United States Department of Agriculture

Tonto National Forest's Preliminary Proposed Land and Resource Management Plan

Tonto National Forest
Coconino, Gila, Maricopa, Pinal, and Yavapai Counties
Arizona

Forest Service Tonto National Forest November 2017

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Cover Photo: View of Mogollon Rim near Payson, AZ - ponderosa pine evergreen oak system

Tonto National Forest – Preliminary Proposed Plan – November 2017

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Chapter 1. Forest Plan Purpose and Framework

Purpose of the Preliminary Proposed Plan

The Tonto National Forest is a unit of the United States Forest Service (USFS), a land management agency in the U.S. Department of Agriculture (USDA). The mission of the Forest Service is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. The principal document that guides management on the Tonto National Forest is the "Land and Resource Management Plan for the Tonto National Forest" (Tonto National Forest Plan).

The National Forest Management Act of 1976 requires each national forest to develop a land and resource management plan (commonly referred to as a forest plan) and amend or revise the plan every 10 to 15 years. This forest plan is the result of a revision process conducted in accordance with the 2012 Land and Resource Management Planning Rule (36 CFR 219) and its 2015 planning directives (FSH 1909.12). The Tonto National Forest, under the direction of the 2012 planning rule and associated directives, is utilizing best available scientific information (BASI) to inform the planning process (36 CFR 219.3). The planning record documents how BASI was determined to be accurate, reliable, and relevant to issues being considered.

A forest plan guides and constrains Forest Service personnel and resource management, not the public. Management of NFS lands is also guided and constrained by laws, regulations, policies, practices, and procedures that are in the Forest Service Directive System. These are generally not repeated in forest plans. Any constraint on the public needs to be imposed by law, regulation, or through the issuance of an order by the Responsible Official under 36 CFR part 261, Subpart B.

Development of this Preliminary Proposed Plan was an iterative process utilizing BASI, regional guidance, collaboration with internal and external resources specialists, and collaboration with a wide variety of government agencies, tribes, non-governmental organizations, stakeholders, forest users, and member of our forest communities.

Forest Plan Content

A forest plan provides broad, program-level direction for management of National Forest System lands and its resources. The plan provides direction for how future projects are to be managed to address the risks to sustainability of resources, goods, and services the forest produces and to provide for the future management of the forest. Although the forest plan does not contain a commitment to select any specific project, future projects are carried out based on guidance provided in the plan. A forest plan:

- Applies to only those lands within the National Forest System;
- Is developed through an ongoing public process;
- Uses the best available scientific, local, and native knowledge to inform the planning process;
- Provides a framework for integrated resource management and for guiding project and activity decision making;
- Does not authorize projects or activities, commit the Forest Service to take action, or regulate uses by the public (in other words, no site-specific decisions are expected to be made in a forest plan); and
- Should not repeat laws, regulations, or program management policies, practices, and procedures that are in the Forest Service Directive System.

A forest plan consists of (1) plan components; (2) other plan content, and (3) optional plan content. Each of these is discussed below:

Plan Components

Plan components guide future project and activity decision making. They apply forest-wide, to specific parcels of land (management areas), or to land of specific character (e.g., riparian areas, roads, seeps, springs). These components are:

Desired conditions are specific social, economic, and ecological conditions of the plan area, or a portion of the plan area, that are described in terms specific enough to allow for progress toward their achievement. Desired conditions are what drive the plan. All project-level management activities should be aimed at the achievement of the desired conditions for those resources in the area where the project is located. Desired conditions can be thought of as vision statements that help define a collective vision for the National Forest in the future.

Objectives are concise, measurable, and time-specific statements of a desired rate of progress toward desired conditions and should be based on reasonably foreseeable budgets. Objectives, along with the strategies (from management approaches or Forest Service handbook direction) used to accomplish them, can be thought of as the tools we will use to prioritize project activities to reach desired conditions. Objectives are mileposts along the road toward desired conditions.

Standards can be thought of as the sideboards we will operate within as we develop projects to accomplish objectives and achieve desired conditions. These are mandatory constraints on project and activity decision-making. A deviation from a standard within a project requires a plan amendment for that deviation.

Guidelines describe constraints on project and activity decision-making that allow for departure from its terms, so long as the intent of the guidelines is met. In other words, guidelines are mandatory with some flexibility on how they are implemented in meeting the intent of the existing guideline. Any deviation from the intent of a guideline requires a plan amendment.

Suitability of lands is identified in a plan as specific lands within a plan area that are suitable for various uses or activities based on the desired conditions applicable to those lands. The plan also identifies lands within the plan area as not suitable for uses that are not compatible with desired conditions for those lands. The suitability of lands need not be identified for every use or activity; however, every plan must identify those lands that are not suitable for timber production (required by the National Forest Management Act).

Every plan must identify **management areas** or **geographic areas,** or a plan may have both. See more information about management areas in the Forest Plan Organization section below.

Other Required Plan Content

In addition to plan components the forest plan must include other plan content. Other plan content are not plan components.

Priority watersheds: Every plan must identify watersheds that are impaired or at risk for priority maintenance or restoration.

Roles and contributions: Every plan must describe the roles and contributions of the plan area to ecological, social, and economic sustainability within the broader landscape.

Monitoring program: Every plan must include a monitoring program. Monitoring information enables the responsible official to determine if a change in plan components or other plan content that guide management of resources on the plan area may be needed.

Proposed and possible actions: Every plan must describe proposed and possible actions that may occur during the life of the plan on the plan area. Possible actions are not a commitment to do work, but possible actions which could be performed to move toward desired conditions and objectives.

Optional Plan Content

Forest plans may include other optional plan content, such as existing conditions, explanatory narrative, and management approaches. Optional plan content are not plan components but serve to support the plan by providing additional information and approaches in achieving the desired conditions.

Management approaches and associated information do not offer plan direction, but describe an approach or strategy to manage the unit to achieve a desired condition. Management approaches often convey how plan components work together to achieve the desired condition. They may also describe context, intent, priorities, partnership opportunities or coordination activities, needs to surveys, inventories or assessments, or approaches to risk and uncertainty. Not every resource topic area may have an associated management approach heading. Changes to management approaches do not require plan amendments.

Background and description and associated information do not offer plan direction, but give a brief sense of the history and/or description of the resource topic area being addressed, as of the writing of the plan. The background and description information also provide a context for the desired conditions identified as part of a plan component.

Other sources of information include existing laws, regulations, policies, memorandums of understanding and other guidance that will be incorporated into the plan as an appendix. These sources are important in designing projects and activities to achieve desired conditions. Most of these documents are available from Forest Service offices. Many are posted on the Tonto National Forest Internet Web site www.tontoplan.org.

Goals (include description)**.** Goals were not utilized in the Tonto National Forest Preliminary Proposed Plan.

Forest Plan Organization

Chapter 1. Forest Plan Purpose and Framework briefly describes the purpose of the Forest Plan, Forest Plan content and organization, project consistency with plan components, implementation, and a description of the planning area and its context.

Chapter 2. Forest-wide Plan Direction includes forest-wide plan components including desired conditions, objectives, standards, and guidelines as well as overall descriptions and management approaches for all forest resources. Ecological, social, cultural, and economic sustainability and multiple use direction is all combined in this chapter.

Chapter 3. Designated Areas and Management Areas Plan Direction contains the plan components applicable to specific areas that call for site-specific management. This chapter is divided into two sections: “Designated Areas” and “Management Areas” (MAs).

Designated areas are mostly designated by statute, but some categories may be established administratively through the federal executive branch. Plan components for a designated area may differ from forest-wide guidance and must provide for appropriate management of the designated area, based on

the applicable authorities and the specific purposes for which the area was designated or recommended for designation.

Management areas are used to describe how plan components apply to specific parcels of NFS land. A management area represents a management emphasis for an area or several similar areas on the landscape. Plan components for a management area may differ from forest-wide guidance by:

1. Constraining an activity where forest-wide direction does not;
2. Constraining an activity to a greater degree than forest-wide direction; or
3. Providing for an exception to forest-wide direction, when forest-wide direction is in conflict with the management emphasis of the management area.

Forest-wide plan components are applied, unless there is management direction for a designated area or management area.

Chapter 4. Forest Plan Monitoring Program (not available at this time) outlines the monitoring and evaluation of plan implementation is used to determine progress toward achieving desired conditions and objectives, and how well management requirements, such as standards and guidelines, are being applied. The monitoring strategy provides a framework for subsequent monitoring and evaluation designed to inform adaptive management.

Appendix A. Proposed and Possible Actions (not available at this time) contains a list of possible actions and potential management approaches. Possible actions are the types of projects that the forest may use in the next 3 to 5 years to move toward achieving desired conditions and objectives. They represent examples of actions that would likely be consistent with plan components, but they do not commit the Agency to perform or permit any particular action.

Project Consistency with Plan Components

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

- Modify the proposed project or activity to make it consistent with the applicable plan components.
- Reject the proposal or terminate the project or activity.
- Amend the plan so that the project or activity will be consistent with the plan as amended.
- Amend the plan contemporaneously with the approval of the project or activity so that the project or activity will be consistent with the plan as amended (36 CFR 219.15(c)).

Determining consistency

Because of the many types of projects and activities that can occur over the life of the plan, it is not likely that a project or activity can maintain or contribute to the attainment of all desired conditions, nor are all desired conditions relevant to every activity (i.e., recreation desired conditions may not be relevant to a fuels treatment project). Most projects and activities are developed specifically to maintain or move conditions toward one or more of the desired conditions of the plan.

Every project and activity must be consistent with the applicable plan components. A project or activity approval document must describe how the project or activity is consistent with applicable plan components by meeting the following criteria (36 CFR 219.15(d)):

1. **Desired conditions and objectives**. The project or activity contributes to the maintenance or attainment of one or more desired conditions, or objectives, or does not foreclose the opportunity to maintain or achieve any desired conditions, or objectives, over the long term.
2. **Standards**. The project or activity complies with applicable standards.
3. **Guidelines**. The project or activity:
    a. Complies with applicable guidelines as set out in the plan; or
    b. Is designed in a way that is as effective in achieving the purpose of the applicable guidelines (§219.7(e)(1)(iv)).
4. **Suitability**. A project or activity would occur in an area:
    a. That the plan identifies as suitable for that type of project or activity; or
    b. For which the plan is silent with respect to its suitability for that type of project or activity.

Forest Plan Implementation

Project-level planning is the mechanism for plan implementation. Project planning translates the desired conditions and objectives in the plan into proposals that identify specific actions, design, features, and project-level monitoring. Projects address site-specific needs developed locally with input from experts and stakeholders and consideration of the most current and relevant information. Project decisions are made following public involvement and analysis. Important considerations in project development include consistency with the plan, consistency with higher-level direction, project potential effects on moving toward desired conditions at multiple scales, and feedback form project- and plan-level monitoring regarding the effectiveness of management strategies.

In order to ensure a project is consistent with the plan, its design and implementation should consider its setting, any Designated or Management Areas it overlaps, and plan guidance related to any resources or conditions that maybe be present in the area (e.g., cultural resources, nonnative species, geologic formation, and wildlife). Additionally, they should consider any potential conflicts with other authorized projects and activities. Project design should be consistent with forest-wide plan direction except where superseded by Designed or Management Area direction, which takes precedence.

Plan- and project-level monitoring and evaluation are the tools for gathering information on progress toward desired conditions, the effectiveness of plan implementation, and the appropriateness of plan direction. This information is subsequently used to determine management needs and adjust management strategies, which, in part, determine the form of future projects and activities. As such, monitoring and evaluation are key elements in plan implementation, as they guide future management occurring under the plan.

Plan Area

The Tonto National Forest Plan was originally approved in 1985 and has since been amended 29 times to accommodate situations in specific projects or to reflect changes in social, economic, or ecological conditions. The Tonto National Forest is the fifth largest forest in the United States, covering 2,964,308 acres of rugged and spectacularly beautiful country. It is located in central Arizona, with Phoenix to the south, the Mogollon Rim to the north, and the San Carlos and Fort Apache Indian Reservations to the east.

Chapter 2. Forest-Wide Plan Direction

Partnerships and Volunteers

Description

Relationship are a key factor that can impact the success of how the forest plan is implemented. With the challenges faced by the Forest today, strong relationships with partners and volunteer groups are necessary to help care for the land and serve the people. While the forest plan does not provide direction beyond the scope of managing Tonto National Forest resources, partners and volunteers may be part of strategies that help to achieve resource desired conditions and other plan components.

Desired Conditions

- The Tonto, and the diverse communities and partners it serves are engaged and able, together, to make better decisions and successfully implement programs, conserve the natural environment and encourage others to enjoy the social, economic, and ecological benefits that the Tonto National Forest provides.
- Strive for shared leadership and shared funding that leads to greater outcomes and joint benefits. Shared leadership is the foundation for long-term collaborative structures that transcend leadership and staff turnover.
- Mechanisms to recruit, train, and coordinate volunteers across agencies and organizations are supported.
- Youth, diverse communities, volunteerism, citizen science, environmental education, and sustainable funding sources support restoration and recreation work.
- Partnerships with diverse communities, youth, and volunteerism are embraced and celebrated.
- Youth are excited and engaged for future employment and/or they simply value public lands.
- Historically unrepresented communities and partners are represented and part of the decision making process.
- Strong connections between the Forest and neighboring communities exist.
- Staff are dedicated to working effectively with partners and communities seizing on opportunities to improve natural resource management, resulting in projects moving forward in a timely manner, and minimizing loss of project momentum due to staff turnover.

Management Approaches

- Partners are encouraged and able to work effectively on forest issues. (Community partners are enabled to take action to move NEPA and maintenance projects forward when they can provide funding, volunteers and other resources for project implementation.
- Marketing and Tourism Organizations such as Chambers of Commerce and Boards of Tourism are encouraged and able to promote a diverse variety of tourism and recreational opportunities on the Tonto through websites, brochures, conferences and other educational/informative outlets.)
- Special interest recreation groups (OHV, MTB, Hike, Equestrian, other) assist in stewardship of the resources they enjoy while recreating. (e.g., trail maintenance).

Vegetation – Ecological Response Units (ERUs)

Description

The Tonto National Forest stretches across a range of altitudes and geology giving rise to diverse vegetative communities from lower Sonoran deserts to pine-forested mountains. Management direction is described for vegetation communities and ecosystems using Ecological Response Units. Ecological response units (ERUs) are mapped ecosystem types based off biophysical themes that represent the range of conditions (e.g., dominant species, vegetation associations, soils, landscape features, climate, etc.) that prevail under natural disturbance regimes (e.g., fire, insects and disease, etc.). Each ERU has specific seral stages that describe smaller units of vegetation conditions and succession (e.g., dominance of post-disturbance species, closed canopy conditions) that is influenced by both natural processes and management.

Table 1. Ecological Response Units by System Type

ERUs Grouped by System Type	Acres	Elevation (feet)
Shrublands/Deserts	791,284	1,300 – 5,800
Shrublands/Interior Chaparral	290,771	2,300 – 7,800
Grasslands/Semi-desert grassland	340,983	1,800 – 6,800
Woodlands	1,035,449	2,200 – 7,800
Forests	302,436	1,700 – 5,100

Desired conditions for ERUs are presented at three spatial scales: the landscape scale, mid-scale, and fine-scale (Figure 1). For woodland and forest ERUs, the landscape scale is 1,000-10,000 acres or larger, the mid-scale is 10 to 1,000 acres, and the fine-scale is less than 10 acres. For shrublands (semi-desert grassland, and desert ERUs), the landscape scale is 1,000's-10,000 acres or larger, the mid-scale is 100's to 1,000's acres, and the fine-scale is less than 100 acres. Vegetation descriptions at these scales provide adequate detail and guidance for the design of projects and activities that will help achieve the desired conditions over time. In some cases not enough science is available to provide descriptions at multiple scales. Descriptions begin with the landscape scale to provide a "big picture" of the desired conditions across the larger land area. Descriptions at the mid- and fine-scales provide additional detail necessary for guiding future projects and activities. The landscape scale is typically composed of variable elevations, slopes, aspects, soils, plant associations, and disturbance processes. A landscape area is comprised of ten or more mid-scale units. The mid-scale is composed of assemblages of fine-scale units which have similar biophysical conditions. The fine-scale is an area in which the species composition, age, structure, and distribution of plants (single, grouped, or aggregates of groups) is described.

Each ERU describes a range of conditions (e.g., cacti and grass ranges from 10-25 percent on average) for desired conditions. No one individual project is anticipated to reach these targets (not every acre will be representative of these ranges) but individual projects should be designed in a manner that helps to drive the ecosystem towards the desired conditions. However, the culmination of projects and averaged conditions across the forest, over time, is anticipated to drive the ecosystem/ERU towards these targets/ranges for desired conditions.

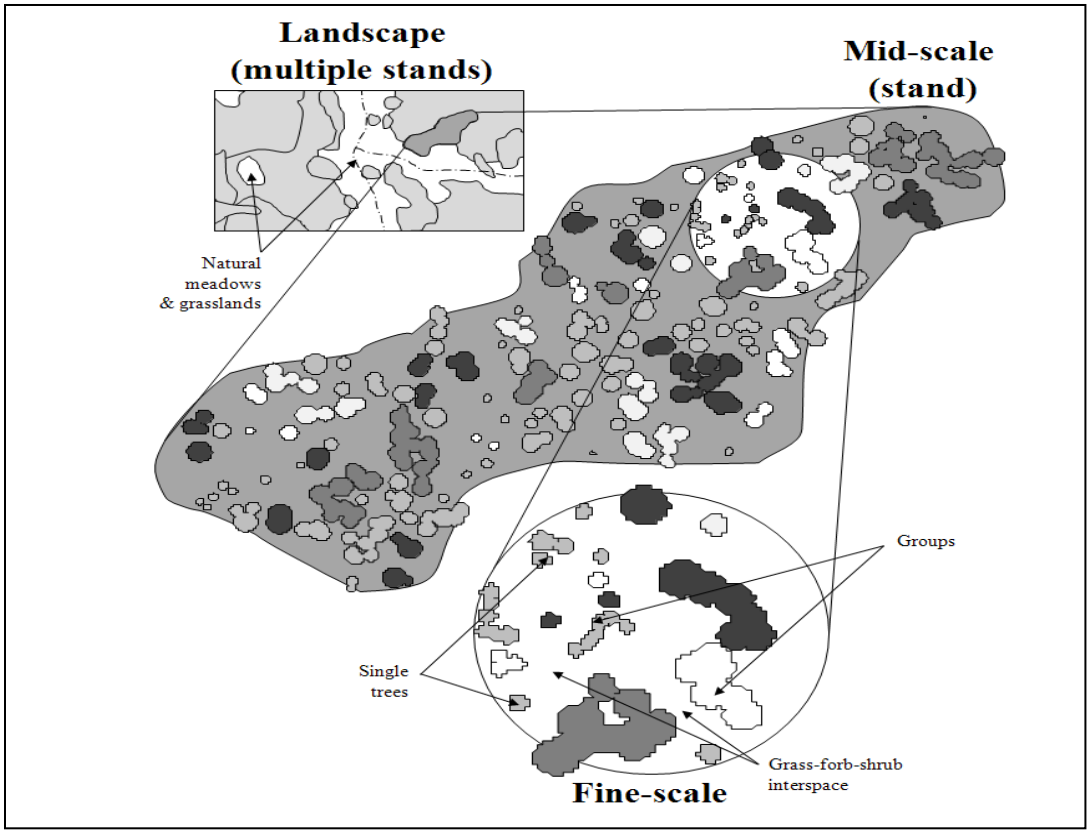

Figure 1. Desired Conditions at Three Spatial Scales

Woodland ERUs, mostly the Pinyon-Juniper types, are the most abundant on the forest – representing a combined 34 percent of the forest. Desert ERUs make up 29 percent of the forest. Out of the forested ERUs, the Ponderosa Pine Evergreen Oak ERU is the most common while the Ponderosa Pine Forest and Mixed-conifer ERUs are the least common on the forest. The Semi-desert Grassland ERU makes up 12 percent of the forest.

