed shrub associations include: manzanita, desert ceanothus, mountain mahogany, siltkassel, Stansbury cliffrose, yerba de pasmo, evergreen oaks, Arizona cypress, sumacs, and various cacti. Grasses are a minor component in chaparral and may include bullgrass and longtongue muhly.

Current (2011) interior chaparral composition, structure, and fire regime are similar to reference conditions. However, nonnative invasive species, such as mullein, are infesting a portion of the chaparral PNVT.

### **Desired Conditions for Interior Chaparral**

- In the early seral state, chaparral contains an herbaceous component in the understory. Later seral states are dense, nearly impenetrable thickets with considerable leaf litter. Standing dead material may accumulate in areas that have not burned for several decades. Chaparral is in a constant state of transition from early to late seral state and back again, with fire being the major ecological process.
- Ground cover consists primarily (85 to 95 percent) of shrub litter (e.g., small stems, leaves).
- The majority (85 to 95 percent) of chaparral is closed canopy with some openings of grasses and forbs.
- High severity fires occur every 20 to 100 years (fire regime IV) in a mosaic pattern.

## Management Approach for Interior Chaparral

Since the interior chaparral is the PNVNT closest to reference conditions, the management approach is to maintain that condition into the future, primarily by using fire (unplanned and planned ignitions).

## Related Plan Content for Interior Chaparral

See the following sections: [Overall Ecosystem Health](#), [Soil](#), [All PNVNTs](#), and [Wildlife and Rare Plants](#) .

## Wildlife and Rare Plants

### Background for Wildlife and Rare Plants

The great variety of habitats found on the Apache-Sitgreaves NFs provide for a wide diversity of plant and animal species.

Preliminary estimates account for over 500 wildlife species including 14 native fish, 13 amphibians, 36 reptiles, and more than 300 birds and 100 mammals. Over 2,000 species of plants have been identified, including nonvascular species like mosses and fungi. The forests currently (2012) have 13 federally listed species under the Endangered Species Act of 1973 (Public Law 93-205), 8 with proposed or designated [critical habitat](#). An additional four species are candidates being considered for Federal listing. Three areas have been identified by the National Audubon Society for their great diversity of breeding and migratory bird species. These are known as important bird

areas (IBAs). The Mogollon Rim Snowmelt Draws IBA is located on the west side of the forests on the Black Mesa Ranger District, overlapping onto the Coconino National Forest. The Blue and San Francisco Rivers IBA is located on the Alpine and Clifton Ranger Districts. The Upper Little Colorado River IBA on the Springerville Ranger District includes its east, west, and south fork tributaries and extends off the forests to include the AZGFD Wenima Wildlife Area. While these areas provide exceptional birding opportunities, they carry no management obligations or restrictions for the forests.

The modified landscape of the Apache-Sitgreaves NFs does not support the patterns of native species distribution and abundance it once did. Some species are no longer found on the forests (e.g., Merriam elk, grizzly bear) and once common species are now found in limited locations (e.g., California floater, Bebb willow). On the other hand, some species such as Abert's squirrels may be more abundant today than historically. Other species have been introduced, such as Rocky Mountain elk and crayfish. In recent years, management changes (e.g., stream buffers for thinning and burning, activity timing restrictions, adjustments in livestock numbers and seasons) have



**Figure 5. Golden-crowned kinglet.**  
© Photo courtesy of Nick Saunders.

been made to improve habitat. In addition, efforts are underway to restore a number of species including the Chiricahua leopard frog and Mexican wolf.

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, refuges (e.g., wildlife quiet areas, unroaded areas) or unique habitats are necessary to sustain other species.

This section addresses primarily terrestrial species. The “Aquatic Habitat and Species” section addresses fish and other aquatic dependent species. Other sections of the plan address many habitat components and species’ needs. Additional considerations are included here.

### **Desired Conditions for Wildlife and Rare Plants**

#### **Landscape Scale Desired Conditions (10,000 acres or greater)**

- Habitat conditions contribute to the recovery of federally listed species.
- Habitat is well distributed and connected.

#### **Mid-Scale Desired Conditions (100 to 1,000 acres)**

- Wildlife are free from harassment and disturbance at a scale that impacts vital functions (e.g., breeding, rearing young) that could affect persistence of the species.

#### **Fine Scale Desired Conditions (less than 10 acres)**

- Collection of animals and plants does not negatively impact species abundance.
- Localized rare plant and animal communities are intact and functioning.

### **Objectives for Wildlife and Rare Plants**

- Annually, improve wildlife connectivity by removing at least five unneeded structures (e.g., fence).

### **Guidelines for Wildlife and Rare Plants**

- Management activities should not contribute to the trend toward Federal listing.
- Habitat management objectives and species protection measures from approved recovery plans should be applied to activities occurring within federally listed species habitat.
- Measures (e.g., fencing, planting/translocation, research) should be implemented to help ensure regional forester identified sensitive species do not trend toward Federal listing.

- Modifications, mitigations, or other measures should be incorporated to reduce negative impacts to plants, animals, and their habitats and to help provide for species needs, consistent with project or activity objectives.
- A minimum of six nest areas (known and replacement) should be located per northern goshawk territory. Northern goshawk nest and replacement nest areas should be located around active nests, in drainages, at the base of slopes, and on northerly (northwest to northeast) aspects. Nest areas should be 25 to 30 acres each in size.
- Northern goshawk post-fledgling family areas (PFAs) of approximately 420 acres in size should be designated around the nest sites.
- During treatments, snags should be retained in the largest diameter classes available as needed to meet wildlife or other resource needs.
- Cool and/or dense vegetation cover should be provided for species needing these habitat components (e.g., Goodding's onion, black bear, White Mountains chipmunk).
- Active raptor nests should be protected from treatments and disturbance during the nesting season to provide for successful reproduction. Specifically for northern goshawk nest areas, human presence should be minimized during nesting season of March 1 through September 30.
- Any action likely to cause a disturbance and take to bald and golden eagles in nesting and young rearing areas should be avoided per the Bald and Golden Eagle Protection Act.
- Prairie dog controls should not be authorized except when consistent with approved State of Arizona Gunnison's prairie dog conservation strategies.
- Rare, unique habitats (e.g., talus slopes, cliffs, canyon slopes, caves, fens, bogs, [sinkholes](#)) should be protected.
- The needs of localized species (e.g., New Mexico meadow jumping mouse, Bebb willow, White Mountains paintbrush) should be considered and provided for during project activities to ensure their limited or specialized habitats are not lost.
- Spike camps (i.e., a remote camp usually near a [fireline](#)) should be located to avoid disturbance to critical species.
- Constructed features should be maintained to standard or removed when no longer needed.

### Other Sources of Information for Wildlife and Rare Plants

- Species Recovery Plans (see appendix D)
- Arizona's Comprehensive Wildlife Conservation Strategy 2005-2015. Arizona Game and Fish Department (Sections: Wildlife and Habitats; Stressors the Impact Wildlife and Habitat; Ecoregion-Specific Habitat Conditions; Conservation Actions to Address Stressors to Habitat; and Monitoring Habitat Condition and Wildlife).
- Birds of Conservation Concern. U.S. Fish and Wildlife Service, Division of Migratory Birds. Bird Conservation Regions (BCRs) 16 and 34.

- Interagency Management Plan for Gunnison's Prairie Dogs in Arizona. Arizona Game and Fish Department, Nongame and Endangered Wildlife Program (Sections: Conservation Objectives and Actions).
- Arizona Partners in Flight Conservation Plan. Arizona Game and Fish Department, Nongame and Endangered Wildlife Program. Technical Report 142 (Chapter V).
- Western Hummingbird Partnership Action Plan. U.S. Forest Service and the Hummingbird Monitoring Network (Section V – Conservation Actions).
- Conservation Assessment and Strategy for the Bald Eagle in Arizona, specifically Interagency MOU, Nest Watch Program (Sections: Post-Delisting Nest Area Monitoring, Winter Roost and Counts, Strategies Regarding Maintenance of Existing and Establishment of New Breeding Closures, Recreation, and Development).
- Candidate Species Analysis and Recommended Action Plan. U.S. Forest Service and U.S. Fish and Wildlife Service. New Mexico meadow jumping mouse.
- Conservation assessments/strategies and agreements with the U.S. Fish and Wildlife Service (bluehead sucker, Little Colorado River sucker, roundtail chub, Goodding's onion, and Arizona willow).

### **Management Approaches for Wildlife and Rare Plants**

Conservation of wildlife species remains a high priority on the Apache-Sitgreaves NFs and wildlife considerations are an integral part of planning and activities. The management approach is to provide a diversity of habitats, well distributed, with ecological conditions that support native and desired nonnative animal species over the long term. The forests also provide for wildlife and their needs consistent with recovery plans, biological opinions, conservation strategies, conservation assessments, management plans, memorandums of understanding (MOUs), and Forest Service direction. Species conservation assessments/strategies and agreements executed at the forest level are reviewed every 10 years and updated as necessary. Wildlife and plant species occurring or potentially occurring on the forests are tracked in the forests' species databases; these are maintained and periodically updated. The forests also support species conservation initiatives such as the Important Bird Area Program.

The forests work collaboratively with the AZGFD to plan and implement projects that make progress toward the forests' desired conditions and help achieve goals and objectives specified in the Arizona Wildlife and Fisheries Comprehensive Plan. Large scale wildlife habitat restoration treatments benefit multiple species while small project address the needs of localized species. The forests also work with AZGFD to develop species and associated habitat management plans (e.g., Gunnison's Prairie Dog Conservation Plan).

The Apache-Sitgreaves NFs work in partnership with the AZGFD to protect and reintroduce native species, including highly interactive species such as beavers, prairie dogs, and wolves, and to control or eradicate nonnative, undesirable species. Agreements are implemented so that appropriate species and subspecies are introduced.

The Apache-Sitgreaves NFs cooperate with other State and Federal agencies, tribes, as well as private entities and adjacent landowners, to support species diversity, recovery, and wildlife management. The forests participate in the development and implementation of conservation plans and activities for identified species to help preclude Federal or State listing. The forests actively participate in implementation of recovery plan actions for federally listed species.

Actions (e.g., closures, timing of treatments) are implemented to limit management impacts and prevent relisting of species as threatened or endangered.

Habitat and species monitoring are an integral part of proactive and adaptive wildlife and resource management on the forests. Examples include monitoring of federally listed and candidate species, management indicator species, ecological indicators, landbirds, and bears.

The forests coordinate with the AZGFD, Arizona Wildlife Linkages Working Group, and Arizona Department of Transportation (ADOT) to enhance public safety and promote passage of wildlife. There may be a need to develop, construct, and install habitat connecting and safer wildlife crossings and modify proposals to account for important wildlife linkages.

The forests coordinate with the USDA Wildlife Services Program along with the State of Arizona to promote healthy populations of predators, while reducing livestock conflicts with wildlife. Proactive livestock management practices (e.g., separating livestock from predators in time and place, range riders, herding) are incorporated to help keep conflicts from arising.

Forest managers recognize the need to acquire a greater understanding of many nongame species (e.g., amphibians, invertebrates, fish), including their habitat requirements and the effects of management activities. The forests encourage and support wildlife research and inventory. The forests develop partnerships with interested individuals and groups to help implement the wildlife program, including wildlife survey and habitat assessment. The forests also promote public education and valuing of the wildlife resource on the forests. The latter is increasingly important with growing urbanization and forest use.

Seasonal road restrictions and area closures may be used where the need is demonstrated to provide refuge in small and large blocks of land habitat for a wide range of species.

### **Related Plan Content for Wildlife and Rare Plants**

See the following sections: [Overall Ecosystem Health](#), [All PNVTs](#), [Dispersed Recreation Opportunities](#), [Developed Recreation Opportunities](#), [Motorized Opportunities](#), [Nonmotorized Opportunities](#), [Livestock Grazing](#), and [Minerals and Geology](#).

## **Invasive Species**

### **Background for Invasive Species**

Nonnative plants and animals that do, or have the potential to do, ecological or economic harm are classified as invasive species. Invasive species can be terrestrial or aquatic. On the Apache-Sitgreaves NFs, numerous invasive species pose risks to native species and ecosystem function and to the production of forest goods and services. Invasive plants, of which there are over 50 species, are currently (2008) found on at least 30,000 acres of the forests. For example, musk thistle and Siberian elm have spread along roadways, bull thistle has established in numerous meadows and wetlands, and tamarisk has become common along many streams and lakes. Crayfish, also common in many streams and lakes, are harming several native aquatic species.

Management of invasive species is an increasing need across all PNVTs on the Apache-Sitgreaves NFs. There is an array of tools (chemical, biological, mechanical, and cultural) to help managers control or eradicate these species. To address terrestrial invasive plants, managers have implemented an integrated forestwide noxious or invasive weed management program. Even

though complete eradication of invasive species is not always possible, aggressive treatment of existing populations, along with prevention of new infestations or populations, is important to protect native ecosystem diversity.

### **Desired Conditions for Invasive Species**

#### **Landscape Scale Desired Condition (10,000 acres or greater)**

- Invasive species are in low abundance or nonexistent.

#### **Mid-Scale Desired Conditions (100 to 1,000 acres)**

- Undesirable nonnative species are absent or present only to the extent that they do not adversely affect ecosystem composition, structure, or function, including native species populations or the natural fire regime.
- Introduction of additional invasive species rarely occurs and is detected at an early stage.

### **Objectives for Invasive Species**

- Annually, contain, control, or eradicate invasive species (e.g., musk thistle, Dalmatian toadflax, cowbirds) on 500 to 3,500 acres.
- Annually, control or eradicate invasive species (e.g., tamarisk, bullfrogs) on at least 2 stream miles.

### **Standards for Invasive Species**

- Projects and authorized activities shall be designed to reduce the potential for introduction of new species or spread of existing invasive or undesirable aquatic or terrestrial nonnative populations.

### **Guidelines for Invasive Species**

- Projects and activities should not transfer water between drainages or between unconnected water bodies within the same drainage to avoid spreading disease and aquatic invasive species.
- Project areas should be monitored to ensure there is no introduction or spread of invasive species.
- Treatment of invasive species should be designed to effectively control or eliminate them; multiple treatments may be needed.
- Pesticide use should minimize impacts on nontarget plants and animals.

### Other Sources of Information for Invasive Species

- Environmental Assessment for the Apache-Sitgreaves NFs Integrated Forestwide Noxious or Invasive Weed Management Program (Pages 24–27 Control Techniques Common to All Alternatives; pages 27–31 Objectives Common to All Action Alternatives; page 34 Fundamentals Common to All Action Alternatives; pages 35–41 Alternative C Proposed Action Integrated Weed Management With Herbicides; pages 112–129 in appendix A; pages 130–152 in appendix B; pages 178–182 in appendix E; and pages 190–193 in appendix I).
- Annual Interagency Guidance for Preventing Spread of Aquatic Invasive Organisms Common to the Southwestern Region (Section: Technical Guidelines for Fire Operations).

### Management Approaches for Invasive Species

The forests use an integrated management approach with the goal of preventing, controlling, or eradicating invasive species. This involves prioritizing both species and areas for treatment, depending on risk, and identifying the most appropriate methods for control and eradication. Particular attention is needed for treatment of yellow starthistle, tamarisk, musk thistle, and bull thistle. Species not yet extensive which provide good opportunity for treatment success include Dalmatian toadflax, Canada thistle, and bullfrog. Treatment efforts are focused in roadways, [developed recreation sites](#), trailheads, boating areas, and areas with mechanical treatments or concentrated use (e.g., corrals, driveways, dispersed campsites). The control or eradication of crayfish and nonnative fish is needed to restore native aquatic species; however, more research is needed to determine effective tools for aquatic invasive species.

Forest employees identify, locate, and report invasive species occurrences. The forests maintain an inventory which identifies areas of invasive species occurrence. Because of the often aggressive and tenacious nature of invasive species, the forests apply timely initial treatments with followup treatments for as long as needed to meet either eradication or control goals.

The forests continue to provide education and outreach programs designed to increase employee, public, and permittee awareness. Implementation of preventative measures (e.g., pre- and post-work equipment sanitation, requiring certified weed-free seed and hay) continues through permitting, contracting, and other forest administrative processes. The forests continue to utilize the noxious weed vehicle wash station to prevent spread of noxious weeds and nonnative invasive plants.



**Figure 6. *Linaria vulgaris* or yellow toadflax is an invasive species which has been found on the Apache-Sitgreaves NFs**

© Photo courtesy of Michael Shepherd, USDA Forest Service, [Bugwood.org](#).

Where determined appropriate, the forests collaborate with other agencies and entities in the effort to replace nonnative aquatic species with natives. The forests encourage ADOT to treat noxious weeds and nonnative invasive plants along highways. The forests cooperate with the Natural Resource Conservation Service (NRCS), AZGFD, ADOT, counties, local governments, and other organizations to support a successful invasive species management program.

### **Related Plan Content for Invasive Species**

See the following sections: [Overall Ecosystem Health](#), [Aquatic Habitat and Species](#), [All PNVTs](#), [Wildlife and Rare Plants](#), [Conservation Education](#), and [Special Uses](#).

## **Landscape Scale Disturbance Events**

### **Background for Landscape Scale Disturbance Events**

Landscape scale (generally over 10,000 acres) disturbance events are recurring natural ecological processes with characteristic outcomes. However, given current (2011) departure from reference conditions, outcomes can be uncharacteristic where there are drastic changes in soil and vegetation components. These can lead to ecological succession away from desired conditions, which can be complicated by other factors like climate change and invasive species. When uncharacteristic outcomes occur, the landscape can take hundreds of years or more to recover to some level of stability. Where outcomes are uncharacteristic and there are needs to accelerate recovery, additional direction is provided to protect existing resources and facilitate recovery of soil and vegetation components and improve ecosystem health.

### **Desired Conditions for Landscape Scale Disturbance Events**

#### **Landscape Scale Desired Conditions (10,000 acres or greater)**

- The Apache-Sitgreaves NFs landscapes retain the resiliency to survive landscape scale disturbance events.

### **Standards for Landscape Scale Disturbance Events**

- Threats to human safety and property shall be promptly addressed following landscape scale disturbance and mitigated through measures such as signing, temporary closures, or treatment.

### **Guidelines for Landscape Scale Disturbance Events**

- Erosion control mitigation features should be implemented to protect significant resource values and infrastructure such as stream channels, roads, structures, threatened and endangered species, and cultural resources.
- Felling of hazard trees (either dead or alive) should be limited to those which could hit a road, recreation site, building, or other infrastructure to protect places where humans, vehicles, or developments would most likely be present.

- Projects and activities (e.g., revegetation, mulching, lop and scatter) should be designed to stabilize soils and restore nutrient cycling, if needed, and establish movement toward the desired conditions for the affected PNVNT(s).
- Where conifer seed sources are lost or poorly distributed, and/or deciduous tree species are not adequately resprouting, artificial regeneration (e.g., planting, seeding) should be used to promote the movement toward desired conditions, provided adequate site conditions exist.
- Management should emphasize long-term reestablishment of deciduous tree species.
- An adequate number and size of snags and logs, appropriate for the affected PNVNT, should be retained individually and in clumps to provide benefits for wildlife and coarse woody debris for soil and other resource benefits.
- Projects and activities should include both short- and long-term provisions for scenic integrity, especially in sensitive foreground areas (high and very high scenic integrity).

### **Management Approaches for Landscape Scale Disturbance Events**

Managers consider the large scale event recovery guidance in Forest Service Manual 2030 when responding to these disturbance events. Hazard trees may be removed along roads to meet guidance in FSM 2331.1 (publicly managed recreation opportunities) and FSM 7703.4 (travel management). Where extensive tree mortality results from landscape scale disturbance and economic value exists, salvage of dead trees may be considered where this contributes to the movement toward desired conditions. Deferral of [ecological restoration](#) or salvage projects and activities may also be considered where these are not necessary for recovery.

Principles for ecological restoration and resilience as outlined in FSM 2020 are the basis for ecological restoration projects and activities. Based on site conditions, ecological restoration projects and activities focus on establishing native vegetation and ensure survival. Native tree and shrub planting follows plan guidelines for those individual forested and woodland PNVNTs. To ensure persistence, there is a focus on reintroduction of fire, protection of tree regeneration, treatment of insects and disease, or adjustment of management actions as needed. Additional direction found in the FSM 2400, Chapters 70 and 90, and FSM 2300, Chapter 20, guide managers in silvicultural practices, [reforestation](#), and forest management in wilderness. Where wild ungulate use is hindering long-term reestablishment of deciduous tree species, managers work with the AZGFD to address the situation.

Developed sites (recreation and administration) are evaluated following a landscape disturbance event for short- and long-term viability for continued use or for modification of the site. Site action plans are developed for implementation. Roads in event areas are evaluated for current and future access needs. Opportunities to decommission roads that are identified as no longer necessary for forest management and access or to relocate necessary access routes are considered.

### **Other Sources of Information for Landscape Scale Disturbance Events**

- FSH 2509.13, Chapter 20 (Burned Area Emergency Response Handbook)
- FSH 7709.59, Chapter 41.7 (Hazard Identification and Correction – Danger Tree Hazards)

- FSH 2409.17, Chapter 2 and R3 Supplement (Silvicultural Practices Handbook – Reforestation)

### **Related Plan Content for Landscape Scale Disturbance Events**

See the following sections: [Overall Ecosystem Health](#), [Soil](#), [Water Resources](#), [All PNVTs](#), [Developed Recreation](#), [Motorized Opportunities](#), and [Scenic Resources](#).

## **Managed Recreation**

### **Overall Recreation Opportunities**

#### **Background for Overall Recreation Opportunities**

The primary recreation activities are “relaxing and escaping the heat,” fishing, hiking, off-highway-vehicle (OHV) use, viewing natural features and wildlife, camping, driving for pleasure, picnicking, large group gatherings, and hunting. There are over 30 lakes and reservoirs and more than 1,000 miles of rivers and streams, more than can be found in any other national forest in the Southwestern Region. The forests are a destination for winter activities including snow play, snowmobiling, ice fishing, cross-country skiing, and sledding.

The Apache-Sitgreaves NFs receive approximately 2 million visitors per year. A high proportion of these visitors spend the night on the forests. Approximately 70 percent of the forests’ Arizona visitors are from the Phoenix and Tucson metropolitan areas.

Highway improvements provide easier access to the forests from Arizona’s major metropolitan areas, increasing the number of visitors and demand for recreation. The demographics of the recreating public are changing. An aging and urban population and increased ethnic diversity contribute to an increased demand for an array of recreation opportunities.

Forest managers face major challenges in providing quality recreation opportunities, maintaining a safe transportation system, and providing for resource protection.

#### **Desired Conditions for Overall Recreation Opportunities**

- The Apache-Sitgreaves NFs offer a spectrum of recreation settings and opportunities varying from primitive to urban and dispersed to developed, with an emphasis on the natural appearing character of the forests.
- Inventoried roadless areas (IRAs) maintain their overall roadless character.
- Recreation activities occur within the ability of the land to support them and with minimal user conflicts.
- Recreation enhances the quality of life for local residents (e.g., social interaction, physical activity, connection with nature), provides tourist destinations, and contributes monetarily to local economies.
- Recreation opportunities provide for a variety of skill levels, needs, and desires in partnership with recreation permit holders, private entities, volunteer groups, community groups, and State, Federal, and tribal governments.

- Visitors can easily access information about recreation activities and safe and proper use of the Apache-Sitgreaves NFs.
- Recreation use does not negatively affect wildlife habitat and populations. Negative interactions between people and wildlife are minimized.
- The Apache-Sitgreaves NFs are free from vandalism and refuse.
- Recreation use does not negatively affect the use and character of cultural resources.
- “[Leave No Trace](#)” principles are practiced.

### Guidelines for Overall Recreation Opportunities

- Recreation related project-level decisions and implementation activities should be consistent with mapped classes and setting descriptions in the [recreation opportunity spectrum \(ROS\)](#).
- Developed and dispersed recreation sites and other authorized activities should not be located in places that prevent wildlife or livestock access to available water.
- Food and other items that attract wildlife should be managed to prevent reliance on humans and to reduce human-wildlife conflicts.
- Constructed features should be maintained to standard or removed when no longer needed.

### Other Sources of Information for Overall Recreation Opportunities

- Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG), Technical Provisions (Sections 1.0–6.0).
- Forest Service Trails Accessibility Guidelines (FSTAG), Technical Provisions (Sections 7.0–7.3).
- Apache-Sitgreaves NFs Recreation Facility Analysis (chapter 4 table of tasks).