Desired conditions for All Terrestrial Ecosystems/ERUs

- At the landscape scale, a mosaic of different vegetation conditions (structure and composition) and diversity of landscape features (e.g., openings, water bodies, etc.) promote resiliency and ecosystem function. These heterogeneous conditions also create natural fire breaks, thereby reducing the severity and extent of uncharacteristic fire. A diversity of seral states are present and approach desired seral state distributions by Ecological Response Unit.
- Terrestrial ERUs are functioning properly and are resilient to the frequency, extent, intensity, and severity of disturbances, such as fire in fire-adapted systems. Natural and human disturbances provide desired overall plant density, species composition (mix of species), structure, coarse woody debris, and nutrient cycling.
- Areas experiencing climate change effects or those ERUs with high vulnerability to such effects, tree basal area is restored or maintained at the low end of the desired range (see individual ERU desired condition descriptions) to mitigate water stress. , early-mid seral species (those species first to establish or colonize an area following disturbance) dominate over late-seral species,

given the adaptations of many early-mid species for warmer and drier conditions. Encroaching species characteristic of lower life zones are maintained.

- Upland vegetation and riparian zones are ecologically connected based on natural patterns that are consistent with landforms and topography, habitat corridors provide for upland and aquatic species movements and genetic exchange.
- Transition zones or ecotones between riparian areas, forests, woodlands, shrublands, and grasslands are intact and shift in time and space due to factors affecting site conditions (such as fire or climate).
- Vegetation provides ecologically sustainable amounts of forest products, such as firewood, pinyon nuts, and forage.
- Vegetative cover and litter are distributed across the soil surface in adequate amounts to limit erosion and contribute to soil deposition and development. Soil cover and herbaceous vegetation protect soil, facilitate moisture infiltration, and contribute to plant and animal diversity and support ecological integrity.
- Ecological conditions for habitat quality, distribution, and abundance contribute to self-sustaining populations of native terrestrial and aquatic plants and animals. Conditions provide for the life history, distribution, and natural population fluctuations of plant and animal species within the capability of the ecosystem.
- Unique plant communities and landscape features (e.g., limestone cliffs, calcareous soils, margins of seeps and springs, canyons/cliffs, hanging gardens) are present to maintain well-distributed populations of associated native, endemic and rare plant species. Locally endemic plant communities are intact and functioning.
- Native plants provide nectar, floral diversity, and pollen throughout the seasons that pollinator species are active. Site conditions promote pollinator success and survival.

Objectives for Terrestrial Ecosystems/ERUs

- Reduce the potential for active crown fire and restore frequent fire by improving Forest ERU's (Ponderosa Pine-Evergreen Oak, Ponderosa Pine Forest & Mixed Conifer-Frequent Fire) that are outside or trending away from their natural range of variability by annually treating 5,000 – 10,000 acres on average (averaged across ERUs) through the use of wildland fire (natural & prescribed), mechanical (e.g., thinning or timber harvest), planting, or other methods.

- Reduce the potential for active crown fire and restore frequent fire by improving Woodland ERU's (Pinyon-Juniper Woodland, Pinyon-Juniper and Juniper Grass, Madrean Encinal Woodland & Pinyon-Juniper Evergreen Shrub) that are outside or trending away from their natural range of variability by annually treating 4,000 – 6,000 acres on average (averaged across ERUs) through the use of wildland fire (natural & prescribed), mechanical (e.g., thinning, mastication or fuelwood harvest), or other methods.

Standards for Terrestrial Ecosystems/ERUs

- When openings are created with the intent of regeneration, efforts shall be made to ensure that lands can be adequately restocked within 5 years of final harvest.

- The maximum size opening that may be created in one harvest operation to create an even-aged stand shall not exceed 40 acres except when following a large-scale disturbance event such as a stand-replacing fire, wind storm, or insect or disease outbreak.

Guidelines for All Terrestrial ERUs

- Naturally ignited fires (lightning-caused fires) should be allowed to function in their natural ecological role in fire-adapted ERUs when burning conditions facilitate progress toward desired conditions. Wildland fire (natural & prescribed) should be suppressed when outside the natural range of variability and actively suppressed where necessary to protect life, property, and valuable resources.
- For restoration, seeding with native species appropriate for the area (or similar in elevation, soil type, and ecosystem) should be prioritized. Use of desirable, non-native plant materials may be allowed where native plant materials are unavailable, cost-prohibitive, insufficient to address site-specific problems, and the non-native plant materials do not impede re-establishment of native species or degrade ecological integrity.
- Even-aged silvicultural practices may be used as a strategy for achieving the desired conditions over the long term, such as bringing mistletoe infection levels to within a sustainable range.
- Vegetation management activities should retain large diameter trees, snags, and downed logs in and near stream channels and riparian areas to provide for wildlife habitat and recruitment of large woody material.
- Management activities such as vegetation treatments or other restoration actions should be designed to minimize impacts to other uses and resources and maintain biodiversity created by landscape variability including transition zones.
- The removal of the majority of the overstory may be required where it is determined through site-specific analysis to be the optimum method for a particular area to make progress toward desired conditions.

Management Approaches

- Work with partners on collaborative plant conservation programs and projects aimed at restoring native plant communities and ecosystem resiliency.
- Support new and existing efforts to increase the availability and use of genetically appropriate native plant materials for restoration activities (e.g., pollinator habitat, revegetation post invasive species removal, erosion control post fire).

Desert Ecosystems

General Description

Desert communities on the forest range in elevation from 1,300 up to 5,800 feet (Table 2). The predominant species are shrubs, desert trees, and succulents, with lesser amounts of grasses and forbs. Desert ecosystems are described from 3 Ecological Response Units. The Mojave Sonoran Desert Scrub ERU represents a broad inclusion of Mojave Desert and Sonoran Desert plant communities, but on the Tonto National Forest, this ERU is more representative of Sonoran Desert plant communities represented by 2 provisional subclasses: the Sonora Mid-Elevation Desert Scrub (MSDS-SOS) and Sonoran Palo Verde-Mixed Cactus Desert Scrub (MSDS-SP). The third desert ERU is the Sonora-Mojave Mixed Salt Desert Scrub.

Table 2. Desert Ecological Response Units

ERU	ERU Code	Acres	Elevation (feet)
Sonora-Mojave Mixed Salt Desert Scrub	SDS	21,095	1,900 – 3,200
Sonoran Paloverde-Mixed Cactus Desert Scrub[1]	MSDS-SP	656,632	1,300 – 5,800
Sonoran Mid-Elevation Desert Scrub[1]	MSDS-SOS	113,557	1,700 – 5,100

[1] Both of these provisional subclasses are part of the broader Mojave Sonoran Desert Scrub ERU.

Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)

MSDS-SOS is found at higher elevations than MSDS-SP where palo verde tend to be less common (frost-sensitive) and includes species such as buckwheat (*Eriogonum fasiculatum*), jojoba (*Simmondsia chinensis*), crucifixion thorn (*Canotia holacantha*) and creosote bush (*Larrea tridentata*).

Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)

Generally MSDS-SP is found at low to mid elevations and has a diverse assemblage of vegetation including the saguaro cactus (*Carnegia gigantea*), creosote bush (*Larrea tridentata*), chollas (*Cylindropuntia* sp.), prickly pear cactus (*Opuntia* sp.), bursage (*Ambrosia deltoidea, Ambrosia dumosa*), palo verde (*Parkinsonia* sp.) and crucifixion thorn (*Canotia holacantha*), ironwood (*Olneya tesota*) and tall shrubs such as catclaw (*Acacia greggii*), wolfberry (*Lycium* sp.), jojoba and teddy-bear cactus (*Cylindropuntia bigelovii*). Creosote bush is well represented at some areas, but usually eclipsed by brittlebush (*Encelia farinosa*) on warm slopes while some north-exposures are dominated by spikemoss (*Selaginella arizonica*).

Sonora-Mojave mixed Salt Desert Scrub (SDS)

The Sonora-Mojave Mixed-Salt Desert Scrub ERU includes extensive open-canopied shrublands of typically saline basins in the Mojave and Sonoran deserts. Stands often occur around playas and substrates are generally fine-textured, saline soils. Vegetation is typically composed of one or more saltbush species such as *Atriplex canescens* or *Atriplex polycarpa* along with other species of Atriplex. Other halophytic plants may also be present. Graminoid species may include *Sporobolus airoides* or *Distichlis spicata* at varying densities.

At-risk species associated with Desert Ecosystems:

Alamos deer vetch, Allen's big-eared bat, Arizona cliffrose, Bezy's night lizard, California leaf-nosed bat, Davidson sage, desert purple martin, Fish Creek fleabane, Fish Creek rock daisy, Galiuro talussnail, Gila rock daisy, gilded flicker, Salt River rock daisy, Tonto Basin agave, Verde breadroot, Grand Canyon century plant, Hohokam agave, horseshoe deer vetch, lesser long-nosed bat, mapleleaf false snapdragon, monarch butterfly, Phoenix talussnail, Ripley wild buckwheat, Rusby's milkwort

Landscape Scale Desired Conditions

- A majority (75 percent) of the Mojave Sonoran Desert Scrub ERU (including both subclasses, MSDS-SP and MSDS-SOS) is made up of greater than 60 percent cover of mature shrubs, succulents and cacti (Table 3). Some areas (25 percent of ERU) have a mix of perennial grasses and cacti that range in cover from 10 to 25 percent,. Native annual grass and forbs are present, making up 5 percent canopy cover within this ERU. Exotic annual and perennial grasses is sparse for this ERU (< 1 percent). These values and ranges can vary and are evaluated based of site

potential during project planning and implementation (measured from TEUI data or other suitable scientific protocol or method).

Table 3. Mojave Sonoran Desert Scrub ERU Desired Vegetation Conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover	Structure Class
5	Annual grasses and forbs	10-25%	Open
20	Cacti and perennial grasses	10-25%	Open
75	Cacti and shrubs	>60%	Closed
<1	Exotic annual and perennial grasses	<1%	Absent-sparse

- A majority (85 percent) of the Sonora-Mojave Mixed Salt Desert Scrub ERU consists of open conditions (moderate interspaces between patches of vegetation) with mature shrubs typically 0.5 to 1.5 meters tall and a mix of perennial grasses ranging in cover from 10-25 percent (Table 4). Some areas (15 percent of ERU) have sparse shrub cover (1-10 percent) with a mix of perennial grasses present.

Table 4. Sonora-Mojave Mixed Salt Desert Scrub ERU Desired Vegetation Conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover	Structure Class
15	Perennial grass, sparse shrub	10-25%	Open
85	Shrubs and perennial grasses	10-25%	Open
<1	All exotic vegetation	<1%	Absent-sparse

- Fires are infrequent and localized, with a mean fire return intervals estimated at over 100 years.
- Although the abundance of annual plant species (namely exotic and invasive grasses) can increase following exceptionally wet seasons, it does not facilitate the spread, intensity, or severity of uncharacteristic fire.
- There are few signs of compaction or accelerated erosion and the ability of soil to maintain resource values and sustain outputs are high. Soil condition and erosion hazards are within the natural range of variability (i.e. the majority of soils, greater than 66 percent on average are rated as functioning properly).
- Arroyos and gullies in desert ERUs are stabilizing and recovering.
- Plant species are well distributed within desert ERUs and there is high species similarity to the reference plant community (based off similarity to site potential measured from TEUI data or other suitable scientific protocol or method).
- Saguaros, mesquite trees (*Prosopis* sp.), and other vegetation large enough to sustain cavity nesting birds are present across the landscape (measured from species-specific needs/requirements during project planning).

Midscale Desired Conditions

- Plants form beneficial relationships with soil microbes and cryptogrammic soil crusts are intact in all desert ERUs. Roots are covered with soil and there is little evidence of plants perched above the soil with exposed roots (pedestalling).
- Native and iconic desert plant species (such as the saguaro cactus) are present in natural patterns of abundance and density, and regenerating successfully in all desert ERUs.

- Important desert plant communities are present across the forest based of the ERU and site potential (based off similarity to site potential measured from TEUI data or other suitable scientific protocol or method). Descriptions of specific desert plant communities and the associated ecological conditions are described in the "description" section above.
- Habitat is preserved and remains suitable for federally listed animal and plant species, other endemic and rare plant and animal species and species of conservation concern associated with desert ERUs.

Guidelines

- Ground-disturbing activities that occur in areas occupied by exotic and invasive plant species capable of increasing fires in desert ecosystems should include measures to eradicate or limit the spread of these species following the activity and implement measures to limit the potential for its spread into unoccupied areas.

Management approaches

- Support or assist partners in monitoring Sonoran desert ecosystems to better understand post-disturbance (e.g., fire, OHV impacts, etc.) recovery of desert plant species and plant communities to better guide management.
- Work with stakeholders to develop collaborative solutions to managing desert ecosystems resources and activities. Resources and activities may include rare plants; archeological and historical sites; recreation; geological features; and management of water resources, fire, soil and vegetation.

Semi-Desert Grasslands

General Description

The Semi-desert Grassland ERU is a low-elevation grassland and shrubland community that tend to occur adjacent to and above desert communities, and below Interior Chaparral and woodlands. Shrubs also occupy Semi-desert grasslands and their abundance and species composition varies. Some areas on the forest may be difficult to distinguish semi-desert grasslands, as desert shrubs species commonly occur in semi-desert grasslands. Other areas may also be difficult to distinguish as semi-desert grasslands as some areas are in a disclimax state (from past land use practices) where shallow rooted shrubs and desert scrub vegetation is dominant.

At-risk species associated with Semi-Desert Grasslands:

Arizona hedgehog cactus, Metcalfe's tick-trefoil, monarch butterfly, Salt River rock daisy.

Landscape Scale Desired Conditions

- Canopy cover of trees and shrubs on semi-desert grasslands is generally less than 10 percent. Semi-desert grasslands is dominated by native grasses, forbs and annuals of varying successional stages/seral stages where they naturally occur. Early seral stages will typically contain more forbs, and then transition into states dominated by more grasses and fewer forbs (

- Table 5). Native plant species are present in natural patterns of abundance and density, and regenerate successfully in most years depending on seasonal climatic conditions.

Table 5. Semi-Desert Grassland ERU Desired Vegetation Conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover	Structure Class
20 – 25	Recently disturbed, grass and forbs, and shrub resprouts	Shrub, Tree <10%	Sparse
70 – 75	Majority of vegetation is late successional herbaceous perennial grasses	Shrub, Tree <10%	Sparse
0 – 5	Shrub and tree encroachment and herb dominance (departure/disclimax states)	Shrub, Tree 10-30%	Open

- Overall plant composition is similar to site potential (greater than 66 percent, determined by TEUI or other suitable scientific protocol or method). Plant composition can vary considerably at the fine- and mid-scales depending on site potential and climate, topography, soils, and smaller scale disturbances. Succulents are present on more arid sites.
- Grasslands are connected based on the distribution of soils with most occurring on Aridsoils, and some minor inclusions of Vertisols. Entisols support desert grasslands at valley plains and drainages where fluvial processes are taking place.
- Native herbaceous vegetation provides fine fuels that support stand replacement fires, occurring at an average fire return interval of 0-35 years. Fire maintains grass productivity, reduces shrub encroachment and improves structural diversity. As a result, over time more acres move from fire regime condition class (FRCC) II and III (moderate and high departure) to FRCC I (low departure in fire regime).
- The presence of invasive or exotic annual species does not facilitate the spread, intensity, or severity of uncharacteristic fire.
- A mix of cool and warm season understory species, of varying heights and density, provide food and cover for invertebrates and wildlife based off site potential (TEUI data or other suitable scientific protocol or method).

Midscale Desired Conditions

- While a number of subclasses or types exists within the Semi-Desert Grassland ERU, the Piedmont subclass is the dominant and most abundant type on the forest. The Piedmont subclass represents grasslands at coalesced alluvial fan piedmonts along mountain fronts with dominant grasses such as black grama (*Bouteloua eripoda*), bush muhly (*Muhlenbergia porteri*) and fluffgrass (*Dasyochloa pulchella*).
- Arroyos and gullies are stabilizing and recovering. Water infiltration is at natural rates, which reduces arroyos and gullies and prevents head cuts from forming in drainages.

Guidelines

- Prioritize maintenance of intact open perennial grasslands (high ecological integrity) over areas with high scrub encroachment and degraded soil conditions during restoration projects.

Management Approaches

- Collaborate with partners and stakeholders on grassland restoration, grassland connectivity, and education

- Work with partners and research institutions to assess the efficacy of restoring native perennial grasslands and ecological integrity using prescribed fire at areas where non-native grass species, such as Lehmann lovegrass (*Eragrostis lehmanniana*), Boer lovegrass (*E. chloromelas*), red brome (*Bromus rubens*), and cheatgrass (*Bromus tectorum*) are abundant.

Interior Chaparral

General Description

The Interior Chaparral ERU is a shrub-dominated system that varies from widely scattered pockets within grasslands and woodlands to more extensive areas on steep slopes. Some of the most extensive continuous stands in Arizona occur on the Tonto National Forest. Vegetation is typically located on mountain foothills and lower slopes where low-elevation desert landscapes transition into wooded evergreens (such as the Madrean Encinal Woodland ERU). Species composition and dominance varies across the landscape depending on fire history, soils, topography and climate and include, but is not limited to, manzanita spp. (*Arctostaphylos* spp.), crucifixion thorn (*Canotia holacantha*), desert ceanothus (*Ceanothus greggii*), mountain mahogany (*Cercocarpus montanus*), little-leaved mountain mahogany (*Cercocarpus intricatus*), Antelope bushes (*Purshia* spp.), silktassles (*Garrya* spp.), Stansbury cliffrose (*Purshia stansburiana*), shrub live oak (*Quercus turbinella*), and sumacs (*Rhus* spp.).