### Management Approaches for Overall Recreation Opportunities

The primary management approach is to continue the availability of outdoor experiences visitors seek and which are not readily available from other public or private entities. These experiences must be compatible with the environment and other uses.

To better understand future recreation needs, supply and demand studies (capacity analyses) may be completed for high use recreational areas and outfitter and guide permits. There is a focus on reducing conflicts between users and resources and utilizing tools such as law enforcement, public involvement, and education. Private ventures and partnerships may be used to help provide recreation opportunities to forest visitors.

The recreation opportunity spectrum (ROS) map establishes desired ROS classes for the management areas of the Apache-Sitgreaves NFs. The ROS classes reflect desired settings that provide information for project- and activity-level decisions and implementation activity. The ROS classes define broad physical, social, and administrative settings. Site-specific analysis is

necessary to further refine desired settings that may apply at the project or activity level. The ROS map can be found in the [plan set of documents](#).

## **Dispersed Recreation**

### **Background for Dispersed Recreation**

Visitors to the Apache-Sitgreaves NFs participate in a variety of dispersed recreation activities. These activities run the gamut from motorized to nonmotorized and consumptive to nonconsumptive. Some examples of dispersed recreation are hunting and fishing, camping, trail use, sightseeing, driving for pleasure, snowmobiling, cross-country skiing, wildlife viewing, and picnicking. The forests are known for their back-country opportunities: three designated wilderness areas, the Blue Range Primitive Area, and roadless areas encompassing over 300,000 acres.

In spite of the large expanse of undeveloped area available for dispersed recreation use (both motorized and nonmotorized), every acre is not suitable for every use. The challenge for forest visitors and managers is to protect multiple-use opportunities and to minimize conflicting uses while, at the same time, maintaining freedom of choice to the greatest extent possible.

### **Desired Conditions for Dispersed Recreation**

- Dispersed recreation opportunities (e.g., hunting, fishing, hiking, camping) are available and dispersed recreation sites (e.g., campsites, trailheads, vistas, parking areas) occur in a variety of ROS classes throughout the forests.
- Facilities for dispersed recreation activities are appropriate for the ROS class and scenic integrity objective of the location and are designed to the minimum necessary to protect natural and cultural resources.
- Wildlife viewing areas are dispersed throughout the forests and provide opportunities to view waterfowl, migratory birds, elk, and other species.
- Access, parking, regulations, orientation, and safety information are in place to provide a safe and enjoyable dispersed recreation experience.
- Water-based settings are available and the associated recreation opportunities (e.g., canoeing, fishing, waterfowl hunting) do not degrade aquatic resources.
- Winter nonmotorized areas provide a variety of nonmotorized recreation opportunities in a quiet, natural setting (including groomed and ungroomed ski trails). Noise from motorized use is uncommon in areas away from main road corridors.
- Winter motorized areas provide a variety of motorized recreation opportunities with a variety of challenges including areas open to cross-country, over-snow motorized use, some with groomed or ungroomed trails.
- Roads and trails provide a variety of opportunities to view natural landscapes and wildlife.

### Objectives for Dispersed Recreation

- Annually, rehabilitate, stabilize, revegetate, or relocate an average of five dispersed campsites to improve the recreation experience and/or protect the environment.
- Within the planning period, work with the AZGFD, ADOT, and other partners to provide at least 10 new wildlife viewing opportunities.

### Standards for Dispersed Recreation

- Dispersed campsites shall not be designated in areas with sensitive soils or within 50 feet of streams, wetlands, or riparian areas to prevent vegetation and bank damage, soil compaction, additional sediment, or soil and water contamination.

### Guidelines for Dispersed Recreation

- In dispersed areas, the priority for facilities or minor developments should be access and protection of the environment, rather than the comfort or convenience of the visitors.
- Timing restrictions on recreation uses should be considered to reduce conflicts with wildlife needs or soil moisture conditions.
- Dispersed campsites should not be located on or adjacent to archaeological sites or sensitive wildlife areas.

### Management Approaches for Dispersed Recreation

Forest managers recognize the importance and popularity of dispersed recreation and seek to balance the strong desire people have for freedom of choice (in terms of their recreation activity) with adequate protection of cultural and natural resources. Focus is on providing quality dispersed recreation opportunities and reducing conflict among recreation users. Where intensive dispersed use—including camping—occurs (e.g., Bear Canyon Lake, south of Big Lake), managers consider the development of a management plan to delineate the intensive use area, address resource concerns, and provide for sustainable recreation.

### Related Plan Content for Dispersed Recreation Opportunities

See the following sections: [Soil](#), [Riparian Areas](#), [Water Resources](#), [Wildlife and Rare Plants](#), [Overall Recreation Opportunities](#), [Conservation Education](#), and [Cultural Resources](#).

### Developed Recreation

#### Background for Developed Recreation

There are over 50 developed campgrounds, offering single family, multifamily, and large group campsites. Other developed recreation opportunities include picnic areas, boating and fishing sites, trailheads, two visitor centers, and scenic overlooks.

In the late 1980s, the Apache-Sitgreaves NFs first awarded concessionaire permits to a private corporation to manage and operate the majority of the developed recreation sites; more than half

of the developed campgrounds are currently (2012) operated by concessionaire. One developed recreation area, Fools Hollow Lake, is operated through a partnership with Arizona State Parks. The Apache-Sitgreaves NFs have one rental cabin located on the Alpine Ranger District.

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

- Developed recreation sites provide opportunities for people to camp, obtain information, and participate in day-use activities (e.g., picnic areas, fishing piers, scenic overlooks, wildlife viewing sites).
- Facilities are maintained, accessible, and complement the forests' natural character. Facilities range from primitive to highly developed, with an emphasis on blending the facilities with the landscape.
- Forest vegetation in developed sites is healthy (species, size, and age) and complements recreational activities, scenery, and human safety.
- Developed campgrounds are places where structures and human caused vegetation changes may be seen but they do not dominate the view or attract attention (low to moderate scenic integrity). Human activities in the areas visible from campgrounds (foreground to middle ground, 300 feet to 4 miles) should not attract attention or stand out, and the landscapes should appear natural (moderate to high scenic integrity).
- Developed campgrounds provide roaded natural or roaded modified recreation opportunities.

### **Objectives for Developed Recreation**

- Within the planning period, reduce the developed recreation deferred maintenance backlog at plan approval by 10 percent.
- Within the planning period, wildlife-proof and accessible trash facilities should be provided in all developed sites where trash is collected.

### **Standards for Developed Recreation**

- Where trash facilities are provided, they shall be bear resistant.

### **Guidelines for Developed Recreation**

- Developed recreation sites should not be constructed unless validated with a capacity analysis.

### **Management Approaches for Developed Recreation**

Focus is on maintaining the forest recreation and administrative developments in a safe and sustainable manner while providing for quality experiences for visitors. As the Apache-Sitgreaves NFs move into the future, the emphasis is to balance new construction with current and future maintenance requirements.

Forest managers assess Apache-Sitgreaves NFs recreation and administrative facilities in order to establish a program that is sustainable, realistic, and responsive to public need. Facilities may be redesigned, as necessary, in order to accommodate persons with disabilities, respond to demographic changes, and reduce conflicts with cultural and natural resources as outlined in the recreation facility analysis and master plan. Recreation site plans describe the detailed management for each developed recreation area, including vegetation management plans for campgrounds. Future recreational rental designations (e.g., cabins) are considered on a case-by-case basis including administrative and public benefits.



**Figure 7. Woods Canyon Lake, Black Mesa Ranger District**

### **Related Plan Content for Developed Recreation**

See the following sections: [Overall Recreation Opportunities](#), [Wildlife and Rare Plants](#), and [Conservation Education](#).

## **Motorized Opportunities**

### **Background for Motorized Opportunities**

Over 2,900 miles of roads and trails are open for public or administrative motorized use. OHV use continues to increase. Unauthorized (user-created) routes and motorized use on closed roads are major concerns. Summers, holidays, and hunting seasons generally have a high volume of motor vehicle traffic. These roads and trails are also needed for forest management.

### **Desired Conditions for Motorized Opportunities**

- A maintained roads and motorized trail system is in place and provides for safety and access for the use (e.g., recreation, minerals, vegetation treatment, fire protection) of the Apache-Sitgreaves NFs.
- Users experience motorized access and travel on a system of designated NFS roads, motorized trails, and motorized areas.
- The transportation system provides a variety of recreation opportunities including varying degrees of difficulty, from OHV trails to paved scenic byways, while limiting resource and/or user conflicts.
- Motorized trails are easily identified on the ground (e.g., well marked).
- The road and trail system is accessible from local communities, State, county, and local public roads and trails.

- Loop trails exist for motorized trail users.
- [Tread Lightly!](#)<sup>®</sup> principles are commonly practiced.
- The location and design of roads and trails does not impede wildlife and fish movement.

### Objectives for Motorized Opportunities

- Annually, maintain at least 20 percent of the passenger vehicle and 10 percent of the high-clearance vehicle NFS roads.
- Annually, maintain at least 20 percent of NFS motorized trails.

### Standards for Motorized Opportunities

- Motorized vehicle travel shall be managed to occur only on the designated system of NFS roads and motorized trails<sup>21</sup> and designated motorized areas<sup>22</sup>.
- Unless specifically authorized, motorized cross-country travel shall be managed to occur only in designated motorized areas.
- [Temporary roads](#) shall be constructed to minimize the impacts to resource values and to facilitate road rehabilitation. Temporary roads shall be rehabilitated following completion of the activities for which they were constructed.
- Road maintenance and construction activities shall be designed to reduce sediment (e.g., water bars, sediment traps, grade dips) while first providing for user safety.

### Guidelines for Motorized Opportunities

- New motorized trails or additions to existing trails should include destinations and loops to provide for a variety of opportunities.
- New roads or motorized trails should be located to avoid Mexican spotted owl [protected activity centers \(PACs\)](#), northern goshawk post-fledgling family areas (PFAs), and other wildlife areas as identified; seasonal restrictions may be an option.
- New roads, motorized trails, or designated motorized areas should be located to avoid meadows, wetlands, riparian areas, stream bottoms, sacred sites, and areas with high concentrations of significant archaeological sites. The number of stream crossings should be minimized or mitigated to reduce impacts to aquatic species.
- As projects occur in riparian or wet meadow areas, unneeded roads or motorized trails should be closed or relocated, drainage restored, and native vegetation reestablished to move these areas toward their desired condition.

<sup>21</sup> The system of NFS roads and motorized trails is identified in the I-WEB database.

<sup>22</sup> In 2012, there are no areas designated for motorized cross-country travel.

- As projects occur, roads or motorized trails that contribute to negative impacts on cultural resources should be closed or relocated.
- To reduce degradation of natural resources, redundant roads or motorized trails should be removed as projects occur.
- Roads and motorized trails removed from the transportation network should be treated in order to avoid future risk to hydrologic function and aquatic habitat.
- Trail markings (e.g., signs) should be designed to complement the character of the surrounding lands.
- Roads and motorized trails should be designed and located so as to not impede terrestrial and aquatic species movement and connectivity.
- As projects occur, existing meadow crossings should be relocated or redesigned, as needed, to maintain or restore hydrologic function using appropriate tools such as French drains and elevated culverts.
- After management activities occur in areas with high potential for cross-country motorized vehicle use, methods (e.g., barriers, signing) should be used to control unauthorized motorized use.

### **Other Sources of Information for Motorized Opportunities**

- FSH 7709.56, Chapter 4 (Design)
- Apache-Sitgreaves NFs Best Management Practices for Road Maintenance

### **Management Approaches for Motorized Opportunities**

Access and opportunity to experience areas through [motorized travel](#) is a key component of recreation, as well as a management emphasis for the Apache-Sitgreaves NFs. The Apache-Sitgreaves NFs provide a serviceable and sustainable transportation system that meets the need for public access, land management, resource protection, and user safety. The management approach is to enhance opportunities for motorized trail users, relocate trails to reduce conflicts between motorized and nonmotorized users or other resources, and develop management plans for designated motorized use areas.

This plan provides the framework to guide future changes to the transportation system. Once the final decision of this plan has been made, potential changes to the forests' transportation system will be evaluated under this framework and through implementation of the Travel Management Rule (73 FR 74689) as required by Executive Order 11644. Upon completion of travel management planning, the associated [motor vehicle use map \(MVUM\)](#) would be printed. The MVUM would display the roads, trails, and areas that are designated for motorized vehicle use. Use inconsistent with those designations, and inconsistent with this plan, would be prohibited.