While forb densities are generally low (except after brief periods following burns), the following are forbs are found at various abundance: Palmer's, Eaton's, and Toadflax Penstemon (*Penstemon palmeri, P. eatoni, and P. linariodes*), Wright's verbena (*Verbea wrightii*), few-flowered goldenrod (*Solidago sparsiflora*), purple nightshade (*Solanum xanti*), white dalea (*Dalea albiflora*), and scarlet starglory (*Ipomoea coccinea*). Naturalized species include hoarhound (*Marrubium vulgare*). Drier, rockier and more open areas may have one or more thornscrub species, such as wait-a-bit (Mimosa biuncifera) and catclaw acacia (Acacia greggii). Sonoran scrub and semi-desert species, such as jojba (Simondsia chinensis), crucifixion thorn (Canotia halocantha), and banana yucca (Yucca beccata), agaves (Agave spp.), and beargrass (Nolina microcarpa) are also present at these areas. Where shrub canopy is open to moderate, native grasses and forbs fill the intershrub spaces. Common grasses include sideoats grama (Bouteloua curtipendula), hairy grama (Bouteloua hirsuta), blue grama (Bouteloua gracilis), three-awns (Aristida spp.), cane bluestem (Bothriochloa barbinodis), plains lovegrass (Eragrostis intermedia) and muhlys (Muhlbergia spp.). Common forbs include penstemon (Penstemon spp.), redstar morning glory (Ipomoea coccinea), dark spurge, mustards, buckwheats, asters, fleabanes, and bluedicks. Herbaceous cover is virtually nonexistent when shrub cover approaches 60 percent.

Fire is the primary natural disturbance. Some chaparral species have fire adaptations such as needing fire or smoke for seedling germination and establishment. Soil productivity is naturally low and most soils are inherently unstable due to the steep slopes. The most developed stands (species diversity, structure and cover) occur on coarser granitic intrusives and on limestone. Other typical parent materials include diabases, gneiss, schist, shales, slates, and sandstone. Average annual precipitation varies from 15 to 25 inches, with significant amounts during the summer monsoon. Marginal open chaparral communities can occur at annual precipitation levels of 13 inches.

At smaller scales (mid and fine) and extents the following associations may be encountered (Carmichael et al. 1978):

Shrub Live Oak-Mixed Shrub

The Shrub Live Oak-Mixed Shrub association has the widest ecological amplitude than other associations. Vegetation occurs on all exposures at elevation ranges from 2,900 to 5,400 feet at slopes ranging from 5 to 50 percent. There are more shrub and half shrub species in this association than in the

other chaparral associations. Common shrubs include live oak (*Quercus turbinella*), sugar sumac (*Rhus ovata*) and half-shrubs such as broom snake-weed (*Gutierrezia sarothrae*). Soil types vary with most derived from granite and basalt and less consisting of schist, limestone and shale.

Shrub Live Oak-Birchleaf Mountain mahogany

The Shrub Live Oak-Birchleaf Mountain mahogany association (*Quercus turbinella – Cercocarpus betuloides*) occurs primarily on north exposures at elevation ranges from 3,200 to 4,200 feet at slopes ranging from 7 to 70 percent. Mountain mahogany species may occur as the only dominant on wetter, southerly slopes in the drier reaches in interior chaparral. Drier areas may have a similar association but with hair mountain mahogany (*Cercocarpus montanus* var. *paucidentatus*) replacing birchleaf mountain mahogany.

Shrub Live Oak-Datil Yucca-Yellowleaf Silktassel

The Shrub Live Oak-Datil Yucca-Yellowleaf Silktassel association tends to occur on wetter north and east exposures at elevation ranges from 1,097 to 1,737 m at slopes ranging from 2 to 80 percent. Other species associated with this type include Emory and Arizona oak, pointleaf manzanita and Wright buckwheat. Most of this association is found on soils derived from granite.

Other dominant shrub associations are found at smaller extents and are less abundant but are still important: pointleaf manzanita (*Arctostaphylos pungens*), Arizona cypress – shrub live oak (*Cupressus arizonica – Quercus turbinella*), Yerbasanta – desert ceanothus (*Eriodictyon augustifolium – Ceanothus greggii*), Pringle manzanita (*Archtostaphylos pringlei*) and Arizona oak – yellow leaf silktassel – Emory oak (*Quercus arizonica – Garrya flavescens – Quercus emoryi*). Manzanita associations are generally found at higher elevations.

At-risk species associated with Interior Chaparral:

Aravaipa sage, Arizona hedgehog cactus, Bezy's night lizard, broadleaf lupine, Fish Creek fleabane, Gila rock daisy, Hodgson's fleabane, Hohokam agave, monarch butterfly, Pinaleno Mountain rubberweed, Pringle's fleabane, Salt River rock daisy, Sierra Ancha fleabane, Tonto Basin agave.

Landscape Scale Desired Conditions

- Early seral native grass and forbs regenerate successfully in most years depending on seasonal climatic conditions. A majority of acres are mature shrublands with closed canopied conditions (Table 6) and dense thickets with considerable shrub litter, such as small stems and leaves. Standing dead material accumulates in areas that have not burned for several decades. Canopy may be more open on drier sites.

Table 6. Interior Chaparral ERU Desired Vegetation Conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover	Structure Class
2	Recently disturbed, grass and forbs, and shrub resprouts	Shrub <10%	Sparse-Open
5	Dominated by shrub resprouts, grasses and forbs present	Shrub 10-30%	Open
93	Mature shrubland, closed canopy, limited herbaceous vegetation	Shrub > 60%	Closed

- Interior chaparral vegetation supports Fire Regime IV where stand-replacing fires at 35- to 100-year fire return intervals create a mosaic of variably aged and sized patches on the landscape.

Native fire-adapted species re-sprout vigorously after fire, helping to prevent excessive erosion. Invasive plants do not alter the fire regime. The presence of invasive annual species does not facilitate the spread, intensity, or severity of uncharacteristic fire.

- Species composition varies considerably depending on site conditions, but shrub live oak (*Quercus turbinella*) associations tend to be the most common, dominant shrub within chaparral vegetation (Carmichael et al. 1978).
- Vegetation and litter cover protects soil from accelerated erosion. Annual litter production varies substantially with some areas reaching up to 46,200 kg per hectare.

Midscale Desired Conditions

- Shrub canopy cover varies from less than 40 percent on dry sites to more than 80 percent on the wetter sites.
- Important plant associations are present across the forest based of site potential (based off similarity to site potential measured from TEUI data or other suitable scientific protocol or method). Descriptions of specific plant associations and the associated ecological conditions are described in the "description" section above.

Fine Scale Desired Conditions

- At smaller extents, locally important species such as hollyleaf buckthorn (*Rhamnus crocea*), Stansbury cliffrose (*Purshia stansburiana*), desert olive (*Forestiera pubescens* var. *pubescens*), Texas mountain laurel (*Dermatophyllum secundiflorum*) and singleleaf ash (*Fraxinus anomala* var. *lowellii*), are present based on site potential (determined by TEUI data or other appropriate ecological data)
- Important forage species for wildlife, such as Wright's buckwheat (*Eriogonum wrightii*) and desert ceanothus (*Ceanothus greggii*), are well-represented and distributed based on site potential and capability (determined by TEUI data or other appropriate ecological data).

Guidelines

- Treatment locations should be rotated to re-establish seed banks of important obligate seeder species (dominant reproduction from seed; such as desert ceanothus, deer brush, and point leaf and Pringle manzanita).

Pinyon-Juniper Woodland

General Description

The Pinyon-Juniper Woodland is mostly found on lower slopes of mountains and in upland rolling hills at approximately 4,500 to 7,500 feet in elevation. Pinyon-Juniper Woodland is a broad grouping of different plant associations with trees occurring as individuals or in smaller groups and range from young to old, but more typically as large, even-aged structured patches. Pinyon-Juniper Woodland characteristically has a moderate to dense tree canopy and a sparse understory of perennial grasses, annual and perennial forbs, and shrubs. Woodland development occurs in distinctive phases, ranging from open grass-forb, to mid-aged open canopy, to mature closed canopy. Some types on broken or rocky terrain exhibit little to no natural fire, and insects and disease may be the only disturbance agents. Fire is infrequent and variable due to differences in ground cover, though some sites are capable of carrying surface fire. The fires that do occur are generally mixed to high severity (Fire Regime III, IV, & V). Species composition and stand structure vary by location primarily due to precipitation, elevation, temperature, and soil type. Typical species for Pinyon-Juniper Woodland include twoneedle pinyon (*Pinus edulis*), single leaf pinyon (*Pinus monophylla* var. *fallax*), Utah juniper (*Juniperus osteosperma*), oneseed juniper (*J.* monosperma), and

alligator juniper (*J. deppeana*). Most common pinon pine is the two-needle pinon occurring in limited areas. One-seed juniper is most common juniper species; however, there are areas with Utah juniper and Rocky Mountain juniper. In addition, annual and perennial grasses and graminoids, forbs, half-shrubs and shrubs can be found in the understory.

At-risk species associated with Pinyon-Juniper Woodland:

Allen's big-eared bat, Arizona giant sedge, monarch butterfly, Mt. Dellenbaugh sandwort, Pinaleno Mountain rubberweed, Pringle's fleabane.

Landscape Scale Desired Conditions

- In Pinyon Juniper Woodland, at the landscape scale, even-aged patches of pinyons and junipers form multi-aged woodlands. Very old trees (greater than 300 years old) are present. Tree density and canopy cover are high, and where interlocking crowns shade the ground over extensive areas, shrubs are sparse to moderate and herbaceous cover is low and discontinuous. The patch size of woodlands ranges from tens to hundreds of acres.

Table 6. Pinyon-Juniper Woodland ERU Desired Vegetation Conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover	Structure Class
10	Recently disturbed, grass and forbs, and shrub resprouts	Tree < 10%	Sparse-Open
15	Dominated by trees 5.0"- 9.9" diameter	≥ 30%	Closed
5	Dominated by trees 0"- 9.9" diameter	10-29.9%	Open
10	Dominated by trees ≥ 10.0" diameter	10-29.9%	Open
60	Dominated by trees ≥ 10.0" diameter	≥ 30%	Closed

- Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- Snags and older trees with dead limbs and/or tops are scattered across the landscape. Snags 8 inches and above at diameter at root collar average 5 snags per acre, while snags 18 inches and above average 1 snag per acre. Coarse woody debris increases with succession and averages 2 to 5 tons per acre.
- The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (e.g., insects, diseases, and fire) and climate variability. Insects and disease occur at endemic levels. Fire as a disturbance is less frequent and variable due to differences in ground cover, though some sites are capable of carrying surface fire. The fires that do occur are mixed to high severity and conditions promote a fire regime similar to reference conditions (Fire Regime III, IV, & V).
- In Pinyon Juniper Woodland, ground cover consists of shrubs, perennial grasses, and forbs ranging between 5 and 15 percent with some sites capable of carrying surface fire. The amount of shrub cover vary by location primarily due to precipitation, elevation, temperature, and soil type.

- Seral state proportions, per the R3 Seral State Proportions Supplement, are applied at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.
- Overall plant composition similarity to site potential (FSH 2090.11) averages greater than 66%, but can vary considerably at fine- and mid- scales owing to a diversity of seral conditions.

Midscale Desired Conditions

- Tree density and canopy cover are high, shrubs are sparse to moderate, and herbaceous cover is low and discontinuous. The amount of shrub cover depends on the TEUI unit.
- Trees occur in even-aged patches ranging from young to old, where patch size of these woodlands ranges from 10s' to 100s' of acres.
- Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about 5 and 15 percent (based on Terrestrial Ecological Unit or other suitable scientific protocol or method).

Guidelines

- Large accumulations of green material (such as slash, wind-thrown trees) should be managed to reduce the risk of uncharacteristic bark beetle outbreaks.
- To increase small mammal occupancy in areas where coarse woody debris is deficient and to provide nesting habitat and cover for turkeys, birds, small mammals, reptiles, and invertebrates, slash piles should be retained across the landscape for several years, rather than immediately being burned. The number and distribution of retained slash piles should be balanced with potential threats from bark beetles and fire/fuels concerns.

Pinyon-Juniper Grass and Juniper Grass

General Description

The Pinyon-Juniper Grass ecological response unit occurs in what were historically more open woodlands with grassy understories. The PJ Grass type is typically found on sites with well-developed, loamy soil characteristics, including gentle upland and transitional valley locations where soil conditions favor grasses (or other grass-like plants) but can support at least some tree cover. Tree species include one seed juniper (*Juniperus monosperma*), Utah juniper (*Juniperus osteosperma*), Rocky Mountain juniper (*Juniperus scopulorum*), alligator juniper (*Juniperus deppeana*) and twoneedle pinyon (*Pinus edulis*). Native understories were made up of perennial grasses, with both annual and perennial forbs, and shrubs that were absent or scattered. Historically, herbaceous understories of native grasses and forbs provided fine fuel sources for fire, aiding in the maintenance of an uneven-aged open canopy condition (Wahlberg et al. 2014).

Juniper Grass is typically on warmer and drier settings beyond the environmental limits of pinyon pine, and just below, and often intergrading with, the pinyon-juniper zone. However Juniper Grass tends to be restricted to warmer and drier settings that limit pinyon (Wahlberg et al. 2014). This type is typically found on sites with well-developed, loamy soil characteristics, generally at the drier edge of the woodland climatic zone. Mollisol soils are common for this ecological response unit and support a dense herbaceous matrix of native grasses (mostly perennials) and forbs. Typical disturbances (fire, insects, and disease) are of low severity and high frequency with a historic average fire return interval of 0 to 35 years from low to moderate severity fires. These disturbance patterns create and maintain the uneven- aged, open-canopy nature of this type. Typically, native understory grasses are perennial species, while forbs consist of both annuals and perennials. Shrubs are characteristically absent or scattered. Generally these types are most

extensive in geographic areas dominated by warm (summer) season or bi-modal precipitation regimes. Overall these sites are less productive for tree growth than the Pinyon-Juniper Woodland type.

At-risk species associated with Pinyon-Juniper Grass and Juniper Grass:

Gila rock daisy, Grand Canyon century plant, monarch butterfly, Pringle's fleabane, Salt River rock daisy, Tonto Basin agave.

Landscape Scale Desired Conditions

- Pinyon Juniper Grass and Juniper Grass are generally uneven-aged and open in appearance. They are dominated by one or more species of juniper and/or pinyon pine and occur with a grass/forb dominated understory. At the landscape scale the majority of ERU (50 %+) is dominated by trees over 10.0" in diameter. Trees 0.0" to 9.9" in diameter occur as individuals or small groups scattered throughout the landscape, intermixed with the larger trees and occupy 25 to 30 % of the landscape.

Table 7. Pinyon-Juniper Grass and Juniper Grass ERU Desired Vegetation Conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover	Structure Class
5	Recently disturbed, grass and forbs, and shrub resprouts	Tree < 10%	Sparse-Open
10	Dominated by trees 5.0"- 9.9" diameter	≥ 30%	Closed
25	Dominated by trees 0"- 9.9" diameter	10-29.9%	Open
50	Dominated by trees ≥ 10.0" diameter	10-29.9%	Open
10	Dominated by trees ≥ 10.0" diameter	≥ 30%	Closed

- Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) – all of which have high structural diversity (presence of various age groups/size classes and canopy layers). The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

- In Pinyon Juniper Grass and Juniper Grass, snags and older trees with dead limbs are scattered across the landscape. At the landscape scale, snags 8 inches and above at diameter at root collar average 5 snags per acre, while snags 18 inches and above average 1 snag per acre. Coarse woody debris increases with succession and averages 1 to 3 tons per acre.

- The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (e.g., insects, diseases, and fire) and climate variability. Fires are typically frequent and low-severity (Fire Regime I). Isolated insect and disease infestations (e.g., Ips Beetle) occur at endemic levels and do not affect the ecological function or sustainability.

- Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, and averages between 10 and 30 percent (based on the Terrestrial Ecological Unit or other suitable scientific protocol or method). Shrubs average less than 30 percent canopy cover.

- Seral state proportions, per the R3 Seral State Proportions Supplement, are applied at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.

- Overall plant composition similarity to site potential (FSH 2090.11) averages greater than 66%, but can vary considerably at the fine- and mid- scales owing to a diversity of seral conditions.

Midscale Desired Conditions

- Scattered shrubs and a dense herbaceous understory including native grasses, forbs and annuals are present to support frequent surface fires.
- Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values averaging between about 10 and 30% depending on site potential (based on the Terrestrial Ecological Unit or other suitable scientific protocol or method).
- Shrubs average less than 30% canopy cover.

Fine-scale Desired Conditions

- Pinyon-juniper grass and juniper grass are generally uneven aged and open in appearance. Trees occur as individuals, but occasionally in smaller groups, and range from young to old. Patch sizes of woodlands range from individual trees and clumps that are less than one-tenth acre, to tree groups of approximately an acre.

Guidelines

- In areas where there is little understory and treatments are proposed, slash treatments (such as lop and scatter and mastication) should be used that improve herbaceous vegetation growth, watershed condition, and soil productivity.
- In Pinyon Juniper Grass and Juniper Grass ERUs, areas with soils classified as Mollisols (soils with relatively thick organic surfaces) should be managed as grasslands.
- Large accumulations of green material (such as slash, wind-thrown trees) should be managed to reduce the risk of uncharacteristic bark beetle outbreaks.
- In Pinyon Juniper Grass and Juniper Grass, the development of old-growth conditions should be encouraged in areas where old growth is lacking to perpetuate old-growth forest components. Uneven-aged vegetation treatments should be designed such that replacement structural stages and age classes are proportionally present to assure continuous representation of old-growth characteristics across the landscape over time.

Madrean Encinal Woodland

General Description

The Madrean woodlands generally occur at elevations between 3,400 and 6,700 feet and can occur with a grass/forb-dominated understory or a shrub-dominated understory. Madrean Encinal Woodland is characterized by the dominance of oak trees, while Madrean pinyon-oak is dominated by both oaks and pinyon. Juniper can be co-dominant in either type. The two Madrean types can intergrade with one another and with pinyon-juniper woodlands. Also, these woodlands do intergrade with semi-desert grasslands at lower elevations and pine/oak woodlands at higher elevations. The Madrean Encinal

Woodland is dominated by Madrean evergreen oaks such as Arizona white oak (*Quercus arizonica*), Emory oak (*Quercus emoryi*), gray oak (*Quercus grisea*), Mexican blue oak (*Quercus oblongifolia*), and Toumey oak (*Quercus toumeyi*) are the dominant species for this ecological response unit which historically had greater than 10% canopy cover (Wahlberg et al. 2014). Occasionally, madrean pine, Arizona cypress, pinyon, juniper, and interior chaparral species may be present. The groundcover is dominated by warm-season grasses. Grass species include threeawns (e.g., *Aristidateripes, and A. schiedeana* var. *orcuttiana*), blue grama (*Bouteloua gracilis*), sideoats grama (*Bouteloua curtipendula*), Rothrock grama (*Bouteloua rothrockii*), Arizona cottontop (*Digitaria californica*), plains lovegrass (*Eragrostis intermedia*), curly-mesquite (*Hilaria belangeri*), green sprangletop (*Leptochloa dubia*), muhly grasses (e.g., *Muhlenbergia emerslyi, M. pauciflora,* and *M. setifolia*), and Texas bluestem (*Schizachyrium cirratum*) (Wahlberg et al. 2014).