Approval of temporary road construction is contingent on the completion of an environmental analysis that addresses road construction and road obliteration, including setting timelines.

When routes are removed from the transportation system, followup treatments may include: outslipping roadbeds, removing stream crossing structures, breaching drainage ditches, removing unstable fills, maintaining or restoring fish passage, and removing invasive weeds.

Measures (e.g., education, signage, law enforcement, seasonal road closures) are used to discourage encroachment of motorized vehicles into nonmotorized areas and to protect wildlife, infrastructure, and other resources. Emphasis is placed on reducing user conflict and resource damage. Resource damage from vehicle use is rehabilitated as soon as possible. The forests promote roadside interpretive services along scenic byways. Educational techniques (e.g., brochures, signs) may be used to help visitors understand proper motorized use etiquette.

The Apache-Sitgreaves NFs coordinate with the Federal Highway Administration and ADOT to facilitate transportation needs, planned improvements, and transportation conditions. Apache-Sitgreaves NFs work with ADOT to alleviate concerns with scenic resources; maintenance activities; use of herbicides; use of deicing agents; and creation of safety turnouts, parking lots, and wildlife crossings.

Trail maintenance priorities are based on providing user safety, minimizing erosion, providing appropriate recreation opportunities, and accommodating administrative needs. The forests work with partners and volunteers to maintain trails, including the Adopt-A-Trail Program and user groups. Partnerships are in place prior to new motorized trail construction to facilitate trail maintenance.

### **Related Plan Content for Motorized Opportunities**

See the following sections: [Soil](#), [Riparian Areas](#), [Water Resources](#), [All PNVTs](#), [Wildlife and Rare Plants](#), [Overall Recreation Opportunities](#), [Scenic Byways](#), and [Cultural Resources](#).

### **Nonmotorized Opportunities**

#### **Background for Nonmotorized Opportunities**

The Apache-Sitgreaves NFs have approximately 1,000 miles of nonmotorized trails for hiking, horseback riding, mountain biking, and cross-country skiing. Trail conditions are variable across the forests, with maintenance focused on high-use trails. Several trails are paved to provide additional opportunities for visitors with physical limitations. National recreation trails are addressed following the “Scenic Byways” section.

#### **Desired Conditions for Nonmotorized Opportunities**

- Nonmotorized opportunities are available in a variety of settings that provide differing levels of challenge and seclusion.
- Blocks of forest land accessible from populated areas are available for nonmotorized opportunities. These areas are free from the sights and sounds of motorized recreation.
- Opportunities for [primitive recreation](#) are available.
- A maintained and environmentally sound nonmotorized trail network is in place, providing for user safety and access to locations of interest for a variety of uses.
- Nonmotorized trails are defined and marked.
- Destination and loop trails exist for nonmotorized users.

### Objectives for Nonmotorized Opportunities

- Annually, maintain at least 20 percent of nonmotorized trails.

### Guidelines for Nonmotorized Opportunities

- Trail markings (e.g., signs, blazes) should be designed to complement the character of the surrounding lands.
- New nonmotorized routes should avoid meadows, wetlands, riparian areas, stream bottoms, sacred sites, and areas with high concentrations of significant archaeological sites. The number of stream crossings should be minimized or mitigated to reduce impacts to aquatic habitat.
- To maintain the nonmotorized user experience, nonmotorized trails should not be colocated on open motorized routes.
- New trails and trail relocations should be designed and located so as to not impede terrestrial and aquatic species movement and connectivity.
- Meadow crossings should be designed or redesigned to maintain or restore hydrologic function using appropriate tools such as French drains and elevated culverts.

### Management Approaches for Nonmotorized Opportunities

Access and opportunity to experience areas through [nonmotorized travel](#) is a key component of recreation. The Apache-Sitgreaves NFs provide a serviceable and sustainable trail system that meets the need for public access, land management, resource protection, and user safety. Emphasis is on reconstructing or adding nonmotorized trails near population centers or developed recreation sites to provide additional or enhanced nonmotorized recreational opportunities.

Signing, enforcement, public information, seasonal and special closures, maintenance, construction, and restoration take place as appropriate. Emphasis is placed on reducing user conflict and resource damage. Educational techniques (e.g., brochures, signs) enhance visitor knowledge of proper nonmotorized use etiquette.

Trail maintenance priorities are based on providing user safety, minimizing erosion, providing appropriate recreation opportunities, and accommodating administrative needs. Partnerships are in place prior to new nonmotorized trail construction to facilitate trail maintenance. The forests work with partners, user groups, and volunteers to maintain trails, including the Adopt-A-Trail Program.

### Related Plan Content for Nonmotorized Opportunities

See the following sections: [Overall Recreation Opportunities](#), [National Recreation Trails](#), [Wildlife and Rare Plants](#), [Riparian Areas](#), [Soil](#), [Scenic Resources](#), and [Water Resources](#).

## Scenic Byways

### Background for Scenic Byways

Three scenic byways pass through the Apache-Sitgreaves NFs: Coronado Trail National Scenic Byway, From the Desert to Tall Pines Scenic Road, and White Mountain Scenic Road. Scenic byways are considered special areas by the Forest Service.

In September 2005, the 120-mile Coronado Trail National Scenic Byway was designated by the Federal Highway Administration. This route has also been a national forest byway and Arizona State scenic byway since 1989. This byway traverses the Springerville, Alpine, and Clifton Ranger Districts.

The From the Desert to Tall Pines Scenic Road has been a national forest scenic road and Arizona State scenic byway since 1996. Approximately 3 miles of this 67 mile scenic road are on the Black Mesa Ranger District. The 123-mile White Mountain Scenic Road has been an Arizona State scenic byway since 1992 and a national forest byway since 1989. This byway is partially located on the Springerville Ranger District.

### Desired Conditions for Scenic Byways

- Viewsheds along scenic byways provide natural appearing landscapes and enhance recreation tourism that supports local communities.
- The [intrinsic qualities](#) identified for each scenic byway remain intact.
- Scenic byways exhibit natural appearing landscapes where human activities do not stand out in the foreground, up to ½ mile (high scenic integrity).
- Scenic byways provide roaded natural recreation opportunities.

### Guidelines for Scenic Byways

- Visual impacts from vegetation treatments, recreation uses, rangeland developments, and other structures should blend with the overall landscape character along scenic byways.
- Signs, kiosks, and other exhibits should provide interpretive, education, and safety information along scenic byways and in adjacent recreation sites.

### Management Approaches for Scenic Byways

Forest managers work with partners to implement the “Coronado Trail Corridor Management Plan.”

### Related Plan Content for Scenic Byways

See the following sections: [Motorized Opportunities](#) and [Scenic Resources](#).

## National Recreation Trails

### Background for National Recreation Trails

The forests have four national recreation trails (NRTs), all designated in 1979: Blue Ridge, General George Crook, Eagle, and Escudilla. NRTs provide a variety of outdoor recreation opportunities and are accessible from urban areas. NRTs are considered a special area by the Forest Service.

The Blue Ridge NRT, located on the Lakeside Ranger District, is approximately 9 miles long. The trail climbs the west side of Blue Ridge Mountain (7,650 feet in elevation) through a mixture of pines, junipers, and many varieties of wildflowers. The mountain itself is a volcanic remnant. There are scenic views from the summit.

Fifty-eight miles of the 114-mile long General George Crook NRT are located in both the Black Mesa and Lakeside Ranger Districts. The trail is part of the route used by General George Crook to deliver supplies to outposts including Fort McDowell, Fort Verde, Camp Reno, Fort Apache, and Camp San Carlos. This route became one of the first major roads in Arizona and was used for decades as a supply and communications route. The original blazes can still be seen on the ponderosa pines lining the trail, as well as occasional traces of homesteads. The trail is popular with equestrians, mountain bikers, and hikers.

The Eagle NRT, located on the Clifton Ranger District, is approximately 28 miles long. The northern end of the trail begins on the Mogollon Rim at about 9,000 feet elevation and descends over 4,000 feet through a variety of vegetation types (mixed conifer to riparian) to its southern trailhead adjacent to Eagle Creek Road. The trail traverses several canyons, each with its own unique scenery and vegetation.

Escudilla NRT, located on the Alpine Ranger District, is approximately 3 miles long. The trail ascends Arizona's third highest mountain and is located in Escudilla Wilderness. Administrative designation of the trail predates wilderness designation. Forest Service policy discourages national recreation trails in designated wilderness.

### Desired Conditions for National Recreation Trails

- The Blue Ridge NRT provides a nonmotorized trail experience where visitors can experience the scenic qualities of the area.
- The General George Crook and Eagle NRTs provide a nonmotorized trail experience where visitors can experience the historic and scenic qualities of the area.
- The immediate foreground (0 to 200 feet) views from the NRTs vary from natural appearing landscapes where human activities do not stand out (high scenic integrity) to unaltered landscapes where generally only ecological changes occur (very high scenic integrity).

### Objectives for National Recreation Trails

- Within 5 years of plan approval, initiate the process for the regional forester to remove the NRT designation from the Escudilla trail in conformance with Forest Service Manual 2353.57 – Management of National Recreation Trails.

### Standards for National Recreation Trails

- Visual impacts from vegetation treatments, planned ignition, recreation uses, rangeland developments, and other structures will blend with the overall landscape character along national recreation trails.

### Guidelines for National Recreation Trails

- Trail markings (e.g., signs, blazes) should be designed to complement the character of the surrounding lands.
- National recreation trails should be managed for nonmotorized or [mechanized travel](#) where permitted; however, the General George Crook and Eagle NRTs may have motorized travel where the trail coincides with a designated road or motorized trail.
- New developments which do not support use of, or enhance, a national recreation trail should not be placed within the visual corridor of the trail.
- The General George Crook National Recreation Trail should be managed to preserve evidence of historic roadway and landscape character, including related historic trees, markers, gravesites, and water holes within a 200-foot corridor.

### Related Plan Content for National Recreation Trails

See the following sections: [Nonmotorized Opportunities](#) and [Cultural Resources](#).

### Eligible and Suitable Wild and Scenic Rivers

#### Background for Eligible and Suitable Wild and Scenic Rivers

There are no designated [wild and scenic rivers](#)<sup>23</sup> on the Apache-Sitgreaves National Forests. However, the forests have over 20 eligible rivers and 2 suitable rivers, which reflects the importance of water and its presence on the Apache-Sitgreaves NFs. Eligible and suitable wild and scenic rivers are considered special areas by the Forest Service.

There are approximately 339 miles of 23 rivers that are eligible to be included in the National Wild and Scenic Rivers System (table 1). There are 172 miles classified as wild, 66 miles classified as scenic, and 101 miles classified as recreational. These rivers are located in all ranger districts except Lakeside.

Eligible rivers are managed to retain their status until a suitability determination has been made whether to recommend their inclusion in the National Wild and Scenic Rivers System.

Suitable rivers on the ASNFs include portions of the Blue River and KP Creek (table 2). These rivers were found to be suitable for inclusion in the National Wild and Scenic Rivers System through a separate environmental analysis (Forest Service, 2010b). Suitable rivers are managed to maintain their conditions and values until congressional action is taken.

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<sup>23</sup> Designated wild and scenic rivers are those that are included in the National Wild and Scenic Rivers System.

**Table 1. Eligible wild and scenic rivers of the Apache-Sitgreaves NFs by river classification<sup>1</sup>**

River Name	Wild (miles)	Scenic (miles)	Recreational (miles)	Total Miles
Bear Wallow Creek	3.7	–	0.9	4.6
Black River	18.3	0.5	–	18.8
Campbell Blue Creek <sup>2</sup>	4.1	–	8.0	12.1
Coal Creek <sup>2</sup>	9.6	0.6	7.7	17.9
Dix Creek	–	3.3	–	3.3
Eagle Creek	–	–	19.5	19.5
East Clear Creek <sup>3</sup>	–	21.2	–	21.2
East Eagle Creek	7.5	3.5	3.5	14.5
East Fork Black River	3.3	1.2	8.2	12.7
East Fork Little Colorado River	–	9.3	–	9.3
Fish Creek	–	9.9	0.6	10.5
Little Blue Creek	18.4	–	–	18.4
Leonard Canyon <sup>4</sup>	–	–	23.6	23.6
North Fork East Fork Black River	12.7	1.0	–	13.7
Pigeon Creek	4.8	–	10.3	15.1
San Francisco River	9.0	–	15.0	24.0
Sardine Creek	8.9	–	–	8.9
South Fork Little Colorado River	–	7.3	–	7.3
Turkey Creek	9.1	–	–	9.1
West Fork Black River	8.6	3.0	–	11.6
West Fork Little Colorado River	6.4	–	1.7	8.1
Willow Creek	18.9	–	–	18.9
Woods Canyon – Chevelon Creek	28.4	5.3	2.4	36.1
<b>Total Miles</b>	<b>171.7</b>	<b>66.1</b>	<b>101.4</b>	<b>339.2</b>

<sup>1</sup> Forest Service, 2009b<sup>2</sup> Also located on the Gila NF. Total miles shown.<sup>3</sup> Also located on the Coconino NF. A portion of this river is the boundary between the Apache-Sitgreaves NFs and the Coconino NF. Miles shown are the common boundary.<sup>4</sup> Also located on the Coconino NF. Miles shown are the common boundary between the Apache-Sitgreaves NFs and the Coconino NF.

**Table 2. Suitable wild and scenic rivers of the Apache-Sitgreaves NFs by river classification**

River Name	Wild (miles)	Scenic (miles)	Recreational (miles)	Total Miles
Blue River	23.3	4.2	–	27.5
KP Creek	11.3	–	–	11.3
Total Miles	34.6	4.2	0.0	38.8

Portions of the eligible West Fork and East Fork Little Colorado Rivers are located within Mount Baldy Wilderness. All of the eligible Bear Wallow Creek is within Bear Wallow Wilderness. There are no eligible or suitable rivers in Escudilla Wilderness. A portion of the suitable Blue River is within the Primitive Area Management Area. Most of the suitable KP Creek is also within the Primitive Area Management Area; the remainder is within the Natural Landscape Management Area. Other eligible rivers are located within a variety of management areas across the forests.

**Desired Conditions for Eligible and Suitable Wild and Scenic Rivers**

- Eligible and suitable wild river segments display unaltered landscapes where generally only ecological changes occur (very high scenic integrity) and provide primitive and/or semiprimitive nonmotorized recreation opportunities.
- Eligible and suitable scenic river segments display landscapes which vary from slightly altered where human activities may be seen but do not attract attention (moderate scenic integrity) to natural appearing where human activities do not stand out (high scenic integrity) and provide semiprimitive nonmotorized, semiprimitive motorized, and/or roaded natural recreation opportunities.
- Eligible and suitable recreational river segments display landscapes which vary from moderately altered where human activities are evident (low scenic integrity) to slightly altered where human activities may be seen but do not attract attention (moderate scenic integrity) and provide primitive, semiprimitive nonmotorized, semiprimitive motorized, and/or roaded natural recreation opportunities.

**Standards for Eligible and Suitable Wild and Scenic Rivers**

- Each eligible river’s free-flowing condition, outstandingly remarkable values, and classification shall be sustained until further study is conducted.
- Each suitable river’s free-flowing condition, outstandingly remarkable values, and classification shall be maintained until congressional action is completed.

**Other Sources of Information for Eligible and Suitable Wild and Scenic Rivers**

- FSH 1909.12, Chapter 82.5 (Interim Management of Eligible or Suitable Rivers)

## Management Approaches for Eligible and Suitable Wild and Scenic Rivers

Where eligible or suitable wild and scenic rivers segments occur (all management areas), the most restrictive management direction applies.

## Related Plan Content for Eligible and Suitable Wild and Scenic Rivers

See the following sections: [All PNVTs](#), [Wilderness](#), and [Primitive Area](#).

## Scenic Resources

### Background for Scenic Resources

The Apache-Sitgreaves NFs contain some of the most scenic landscapes in the State of Arizona ranging from rugged canyons to rolling hills and grasslands to alpine forests. A favorite activity of forest visitors is viewing natural features and wildlife.

### Desired Conditions for Scenic Resources

- The Apache-Sitgreaves NFs appear predominantly natural, and human activities do not dominate the landscape.
- The natural and cultural features of the landscapes that provide a “[sense of place](#)” are intact.
- Landscapes possess vegetation patterns and compositions that are naturally variable in appearance and ecological function and contribute to scenic values.
- Visitors have opportunities to experience important scenic elements including fall colors, rolling grasslands, picturesque vistas, and green riparian corridors.
- Lakes (reservoirs) and surrounding lands (¼ mile from the shore) provide landscapes which vary from slightly altered where human activities may be seen but do not attract attention (moderate scenic integrity) to natural appearing where human activities do not stand out (high scenic integrity).
- The scenic vistas associated with canyons and other landforms retain their scenic integrity.
- The vistas—both from and onto—the Mogollon Rim exhibit landscapes which vary from natural appearing where human activities do not stand out (high scenic integrity) to unaltered where generally only ecological changes occur (very high scenic integrity).

### Objectives for Scenic Resources

- Annually, accomplish an average of five projects to enhance scenic resources (e.g., restore grasslands and aspen, remove unnecessary fences, close and rehabilitate unneeded gravel/cinder pits).

### **Guidelines for Scenic Resources**

- Constructed features and landscape alterations should be designed to complement the natural setting.
- Projects or activities in primitive and semiprimitive recreation opportunity spectrum (ROS) classes should be designed to maintain a predominately natural appearing environment.

### **Management Approaches for Scenic Resources**

Management emphasis is to maintain the scenic qualities of the Apache-Sitgreaves NFs that contribute to the forests' niche (e.g., rolling grasslands, rugged desert terrain, lush forests, fall colors).

The Scenery Management System (SMS) is a tool for inventorying and managing scenic resources. This system is used to incorporate scenery management principles into the planning, design, and implementation of projects and activities. Forest managers follow Forest Service Manual 2380 which provides advice for applying SMS at the project level. The scenic integrity objective map can be found in the plan set of documents.

### **Related Plan Content for Scenic Resources**

See the following sections: [Grasslands](#), [Scenic Byways](#), [National Recreation Trails](#), [Eligible and Suitable Wild and Scenic Rivers](#), [Livestock Grazing](#), [Minerals and Geology](#), [Special Uses](#), [Energy Corridor](#), [Natural Landscape](#), [Recommended Research Natural Area](#), [Research Natural Area](#), [Wilderness](#), [Primitive Area](#), [Recommended Wilderness](#), [Community-Forest Intermix](#), and [Wildlife Quiet Areas](#).

## **Community-Forest Interaction**

The Apache-Sitgreaves NFs are literally the backyard for many residents of the White Mountains region of Arizona. Many communities adjoin the forests, while the forests completely surround others. Because of this close proximity, many communities and private landowners are directly affected by forest management decisions. These entities, in turn, affect forest management.

There has been a major increase in development on land adjoining and/or surrounded by the Apache-Sitgreaves NFs. Demands related to this growth include access to the forests, utility corridors, roads, special use permits, and recreational opportunities. More and more people are living close to the forests, and managers are challenged to provide goods, services, and access that populations demand, while meeting a variety of user expectations and desires.

Increases in population and housing development may lead to more wildland-urban interface (WUI) areas, loss of open space, and associated use of the Apache-Sitgreaves NFs and demands for services. Forest managers are faced with concerns over available water supply and the preservation of open space (natural areas) around communities.

In general, communities associated with the forests have shifted from a commodity-based economy dependent on logging and grazing to a service-based economy dependent on service, recreation, and construction. However, there continues to be local social and economic

dependencies on commodity use and production, which in turn contribute to economic diversity and sustaining the lifestyles and traditions of local communities.

Management emphasis is to build and maintain lasting relationships with local communities, forest users, and tribes. Communication and trust contribute to quality of life, economically stable communities, and healthy forests. A variety of partnerships, including volunteers, are in place to assist in resource management and advancement toward desired conditions. This includes partnerships and relationships among Forest Service, local community groups, and forest permittees.

The Apache-Sitgreaves NFs contribute leadership, organizational skills, facilities, and other resources to communities. Agency personnel are active participants within the communities. These communities benefit economically when the Apache-Sitgreaves NFs and its employees make local purchases for goods and services.

Laws and regulations are enforced so that the Apache-Sitgreaves NFs are available to all persons for legitimate uses with a minimum of restrictions and to promote visitor safety, protect facilities, and cultural and natural resources. There is an emphasis to provide an increased visible presence of uniformed Forest Service employees that help to facilitate law enforcement, deter violations, and provide information to the public. The Apache-Sitgreaves NFs cooperate with State and local law enforcement agencies to protect forest resources, employees, visitors, and property. The forests are responsive and assist with local search and rescue requests.

The Apache-Sitgreaves NFs collaborate with other Federal agencies; tribes; State and local governments; or other interested or affected communities, groups, or persons to better understand climate change across the landscape.

## **Conservation Education**

### **Background for Conservation Education**

The Forest Service has a recognized role and responsibility to educate people about the management and conservation of our Nation's forests and grasslands. Increasing youth and adult knowledge of—and environmental literacy about—forests and natural resources continues to be critical to the accomplishment of the Forest Service mission today.

The Apache-Sitgreaves NFs provide many learning opportunities where participants appreciate the diversity of ecosystems, plants, and wildlife. The conservation education program of the Apache-Sitgreaves NFs includes opportunities for local residents and visitors to learn about the forests. Forest Service employees provide information, lead tours, and participate in local school programs. Interpretive programs are provided in campgrounds and the forests' two visitor information centers, Big Lake and Mogollon Rim. With the help of partners, the forests have been able to expand education opportunities with additional programs (e.g., Kids in the Woods).

The importance of having a viable conservation education program is affirmed. There is often a clear lack of public understanding regarding forest issues, laws, consequences of forest user behavior, and forest management actions.

### Desired Conditions for Conservation Education

- The Apache-Sitgreaves NFs provide opportunities for adults and children to explore and learn about ecosystems.
- Forest visitors have access to information about topics of concern related to the Apache-Sitgreaves NFs (e.g., ecosystem restoration, unmanaged recreation, uncharacteristic wildfire), including appropriate visitor behavior (e.g., follow forest orders, pack out trash, appropriate sanitation).
- Forest visitors have access to information about the features of the Apache-Sitgreaves NFs, its ecosystems, multiple uses, and other management aspects of the forests.
- Interpretive information (e.g., ecology, cultural resources, unique geologic features, Forest Service mission) is available to forest visitors at Apache-Sitgreaves NFs visitor centers, administrative offices, recreation sites, and along major forest roadways.

### Management Approaches for Conservation Education

Forest users are informed about the mission of the Forest Service and the benefits derived from authorized land uses. Forest users have access to timely public information (e.g., forest closures, fire danger). Public information, interpretive services, and environmental education programs and activities connect people to the land and to each other. Programs encourage visitors and local residents to take informed actions in sustaining cultural and natural resources. The forests promote established programs (e.g., TreadLightly!, Leave No Trace, Kids in the Woods, Passport in Time, and Bear Aware) that help connect people to nature. A variety of techniques (e.g., handouts, Web site, presentations) are used to educate users on topics ranging from land ethics to forest history. The forests place an emphasis on providing interpretive programs, especially through its visitor centers (Big Lake and Mogollon Rim) and development of education tools (e.g., invasive species prevention).

### Related Plan Content for Conservation Education

See the following sections: [Overall Ecosystem Health](#), [Invasive Species](#), [Overall Recreation Opportunities](#), and [Cultural Resources](#).

## Lands

### Background for Lands

Many communities are completely surrounded by the Apache-Sitgreaves NFs and, therefore, are limited in the ability to expand. Forest managers face many challenges associated with growing communities within and adjacent to the forests. Apache-Sitgreaves NFS lands provide less developed opportunities than residents and visitors find in urban settings, such as greenbelts and parks.

### Desired Conditions for Lands

- The Apache-Sitgreaves NFs exist in a pattern that promotes efficient management which consists of large contiguous tracts of NFS lands.

- Residents and visitors are aware of Forest Service regulations and respect common property boundaries.
- The construction or placement of fences and gates, structures, signs, or other private personal property on NFS land (occupancy trespass) rarely occurs. Disposal of personal property (e.g., dumping) rarely occurs on NFS lands.

### Objectives for Lands

- Annually, survey and post on average 2 to 5 miles of unposted NFS boundary.
- During the planning period, maintain on average 2 to 5 miles of property boundary posting and corner monuments per year.
- During the planning period, resolve an average of three existing trespass cases per year.