At-risk species associated with Madrean Encinal Woodland:

Aravaipa sage, Arizona hedgehog cactus, Blumer's dock, broad-billed hummingbird, monarch butterfly, ocelot, yellow-eyed junco.

Landscape Scale Desired Conditions

- The Madrean Encinal Woodland is relatively homogenous in structure, generally uneven-aged and open, with occasional patches of even-aged structure. Patch sizes range from individual trees and clumps that are less than one-tenth acre, to tree groups of 10 to 40 acres.

Table 9. Madrean Encinal Woodland ERU Desired Vegetation Conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover	Structure Class
20	Recently disturbed, sparsely vegetated, grass, forbs, and shrub resprouts	Shrub <10% Tree <10%	Sparse-Open
40	Dominated by trees 5.0”- 9.9” diameter	≥ 30%	Closed
25	Dominated by trees 0”- 9.9” diameter	10-29.9%	Open
15	Dominated by trees ≥ 10.0” diameter	10-29.9%	Open
0	Dominated by trees ≥ 10.0” diameter	≥ 30%	Closed

- The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances and climate variability. The landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from natural disturbances (e.g. insects, diseases, fire, and wind), including old growth.
- Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) – all of which have high structural diversity (presence of various age groups/size classes and canopy layers). The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- Declining trees are a component and provide for snags, top-killed, lightning- and fire-scarred trees, and coarse woody debris, all well-distributed throughout the landscape. Snags 8 inches or greater at DBH average 4 snags per acre, while snags 18 inches or greater average 1 snag per acre. Large oak snags (>10 inches) are a well-distributed component. Coarse woody debris increases with forest succession and averages 2-3 tons per acre.

- Grasses, forbs, shrubs, and needle cast (fine fuels), and small trees help to maintain the natural fire regime. Litter cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Frequent, primarily low severity fires (Fire Regime I and III) burn on the forest floor and do not typically spread between trees as crown fire. Mixed-severity fires occur less frequently and over smaller spatial extents than low severity fires.
- The amount of shrub cover depends on the TEUI unit (USDA Forest Service 1986). Overall plant composition similarity to site potential (FSH 2090.11) averages greater than 66%, but can vary considerably at fine- and mid- scales owing to a diversity of seral conditions.
- Natural and anthropogenic disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.
- Seral state proportions, per the R3 Seral State Proportions Supplement, are applied at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.

Midscale Desired Conditions

- The majority of woodland is in open condition with tree cover averaging between 10 and 40% depending on site productivity and past disturbance, with tree cover in canyons and drainage bottoms nearer the upper end of this range. A lesser amount is in closed canopy condition characteristic of the reference condition. Patch sizes range from less than 1 acre to 10s of acres.
- The size, shape, and number of trees per group, and number of groups per mid-scale unit are variable. Tree groups vary in size and number depending on climate, soil type, and past disturbance. The more biologically productive sites contain more trees per group and more groups per acre.
- All structural stages of oak are present with old trees occurring as dominant individuals, and small groups occurring typically within openings. Denser overall tree conditions exist in some locations such as north facing slopes and canyon bottoms.
- Shrubs occur in low to moderate densities which does not inhibit tree regeneration.
- Ground cover consists of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values between about 2 and 20 percent (based on Terrestrial Ecological Unit or other suitable scientific protocol or method).

Fine-scale Desired Conditions

- At the fine-scale, individual trees, small clumps, and groups of trees are interspersed within variably-sized openings of grass/forbs/shrub vegetation associations similar to the natural range of variability.
- Trees typically occur in small groups in which they are variably-spaced with some tight clumps. Crowns of trees within the mid- to old-age groups are interlocking or nearly interlocking.
- Trees within groups are of similar or variable ages and may contain species other than oak, juniper, and pinyon pine. The size of tree groups is typically 1 acre or less. Groups at the mid- to old-age stages consist of 2 to approximately 40 trees.
- Interspaces between tree groups are variably-shaped and comprised of a grass/forb/shrub mix. Some natural openings contain individual trees, including large open-grown oaks.

Guideline

- In proposed treatment areas where there is little understory, slash treatments (such as lop and scatter and mastication) should be used that improve herbaceous vegetation growth, soil and watershed condition, and soil productivity.
- Strategies for re-establishing the desired conditions should include leaving snags, downed logs, and other woody components that collect drifting seeds, provide shade, cooler temperatures, moisture retention, and protection from ungulate herbivory.

Pinyon-Juniper Evergreen Shrub

General Description

Pinyon-Juniper Evergreen Shrub generally occurs at elevations of 2,400 to 7,800 feet. This ecological response unit is generally found on lower slopes bordering chaparral at the lower elevations and montane forests at higher elevations. This type reaches dominance among areas with mild climate gradients and bi-modal precipitation regimes (Wahlberg et al. 2014). Dominant tree and shrub species include twoneedle pinyon (*Pinus edulis*), single leaf pinyon (*Pinus monophylla* var. *fallax*), Utah juniper (*Juniperus osteosperma*), oneseed juniper (*J.* monosperma), alligator juniper (*J. deppeana*), Manzanita spp. (*Arctostaphylos spp.*), mountain mahogany (*Cercocarpus montanus*), Antelope bushes (*Purshia spp.*), silktassles *(Garrya spp*.), Stansbury cliffrose (*Purshia stansburiana*), turbinella oak (*Quercus turbinella*), and sumacs (*Rhus spp*.). Pinyon may be absent at some areas, however juniper is always present. Oaks (Arizona white oak, grey oak, Emory oak) become more common among mild climate zones in central Arizona. The understory is dominated by low to moderate density shrubs, with herbaceous plants in the interspaces. This ecological response unit is found on well-drained soils, frequently with coarse-textured or gravelly (stony) soil characteristics. Aside from disparities in structure and composition, Pinyon-Juniper Evergreen Shrub can also be differentiated from Interior Chaparral by longer fire intervals and less severe fire events.

At-risk species associated with Pinyon-Juniper Evergreen Shrub:

Allen's big-eared bat, Aravaipa sage, Fish Creek rock daisy, Hodgson's fleabane, Mexican spotted owl, Mexican wolf, monarch butterfly, Pinaleno Mountain rubberweed, Pringle's fleabane, Sierra Ancha fleabane.

Landscape Scale Desired Conditions

- In Pinyon Juniper Evergreen Shrub, a mix of trees and shrubs occurs as a series of vegetation states that move over time from herbaceous-dominated to shrub-dominated to tree-dominated. Trees occur as individuals or in smaller groups ranging from young to old. Pinyon trees are occasionally absent but one or more juniper species is always present.

Table 10. Pinyon Juniper Evergreen Shrub ERU Desired Vegetation Conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover	Structure Class
5	Recently disturbed, grass and forbs, and shrub resprouts	Tree < 10%	Sparse-Open
0	Dominated by trees 5.0"- 9.9" diameter	≥ 30%	Closed
55	Dominated by trees 0"- 9.9" diameter	10-29.9%	Open
40	Dominated by trees ≥ 10.0" diameter	10-29.9%	Open
0	Dominated by trees ≥ 10.0" diameter	≥ 30%	Closed

- Groups are even-aged in structure with all ages represented across the landscape for an overall uneven-aged grouped appearance. The patch size of woodlands ranges from 10 to less than 100 acres.

- Old-growth structure occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) – all of which have high structural diversity (presence of various age groups/size classes and canopy layers). The location of old-growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

- Snags and old trees with dead limbs/tops are scattered across the landscape. Large dead wood is present. Snags 8 inches and above at diameter at root collar average 3 snags per acre, while snags 18 inches and above average 1 snag per acre. Large dead wood is present and coarse woody debris averages 2 to 4 tons per acre.

- The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (e.g., insects, diseases, and fire), and climate variability. Fires are typically mixed-severity with a moderate frequency (Fire Regime III). Some evergreen shrub types exhibit occasional high severity fires (Fire Regime IV).

- Seral state proportions, per the R3 Seral State Proportions Supplement, are applied at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.

- Overall plant composition similarity to site potential (FSH 2090.11) averages greater than 66%, but can vary considerably at fine- and mid- scales owing to a diversity of seral conditions.

Midscale Desired Conditions

- The understory is dominated by low to moderate density of shrubs, depending on seral stage. Shrubs average greater than 30 percent canopy cover.

- The shrub component consists of one or a mix of evergreen shrub, oak, manzanita, mountain mahogany, sumac, skunk bush, Fremont barberry, and other shrub species, which are well distributed (based on Terrestrial Ecological Unit or other suitable scientific protocol or method).

- Native perennial grasses and annual and perennial forbs are present in the interspaces. Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about 5 and 15 percent (based on Terrestrial Ecological Unit or other suitable scientific protocol or method).

Fine-scale Desired Conditions

- Trees occur as individuals or in smaller groups ranging from young to old. Typically groups are even-aged in structure with all ages represented across the landscape for an overall uneven-aged grouped appearance. The patch size of woodlands ranges from 1 to 10s of acres.

Guidelines

- In areas where there is little understory and treatments are proposed, slash treatments (such as lop and scatter and mastication) should be used that improve herbaceous vegetation growth, watershed condition, and soil productivity.
- Large accumulations of green material (such as slash, wind-thrown trees) should be managed to reduce the risk of uncharacteristic bark beetle outbreaks.
- The development of old-growth conditions should be encouraged in areas where old growth is lacking to perpetuate old-growth forest components. Uneven-aged vegetation treatments should be designed such that replacement structural stages and age classes are proportionally present to assure continuous representation of old-growth characteristics across the landscape over time.

Management Approaches

- Some areas of this ERU burns at high severity fire similar to interior chaparral vegetation. Emphasize coordination with local partners and stakeholders to reduce the risk of uncharacteristic fires that are hazardous to values in the WUI on the Tonto NF and adjacent lands of other

Ponderosa Pine-Evergreen Oak

General Description

The Ponderosa Pine - Evergreen Oak ecological response unit occurs in the mild climate gradients of central and southern Arizona and in southern New Mexico, particularly below the Mogollon Rim, where warm summer seasons and bimodal (winter-summer) precipitation regimes are characteristic. This type occurs at elevations ranging from 5,500-7,200 feet, on sites slightly cooler-moister than the Madrean Pinyon-Oak ecological response unit, and with a much greater plurality of ponderosa pine. This system is dominated by ponderosa pine (*Pinus ponderosa* var. *scopulorum*) and can be distinguished from the Ponderosa Pine Forest ecological response unit by well-represented evergreen oaks (for example, Emory oak, *Quercus emoryi*), Arizona white oak (*Quercus arizonica*), alligator juniper, and pinyon pine (for example, *Pinus edulis*). In some areas, Ponderosa Pine - Evergreen Oak communities can alternatively be dominated or codominated by Apache pine (*Pinus englemannii*) and Chihuahuan pine (*P. leiophylla*), both site potential indicators. In terms of disturbance, the Ponderosa Pine - Evergreen Oak averaged greater fire severity than the ponderosa pine forests above the Mogollon Rim, and greater patchiness with less horizontal uniformity and more even-aged conditions. Understory shrubs include manzanita (*Arctostaphylos* sp.), turbinella oak (*Quercus turbinella*), skunkbush sumac (*Rhus trilobata*), and mountain mahogany (*Cercocarpus montanus*). Depending on site conditions, shrubs and perennial grasses have varying importance in vegetation response to disturbance. Historically this ecological response unit had over 10 percent tree canopy cover, with the exception of early, post-fire plant communities. Insects are generally small scale disturbance agents, but have the potential to cause large-scale disturbances. Dwarf mistletoes, parasitic plants found on several coniferous species, are chronic disturbance agents.

The Ponderosa Pine-Evergreen Oak ERU can be split into two provisional subclasses that describe the structure of this system: Ponderosa Pine - Evergreen Oak, Perennial Grass Subclass and Ponderosa Pine - Evergreen Oak, Evergreen Shrub Subclass. The Perennial Grass Subclass is distinguished from the Evergreen Shrub Subclass by a more continuous layer of perennial grasses in the understory and a relatively minor shrub component. These circumstances may be less evident in the current condition depending on the degree of shrub encroachment. The Evergreen Shrub Subclass differs from the former subclass by site potential, typically favoring high shrub cover, and by higher fire severity and more even-aged conditions characteristic of mixed-severity fire regimes. This type is found on well-drained soils,

frequently with coarse-textured or gravelly (stony) soil characteristics that favor shrub layer development (particularly oaks) over herbaceous plants.

At-risk species associated with Ponderosa Pine-Evergreen Oak:

Allen's big-eared bat, Ancha mountainsnail, Arizona bugbane, Blumer's dock, bristle-tipped aster, Flagstaff beardtongue, Gila rock daisy, Hodgson's fleabane, James' rubberweed, Lewis's woodpecker, Metcalfe's tick-trefoil, Mexican spotted owl, Mexican wolf, Milk Ranch talussnail, monarch butterfly, Mt. Dellenbaugh sandwort, Pringle's fleabane, red-faced warbler, Sierra Ancha fleabane, Sierra Ancha talussnail.

Ponderosa Pine-Evergreen Oak Perennial Grass Subclass

Landscape Scale Desired Conditions

- The ponderosa pine-evergreen oak perennial grasses sub-type is composed of trees from structural stages ranging from young to old. Forest appearance is variable but generally uneven-aged and open at landscape scales (though can appear even-aged within tree groups); occasional larger areas of even-aged structure are present. The forest arrangement is in individual trees, small clumps and groups of trees interspersed within variably-sized openings of grass/forbs/shrub vegetation associations similar to historic patterns. Shrubs occur in low densities which do not inhibit ponderosa pine regeneration. Size, shape, number of trees per group, and number of groups per area are variable across the landscape. All structural stages of oak are present, with old trees occurring as dominant individuals, and small groups occurring typically within openings. Denser overall tree conditions exist in some locations such as north facing slopes and canyon bottoms.

Table 11. Ponderosa Pine-Evergreen Oak ERU Desired Vegetation Conditions (includes Perennial Grass and Shrub subclasses)

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover	Structure Class
4	Recently disturbed, grass and forbs, and shrub resprouts	Tree < 10%	Sparse-Open
3	Dominated by trees 5.0"- 9.9" diameter	≥ 30%	Closed
24	Dominated by trees 5.0"- 9.9" diameter	10-29.9%	Open
60	Dominated by trees ≥ 10.0" diameter	10-29.9%	Open
4	Dominated by trees ≥ 10.0" diameter	≥ 30%	Closed
5	Dominated by trees 0"- 4.9" diameter	> 10%	Open

- Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) – all of which have high structural diversity (presence of various age groups/size classes and canopy layers). The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- The ponderosa pine –evergreen oak perennial grasses sub-type is composed predominantly of vigorous trees, but declining trees are a component and provide for snags, top-killed, lightning- and fire-scarred trees, and coarse woody debris (>3 inch diameter), all well-distributed throughout the landscape. Ponderosa pine snags are typically 18 inches or greater at DBH and average 1 to 2 snags per acre, while snags greater than 8 inches average 5 snags per acre. Large oak snags (>10

inches) are a well-distributed component. Downed logs (>12 inch diameter at mid-point, >8 feet long) average 3 logs per acre within the forested area of the landscape. Coarse woody debris, including downed logs, ranges from 3 to 10 tons per acre.

- The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances, and climate variability. The landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from natural disturbances (e.g., insects, diseases, fire, and wind), including old growth. Grasses, forbs, shrubs, and needle cast (fine fuels), and small trees maintain the natural fire regime. Fires are characteristically frequent and primarily low severity fires (Fire Regime I) throughout the ERU including goshawk home ranges.
- Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Shrubs average less than 30% cover.
- Southwestern dwarf mistletoe is a natural disturbance agent occurring in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures.
- Natural and anthropogenic disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.
- Seral state proportions, per the R3 Seral State Proportions Supplement, are applied at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.
- At the plan scale, overall plant composition similarity to site potential (FSH 2090.11) averages greater than 66%, but can vary considerably at fine- and mid- scales owing to a diversity of seral conditions.

Midscale Desired Conditions

- The ponderosa pine-evergreen oak perennial grasses sub-type is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The more biologically productive sites contain more trees per group and more groups per area. Openness typically ranges from 10 percent in more productive sites to 70 percent in the less productive sites.
- Tree density within forested areas generally ranges from 20 to 80 square foot basal area per acre. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present, though tree groups and patches may be relatively even-aged. Small areas of even-aged forest structure are present. Patch sizes range from less than 1 acre to 10s of acres. The mix of natural disturbances sustains the overall age and structural distribution.
- Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests contain 10 to 20 percent higher basal area in the mid- to old-age tree groups than goshawk foraging areas and the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the ponderosa pine-evergreen oak type.
- Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about 5 and 15 percent (based on Terrestrial Ecological Unit or other suitable scientific protocol or method). Fires burn primarily on the forest floor and do not typically spread

between tree groups as crown fire. Mixed-severity fires occur at less frequency and over smaller spatial extents than low severity fires occur.

Fine-scale Desired Conditions

- At the fine-scale in the ponderosa pine-evergreen oak perennial grasses sub-type, trees typically occur in small groups in which they are variably-spaced with some tight clumps. Crowns of trees within the mid- to old-age groups are interlocking or nearly interlocking. Interspaces between tree groups are variably-shaped and comprised of a grass/forb/shrub mix. Some natural openings contain individual trees, including large open-grown oaks. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Size of tree groups typically is less than 1 acre. Groups at the mid-to old-age stages consist of 2 to approximately 40 trees.

Ponderosa Pine-Evergreen Shrub Subclass

Landscape Scale Desired Conditions

- The ponderosa pine-evergreen shrub sub-type is composed of trees from structural stages ranging from young to old. Forest appearance is variable but generally uneven-aged and open; areas of even-aged structure are present. The forest arrangement is in small clumps and groups of trees interspersed within variably-sized openings of moderate to high density shrubs and limited grass cover. Size, shape, number of trees per group, and number of groups per acre are variable across the landscape. All structural stages of oak are present, with old trees occurring as dominant individuals or in small groups. Denser tree conditions exist in some locations such as north facing slopes and canyon bottoms.

- Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) – all of which have high structural diversity (presence of various age groups/size classes and canopy layers). The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

- The ponderosa pine –evergreen shrub sub-type is composed predominantly of vigorous trees and shrubs, but declining trees and shrubs are a component. Declining trees provide for snags, top-killed, lightning- and fire-scarred trees, and coarse woody debris (>3 inch diameter), all well-distributed throughout the landscape. Ponderosa pine snags are typically 18 inches or greater at DBH and average 1 to 2 snags per acre, while snags greater than 8 inches average 5 snags per acre (Weisz et al. 2011); large oak snags (>10 inches) are a well-distributed component. Downed logs (>12 inch diameter at mid-point, >8 feet long) average 3 logs per acre within the forested area of the landscape. Coarse woody debris, including downed logs, ranges from 3 to 10 tons per acre.