### Guidelines for Lands

- Access points to NFS land from adjacent non-NFS developments and subdivisions should be limited and provide all residents (not just edge lot owners) common entry points. Individual access points should be discouraged to minimize the development of unauthorized roads or trails.
- Land exchanges should not result in the creation of isolated NFS parcels surrounded by other ownerships.
- Land acquisitions and exchanges should evaluate, and possibly include, associated beneficial [encumbrances](#) (e.g., water rights, mineral rights, easements, instream flow).

### Management Approaches for Lands

Land adjustments (e.g., exchanges, purchases) help to consolidate the NFS land base, reduce administrative problems and costs, enhance public access and use, and support resource management objectives. Management emphasis is to work with local communities to understand their community expansion needs and retain access to NFS land. The Apache-Sitgreaves NFs work with communities during development of their master plans and with communities, developers, and homeowner groups to retain legal access to public lands (e.g., easements, trailheads).

In order to reduce trespass issues along property boundaries, education, partnerships, and law enforcement are used. Survey and proper posting of boundaries between NFS lands and other lands is a key objective. Bureau of Land Management (BLM) resurveys are requested where section corners have not been brass capped, especially in areas of complex land patterns or where development is taking place.

NFS lands that are made available for exchange generally meet one or more of the following criteria: (1) isolated tracts or scattered parcels that cannot be efficiently managed, (2) recreation residence tracts, (3) provide for consolidation of public lands, (4) improve management or benefit specific resources, or (5) overriding public needs.

Lands desirable for acquisition generally meet one or more of the following criteria: (1) lands that contain vital species habitat or vital wildlife habitat (e.g., calving areas, critical winter range); (2) lands needed for developed or dispersed recreation; (3) wetlands, riparian areas, and other water oriented lands; (4) lands that contain unique natural or cultural values; (5) lands that improve public land management, meet specified administrative needs, or benefit other NFS programs; (6) lands that provide needed access, protect public lands from fire or trespass, or prevent damage to public land resources; (7) lands that are needed to consolidate public landownership or meet research needs; (8) lands that are needed to meet programs prescribed or endorsed by acts or reports of Congress or the Department of Agriculture; (9) inholdings that contain needed access; or (10) undeveloped inholdings.

### **Related Plan Content for Lands**

See the following section: [Community-Forest Intermix](#).

## **Cultural Resources**

### **Background for Cultural Resources**

The Apache-Sitgreaves NFs' heritage program manages the cultural resources of the forests. The lands of the Apache-Sitgreaves NFs contain a long and diverse cultural record that began approximately 12,000 years ago. Remnants of past and current human activities and events that reflect continuous use by Native peoples and the exploration, settlement, and management by Euro-American cultures can be found throughout the forests. Based on inventory surveys, it is estimated that approximately 100,000 archaeological sites are located on the forests. As of 2011, approximately 385,300 acres had been intensively surveyed for cultural resources resulting in the identification of over 6,900 sites. Many of these sites have been determined as eligible for listing on the National Register of Historic Places (NRHP). At present, 10 properties are listed on the National Register. The forests also contain cultural landscapes, prehistoric trails, and historic routes and trails.

Properties presently listed on the National Register of Historic Places include Bailey Ruin, Bear Mountain Lookout, Butterfly Lodge, Deer Springs Lookout, Lake Mountain Lookout, Los Burros Ranger Station, Pinedale Ranger Station, Promontory Butte Lookout, PS Knoll Lookout, and Water Canyon Administrative Site.

In addition, lands and resources are considered traditionally significant to all American Indian tribes associated with the lands of the Apache-Sitgreaves NFs: Fort McDowell Yavapai Nation, Hopi Tribe, Navajo Nation, Pueblo of Zuni, San Carlos Apache Tribe, Tonto Apache Tribe, White Mountain Apache Tribe, Yavapai-Apache Nation, and Yavapai-Prescott Indian Tribe, and in some cases, specific resources or areas are considered sacred by one or more tribes. Traditional cultural places and use areas are cultural historic properties that may be eligible to the National Register of Historic Places.

Cultural resources are nonrenewable with few exceptions. Once the resource has been disturbed, damaged, altered, or removed, nothing can recover the information that could have been gained through analysis or replace the opportunity for individuals to understand and experience the site. Forest Service management activities, public use, and natural processes have impacted cultural resources. Damage from vandalism (e.g., pilfering) continues to be a management issue. Current forest management practices minimize or avoid impacts to cultural resources.

### Desired Conditions for Cultural Resources

- Significant cultural resources (i.e., archaeological, historic, [traditional cultural properties](#) (TCPs), and known American Indian sacred sites) are preserved and protected for their cultural importance and are free from adverse impacts.
- Heritage programs, interpretive presentations, brochures, or displays are available to provide opportunities for public use, understanding, and enjoyment of the Apache-Sitgreaves NFs' cultural resources.
- Eligible and historically-significant<sup>24</sup> cultural properties are listed on the National Register of Historic Places (NRHP).

### Objectives for Cultural Resources

- Every 2 years or according to Southwestern Region Heritage Program standards, National Register sites and priority cultural resources are inspected.
- During the planning period, nominate at least five eligible cultural resources for inclusion in the NRHP.
- Annually, provide a Passport in Time (PIT) or other education project to provide opportunities for the public to learn about the Apache-Sitgreaves NFs' past and cultural resources.
- Annually, complete a minimum of 100 acres of nonproject cultural inventory to expand existing knowledge about their nature, location, and management needs of the forests' cultural resources.

### Standards for Cultural Resources

- Human remains shall not intentionally be excavated for educational purposes (e.g., research, field schools).
- Contracts, permits, or leases that have the potential to affect cultural resources shall include appropriate clauses specifying site protection responsibilities and liabilities for damage.

### Guidelines for Cultural Resources

- Activities that have the potential to adversely affect cultural resources should be discouraged in areas with a high concentration of significant archaeological sites or in areas of cultural or religious significance<sup>25</sup> to American Indians.

<sup>24</sup> Significance as defined by the National Historic Preservation Act and 36 CFR 60.

<sup>25</sup> Sacred sites as defined in E.O. 13007, traditional cultural properties as defined in National Register Bulletin 38, traditional cultural purposes as defined in the 2008 Farm Bill Section 8102, Subtitle B.

- Avoidance or protection measures should be the preferred method to prevent or minimize adverse effects to cultural resources listed in, nominated to, eligible for, or unevaluated for the NRHP.
- Historic facilities that are eligible for the NRHP should be managed to retain their integrity.
- Firelines and spike camps (i.e., a remote camp usually near a fireline) should be located to avoid impacts to cultural resources.

### **Other Sources of Information for Cultural Resources**

- Southwestern Region FSH 2309.24, Chapter 10, Cultural Resources Handbook (Section: Survey Standards)
- Southwestern Region FSH 2309.24, Chapter 40, [Cultural Resources Handbook \(Section: Damage Assessment\)](#)
- National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties

### **Management Approaches for Cultural Resources**

Management emphasis of the heritage resource program includes inventory, protection, study/evaluation, interpretation, and preservation. In addition to law, regulation, and policy, the forests follow the programmatic agreement regarding cultural resources protection and responsibilities executed by the New Mexico, Arizona, Texas and Oklahoma State Historic Preservation Officers (SHPO), the Advisory Council on Historic Preservation, and the Forest Service, Southwestern Region. The forests' heritage program also uses National Register Bulletins and the Forest Service Southwestern Region 1996 document "Cultural Affiliations: Prehistoric Cultural Affiliations of Southwestern Indian Tribes" to assist in complying with law, regulations, policy, and desired conditions.

When resource management conflicts occur, the values of preservation of cultural resources are weighed against the values of the proposed land use. In assessing the priority for preservation of cultural resources, consideration is given to the following: (1) listing on or eligibility for the NRHP; (2) adequacy of present methods of investigation and data recovery to realize the current research potential; (3) likelihood that the resource will have greater importance for addressing future research questions than current ones; (4) presence of values associated with significant historical persons or events, traditional cultural or religious values, or unique interpretive values where those values exist undisturbed in their original context(s); (5) likelihood of disturbing historic or prehistoric burials; (6) significance based primarily on architectural character and integrity of the setting; (7) importance of preservation in place relative to the objectives of the State Historic Preservation Plan; and (8) site densities that make data recovery economically infeasible or require unattainable operating conditions. Where preservation in place is important under these conditions, consideration is given to project redesign, relocation, or cancellation. If adverse effects cannot be avoided, they are mitigated per 36 CFR 800.

Areas rated as highest priority for nonproject cultural inventory are those: (1) known or thought to be threatened by looting and/or impacts of visitor use or other forces, (2) expected to have high

site densities, and (3) important to understanding the historic or prehistoric occupation of the forests.

Sites that need management or treatment plans are prioritized as follows: (1) sites subject to ongoing impacts or deterioration, (2) sites of high traditional, scientific, or community value, and (3) historic buildings or facilities with high potential for adaptive reuse.

The Apache-Sitgreaves NFs continue to collaborate with other forests, the State Historic Preservation Officer, the public, and affiliated tribes to develop management strategies for the forests' cultural resources, including a forest heritage plan. Scientific studies and research of the forests' heritage collections and resources, including an ethnographic inventory, contribute to tribal knowledge and Forest Service management activities.

### **Related Plan Content for Cultural Resources**

See the following sections: [Overall Recreation Opportunities](#), [Dispersed Recreation Opportunities](#), [Motorized Opportunities](#), [Nonmotorized Opportunities](#), [National Recreation Trails](#), [Conservation Education](#), [American Indian Rights and Interests](#), [Livestock Grazing](#), [Special Uses](#), [Minerals and Geology](#), and [Community-Forest Intermix](#).

## **American Indian Rights and Interests**

### **Background for American Indian Rights and Interests**

American Indian tribes are sovereign nations. The United States has a fiduciary relationship with tribal governments as set forth in the U.S. Constitution, treaties, statutes, executive orders, court decisions, and agreements. This relationship is also known as the Federal Trust Duty to American Indians. Therefore, the Forest Service has certain responsibilities to American Indian tribes to fulfill the government's Federal Trust Duty. In meeting these responsibilities, the Forest Service must administer their programs in a manner that does not interfere with tribal rights and resources. When American Indian tribes ceded lands to the United States government, rights and privileges to off-reservation lands were reserved for their tribal members. [Culturally affiliated](#) tribes retain rights to use Apache-Sitgreaves NFs' lands in ways that are not allowed to the general public. Access or use by the general public may be temporarily denied to allow tribal members to exercise their rights and interests in privacy and solitude.

Forest managers are required to consult tribes when proposed policies or management actions may affect their interests. Nine federally recognized tribal governments, representing five American Indian tribes, have aboriginal territories and traditional ties to the lands now administered by the Apache-Sitgreaves NFs: Fort McDowell Yavapai Nation, Hopi Tribe, Navajo Nation, Pueblo of Zuni, San Carlos Apache Tribe, Tonto Apache Tribe, White Mountain Apache Tribe, Yavapai-Apache Nation, and Yavapai-Prescott Tribe. Each tribe has their own history, traditions, and relationship to the land and other groups. The lands and resources of the Apache-Sitgreaves NFs have been used and continue to be used by many of the tribes for a variety of traditional cultural and religious activities. Past and current consultations with tribes have identified places and properties of religious and cultural use. These places are ethnographically important to tribal values and are inseparable from their cultures.

The better known TCPs, sacred sites, or areas known to have been used and/or continue to be used for traditional cultural purposes include, but are not limited to, Escudilla Mountain, Mount

Baldy, Greens Peak, Rose Peak, Gobbler Peak, St. Peters Dome, Burro Mountain, Antelope Mountain, Pole Knoll, Flume Mountain, SU Knoll, Head of Chevelon Canyon, Chevelon Butte, areas near Aspen Lake, numerous springs, caves, and the Little Colorado River. Many other areas located on the forests are used for traditional cultural purposes but have not been specifically identified. Additional areas may be identified through project or permit specific tribal consultation. Therefore, the inventory of known TCPs, sacred sites, and areas used for traditional cultural purposes is subject to change, and the list will be updated as needed. Forest managers confer with the forest heritage program manager or forest tribal liaison for more specific information.