- The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances and climate variability. The landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from natural disturbances (e.g., insects, diseases, fire, and wind), including old growth. Limited grasses, forbs, and a moderate density of shrubs, needle cast, and small trees maintain the natural fire regime. Low to mixed-severity fires (Fire Regimes I and III) are characteristic throughout the ERU including goshawk home ranges.

- Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Shrubs average greater than 30% canopy cover.

- Southwestern dwarf mistletoe is a natural disturbance agent occurring in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures.
- Natural and anthropogenic disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.
- Seral state proportions, per the R3 Seral State Proportions Supplement, are applied at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.
- At the plan scale, overall plant composition similarity to site potential (FSH 2090.11) averages greater than 66%, but can vary considerably at fine- and mid- scales owing to a diversity of seral conditions.

Midscale Desired Conditions

- The ponderosa pine-evergreen shrub sub-type is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The more biologically productive sites contain more trees per group and more groups per area. Openness typically ranges from 10 percent in more productive sites to 70 percent in the less productive sites.
- Tree density within forested areas generally ranges from 20 to 80 square foot basal area per acre. The mosaic of tree groups comprises a mix of even-aged and uneven-aged patches with all age classes and structural stages present. The mix of natural disturbances sustains the overall age and structural distribution. Patch sizes range from less than 1 acre to 10s of acres.
- Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests contain 10 to 20 percent higher basal area in the mid- to old-age tree groups than goshawk foraging areas and the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the ponderosa pine-evergreen shrub type.
- Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about 5 and 15 percent (based on Terrestrial Ecological Unit or other suitable scientific protocol or method). Fires are of low to mixed-severity burning on the forest floor as well as in the overstory. Crown fires occur in small patches.

Fine-scale Desired Conditions

- Trees typically occur individually or in small groups in which they are variably-spaced with some tight clumps. Crowns of trees within mid- to old-age groups are interlocking or nearly interlocking. Interspaces between tree groups are variably-shaped and comprised of shrubs and limited grass cover. Some natural openings may contain a high density of shrubs and/or individual trees, including large oaks. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Size of tree groups typically is less than 0.5 acre.

Guidelines for both subclasses of Ponderosa Pine-Evergreen Oak

- To perpetuate old-growth forest components, the development of old-growth conditions should be encouraged in areas where old growth is lacking. Uneven-aged vegetation treatments should be designed such that replacement structural stages and age classes are proportionally present to assure continuous representation of old-growth characteristics across the landscape over time.

- In areas where the dwarf mistletoe infection is widespread and would inhibit the long-term maintenance of diverse age classes and long term sustainability, even-aged management strategies may be needed to reduce infection levels across the stand (mid-scale). Even-aged treatment areas should be limited to 40 acres or less to mimic historical patch sizes. Treatments for mitigating adverse impacts should not be intended to completely eliminate this naturally occurring disturbance agent. Rather, they should typically be aimed at reducing infection levels across the stand, increasing host vigor, and limiting the spread into regeneration areas.
- To promote old-growth attributes consistent with desired conditions, should manage for largeoak trees and snags of all available oak species to be sustained over time.
- Large accumulations of green material (such as slash, wind thrown trees) should be managed to reduce the risk of uncharacteristic bark beetle outbreaks.
- Management activities should leave an average of 1 to 2 snags greater than 18 inches per acre, when these components exist on the landscape prior to treatment.
- To increase small mammal occupancy in areas where logs are deficient and to provide nesting habitat and cover for turkeys, birds, small mammals, reptiles, and invertebrates, management activities should leave an average of 1 to 2 slash piles or 1 to 2 unlopped tops should be retained across the landscape for several years, rather than immediately being burned. This should be balanced with potential threats from bark beetles and fire/fuels concerns.

Ponderosa Pine Forest

General Description

The ponderosa pine forest vegetation community includes two sub-types: Ponderosa pine bunchgrass and ponderosa pine Gambel oak (desired conditions are the same for both). The Ponderosa Pine Forest ecosystem is widespread in the Southwest occurring at elevations ranging from 6,000-7,500 feet on igneous, metamorphic, and sedimentary parent soils with good aeration and drainage, and across elevation and moisture gradients. The dominant species in this system is ponderosa pine. Other trees, such as Gambel oak, pinyon pine, one-seed juniper, and Rocky Mountain juniper, may be present. More infrequently species such as aspen, Douglas-fir and white fir may also be present, and may occur as individual trees. There is typically a shrubby understory mixed with grasses and forbs, although this type sometimes occurs as savannah with extensive grasslands interspersed between widely spaced clumps or individual trees. This system is adapted to drought during the growing season and has evolved several mechanisms to tolerate frequent, low-intensity surface fires. A historical fire regime of frequent, low-severity surface fires is widely documented, but there is growing evidence of limited scale areas of historical mixed-severity and high-severity fires, especially for steep slopes in areas of heterogeneous topography.

At-risk species associated with Ponderosa Pine Forest:

Allen’s big-eared bat, Blumer's dock, broadleaf lupine, Flagstaff beardtongue, Lewis’s woodpecker, Metcalfe's tick-trefoil, Mexican spotted owl, Mexican wolf, monarch butterfly, Mt. Dellenbaugh sandwort.

Landscape Scale Desired Conditions

- The ponderosa pine forest vegetation community is composed of trees from structural stages ranging from young to old. Forest appearance is variable but generally uneven-aged and open; occasional areas of even-aged structure are present. The forest arrangement is in individual trees, small clumps, and groups of trees interspersed within variably-sized openings of

grass/forbs/shrubs vegetation associations similar to historic patterns. Size, shape, number of trees per group, and number of groups per area are variable across the landscape. In the Gambel oak sub-type, all sizes and ages of oak trees are present. Denser tree conditions exist in some locations such as north facing slopes and canyon bottoms.

Table 12. Ponderosa Pine Forest ERU Desired Vegetation Conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover	Structure Class
0	Recently disturbed, grass and forbs, and shrub resprouts	Tree < 10%	Sparse-Open
0	Dominated by trees 5.0”- 9.9” diameter	10-29.9%	Open
100	Dominated by trees 10.0”- 20.0”+ diameter	10-29.9%	Open, Multi-Storied
0	Dominated by trees 0”- 4.9” diameter	10-30+%	Open and Closed
0	Dominated by trees 5.0”- 9.9” diameter	≥ 30%	Closed
0	Dominated by trees 10.0”- 20.0”+ diameter	≥ 30%	Closed, Multi-Storied

- Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

- The ponderosa pine forest vegetation community is composed predominantly of vigorous trees, but declining trees are a component and provide for snags, top-killed, lightning- and fire-scarred trees, and coarse woody debris (>3 inch diameter), all well-distributed throughout the landscape. Ponderosa pine snags are typically 18 inches or greater at DBH and average 1 to 2 snags per acre. In the Gambel oak subtype, large oak snags (>10 inches) are a well-distributed component. Downed logs (>12 inch diameter at mid-point, >8 feet long) average 3 logs per acre within the forested area of the landscape. Coarse woody debris, including downed logs, ranges from 3 to 10 tons per acre.

- The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances and climate variability. The landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g., insects, diseases, fire, and wind), including snags, downed logs, and old trees. Grasses, forbs, shrubs, and needle cast (fine fuels), and small trees maintain the natural fire regime. Frequent, low severity fires (Fire Regime I) are characteristic throughout this ERU including goshawk home ranges.. Natural and anthropogenic disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.

- Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. The amount of shrub

cover depends on the site potential (based on Terrestrial Ecological Unit or other suitable scientific protocol or method).

- Southwestern dwarf mistletoe is a natural disturbance agent occurring in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures.

- Seral state proportions, per the R3 Seral State Proportions Supplement, are applied at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.

- At the Plan unit scale, overall plant composition similarity to site potential (FSH 2090.11) averages greater than 66%, but can vary considerably at fine- and mid- scales owing to a diversity of seral conditions.

Midscale Desired Conditions

- The ponderosa pine forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The more biologically productive sites contain more trees per group and more groups per area, resulting in less space between groups. Openness typically ranges from 52 percent in more productive sites to 90 percent in less productive sites. In areas with high fine-scale aggregation of trees into groups, mid-scale openness ranges between 78-90 percent.

- Tree density within forested areas generally ranges from 22 to 89 square foot basal area per acre. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes present. Infrequently, patches of even-aged forest structure are present. Disturbances sustain the overall age and structural distribution.

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

- Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values ranging between about 5 and 20% depending on site potential (based on Terrestrial Ecological Unit or other suitable scientific protocol or method). Fires burn primarily on the forest floor and do not spread between tree groups as crown fire.

Fine-scale Desired Conditions

- Trees typically occur in irregularly shaped groups and are variably-spaced with some tight clumps. Crowns of trees within the mid- to old-age groups are interlocking or nearly interlocking. Interspaces surrounding tree groups are variably-shaped and comprised of a grass/forb/shrub mix. Some natural openings contain individual trees. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Size of tree groups typically is less than 1 acre, but averages 0.5 acres. Groups at the mid- to old-age stages consist of 2 to approximately 40 trees per group.

Guidelines

- To perpetuate old-growth forest components, the development of old-growth conditions should be encouraged in areas where old growth is lacking. Uneven-aged vegetation treatments should be designed such that replacement structural stages and age classes are proportionally present to assure continuous representation of old-growth characteristics across the landscape over time.
- In areas where the dwarf mistletoe infection is widespread and would inhibit the long-term maintenance of diverse age classes and long term sustainability, even-aged management strategies may be needed to reduce infection levels across the stand. Even-aged treatment areas should be limited to 40 acres or less to mimic historical patch sizes. Treatments for mitigating adverse impacts should not be intended to completely eliminate this naturally occurring disturbance agent. Rather, they should typically be aimed at reducing infection levels across the stand and increasing host vigor.
- Where Gambel oak or other native hardwoods are desirable to retain for diversity, treatments should improve vigor and growth and enhance tree-form structure of these species.
- Large accumulations of green material (such as slash, wind thrown trees) should be managed to reduce the risk of uncharacteristic bark beetle outbreaks.
- Management activities should leave an average of 1 to 2 snags greater than 18 inches per acre, when these components exist on the landscape prior to treatment.
- To increase small mammal occupancy in areas where logs are deficient and to provide nesting habitat and cover for turkeys, birds, small mammals, reptiles, and invertebrates, management activities should leave an average of 1 to 2 slash piles or 1 to 2 unlopped tops should be retained across the landscape for several years, rather than immediately being burned. This should be balanced with potential threats from bark beetles and fire/fuels concerns.

Management Approaches

- Ponderosa pine forests provide Mexican spotted owl habitat as discussed under the most recent, approved recovery plan for the Mexican spotted owl. The Tonto National Forest should work closely with the U.S. Fish and Wildlife Service to address the habitat needs of the Mexican spotted owl by minimizing disturbance and providing nest/roost habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody material.

Mixed Conifer-Frequent Fire

General Description

Also sometimes referred to as Dry Mixed Conifer, the Mixed Conifer Frequent Fire ecological response unit spans a variety of semi-mesic environments in the Rocky Mountain and Madrean Provinces. In the southwestern United States, mixed conifer forests may be found at elevations between 6,000 and 10,000 ft., situated between ponderosa pine, pine-oak, or pinyon-juniper woodlands below and spruce-fir forests above. This ecological response unit typically occupies the warmer and drier sites of the mixed conifer life zone. Typically these types were dominated by ponderosa pine (*Pinus ponderosa* var. *scopulorum*) in an open forest structure (less than 30 percent tree cover), with minor occurrence of aspen (*Populus tremuloides*), Douglas-fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), and Southwestern white pine (*Pinus strobiformis*). Aspen may occur as small groups in north-facing slopes, drainages, and other microsites where cooler, moister conditions prevail, but does not occur as a seral stage in the Mixed Conifer Frequent Fire ecological response unit. More shade tolerant conifers, such as Douglas-fir, white

fir, and blue spruce (*Picea pungens*), tend to increase in cover in late succession, contrary to conditions under the characteristic fire regime. These species could have achieved dominance in localized settings where aspect, soils, and other factors limited the spread of surface fire. This forest vegetation community typically occurs with an understory of grasses, forbs, and shrubs. Fires occur frequently and are generally not limited by lack of fuel connectivity or high fuel moistures.

At-risk species associated with Mixed Conifer-Frequent Fire:

Ancha mountainsnail, Arizona bugbane, Blumer's dock, broadleaf lupine, Metcalfe's tick-trefoil, Mexican spotted owl, Mexican wolf, monarch butterfly, olive-sided flycatcher, red-faced warbler, yellow-eyed junco.

Landscape Scale Desired Conditions

- The dry mixed conifer vegetation community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. Forest appearance is variable but generally uneven-aged and open. Occasionally, small patches (generally less than 50 acres) of even-aged forest structure are present. The forest arrangement is in small clumps and groups of trees interspersed within variably-sized openings of grass/forb/shrub vegetation associations similar to historic patterns. Size, shape, number of trees per group, and number of groups per area are variable across the landscape. Where they naturally occur, groups of aspen and all structural stages of oak are present. Denser tree conditions exist in some locations such as north facing slopes and canyon bottoms.

Table 13. Mixed Conifer Frequent Fire ERU Desired Vegetation Conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover	Structure Class
20	Early development, all structures from Recently disturbed, grass and forbs to 0-4.9" trees	Tree < 10%	Sparse-Open
5	Dominated by trees 5.0"- 9.9" diameter		Closed
10	Dominated by trees 5.0"- 9.9" diameter	10-29.9%	Open, Multi-Storied
60	Dominated by trees 10.0"- 20.0"+ diameter	10-29.9%	Open, Multi-Storied
5	Dominated by trees 10.0"- 20.0"+ diameter	≥ 30%	Closed
0	Historically rare, Dominated by trees 10.0"- 20.0"+ diameter	10-29.9%	Open, 1-2 Storied

- Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- The dry mixed conifer forest vegetation community is composed predominantly of vigorous trees, but declining trees are a component and provide for snags, top-killed, lightning- and fire-scarred trees, and coarse woody debris (>3 inch diameter), all well-distributed throughout the landscape. Snags are typically 18 inches or greater at DBH and average 3 per acre. Smaller snags, 8 inches

and above at DBH, average 8 snags per acre. Downed logs (>12 inch diameter at mid-point, >8 feet long) average 3 per acre within forested areas. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre.

- The composition, structure, and function of vegetative conditions are resilient to the frequency, extent, severity of disturbances, and to climate variability. The landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g., insects, diseases, fire, and wind), including snags, downed logs, and old trees. Grasses, forbs, shrubs, needle cast (fine fuels), and small trees maintain the natural fire regime. Frequent, low severity fires (Fire Regime I) are characteristic, including throughout goshawk home ranges.
- Organic ground cover (leaf litter/needle cast, etc.) and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. The amount of shrub cover depends varies based on site potential (based on Terrestrial Ecological Unit or other suitable scientific protocol or method).
- Southwestern dwarf mistletoe is a natural disturbance agent occurring in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures.
- Natural and anthropogenic disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.
- Seral state proportions, per the R3 Seral State Proportions Supplement, are applied at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.
- At the plan scale, overall plant composition similarity to site potential (FSH 2090.11) averages greater than 66%, but can vary considerably at fine- and mid- scales owing to a diversity of seral conditions.

Midscale Desired Conditions

- The dry mixed conifer forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The more biologically productive sites contain more trees per group and more groups per area. Openness typically ranges from 10 percent in more productive sites to 50 percent in the less productive sites.
- Tree density within forested areas generally ranges from 30 to 125 square foot basal area per acre. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages. Occasionally small patches (generally less than 50 acres) of even-aged forest structure are present. Disturbances sustain the overall age and structural distribution.
- Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests contain 10 to 20 percent higher basal area in mid- to old-age tree groups than in goshawk foraging areas and in the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the dry mixed conifer type.
- Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values ranging between about 5 and 20% depending on the TEUI unit

(USDA Forest Service 1986, 2006). Fires burn primarily on the forest floor and do not spread between tree groups as crown fire.

Fine-scale Desired Conditions

- Trees typically occur in irregularly shaped groups and are variably-spaced with some tight clumps. Crowns of trees within the mid- to old-age groups are interlocking or nearly interlocking. Interspaces surrounding tree groups are variably-shaped and comprised of a grass/forb/shrub mix. Some natural openings contain individual trees or snags. Trees within groups are of similar or variable ages and one or more species. Size of tree groups typically is less than 1 acre. Groups at the mid- to old-age stages consist of 2 to approximately 50 trees per group.

Guidelines

- To promote structural diversity, the development of old-growth structural components should be encouraged in areas where lacking. Vegetation treatments should be designed such that replacement structural stages and age classes are proportionally present to assure continuous representation of old-growth characteristics across the landscape over time.
- In areas where the dwarf mistletoe infection is widespread and would inhibit the long-term maintenance of diverse age classes and long term sustainability, even-aged management strategies may be needed to reduce infection levels across the stand. Even-aged treatment areas should be limited to 40 acres or less to mimic historical patch sizes.Treatments for mitigating adverse impacts should not be intended to completely eliminate this naturally occurring disturbance agent. Rather, they should typically be aimed at reducing infection levels across the stand and increasing host vigor.
- Where Gambel oak or other native hardwoods are desirable to retain for diversity, treatments should improve vigor and growth and enhance tree-form structure of these species.
- In proposed treatment areas where there is little understory, slash treatments (for example, lop and scatter, mastication) should be used that improve herbaceous vegetation growth, soil and watershed condition, and increase soil productivity, consistent with scenic integrity objectives.
- Management activities should leave an average of 1 to 2 snags greater than 18 inches per acre, when these components exist on the landscape prior to treatment.
- To increase small mammal occupancy in areas where logs are deficient and to provide nesting habitat and cover for turkeys, birds, small mammals, reptiles, and invertebrates, management activities should leave an average of 1 to 2 slash piles or 1 to 2 unlopped tops should be retained across the landscape for several years, rather than immediately being burned. This should be balanced with potential threats from bark beetles and fire/fuels concerns.

Management Approaches

- Mixed Conifer Frequent Fire forests provide Mexican spotted owl habitat as discussed under the most recent, approved recovery plan for the Mexican spotted owl. The Tonto National Forest should work closely with the U.S. Fish and Wildlife Service to address the habitat needs of the Mexican spotted owl by minimizing disturbance and providing nest/roost habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody material.

Riparian Ecological Response Units

Description

Riparian species composition and community structure is largely influenced by moisture regimes/water availability, disturbance (flood timing, magnitude, and frequency), climate, soils and other landscape

features (parent material, geomorphology). Riparian plant species can also have strong influences on stream channel conditions and ecological function, such as the presence of deep rooted woody vegetation that maintain alluvial soils. Because riparian species tend to have specific moisture regimes, the presence or absence of certain species and their wetland indicator scores/category[1] can indicate changes in local site conditions and ecological status (e.g., high departure). For example, drying conditions may be evident by the under-representation of wetland-obligate (only found at wetlands) species and increases in facultative-upland or upland species (mostly occur at uplands). A number of riparian species are groundwater dependent (generally requiring shallow groundwater levels), so dominance by upland plants at the riparian zone may indicate a declining water table and or drought conditions.

Riparian Ecological Response Units (ERUs) are mapped riparian areas that describe dominant riparian plant communities. It should be noted that these riparian ERUs represent potential plant associations, and that riparian areas are dynamic and can undergo dramatic changes in plant composition and structure, specifically at reach scales, based on short and long-term disturbances (e.g., periodic flood pulses, 100-year flood, drying conditions). For example, during dry periods, some species better adapted to non-disturbance, such as ash (*Fraxinus* spp.) and boxelder (*Acer negundo*), may colonize areas previously occupied by pioneer species such as cottonwood (*Populus* spp.) and willow (*Salix* spp.) that rely on wetter conditions and disturbance (flood scour and deposition of fresh alluvium) for establishment.

Seven major riparian ERUs are present on the forest: Desert Willow, Fremont Cottonwood-Oak, Fremont Cottonwood/Shrub, Narrowleaf Cottonwood/Shrub, Sycamore-Fremont Cottonwood, Fremont Cottonwood-Conifer, and Ponderosa Pine/Willow. Desired conditions are described for each group of riparian ERUs, following this section, that are grouped by Biotic Communities[2].

The spatial scales for describing desired conditions for riparian vegetation is different than upland vegetation. The landscape scale describes conditions across three or more subwatersheds (6^{th}-level hydrologic unit), the mid-scale describes conditions for one to two subwatersheds, and the fine-scale scale described conditions within in a single subwatershed.

At-risk species associated with Riparian Ecological Response Units:

A caddisfly, A mayfly, Allen's big-eared bat, American dipper, Aravaipa sage, Arizona bugbane, Arizona giant sedge, Blumer's dock, broad-billed hummingbird, California leaf-nosed bat, Chiricahua leopard frog, Colorado pikeminnow, desert pupfish, desert sucker, Fish Creek fleabane, fossil springsnail, Gila chub, Gila topminnow, Gila trout, Hodgson's fleabane, loach minnow, lowland leopard frog, MacGillivray's warbler, Mexican spotted owl, Mexican wolf, monarch butterfly, narrow-headed gartersnake, net-winged midge, northern Mexican gartersnake, Pacific wren, Parker's cylloepus riffle beetle, razorback sucker, red-faced warbler, roundtail chub, Sierra Ancha fleabane, Sonoran sucker, southwestern willow flycatcher, spikedace, sulphur-bellied flycatcher, western red bat, yellow-billed cuckoo, Yuma Ridgeway's rail.

[1] Wetland indicator scores are used to designate a plant species' preference for occurrence in a wetland or upland; Obligate-Wetland species almost always occur in wetlands, Facultative-Wetland species usually occur in wetlands but may occur in non-wetlands, Facultative species occur in wetlands and non-wetlands, Facultative-Upland species usually occur in non-wetlands but may occur in wetlands, and Obligate-Upland species almost never occur in wetlands.

[2] These groupings are based off southwestern riparian biomes described from Minckley and Brown's Biotic Communities (1994). Biotic communities of the southwest represent distinctive vegetation and plant associations influenced by climatic factors throughout Southwest region.

Sonoran Riparian Scrubland:

Riparian ERUs: Desert Willow

The Sonoran Riparian Scrubland is positioned along drainages, generally lower in elevation than Sonoran Riparian Deciduous Forests and Woodlands and Montane Riparian areas. Many of the species associated with Sonoran riparian scrubland are those adapted to flood-prone areas at intermittent to ephemeral reaches. Tamarisk has become a common associate in some areas, mostly patchy occurrences but not reaching great stand densities as it has at other riparian settings (e.g., Lower Colorado River, and along the Salt River as it exits the forest).

Landscape Scale Desired Conditions

- A diversity of scrub vegetation and deciduous desert trees are well represented based on site potential (measured from TEUI data or other suitable scientific protocol or method).
- While most soils are naturally unstable (especially along washes), soil condition promotes the establishment and health of riparian scrub vegetation. A majority of soils (greater than 66 percent) are rated as satisfactory (based on suitable scientific method or protocol).
- The deciduous desert willow (Chilopsis linearis) is the dominant tree component of the desert Willow ERU, and present based on site potential (measured from TEUI data or other suitable scientific protocol).

Mid-Scale Scale Desired Conditions

- Dominant scrub vegetation is well distributed, with dominant shrubs reaching heights up to 10 feet based of site potential (measured from TEUI data or other suitable scientific protocol)
- Adjacent upland desert scrub species often intergrade within riparian scrubland (reaching higher densities at drier sites), but are not dominant along the stream channel. The desired mix of species are determined from site potential (measured from TEUI data or other suitable scientific protocol) and include but are not limited to: wolfberry (*Lycium* sp.), acacias (*Acacia greggii*), hackberry (*Celtis pallida*) and mesquite (*Prosopis* sp.).
- Stream channel dominants include seep willow (*Baccharis salicifolia*). Occasionally, arrow-weed (*Pluchea sericea*) is also a stream channel dominant however this species is more abundant at lower elevation and low gradient riparian settings (e.g., Lower Colorado River).
- Arrow-weed, burro bush (*Ambrosia* sp.) and desert broom (*Baccharis sarothroides*) are dominant on sandy soils (at flood-prone areas) and occupy secondary floodplains. Desert broom tends to occur further from the stream channel at drier reaches. Local site conditions shift the dominance of hydric and mesic species, however mix of Facultative and Facultative-Upland species are well represented overall (measured form TEUI data or other suitable scientific protocol).

Sonoran Riparian Deciduous Forests and Woodlands

Riparian ERUs: Fremont Cottonwood-Oak, Fremont Cottonwood/Shrub, Sycamore-Fremont Cottonwood

Sonoran riparian deciduous forests and woodlands and can be found along perennial and near perennial streams at 3,600 – 3,900 feet in elevation. These areas represent a diverse range of plant associations, described by three major riparian ERUs: Fremont Cottonwood-Oak, Fremont Cottonwood/Shrub, and Sycamore-Fremont Cottonwood. For some of these riparian ERUs, current conditions may show atypical plant associations (disclimax). For example, the Fremont Cottonwood Shrub and Fremont Cottonwood/Oak ERUs, may resemble and be more typical of Sonoran riparian scrubland as a result of

altered flows (drier conditions favoring scrub vegetation). Well-developed stands of riparian forests and woodlands, such as gallery cottonwood and willow forests have been declining from past land use and water control measures in the region. Many of these highly productive and well-structured riparian forests have been reduced to remnant patches at many areas (specifically among flow altered systems).

Landscape Scale Desired Conditions

- Flood timing, magnitude and frequency provide for the maintenance of vernal flood-adapted species (e.g., *Salix gooddingii*) and important habitats, such as cottonwood-willow forests.
- Understories have a range of densities – from open to closed conditions. Scrub vegetation, such as young mesquite (*Prosopis* sp.) stands, are an understory component at some sites.
- Well established mesquite stands, generally located at abandoned channels or terraces, are retained and connected to riparian vegetation and the uplands and support the movement of wildlife.
- The Fremont Cottonwood/Oak, Fremont Cottonwood/Shrub, and Sycamore-Fremont Cottonwood ERUs are intact and functioning properly (based of riparian condition rating; PFC or other suitable scientitic protocol or method).
- Woody species and herbaceous vegetation is present in adequate abundance/density to promote stream bank stability – specifically at stream systems most sensitive to loss of vegetation (Rosgen C-type streams[3]).
- Annual and perennial grasses, forbs, shrubs and trees are present based on site potential (based on Terrestrial Ecological Unit or other suitable scientific protocol or method).
- Riparian vegetation is healthy (few signs of stress, wilting and disease; have high reproductive output), or improving with limiting signs of compacted and degraded soils. Most soils (greater than 66 percent) are rated as satisfactory.
- Wildfire risk is low in the adjacent uplands (riparian corridor), reducing the likelihood of increased flooding, run-off and damage to nearby riparian areas. Most acres in the surrounding watershed are classified into fire regime conditions class I (low departure in fire regime).

Mid-Scale Desired Conditions

- Locally important tree species, such as hackberry (*Celtis reticulata*) and mesquite (*Prosopis* sp.), are present and common at some sites based on site potential (based on Terrestrial Ecological Unit or other suitable scientific protocol or method). While not as abundant or common, desert elderberry (*Sambucus cerulea*) is also located at various reaches based off site potential.
- Velvet ash (*Fraxinus velutina*) and Arizona sycamore (*Platanus wrightii*) are well distributed based off site potential, tend to be more common at mid to high elevations and associated with the Sycamore-Fremont Cottonwood ERU.
- More arid sites support associates such as blue paloverde (*Parkinsonia florida*) and catclaw acacia (*Acacia* sp.) based on the riparian ERU and site potential (based on Terrestrial Ecological Unit or other suitable scientific protocol or method). Ironwood (*Olneya tesota*) is generally

[3] Rosgen C-type streams are not entrenched and have very wide floodplains which are able to dissipate flood flows and support extensive riparian areas. They are low gradient (0 to 2%) streams and display the typical riffle/pool sequence of a meandering stream. C-type streams are sensitive to any disturbance.

limited on the forest (found at warmer low elevation sites), but can be locally common at some sites.

- At occasional openings and sunny locations, graythorn (*Zizyphus obtusifolia*) and wolfberry (*Lycium* sp.) can be found in further from the stream channel and in association with mesquite at areas.
- Local site conditions can shift the dominance of hydric and mesic species, however Facultative-wetland and obligate-wetland species are well represented overall (based on Wetland Indicator Score and Terrestrial Ecological Unit or other suitable scientific protocol).

Montane Riparian Forests

Riparian ERUs: Ponderosa Pine/Willow, Fremont Cottonwood-Conifer, Narrowleaf Cottonwood/Shrub

Regionally, the montane riparian forests span from 4,400 to 7,500 feet in elevation. Canyon bottom forests, such as those found at the Sierra Ancha Mountains on the Tonto are common. Cottonwood, maple box elder, alder and willows form a series with occasional occurrences of adjacent upland species, such as oaks (*Quercus* sp.), white fir (*Abies concolor*), quaking aspen (*Populous tremuloides*), New Mexico locust (*Robinia neomexicana*), smooth sumac (*Rhus glabra*), pine dropseed (*Blepharoneuron tricholepsis*), and others. The following riparian ERUs are found within montane riparian forests: Fremont Cottonwood-Conifer, Ponderosa Pine/Willow and Narrowleaf Cottonwood/Shrub ERUs. The Ponderosa Pine/Willow ERU is characterized by an overstory of ponderosa pine with an understory of shrub-form willow species. As a result of the pine overstory, this map unit is particularly hard to distinguish from pine-oak systems of similar physiognomy and is believed to be under-represented in the mapping. Lanceleaf cottonwood, which is a hybrid between Fremont cottonwood and narrowleaf cottonwood may occur in place of narrowleaf cottonwood in some places as where the Narrowleaf Cottonwood/Shrub ERU transitions into the Fremont Cottonwood / Shrub ERU.

Landscape Scale Desired Conditions

- A diversity of shrubby willow species, other shrubs, grasses and trees are well represented within the Ponderosa Pine/Willow ERU based off site potential (based on Terrestrial Ecological Unit or other suitable scientific protocol or method).Typical species include ponderosa pine (*Pinus ponderosa*), willows (*Salix* sp.), Arizona walnut (*Juglans major*), box elder (*Acer negundo*), and velvet ash (*Fraxinus velutina*).
- Fremont Cottonwood, conifers, shrubs and grasses are well represented within the Fremont Cottonwood-Conifer ERU. Mesquite (*Prosopis* sp.) is also occasionally present at areas.
- Wildfire risk is low in the adjacent uplands (riparian corridor), reducing the likelihood of increased flooding, run-off and damage to nearby riparian areas. Most acres in the surrounding watershed are classified into fire regime conditions class I (low departure in fire regime).
- Soil condition promotes the establishment and health of riparian vegetation. Majority of soils (greater than 66 percent) are rated as satisfactory.

Mid-Scale Desired Conditions

- At smaller scales, locally important species, such as Arizona walnut (*Juglans major*), box elder (*Acer negundo*), velvet ash (*Fraxinus velutina*), net leaf hackberry (*Celtis reticulata*), velvet mesquite (*Prosopis velutina*), oneseed juniper (*Juniperus monosperma*) and Arizona white oak

(*Quercus arizonica*) are present or common based on site potential (based on Terrestrial Ecological Unit or other suitable scientific protocol or method).

- Understories are typically dominated by shrubby species – some areas with high densities of small size classes of riparian trees or dominance of one or more willow species. Riparian scrub species, such as blueberry elder (*Sambucus glauca*), thin-leaf alder (*Alnus tenuifolia*) and red-osier dogwood (*Cornus stolonifera*) replace willows at some sites.
- Upland species often intergrade within the riparian corridor, however facultative, facultative-wetland and obligate-wetland species are well represented overall (based on Terrestrial Ecological Unit or other suitable scientific protocol or method).

Fire and Fuels

Description

Wildland fire includes both wildfire (unplanned ignitions) and prescribed fire (planned ignitions). Fire management includes the strategies and actions used both before and during wildland fire. Management of wildland fire influences whether fire effects create beneficial or negative impacts to values such as water quality, air quality, habitat, recreation areas, or communities. Wildfire management includes a spectrum of responses, from protection objectives (suppression) to resource objectives (letting fire play a natural role on the landscape). Suppression refers to management strategies used to extinguish or confine wildfires for the protection of values.

Manipulation of vegetation for the purpose of changing the fire characteristics when it burns is called fuels management. Fuels reduction treatments result in a change in the amount, configuration, and spacing of live and dead vegetation, with the purpose of creating conditions that result in more manageable and characteristic fire behavior during wildfires.

Desired Conditions

- Fire Management activities minimize the risk of loss of life, damage to property or ecosystem function. Firefighter and public safety is the first priority in every fire management activity.
- In areas where wildfires on National Forest System lands pose a threat to communities and community assets primarily within the wildland-urban interface (e.g., power lines, communication towers, developed recreation sites, adjacent private land, and structures), wildland fuel should be manipulated so that fire behaves similar to reference conditions (historic fire regime).
- To achieve ecosystem sustainability, including interrelated ecological, economic, and social components (e.g., improved ecosystem resilience and wildlife habitat, protection of property, and public safety) forest administrators should use the full range of fire management activities, including wildland fires (planned and un-planned events)
- Wildland Fire should be used to maintain and enhance resources and functions in its natural ecological role. Fire needs to be considered in ecosystem management because the biological effects of fire have a profound influence on composition, structure, and function of forest, brush, and grassland ecosystems.
- Fuel reduction activities should be used (mechanical thinning and wildland fire) to protect social, economic, and ecological values at risk from high-severity disturbance effects.
- Wildfire severity and frequency are within the natural range of variability. Uncharacteristic high-severity fires occur less frequently and do not burn on a landscape scale.
- Wildland fire is recognized and understood, both internally and externally, as a necessary disturbance process integral to the sustainability of the Tonto National Forest's fire-adapted vegetation types.
- Wildland fire is allowed to play a natural ecological role in designated wilderness areas.

- Fuels management by treatment (such as mechanical treatment and/or wildland fire) of forest vegetation utilizing all available management opportunities with an emphasis on areas that provide reduced fire impacts to values at risk.

Standards

- Wildfire risk assessments can be used which provides a means to assess the potential risk posed by wildfire to specific highly valued resources and assets across large landscapes.
- Response to wildfire that occurs in non-fire adapted ecosystems (e.g., Sonoran desert) will be commensurate with desired conditions described for these ecosystems.
- Use wildfires to meet multiple resource management objectives where and when conditions permit and risk is within acceptable limits.

Guidelines

- Manage unplanned fires safely, employing tactics that are cost effective and commensurate with values to be protected or benefits to be accrued.
- When wildland fires occur, appropriate response strategies should be developed based on the risk considerations of life, safety and potential resource impacts and with the participation of other responsible agencies, authorities, and jurisdictions as appropriate.
- Response to unplanned ignitions that cross jurisdictional boundaries should be coordinated and managed to meet agency(s) objectives.
- Wildland fire activities should be used to move ecosystems towards more natural fire regimes.
- Fire suppression activities should be conducted in a manner that avoids disturbance to at-risk species, cultural resources, and other highly valued or at-risk resources, while keeping safety and risk management as a priority.
- Aerial retardant drops should avoid at-risk species habitat, waterways, riparian areas, and wetlands per the Nationwide Aerial Application for Fire Retardant on National Forest System Lands.
- In designated and recommended wilderness areas, prescribed fire should be considered to reduce the risks and consequences of uncharacteristic wildfire if necessary to meet fire management objectives. Naturally occurring fires should be allowed to perform, as much as possible, their natural ecological role.

Management Approaches

- Wildfire Strategic Response Zones were developed on the Tonto National Forest. Five strategic zones were developed: 1) maintain, 2) restore, 3) protect, 4) exclusion, 5) high complexity. These zones across the Tonto National Forest are dynamic over time and space and will change as conditions and management opportunities change, for example an area identified as a 'Restore' zone could become a 'Maintain' zone post treatment (mechanical, wildfire, or combinations of both) or digress towards a 'Protect' zone if fuel conditions increase and value protection needs change.

- Maintain: Current conditions are such that high values at risk are at low risk of loss from wildfire, and many natural resources may benefit from fire. Due to low risk, wildfires are expected to be used as often as possible to maintain ecosystem resilience and provide ecological benefits when conditions allow. Mechanical treatments and/or prescribed burning, where feasible, are used to compliment wildfire to achieve desired conditions.
- Restore: Current conditions are such that high values at risk are at a moderate risk of loss from wildfire. Wildfire should be used to increase ecosystem resilience and provide ecological benefits when conditions allow. Strategically located mechanical treatments and/or prescribed burning, where feasible, may support the reintroduction of wildfire to achieve desired conditions.
- Protect: Current conditions are such that high values at risk are at high risk of loss from wildfire. Mechanical fuel treatments would principally be used to yield desired fire behavior conducive to more effective fire response, or in some instances retention of desired conditions for natural resources. Prescribed burning would principally be used to maintain previously treated areas.
- Exclusion: Current conditions are such that high values at risk are at high risk of loss from wildfire. Historically fires that ignited here did not spread. Current conditions, due to invasive grasses, have created an extremely vulnerable system where fire causes ecosystem conversion. Primary protection objective is to minimize both suppression and fire damage to the ecosystem.
- High Complexity: Current conditions are such that high values at risk are at high risk of loss from wildfire, depending on ignition location and weather conditions. Steep terrain, lack of roads or trails, and dense understory make mechanical fuel treatments and prescribed burning difficult. Fire sensitive high values at risk are intermixed with fire-tolerant high values at risk, often with mixed land ownership. Mitigation action and clear communication with strategic response zone stakeholders will be necessary to address current fire hazards.