### **Desired Conditions for American Indian Rights and Interests**

- Members of affiliated tribes have access to gather forest resources and products for traditional cultural purposes (e.g., medicinal plants, boughs, basket materials, pollen, plants and minerals for pigments).
- Traditionally used resources are not depleted and are available for future generations.
- Sacred sites and significant TCPs are accessible and free of adverse impacts allowing for culturally affiliated tribes to gather traditional forest products and conduct ceremonies.
- All sacred objects, human remains, funerary objects, and objects of cultural patrimony removed from lands of Apache-Sitgreaves NFs have been [repatriated](#) to the appropriate tribe.

### **Objectives for American Indian Rights and Interests**

- Over the planning period, a minimum of five MOUs are renewed or established with tribes associated with the Apache-Sitgreaves NFs.

### **Guidelines for American Indian Rights and Interests**

- Significant TCPs and sacred sites, that are known to be utilized by tribes for traditional use and religious ceremonies, should be managed to preserve the character and use of the site.
- Activities and uses should be administered in a manner that is sensitive to traditional American Indian beliefs and cultural practices.
- Human remains and religious objects recovered from excavations conducted on the forests should be repatriated within 5 years in compliance with the Native American Graves Protection and Repatriation Act of 1990 (Public Law 101-601).

### **Other Sources of Information for American Indian Rights and Interests**

- FSH 1509.13 American Indian and Alaska Native Relations Handbook, Chapter 10 (Section: Consultation with Tribes); Chapter 30 (Section: Considerations for Use in Voluntary Closures)

- National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties

### **Management Approaches for American Indian Rights and Interests**

The Apache-Sitgreaves NFs develop and maintain effective working relationships and recognize American Indian tribal viewpoints. Management actions support the forests' Federal trust responsibilities. Tribes are consulted at the early stages of planning and project design, so that tribal perspectives as well as traditional knowledge can be incorporated into project designs and decisions. Forest managers work with tribes to achieve mutually beneficial desired conditions and objectives. Agreements are in place for repatriation of human remains and artifacts. The management approach is to ensure the confidentiality of tribal information received by tribes through consultation if requested. Temporary closures of forest lands may occur for traditional and cultural purposes if requested by a tribe under authorization of the 2008 Farm Bill.

Forest employees receive training so they understand the unique legal relationship between the Federal government and American Indian tribes, set forth in the U.S. Constitution, treaties, statutes, executive orders, and court decisions. Managers may use fire to restore and enhance traditional cultural use areas used for collecting plants. Managers work to resolve conflicts with activities such as mining and drilling, OHV areas, [energy corridors](#), and electronic sites that are generally inconsistent with the desired conditions for TCPs.

### **Related Plan Content for American Indian Rights and Interests**

See the following sections: [Overall Recreation Opportunities](#), [Cultural Resources](#), [Forest Products](#), [Special Uses](#), and [Community-Forest Intermix](#).

## **Forest Products**

### **Background and Conditions for Forest Products**

Forest products include wood (timber, [biomass](#), [firewood](#)) and special forest products. Special forest products include such products as floral greenery, Christmas trees and boughs, mushrooms, transplants (trees, shrubs, or herbaceous plants), cones, medicinal plants, cuttings, herbs, nuts, berries, and decorative wood.

The total volume of wood products sold by the Apache-Sitgreaves NFs has fluctuated over time with an overall downward trend since the 1990s. Focus has shifted toward ecological restoration similar to reference conditions and reduction of wildfire hazard to communities by removal of small diameter trees, insect infestation, and imminent mortality trees. The forests encourage new wood product industries to utilize these products. Firewood harvest continues to be an important component of the local social and economic fabric.

### **Desired Conditions for Forest Products**

- The Apache-Sitgreaves NFs provide a sustainable supply of forest products (e.g., small roundwood, sawlogs, biomass, firewood, cones, Christmas trees, [wildings](#)) to businesses and individuals within the capability of the land.

- The collection of live plants, mushrooms, and other forest products does not impact species persistence onsite.

### Objectives for Forest Products

- During the planning period, prepare and offer up to an average of 122,000 CCF<sup>26</sup> per year from [suitable timberlands](#) resulting from sustainable harvest to provide wood products to businesses and individuals.
- Annually, provide up to 94,000 CCF (73,400 cords) of firewood for personal and commercial use.
- Annually, provide an average of 5,000 permits for Christmas trees.

### Standards for Forest Products

- Permits which authorize the collection of forest products shall include permit provisions to ensure the needs of wildlife, which depend upon those forest products, will continue to be met (e.g., cone and mushroom collection and the overwinter forage needs of squirrels).

### Guidelines for Forest Products

- Permits issued for forest products should include stipulations to protect resources.

### Other Sources of Information for Forest Products

- FSH 2409.18, Chapter 80 (Sections: Free Use, Administrative Use, Sales of Special Forest Products and Forest Botanical Products)

### Management Approaches for Forest Products

Wood products are a secondary benefit of treatments that are intended to restore the forests' ecological composition, structure, and function to a more resilient condition. Timber production and [tree cutting](#) are used to help achieve vegetation desired conditions, as well as contribute to the local and regional economy. Tree cutting on lands not suitable for timber production may occur for such purposes as restoration, salvage, fuels management, insect and disease mitigation, protection or enhancement of biodiversity or wildlife habitat, research or administrative studies, or recreation and scenery management consistent with other management direction.

A variety of partnerships and authorities are used for making forest products available to forest users (e.g., procurement contracts, stewardship contracts, forest products permits). Tribes culturally affiliated with lands on the Apache-Sitgreaves NFs may gather trees, portions of trees, or forest products free of charge for noncommercial traditional and cultural purposes. Uneven-aged silvicultural systems are emphasized and even-aged systems are used where appropriate.

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<sup>26</sup> CCF = 100 cubic feet

The forests allowable sale quantity (ASQ) is estimated as an annual average of 122,000 CCF. The ASQ represents the amount of timber (not including firewood or nonindustrial wood) that may be sold from lands suitable for timber production.

Other desired forest products, such as house logs, are available through permits or small sales. Areas may be identified for forest product removal (e.g., Christmas tree, firewood). Woody biomass not removed by project operations may be made available to meet public or industry needs.



**Figure 8. Small diameter trees to be used for forest products, Lakeside Ranger District**

### **Related Plan Content for Forest Products**

See these sections: [Overall Ecosystem Health](#), [All PNVTs](#), [Forests: All Forested PNVTs](#), [Woodlands: All Woodland PNVTs](#), [Wildlife and Rare Plants](#), [American Indian Rights and Interests](#), and [Special Uses](#).

## **Livestock Grazing**

### **Background for Livestock Grazing**

As of 2011, the Apache-Sitgreaves NFs administer 96 active grazing allotments and two designated sheep driveways. Livestock grazing contributes to the livelihood of the permittees and to the economy of local communities and counties. Livestock numbers have declined over the last 20 years, as the forests have balanced permitted numbers with the capacity of the land while responding to environmental changes such as drought. 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 for Livestock Grazing**

- Livestock grazing contributes to the social, economic, and cultural diversity and stability of rural communities.
- Livestock grazing and associated activities contribute to healthy, diverse plant communities, satisfactory soils, and wildlife habitat.
- Range developments for livestock minimize impacts to wildlife and blend with the natural environment.
- [Forage reserves](#) are available and provide forage to allow for management activities and/or natural ecological processes.
- Livestock grazing is in balance with available forage (i.e., grazing and browsing by authorized livestock, wild horses, and wildlife do not exceed available forage production within established use levels).
- Livestock grazing and associated activities do not negatively impact cultural resources.

### Objectives for Livestock Grazing

- Within the planning period, and as opportunities arise, establish at least one forage reserve on each ranger district.

### Standards for Livestock Grazing

- New or reconstructed fencing shall allow for wildlife passage, except where specifically intended to exclude wildlife (e.g., elk fencing).
- New livestock watering facilities shall be designed to allow wildlife access and escape.

### Guidelines for Livestock Grazing

- During maintenance of existing watering facilities, escape ramps that are ineffective or missing should be replaced.
- [Critical areas](#) should be managed to address the inherent or unique site factors, condition, values, or potential conflicts.
- Allotment management plans should include quantifiable objectives for implementation and effectiveness monitoring to assist in moving toward or maintaining desired conditions.
- Grazing use on seasonal allotments should be timed to the appropriate plant growth stage and soil moisture.
- New livestock troughs, tanks, and holding facilities should be located out of riparian areas to prevent concentration of livestock in these areas. Existing facilities in riparian areas should be modified, relocated, or removed where their presence is determined to inhibit movement toward desired riparian or aquatic conditions.
- As areas are mechanically treated or burned, timing of livestock grazing should be modified as needed, in order to move toward desired conditions and to accomplish the objectives for the treatment.
- Forage, browse, and cover needs of wildlife, authorized livestock, and wild horses should be managed in balance with available forage.
- Efforts (e.g., temporary fencing, increased herding, herding dogs) should be made to prevent transfer of disease from domestic sheep and goats to bighorn sheep wherever bighorn sheep occur. Permit conversions to domestic sheep or goats should not be allowed in areas inhabited by bighorn sheep.
- To minimize potential resource impacts from livestock, salt or nutritional supplements should not be placed within a quarter of a mile of any riparian area or water source. Salt or nutritional supplements should also be located to minimize herbivory impacts to aspen clones.
- To prevent resource damage, trailing of livestock should not occur along riparian areas.
- Constructed features should be maintained to standard or removed when no longer needed.

- New range developments should be located to minimize impacts to scenic resources and reduce the potential for vandalism and livestock-vehicle conflicts. Range developments should be designed in consideration of public safety, especially in areas of concentrated recreation use.

### **Other Sources of Information for Livestock Grazing**

- Southwestern Region FSH 2209.13, Grazing Permit Administration Handbook

### **Management Approaches for Livestock Grazing**

The management approach is to improve or maintain the health of rangelands by completing site-specific NEPA environmental analyses, assessments, and decisions and updating allotment management plans for individual grazing allotments to emphasize the achievement of desired conditions. Sustainable stocking levels, mitigation measures, and appropriate grazing systems are tools utilized to that end.

Forest managers work with permittees to adjust timing, intensity, and frequency of livestock grazing to respond to changing resource conditions. Livestock and associated developments are managed to minimize impacts to forest resources, including cultural resources, native plant and animal species, wetlands, and riparian areas. Vacant allotments or pastures are stocked, incorporated into forage reserves, or withdrawn from grazing when necessary to benefit other resource needs. Vacant allotments or pastures are evaluated for consistency with, and trend toward, plan desired conditions prior to renewing use. The Congressional Grazing Guidelines (FSM 2320 – Wilderness Management, section 2323.33 – exhibit 01) are used to manage livestock grazing in wilderness and primitive areas.

The Apache-Sitgreaves NFs work with permittees, the State, tribes, and other organizations to maintain or improve rangeland conditions. The forests work with the Tonto National Forest, AZGFD, sheep permittees, and other permittees to administer the Heber-Reno and Morgan Mountain sheep driveways. Range developments are maintained on an annual basis so as to not be a hazard to wildlife. Forest managers also work with nonpermittee livestock owners to prevent unauthorized livestock use, including reconstructing fencing where needed.

Forage reserves may be used as a management tool to provide forage to livestock when an authorized pasture or allotment is unavailable. This tool may be used to respond to a variety of situations (e.g., wildfire, restoration treatment, drought) or to manage for other desired conditions (e.g., aspen regeneration, federally listed species recovery).

### **Related Plan Content for Livestock Grazing**

See the following sections: [Overall Ecosystem Health](#), [Aquatic Habitat and Species](#), [Forests: Aspen](#), [Riparian Areas](#), [Grasslands](#), [Wildlife and Rare Plants](#), [Scenic Resources](#), and [Cultural Resources](#).

## Minerals and Geology

### Background for Minerals and Geology

The potential for [locatable](#) and [leasable minerals](#) is low because of the existing geological makeup of the forests. Numerous active mining claims for locatable sandstone are found on the Lakeside and Black Mesa Ranger Districts. Also, several mill site claims are located on the Clifton Ranger District. There may be some abandoned mines on Apache-Sitgreaves NFS lands that need closure. A number of small abandoned surface operations and test pits are scattered across the forests and are not regarded as hazardous.

[Common variety minerals](#) include sand, gravel, landscape rock, cinders, and crushed rock. The demand for these mineral materials from the Apache-Sitgreaves NFs is low. Permitted uses are predominantly small private sales from common use pits, a multi-operator commercial pit, and various pits for State and county road uses (primarily for road cinders).

### Desired Conditions for Minerals and Geology

- Mineral developments, including pits, mines, equipment, and associated structures, do not dominate the scenic landscape.
- Mineral materials (e.g., gravel, cinders) are available for road maintenance activities for the Forest Service transportation system, public road system, and ADOT use.
- Mineral materials (e.g., cinders, decorative stone) are available to support resource management needs, personal use, and commercial pursuits.
- Lands where past mineral development or exploration has occurred are returned to stable conditions and vegetated with native species.
- Naturally occurring geological features (e.g., caves, sinkholes) retain their integrity.
- Archaeological, geological, and biological features of caves and abandoned mines are not adversely affected by visitors.
- Caves and abandoned mines are available for roosting bats, reducing the potential for displacement, abandonment of young, and possible mortality.
- Abandoned mine lands do not endanger people or the environment.
- Sinkholes remain intact to support wildlife habitat, recreation opportunities, and unique vegetation.

### Guidelines for Minerals and Geology

- Key cultural sites, [research natural areas](#), and administrative and recreation sites with an investment in facilities should be withdrawn from mineral entry to protect resources and existing infrastructure.
- Mineral material resource sites should be located where economical and the scenic integrity objectives can be met. Adverse visual impacts should be minimized.

- Existing designated mineral material collection areas and community pits should be utilized to the maximum before new areas are developed. Additional mineral material development should balance private and community needs while providing for sustainable [administrative use](#).
- Abandoned mine lands or unneeded mineral material pits should be restored, closed, or rehabilitated to provide for resource protection and public health and safety.
- Streambed and floodplain alteration or removal of material should not occur if it prevents attainment of riparian, channel morphology, or streambank desired conditions.
- To reduce disturbances from human activities and prevent the spread of disease, bat gates should be constructed and installed in cave and mine entrances used as shelter for bats within 3 years of discovery when there are no conflicts with cultural resources.
- Caves and abandoned mines that are used by bats should be managed to prevent disturbance to species and spread of disease (e.g., white-nose syndrome).
- Active mineral operations should be managed to deter public motorized vehicle travel for public safety.
- Oil and geothermal leases should contain the “no surface occupancy” restriction in designated<sup>27</sup> or recommended special areas (e.g., recommended wilderness, primitive area, eligible or suitable wild and scenic rivers corridors, research natural areas, botanical area, and wild horse territory), sacred sites, American Indian TCPs, and properties on the National Register of Historic Places to protect the unique character of these areas.
- Common variety mineral activities should not be permitted in designated or recommended special areas or Chevelon Canyon to protect the unique character of these areas.
- Administrative sites, high use developed recreation areas, and other areas with substantial investment in infrastructure should be withdrawn from mineral entry.

### **Management Approaches for Minerals and Geology**

The Apache-Sitgreaves NFs cooperate with the State and other agencies to inventory, mitigate, and rehabilitate hazardous abandoned mines and mined areas. As abandoned mine land hazards (e.g., adits, drifts, portals, shafts) are identified and inventoried, appropriate long-term management and closure is considered. Pit plans provide detailed management direction for mineral material pits. Cave management plans are developed as needed.

Some gravel and cinder pits are managed for very low scenic integrity and may dominate the landscape when viewed from nearby.

### **Related Plan Content for Minerals and Geology**

See the following sections: [Wildlife and Rare Plants](#), [Scenic Resources](#), [Cultural Resources](#), and [Special Uses](#).

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<sup>27</sup> Designated wilderness is withdrawn from leasing and mineral entry.

## Special Uses

### Background for Special Uses

Occupancy and use of NFS lands for public and private purposes, where the use is consistent with natural resource management goals, occur through the issuance of [special use authorizations](#) and easements. A wide range of uses may be permitted including, but not limited to, water storage and transmission, electric transmission and distribution lines, [communications sites](#), alternative and renewable energy generating facilities, research permits, outfitters and guides, recreational events, and large group gatherings.

Increased demand is expected for additional utility lines and renewable energy sources to serve the growing populations of Arizona and the Southwest. There are three major energy transmission corridors, two on the Black Mesa Ranger District and one on the Clifton Ranger District. See the “Energy Corridor Management Area” section for direction specific to these three corridors.

### Desired Conditions for Special Uses

- Energy developments and other special uses are not major features on the landscape and should not attract attention (moderate scenic integrity).
- Lands where special use activities have occurred show little evidence of impacts.
- Communications sites display landscapes which vary from moderately altered where human activities are evident (low scenic integrity) to slightly altered where human activities may be seen but do not attract attention (moderate scenic integrity).

### Standards for Special Uses

- Noxious plants and nonnative invasive species monitoring and control shall be included in contracts, permits, and agreements.
- Special use authorizations for the collection of live species with limited distribution (e.g., some invertebrates, plants) shall include permit provisions to ensure the species persist onsite.
- New communications sites or energy developments shall not be authorized on traditional cultural properties.

### Guidelines for Special Uses

- Special use authorizations should include provisions that limit encumbrances of NFS land.
- The number of communications sites, energy developments, and energy corridors should be minimized to limit encumbrances of NFS land.
- New communications permittees and equipment should be located or colocated within designated communications sites as identified in appendix C.
- New communications sites, energy developments, and energy corridors should be located to minimize impacts to scenery, special areas, and species.

- Commercial use of Forest Service administrative communications sites should be discouraged to avoid potential use conflicts or communication interference.
- High power antenna/towers should not be authorized except for the existing antenna/tower located on Porter Mountain. Upon termination of the high power permit, or in the case of inoperability, this communications site should be managed as low power.
- Existing energy corridors should be used to their capacity with compatible upgraded power lines before evaluating new routes.
- Environmental disturbance should be minimized by collocating pipelines, power lines, fiber optic lines, and communications facilities.
- Power pole installation or replacement under special use authorization should include raptor protection devices in open habitat such as large meadows and grasslands. Raptor protection devices should be installed on existing poles where raptors have been killed.
- The use of underground utilities should be favored to avoid potential conflicts with resources (e.g., scenic integrity, wildlife, wildfire, heritage).
- Water use associated with special use authorizations should be in accordance with Arizona State Statutes and should have a decreed water right.
- If structural degradation occurs to recreational residences, (re)construction should be discouraged.
- Commercial outfitters and guides should not be authorized to use developed campgrounds so those sites remain available for noncommercial forest visitors.
- Commercial outfitters and guides may be authorized use of range developments when there is no conflict with allotment management.
- Large group and recreation event special uses should not be authorized within wilderness, recommended wilderness, primitive area, wildlife quiet areas, eligible “wild” river corridors, Phelps Cabin Botanical Area, Phelps Cabin Research Natural Area, or recommended research natural areas to protect the unique character of these areas.
- Target ranges may be appropriate in the General Forest or Community-Forest Intermix Management Areas because of the wide spectrum of recreation opportunities that can be provided in these areas. Other management areas should be avoided.
- As applicable, issuance of special use authorizations should incorporate measures to reduce potential impacts to wildlife and avoid rare and unique habitats (e.g., bogs, fens).
- Constructed features should be maintained to standard or removed when no longer needed.

### **Other Sources of Information for Special Uses**

- FSH 2709.11, Chapter 40 (Section: Special Uses Handbook (Special Uses Administration))

- FSH 2709.11, Chapter 50.3 (Section: Special Uses Handbook (Terms and Conditions - Policy))

### **Management Approaches for Special Uses**

Special use authorizations are considered for uses that complement other opportunities and are based on public need or cannot be met on private or other Federal lands. Timeliness of processing special use requests is based on agency capacity (available funding and staffing). The cost of processing special use permits may be recovered from the proponent where authorized and used to process permits and monitor compliance. Forest users should have information regarding when there is a need to obtain a permit, particularly for collection of forest products.

Developed energy corridors are managed for very low scenic integrity where vegetation and structural changes may attract attention and dominate the landscape when viewed from nearby.

Requests for energy development and transmission corridors are evaluated based on public need, economics, and environmental impacts of the alternatives. Emphasis is to use existing corridors to their capacity with compatible utilities, including upgrade of existing power lines, before evaluating new routes. To minimize impacts to wildlife, managers consider current U.S. Fish and Wildlife Service and Arizona Game and Fish Department guidelines for energy development.

Site plans for the forests' communications sites provide detailed management direction, including scenery management. The forests have over 35 communications sites (see appendix C), both commercial and administrative, where authorized telecommunications facilities are located. There are no plans to add additional communications sites.

The Forest Service is responsible for obtaining compliance of special use authorization requirements (permit terms and conditions) that would impose restrictions or limitations on water diversion, storage, or use not within the jurisdiction of the Arizona Department of Water Resources.

Public road agencies (agencies that maintain roads with gas tax funding) are encouraged to accept USDA easements on roads they maintain and/or provide access to private properties. Where feasible, road use permits issued to public road agencies may be converted to easements as opportunities arise. Managers coordinate with ADOT on management of vegetation in highway rights-of-way to limit the spread of noxious weeds and nonnative invasive plants through appropriate timing of treatments.

### **Related Plan Content for Special Uses**

See the following sections: [Invasive Species](#), [Scenic Resources](#), [Lands](#), [Cultural Resources](#), [Water Resources](#), and [Recommended Research Natural Areas](#).

## **Water Uses**

### **Background for Water Uses**

Demand for water exceeds supply, except during exceptionally wet years when the amount of water produced exceeds downstream storage capacity. The forests' demand for water is very small compared to downstream users but is extremely important for proper resource management. The

demands for [Federal reserved water rights](#) for administrative sites, road construction and watering, and firefighting are expected to increase.

All new water acquisitions require either application to the State of Arizona or purchase from other water users. In some basins, the forests may have water rights, but the rights may need to be severed and transferred to other locations within the basin to meet management needs. Since the early 1990s, transfers and acquisitions of new waters have not been processed due to a moratorium by the Arizona Department of Water Resources (ADWR), the State agency responsible for administering water. The forests are directed to follow State water rights laws and policies.

### Desired Conditions for Water Uses

- Water developments contribute to fish, wildlife, and riparian habitat as well as scenic and aesthetic values.
- Apache-Sitgreaves NFs water rights are secure and contribute to livestock, recreation, wildlife, and administrative uses.
- Surface water is not diminished by groundwater pumping.
- Dams, diversions, or other water control structures are designed, maintained, and operated to conserve water resources.

### Objectives for Water Uses

- Annually, prepare at least one instream flow water rights application until water acquisition needs are complete to sustain riparian areas, fish, wildlife, and water-based recreation.

### Standards for Water Uses

- Forest Service water rights must be put to beneficial use and that use documented and consistent with ADWR regulations.
- Special uses for water diversions shall maintain fish, wildlife, and aesthetic values and otherwise protect the environment.
- Streams on NFS lands with high aquatic values and at risk from new water diversions shall be preserved and protected with instream flow water rights.
- Groundwater withdrawals shall not measurably diminish surface water flows on NFS lands without an appropriate surface water right.

### Guidelines for Water Uses

- Constructed features should be maintained to standard or removed when no longer needed.

### **Other Sources of Information for Water Uses**

- U.S. Forest Service (FS 881) Technical Guide to Managing Groundwater Resources Part 2 (Section: Overview of National Groundwater Policy)

### **Management Approaches for Water Uses**

Management emphasis is to provide adequate water supplies to support the mission of the Agency in addition to helping maintain continuous water supplies to downstream users on and off the forests. Instream flows are protected or enhanced to achieve resource needs in accordance with State and Federal procedures.

The forests participate in water rights [adjudications](#), maintain a water rights and water uses database, and honor the water rights of others. The forests work with the State and other agencies to deal with groundwater issues and maintain instream flows. The forests work with affected members of the public to gain their support for instream flows.

Project-level analysis (e.g., compliance with the National Environmental Policy Act of 1970 (Public Law 91-190)) for new water developments or reissuances includes an assessment of Forest Service water needs with an inventory of existing water rights and water uses within the subwatershed (6<sup>th</sup> level HUC) of the subject water development. The Apache-Sitgreaves NFs seek to conserve water through better education of water users (e.g., recreationists, permittees) on conservation measures and by applying good water management practices (e.g., preserve water by identifying and reducing leaks) as they relate to diversion and storage operations. Groundwater is critical to maintaining flow in some of the most important streams in the State (e.g., Chevelon Creek and Tonto Creek). Groundwater recharge occurs in higher elevations and is critical to long-term maintenance of the resource.

### **Related Plan Content for Water Uses**

See the following sections: [Water Resources](#), [Aquatic Habitat and Species](#), and [Special Uses](#).