- Utilize a decision support process to guide and document wildfire management decisions that provide for firefighter and public safety, minimize costs and resource damage, and are consistent with values to be protected and management objectives.
- Integrate wildland fire management with other programs to increase the effectiveness in protecting resources and restoring fire-adapted ecosystems. In areas departed from desired conditions, the use of fire is often most effective when combined with mechanical treatments (e.g., mastication) that aid in creating fuel conditions similar to reference conditions.
- Wildland fire can be coordinated across jurisdictional boundaries whenever resource objectives can be met. This is done with the understanding that fire-adapted ecosystems transcend jurisdictional boundaries.
- Community wildfire protection plans, or similar assessment and management plans, should be regularly integrated with Federal, State, County, Local, Tribal governments, land grants and private lands within the Tonto's boundary in order to mitigate negative impacts of wildfire. These plans identify and prioritize areas for treatment based on input from communities and multiple stakeholders. These plans help determine treatment priorities and encourages communication between agency and partners.

- Information, education, and transformational processes should be utilized to inform the public about fire danger and fire prevention. Providing public information and public prevention education is an integral part of the Tonto National Forest fire management program.

Watersheds and Water Resources

Description

A watershed is a region or land area drained by a single stream, river, or drainage network. Watersheds collect precipitation that flows into streams and rivers, infiltrates into the ground and recharges aquifers, evaporates, or is transpired by vegetation within the watershed. Watersheds also span the landscape at many different scales. Watershed boundaries cross ownership boundaries since they are based on topography. Watershed condition is integral to all aspects of resource management and use. Good watershed management maintains the productive capacity of soils, protects water quality and quantity, sustains native species, provides state designated beneficial water uses, and reduces threat of flood damage to Forest resources and downstream values.

Human demand for water resources, particularly in the Phoenix metropolitan area, has resulted in watershed modifications that have altered aquatic and riparian ecosystems from their reference condition in some areas. Six reservoirs have been constructed within the forest to provide water to users in the Salt River Valley. The reservoirs have directly disrupted aquatic and riparian habitat within the confines of the reservoirs themselves, and indirectly by disrupting the natural hydrograph of the rivers below the reservoirs, and by introduction of nonnative aquatic species. These facilities and the river channels below (particularly the Salt River) provide for a substantial portion of the recreation use on the forest and provide habitat for migrating water fowl.

Priority watersheds for the Tonto NF have been identified using the Forest Service National Watershed Condition Framework (WCF) as areas where plan objectives for restoration focus on maintaining or improving watershed condition. These priority watersheds may change over the life of the forest plan and are reevaluated periodically to focus restoration efforts on the Forest.

The Tonto NF is an important source of groundwater for a variety of uses. Groundwater discharge supports, fens, wetlands, seeps, springs, groundwater-fed streams, and lakes. Groundwater also maintains shallow water tables that support riparian vegetation along perennial and intermittent streams and is important for maintaining cave and karst systems. A portion (approximately 390,000 acres) of the forest lies within the Phoenix Active Management Area (AMA) where groundwater use is managed more actively by the state than in areas outside of the AMA's. Well spacing and approval requirements are implemented within AMA's to prevent injury to adjoining well owners for wells that would pump more than 35 gallons per minute (gpm). Some limits on well spacing are also implemented for wells that would pump less than 35 gpm.

Constructed water features provide surface water resources, in many cases perennial sources, which augment natural water sources. Structures include reservoirs, earthen stockponds, wildlife drinkers, and concrete or steel storage tanks or watering troughs fed by natural springs, groundwater wells, or stream diversions. These facilities provide recreation opportunities such a hunting, fishing, camping, boating and other water related sports and provide additional water sources for livestock and wildlife. They can also harbor invasive aquatic species such as American bullfrogs and crayfish that prey on or compete with native wildlife. Poorly designed constructed waters can entrap native wildlife or be inaccessible. These water resources are at increased risk from projections of future climate change and competing demands from multiple uses.

Water for consumption is one of the Tonto NF's key ecosystem services. Consumption of water resources is essential to the economy and quality of life of communities in and around the Tonto National Forest. The Tonto NF contributes to the supply of water used by households, industry, power suppliers, and

agriculture, helping to sustain human populations in and around rural communities, towns, and cities in central Arizona – including the greater Phoenix area.

Desired Conditions

- Watersheds are functioning properly (based on criteria provided in the Watershed Condition Framework or similar current protocol) and they exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential condition. They support the magnitude, frequency, and timing of runoff within a natural range of variability and the movement of water and sediment from the surrounding uplands into the channel system and through the channel system sustains the health and functioning of the channel and riparian corridors.
- Ecological components of the watershed (e.g. soil, vegetation, and fauna) are resilient to human activities and natural disturbances (e.g. fire, drought, flooding, wind, grazing, insects, disease, and pathogens) and maintain or improve water quality and riparian and aquatic species habitat.
- Watershed conditions support important ecosystem services such as clean water, groundwater recharge, base flows in streams, springs and wetlands, and long term soil productivity. These conditions also help moderate the effects of climate variability and change.
- Watersheds provide for recharge of aquifers and sustain groundwater quantity and quality.
- A predominate percent of the watershed is within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity, and pattern; and other associated disturbances. Vegetative species and cover types are well adapted to the fire regime and offer good protection to soil and water resources.
- Groundwater dependent ecosystems persist in size, seasonal and annual timing, and exhibit water table elevations within their natural range of variability. Groundwater discharge supports base flows and water temperature in streams and springs that sustains the function of surface and subsurface aquatic ecosystems within their natural range of variability.
- Groundwater provides habitat for aquatic and riparian wildlife species and water sources for cultural uses within the forest boundary.
- Surface waters provide habitat for aquatic species and riparian species, contribute to connectivity for wildlife across the landscape; provide for local and urban potable water supplies; agricultural uses (e.g., livestock watering and irrigation); and recreation.
- Watersheds support multiple uses (e.g., timber, recreation, grazing) with no long-term decline in ecological conditions and provide high-quality water for downstream communities dependent upon them.

Objectives

- Prepare at least one Watershed Restoration Action Plan annually.
- Improve watershed condition class (as defined in the Watershed Condition Framework) of at least one 6th code (HUC12) watershed every 5 years.
- Decommission at least 10 miles of roads identified for decommissioning in the Travel Management Plan and/or unauthorized user created routes every five years.
- Improve soil and water condition on at least 10,000 acres annually.

- Complete at least four aquatic habitat restoration projects (e.g., increase pool quantity, provide stream cover, bank stabilization, etc.) every 10 years.

Standards

- Project-specific best management practices (BMPs) shall be incorporated in land use and project plans as a principal mechanism for controlling non-point pollution sources, to meet soil and watershed desired conditions, and to protect beneficial uses.

Guidelines

- New or reconstructed roads and motorized routes should not be located within 300 feet of intermittent and perennial water features, except where necessary for stream crossings or to provide for resource protection to avoid the long-term adverse impacts associated with the occupancy and modification of floodplains and water resource features.
- When existing groundwater wells are proposed for improvement, adverse impacts to groundwater dependent ecosystems shouldl be evaluated and measures to mitigate or reduce impacts will be implemented. .
- New wells on NFS lands should only be approved where they would not adversely impact springs, wetlands, riparian areas, surface flows, and other groundwater dependent ecosystems.

Management Approaches

- Work with partners on developing appropriate environmental flows (necessary water flows to sustain water resources and the goods and services they provide to people) for sensitive/high risk areas. Reference available tools and latest science, such as the Desert Flows Assessment: Environmental Water Needs of Riparian and Aquatic Ecosystems (US and Mexico), initiated by the Desert Landscape Conservation Cooperative.
- File water right applications for water sources needed for National Forest management purposes. Protest water right applications filed by others on NFS lands that would interfere with management of resources on NFS lands.

Riparian Areas (Riparian Management Zones)

Description

Southwestern riparian ecosystems are dynamic habitats that border streams, springs, ponds, lakes or occupy other wet areas, such as wetlands, cienegas, fens and bogs. They occur within all terrestrial vegetation communities and are the interface between the terrestrial uplands and open water. Riparian Ecosystem include water dependent plants near the water's edge and often transition to a combination of upland and riparian species as distance from water increases, which adds significantly to their ecosystem diversity. Riparian vegetation may vary widely depending on amount, timing, and source of water, as well as biophysical characteristics (e.g., salinity and gradients in saturated soils). Riparian areas are more productive than other vegetation communities in terms of plant and animal biomass per acre. As a result, they provide some of the most important habitat on the Tonto NF and in the Southwest.

Healthy riparian areas slow water movement that raises the water table and saturation zone and recharges aquifers. Riparian zones protect streams from excessive sedimentation, erosion, and pollution, and, thus, play a role in water quality. Riparian areas provide shelter and food for aquatic animals and shade that is important for water temperature regulation. They dissipate stream energy which can reduce flood damage and maintain stream channel morphology. They provide wildlife habitat, increased biodiversity, and wildlife connectivity, enabling aquatic and riparian organisms to move along river systems thus preventing community isolation and fragmentation. They are a source of large woody debris recruitment. Soils in riparian ecosystems play a key role in nutrient and water storage and distribution.

Natural disturbances in stream ecosystems include animals (e.g., beavers), flooding, and changing climatic conditions (e.g., extended drought). The seasonality and quantity of water in floods are key factors in the germination and establishment of riparian vegetation. Fire is an infrequent disturbance and is dependent on the fire regime in adjacent vegetation communities. Other disturbances on the Tonto NF include surface water withdrawals and impoundments, groundwater pumping, roads and motor vehicle activity, recreation pressure, and animal grazing. These disturbances can impact riparian ecosystem function. As a result of some of these activities, there is also an influx of invasive species into riparian areas.

The forest plan establishes riparian management zones (RMZ) for all lakes, perennial and intermittent streams, and open water wetlands that are identified during project implementation/planning. This section describes the desired conditions, plan direction and management approaches for all riparian areas within the RMZ. Criteria used to delineate the width of the RMZ is provided under guidelines. Additional plan direction is also provided specifically for streams, wetlands, springs and riparian communities/vegetation in their respective sections.

At-risk species associated with Riparian Areas (Riparian Management Zones):

A caddisfly, A mayfly, Allen's big-eared bat, American dipper, Aravaipa sage, Arizona bugbane, Arizona giant sedge, Blumer's dock, broad-billed hummingbird, California leaf-nosed bat, Chiricahua leopard frog, Colorado pikeminnow, desert pupfish, desert sucker, Fish Creek fleabane, fossil springsnail, Gila chub, Gila topminnow, Gila trout, Hodgson's fleabane, loach minnow, lowland leopard frog, MacGillivray's warbler, Mexican spotted owl, Mexican wolf, monarch butterfly, narrow-headed gartersnake, net-winged midge, northern Mexican gartersnake, Pacific wren, Parker's cylloepus riffle beetle, razorback sucker, red-faced warbler, roundtail chub, Sierra Ancha fleabane, Sonoran sucker, southwestern willow flycatcher, spikedace, sulphur-bellied flycatcher, western red bat, yellow-billed cuckoo, Yuma Ridgeway's rail.

Desired Conditions

- Riparian ecosystems are intact and properly functioning. Within their type and capability, riparian ecosystems have vegetation, landform, coarse woody debris, litter, and root masses to filter and capture sediment, filter contaminants, and dissipate stream energy from stream flows and from overland flow from uplands, to protect and enrich soils, stabilize banks and shorelines, and improve water quality. The associated water table supports riparian vegetation.
- Water table elevations are maintained at levels that sustain native riparian and aquatic vegetation, high productivity, and soil moisture characteristics.
- Periodic flooding and scouring are the primary natural disturbances and promote a diverse plant structure consisting of emergent, herbaceous, shrub, and tree species of all ages and size classes, and provide conditions necessary for the recruitment and succession of riparian dependent species. The ecological function of riparian areas is resilient to disturbance, including animal and human uses, drought, fire, and climate variability
- Sedimentation and soil compaction from forest activities (e.g., vehicle use, recreation, ungulate grazing) do not negatively impact riparian areas by not not significantly increasing soil bulk density between years; change the structure of the plant community; or impede geomorphological development of streambank-channel geometry.
- Riparian forests provide the composition and structure to filter sediments, ash, and contaminants; build and stabilize banks; reduce the effects of flooding; store and release water; and recharge aquifers. Riparian forests provide habitat and help maintain temperatures necessary for maintaining populations of native aquatic and riparian- dependent species and for their dispersal.
- 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.
- In aquatic and riparian systems that evolved with wood near the streams, large woody material is present and continues to be recruited into the system at near natural rates.
- Riparian ecosystems exhibit connectivity between and within aquatic, riparian, and upland components that reflect their natural linkages and range of variability. Stream courses and links between riparian and upland components provide habitat and movement that maintain and disperse populations of riparian-dependent species (e.g. beaver).
- Compared to surrounding uplands, riparian corridors have conditions (e.g., surface water, saturated soils) that reduce the frequency and severity of fire. Infrequent fires of high severity and occasionally mixed severity are characteristic of this ecosystem.
- Wetlands, seeps, springs, wet meadows, fens, and associated wetlands or riparian systems develop and support stable herbaceous and woody vegetative communities with root masses that stabilize streambanks, flood plains, shorelines, and soil surfaces.
- Riparian plant communities are intact and support healthy riparian ecosystems.
- Grasses, forbs, shrubs and trees are well distributed based on site potential (TEUI data).
- Protective litter and plant cover is similar to site potential (greater than 66 percent) which allows higher stream terraces and floodplains to recycle nutrients, and resist erosion and compaction.

Objectives

- Restore proper functioning condition (using Thompson et al. 1998, or other similar protocol/BASI) to at least three impaired riparian reaches/wetlands each ten year period.

Standards

- For all management activities applicable best management practices (BMPs) should be identified and implemented, in order to maintain water quality, water quantity, and timing of flows, and prevent or reduce accelerated erosion.
- To protect water quality and aquatic species, refueling, maintaining equipment, and storing fuels or other toxicants should not occur in riparian areas.

Guidelines

- Water diversions from intermittent and perennial stream systems and groundwater pumping should avoid lowering the water table in riparian areas to prevent loss of or undesired changes to composition, structure, or function to riparian plant communities and aquatic ecosystems.
- Vegetation management within riparian areas should not result in long-term degradation to riparian and aquatic conditions.
- Management activities, permitted uses, and structural developments (e.g., livestock water gaps, pipelines, or other infrastructure) should occur at levels or scales that move towards desired conditions for water quality, soils, and vegetation.
- The use of motorized equipment should be limited to designated routes in riparian areas, except when there is an established stream crossing or when short-term uses are required to improve resource conditions or maintain infrastructure.
- Riparian areas should be managed to promote natural movement of water and sediment, to maintain ecological functions, and to maintain habitat and movement corridors for species.
- Herbivory of riparian plants should not impact the long-term health of riparian plants. Livestock and wildlife management practices should allow wetland/riparian vegetation to recover.
- Fire wood cutting or wood removal (such as mesquite) should be managed to improve to understory species, tree density, tree growth, and to avoid channel downcutting and accelerated erosion.
- Large mature cottonwood and sycamore trees should be protected from management activities that could degrade them as suitable habitat for at-risk species. Projects occurring in these areas should incorporate restoration objectives to ensure persistence of cottonwood and sycamore communities/forests.
- The exact width of the riparian management zones (RMZ) may vary, but the following should be considered in developing the appropriate RMZ:
    - Ecological or geomorphic factors or water body type, but includes those areas which provide riparian and aquatic ecosystem functions and connectivity.
    - Width and slope of the riparian zone, soil type, or hydrologic soil group.

- Special attention should be given to the first 100 feet from the edges of all perennial streams, and other bodies of permanent surface water supporting substantial riparian vegetation and or aquatic flora and fauna.
- Presence of threatened or endangered species.
- Condition of the riparian area, adjacent land use, and threat of contamination from pollutants or chemicals.
- Significant topographic changes, such as abrupt canyon edges may be used as boundaries as long as activities beyond the canyon walls do not negatively influence the functioning of the riparian management zone.

Management Approaches

- Use the best available science (current and existing syntheses or assessments) on the diverse range of riparian fuel profiles and their responses to different treatments at the riparian corridor (where the uplands intergrade with the riparian zone) to better manage fire in riparian areas. Collect quantitative or qualitative data (e.g., photos of before-and-after-treatment conditions) on riparian fuels whenever possible.
- Explore opportunities to restore natural flow regimes where the potential exists, connect channels and their floodplains where they have been interrupted and alleviate key stressors to promote natural recovery.
- Focus restoration efforts where the potential to restore self-sustaining ecosystems is high versus those that require active management (e.g., continual planting of vegetation). These stream reaches are classified as "impaired" in the Tonto Stream Assessment protocol – they have the capability of providing improved plant composition and diversity and quality of riverine habitat compared to streams rated as "unstable."

Stream Ecosystems

Description

Stream ecosystems include perennial, intermittent, and ephemeral streams and rivers, their adjoining riparian areas, and associated floodplains. These types of streams differ in the timing and duration of flow. Ephemeral streams flow for short duration in response to storm events. Intermittent streams flow seasonally, usually in response to winter precipitation but typically maintain shallow water tables throughout the year, and may contain perennial pools. Perennial streams flow year-round, though in some locations their flows may be below the surface (near-perennial streams).

The Tonto NF Contains parts of two of the state's major rivers, the Salt and Verde Rivers and supports approximately 700 miles of perennial streams, 1100 miles of intermittent streams, and 11,000 miles of ephemeral streams. Two of the states only Wild and Scenic Rivers (Verde River and Fossil Creek) lie partly within the forest.

Stream ecosystems provide unique habitats for plants, animals, and micro-organisms that are specialized to live in and around water. Stream ecosystems provide water, forage, shelter, and habitat for nesting, roosting, and bedding and are among the most important habitats for wildlife on the Tonto NF. Species that require water for all or part of their life cycles (e.g.,, aquatic and semiaquatic species) are entirely dependent on the limited and scattered water sources on the forest. Stream ecosystems moderate flood events and collect, filter and transport water, sediment, and organic material from upslope and upstream. Lush stream corridors and cool water attract campers, hikers, and fishermen.

At-risk species associated with Stream Ecosystems:

A caddisfly, A mayfly, Chiricahua leopard frog, Colorado pikeminnow, desert pupfish, desert sucker, Gila chub, Gila topminnow, Gila trout, loach minnow, net-winged midge, razorback sucker, roundtail chub, Sonoran sucker, spikedace.

Desired Conditions

- Stream ecosystems are functioning properly (using Tonto Stream Assessment method, Proper Functioning Condition protocol or other suitable method) and are resilient to disturbances (e.g. flooding) and climate fluctuations.
- The timing, magnitude, duration, and spatial distribution of stream flows and the erosion, transport and deposition of sediment reflect the natural range of variability for the stream system. Stream flow regimes and sediment movement characteristics maintain riparian ecosystems, channel and floodplain morphology (e.g., bankfull width, depth, width/depth ratio, entrenchment ratio, slope, sinuosity, etc.), groundwater recharge, and water quality. Channels are vertically stable, with isolated locations of aggradation or degradation, which would be expected in near natural conditions.
- Stream ecosystem conditions within perennial and intermittent riparian stream courses support habitat for self-sustaining populations of native aquatic and riparian species. Woody and herbaceous overstory and understory (where the natural potential exists) and overhanging banks provide fish habitat, regulate stream temperatures, and maintain soil moisture in the aquatic management zone. Stream substrates provide clean gravels for fish spawning, and woody debris for hiding cover. Abiotic structure such as silt, sand, gravel, cobble, boulders, and bedrock provide habitat for a variety of aquatic and terrestrial species
- The timing, variability, and duration of floodplain inundation is within the natural range of variability. Streams and their adjacent floodplains are connected and capable of filtering, processing and storing sediment; aiding floodplain development; facilitating floodwater retention; withstanding high flow events; increasing groundwater recharge; and promoting propagation of flood associated riparian plant and animal species.
- Stream ecosystems exhibit a high degree of connectivity longitudinally along stream channels, laterally across the floodplain and valley bottom, and vertically between surface and subsurface flows.
- Stream ecosystems 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. Barriers to movement may exist to protect native aquatic species from nonnative aquatic species.
- Water quality, including groundwater, meets or exceeds applicable state water quality standards, fully supports designated beneficial uses, meets the ecological needs of native aquatic and riparian associated plant and animal species, and meets the needs of downstream water users.
- Groundwater discharge necessary to maintain base flows in streams, discharge from springs, seeps, fens and other wetland resources, and water table elevations necessary for supporting water dependent riparian and aquatic resources is sustained within the natural range of variability.
- Streambeds contain less than 30 percent fines (sand, silt, clay) in riffle habitat in cold water streams and less than 50 percent fines reach wide in warm water streams.

Objectives

- Complete the process necessary to acquire state based instream flow water rights for at least five streams threatened with dewatering, supporting highly valued resources (e.g., threatened or endangered species, species of conservation concern) or containing unique qualities (e.g., a perennial stream in the Sonoran Desert) within each ten years period.

Guidelines

- Downed woody material in stream channels should be left in place except where safety is a concern.
- Consistent with existing water rights, permitted water uses and diversions should allow passage of sufficient water to support the associated ecosystem and to preserve levels of water flow that maintain aquatic life, aquatic habitat, and other purposes of national forest establishment.
- Projects and management activities in stream channels should be designed and implemented to retain or restore natural streambank stability, native vegetation, and riparian and soil function.
- Modifying stream channels that are currently in proper functioning condition should be avoided.

Springs, Seeps, and Wetlands

Description

Springs and seeps occur where groundwater emerges on sloping terrain, toe-slope breaks, and geologic formation transition zones. They may contribute to stream flow or infiltrate through the overlying soil and underlying geology back to the groundwater. Seeps are a particular type of spring with low flow that filters to the surface through permeable soils and substrates. Spring systems are highly productive habitats that often lie in stark contrast to the surrounding uplands. Springs and their associated wetlands are frequently more biologically diverse and ecologically stable than surrounding upland ecosystems in arid and semi-arid regions, and they may offer biological refugia for some species, particularly those that are narrowly endemic.

Multiple types of springs occur on the Tonto NF that vary based on landform and geology. Examples include springs discharging from caves, hillslope springs, and hanging gardens. Some springs have important cultural significance to tribes that have traditionally used lands within the Tonto NF. Contemporary uses consist of contributions to potable water supplies, recreational use, and agricultural uses, such as livestock watering. Springs are also important for wildlife.

Wetlands are areas that are inundated by surface or groundwater with a frequency to support, and that under normal circumstances, do or would support a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include marshy areas, wet meadows, and fens on the Tonto NF. Standing water and vegetation in wetlands can fluctuate from being nonexistent in dry periods to being abundant in wet periods. Hydric soils, decomposition, nutrient cycling and geomorphic setting contribute to unique vegetation components and functioning wetlands.

Primary natural wetland disturbances are drought and flooding. Natural fire is an infrequent disturbance, entering from adjacent vegetation communities mainly during drought conditions. Human-related disturbances include excessive herbivory, improperly located roads, off-road vehicle use, recreation, and invasive species. Some of these human-related disturbances can result in the channelization and draining of wetlands and/or the lowering of water tables, which can lead to the loss of wetlands.

Desired Conditions

- Springs, seeps, wetlands, ponds, and other groundwater dependent ecosystems have the necessary soil, water, and vegetation attributes to be healthy and functioning. Water levels, flow patterns, groundwater recharge and discharge rates, and geochemistry are similar to reference conditions.
- The natural hydrologic and geomorphic processes inherent to these groundwater dependent ecosystems function at a level that allows retention of their unique physical and biological properties.
- Wetlands are functioning hydrologically, they provide for water infiltration, nutrient cycling, reduce the energy of flood flows, and resist erosion. Wetland vegetation has a variety of age classes that range from young to old and a composition of native species that reflect the individual wetland types (greater than 66 percent similarity to site potential based of TEUI or other ecological data).
- Peatlands, including fens, have the necessary soil, hydrologic, water chemistry, and vegetative conditions to provide for continued fen development and resilience to changes in climate and other stressors. Peatlands support unique plant and animal species that are characteristic of historic conditions.
- Native plant and animal species that require wetland habitats have healthy, extant populations within the natural constraints of the particular wetland community. Native and endemic macroinvertebrates are abundant, diverse and stable.
- Nonnative wetland species are nonexistent, or do not significantly impact native species; nonnative grasses are not present, or are present in amounts that do not alter the fire regime. Upland vegetation is not encroaching and the extent of wetlands is widening or has achieved its potential extent and is within the natural range of variability

Objectives

- Improve or maintain at least 10 individual springs during each 10 year period.

Standards

- New or redeveloped spring developments will provide protection for the ecosystems supported by the spring (e.g. fencing, offsite drinkers/troughs).

Guidelines

- Spring recharge areas, where known, should be managed to maintain or improve spring discharge.
- Projects and activities should be designed and implemented to maintain or improve soil and riparian function and native vegetation, and or prevent the introduction or spread of disease, invasive, or undesirable species.

Management Approaches

- File water right applications where needed to protect onsite water quantity to meet NFS purposes. Existing water rights should be maintained and protected.

Wildlife, Fish, and Rare Plants

Description

The Tonto National Forest provides important habitat for an exceedingly diverse array of wildlife, fish, and rare plants. This level of biodiversity is due largely to the forest's position across three distinct ecological sections; the Sonoran Desert, Tonto Transition, and White Mountain-San Francisco Peak-Mogollon Rim. The Mazatzal Mountains and Sierra Anchas Mountains on the forest have some of the highest concentration of endemic plant species in the state of Arizona. Two major river systems, the Salt and Verde rivers, substantially add to the overall diversity of forest communities, and serve as corridors for animals that migrate along these rivers and drainages. Complex geology, soils, and climate, as well as intense changes in elevation all contribute to the wealth of species found on the Tonto National Forest.

For some species, however, changing land-use patterns outside the forest-boundaries have increased their reliance on lands managed by the Tonto National Forest. A number of species on the forest face additional risks including invasive competitors, historic or current habitat degradation, climate change, drought and dewatering, habitat fragmentation, genetic introgression, restricted distribution or disjunct populations, or high levels of endemism. Forest management and multiple-use activities may also pose risks to some species. In the arid southwest, aquatic and riparian communities are some of the most diverse systems even though they represent only a small fraction forest lands. However, the species associated with these areas are at particularly high risk due to many pressures on water resources.

Under the 2012 planning rule, the forest is instructed to provide for ecological conditions necessary to maintain the persistence or contribute to the recovery of native species within the plan area, including at-risk species (FSH 1909.12, Chapter 20, section 21.13). Ecological conditions consist of the biological and physical environment that can affect the diversity of plant and animal communities, the persistence of native species, and the productive capacity of ecological systems. Ecological conditions include habitat and other influences on species and the environment. Examples of ecological conditions include the abundance and distribution of aquatic and terrestrial habitats, connectivity, roads and other structural developments, human uses, and invasive species (36 CFR 219.19).

At-risk species consist of 1) federally recognized threatened, endangered, proposed, and candidate species, as well as 2) species of conservation concern (SCC). Federal listing under the Endangered Species Act of 1973 falls under the purview of the U.S. Fish and Wildlife Service. Section 7 of the act requires Federal agencies to use their authorities to carry out programs for the conservation of endangered and threatened species and to insure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat. Species of conservation concern are species native to, and known to occur in, the plan area; and for which there is substantial concern about the species ability to persist in the plan area.

At present, a total of 79 at-risk species have been identified, 20 federally recognized and 59 SCC; however, if any employee receives new, scientific information that indicates that a species should be added or removed to the list of SCC, the information should be sent to the Forest Supervisor to be evaluated and documented, and any subsequent recommendation for change should be sent to the Regional Forester for consideration (FSH 1909.12, Chapter 20, section 21.22b).

The forest is also required to provide ecological conditions for other native species, including rare and narrow endemics. Rare species are those that are very uncommon, scarce, or infrequently encountered even though they may not be endangered, threatened, or species of conservation concern. Endemic species are only found in a given region or location and nowhere else in the world.

Due to the integrated nature of ecological conditions that affect species on the forest, plan components that provide for at-risk species are found throughout this plan and not solely within this section.

Desired Conditions

- Ecological conditions contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, maintain viable populations of species of conservation concern, and sustain both common and uncommon native species.
- Habitats are sufficiently resilient to withstand foreseeable levels of disturbance and redundant enough to maintain species diversity and metapopulation4 dynamics, and enable species to adapt to changing environmental and climatic conditions.
- Habitat quality, distribution, and abundance contribute to self-sustaining populations of terrestrial plant and animal species, including at-risk species,
- A diversity of habitat components, including biotic and abiotic features, are available at the appropriate spatial, temporal, compositional, and structural levels to provide adequate opportunity for breeding, feeding, nesting, and other critical life history needs of wildlife.
- Habitats within and adjacent to the forest are sufficiently interconnected in order to allow for necessary movements and dispersal of native animal and plants, as well as promote species interactions. Habitats are connected at a landscape scale that includes adjacent lands.
- Locations and status (e.g., population, threats, and habitat requirements) of rare and endemic species are known. Habitats, refugia, and landscape anomalies for rare and endemic species are intact, functioning, and sufficient for species persistence.
- Desirable non-native species are present where they do not pose significant risks to native species.
- Human-wildlife conflicts and human disturbances are minimal, as are impacts to vital life history functions of fish and wildlife (e.g., breeding, feeding, and rearing young).

Objectives

- Implement at least 20 activities that contribute to the recovery of federally listed species every 10 years.
- Implement at least 10 activities to benefit at-risk species that maintain or contribute to positive trends in population size and/or number every 10 years.
- Complete at least 20 products or activities that educate the public about wildlife, fish, and rare plants every 10 years (e.g., educational signs and brochures, website pages, species checklists, presentations, volunteer projects that restore TES habitats, and field trips).

Guidelines

- Project activities and special uses that may significantly affect federally listed species or occur within federally-designated critical habitat should integrate habitat management objectives and

[4] Metapopulations are interconnected groups of subpopulations separated by space but consisting of the same species

species protection measures from the most recent approved US Fish and Wildlife Service (USFWS) recovery plan.

- Activities occurring within Federally-listed species habitat should apply habitat management objectives and species protection measures from approved recovery plans.
- Best management practices and/or mitigation measures should be used to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, maintain viable populations of species of conservation concern.
- New infrastructure or constructed features (e.g., fences, roads, recreation sites, facilities, drinkers, culverts) should be designed to minimize negative impacts to habitat connectivity for wildlife, fish, and rare plants. Infrastructure and constructed features already present that negatively impact habitat connectivity should be modified or removed when no longer in use in order to improve connectivity. Barriers may be used to protect native species or prevent movement of nonnative species.
- Landscape and vegetation alterations that significantly contribute to habitat fragmentation should be avoided. Project design should provide for wildlife movement between treated and untreated areas.
- Projects and management activities should consider the timing and location of vulnerable life history processes (e.g., reproduction, molting, migration, and hibernation).
    - Site and timing restrictions should be based on the best available information, as well as site-specific factors (e.g., topography, available habitat, etc.).
- Manmade structures (e.g., fences, steel posts, vent pipes) should be constructed and maintained to minimize wildlife mortality (e.g., capped fence posts).
- Where known bat use and concentrations of bats occur (e.g., maternity colonies, hibernacula, or seasonal roosts), measures to maintain habitat and reduce disturbance by human activities through use of seasonal or permanent access restrictions should be used.
- Projects and management activities should consider protections for narrow, endemic species and species with restricted distributions where they are likely to occur.
- Where the Forest Service has entered into a signed Conservation Agreement that provides guidance on activities or actions to be carried out by the forest, those activities or actions should be undertaken consistent with the guidance found within the Conservation Agreement.
- For new documented occurrences of rare and endemic species, best available science and consultation with species experts should be used to determine if measures are needed to protect and provide for their sustainability.
- A minimum of 6 nest areas (known and replacement) should be located per goshawk territory. Nest and replacement nest areas should generally be located in drainages, at the base of slopes, and on northerly (NW to NE) aspects. Nest areas should generally be 25 to 30 acres in size.
- Goshawk PFAs (Post-fledging Family Areas) of approximately 420 acres in size should be designated surrounding the nest sites.
- Human presence should be minimized in occupied goshawk nest areas during nesting season of March 1 through September 30.

- Efforts (e.g., coordination with permitees, temporary fencing, increased herding, and 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 adjacent to or inhabited by bighorn sheep.

Management Approaches

- Work collaboratively with State and Federal agencies (e.g., Arizona Game and Fish Department, U.S. Fish and Wildlife Service), counties, municipal governments, and nongovernment organizations to plan, prioritize, and implement projects that contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, maintain viable populations of species of conservation concern, and work towards achieving relevant desired conditions within the Tonto National Forest.
- Work with partners to consider potential impacts of climate on at-risk species when designing projects and analyzing the effects of proposed projects, especially for those species that have been identified as being sensitive to such changes.
- Work with partners to provide public education of key conservation topics, at-risk species, and the value of rare and narrow endemic species on the forests.
- Identify potential opportunities for graduate students in the Plant Biology and Conservation program (hosted by Arizona State University and Desert Botanical Garden) to assist and initiate projects to address information gaps and advance Forest Service management of vulnerable or at-risk plant species.
- Seek to strengthen and develop programs to survey, monitor, and collect data on at-risk, rare, and endemic species, especially when basic distribution and species status information is lacking on the forest. Identify, document, and correct any management conflicts to the species or their habitat. Such efforts could include collaboration and agreements with local universities, community colleges, state and federal agencies (e.g., Arizona Game and Fish Department, U.S. Fish and Wildlife Service), and other conservation organizations (e.g., Boyce Thompson Arboretum, Desert Botanical Garden, McDowell Sonoran Conservancy).
- Prioritize areas for floristic surveys by focusing on rare soil types, geological features, or biodiversity hotspots.
- Reintroduce extirpated (locally extinct) native species while considering ecological conditions and social values.

Invasive and Undesirable Species

Description

A species is considered invasive if it is 1) non-native to the ecosystem under consideration and 2) its introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112). Across the nation's forests, invasive species have cause massive disruptions in ecosystem function, reducing biodiversity, and degrading ecosystem health. Historically, the Tonto National Forest has suffered from a number of introduced, non-native species that have threatened native communities through direct competition and predation, or by altering the frequency and intensity of fire regimes and other ecosystem functions. Riparian and aquatic communities have been especially impacted over time, and many other ecosystems and native species remain at risk of further invasion of harmful non-native species.

Another category of undesirable species includes noxious weeds, which is defined as any species of plant that is detrimental, destructive, or difficult to control or eradicate. This includes plant found injurious to any domesticated, cultivated, native or wild plant. Most weeds are pioneer plant species that have evolved various traits that adapt them to thrive and reproduce successfully in different habitats. While eradicating noxious weeds is not always possible or needed, aggressive control of existing populations may be important to ensure that native ecosystems are protected.

Invasive species are frequently adapted to a wide range of climates and tend to thrive as early colonizers after disturbances. Changing conditions due climate change and increased human impacts on many systems may favor the spread and establishment of invasive species on the forest.

Desired Conditions

- Record where present,locations and and outbreaks of invasive pest are known to be.
- Intergrated Pest Management should be use on invasive species so that populations are minimized in order to protect and restore native species.

Objectives

- Suppress or control non-native invasive species on at least 50 acres every year using herbicides and manual methods.
- Treat and control invasive species on at least two stream reaches every five years. Maintain follow-up treatments to prevent regrowth, establishment, or spread of treated or other invasive species.

Standards

- Forest management actions must apply Best Management Practices to minimize the introduction or spread of invasive species.
- Treatment of invasive species must use Integrated Pest Management (IPM) practices to treat noxious and invasive species.
- Activities in and around surface waters will use decontamination procedures that prevent the spread of non-desirable fungi, disease, and invasive species.
- Non-native, invasive species shall be treated using methods and in a manner consistent with wilderness character in order to allow natural processes to predominate in designated wilderness.

Guidelines

- Equipment and materials should not be stored or staged in areas infested with invasive weeds or other non-native species.
- Certified weed-free seed and certified weed-free mulch should be used in burned areas.
- If chemical application is necessary near human developments (e.g., developed recreation sites) or ecologically sensitive habitat (e.g., at-risk species, riparian areas), techniques should be applied to minimize negative effects (e.g., chemical-free buffers could be placed around bat roosts).
- Herbicides and pesticides should only be applied within riparian areas and wetlands if needed to maintain, protect, or enhance aquatic and riparian resources or to restore native plant communities.
- Ground disturbing activities within riparian areas and wetland ecosystems should take measures to not introduce new or spread existing invasive species and pathogens.
- Efforts to improve severely disturbed sites should be undertaken to reduce non-native invasive plant species colonization, protect soils, and improve watershed condition.

Management Approaches

- Opportunistically map and record locations of invasive species and noxious weeds.
- Collaborate with state and federal agencies, universities, non-profit organizations, and volunteers to research, inventory, monitor, map, and record data on invasive species. Work to develop educational materials for the public.
- Incorporate new technology and social media (e.g., Instagram, iNaturalist, EDDmaps, Avenza) as a way to increase awareness regarding invasive species and to record occurrences on the Tonto National Forest.
- Coordinate with Animal and Plant Health Inspection Service by providing invasion sites on the forest where appropriate, for the release and monitoring of biological controls. Ensure that biological control agents do not pose substantial risk to other native plants.
- Encourage active participation of forest service employees in scientific weed societies, county weed boards and weed coalitions.
- Encourage the development native plant materials. Investigate new seeds sources, seeding techniques, and other techniques for treating invasive species.
- Develop interpretive signs for placement at portals and at trailheads to alert forest users about relevant invasive species and noxious weeds.
- Noxious and invasive species management programs are compatible with and integrated into overall ecosystem resource management objectives.
- As part of project implementation, encourage the reporting and recording of invasive species data within the project area. Consider streamlined approaches (e.g., mobile data collector apps) to facilitate efficient data entry into Forest Service database and geographic information system (GIS).
- Encourage public land users to inspect and clean motorized vehicles of weeds and their seeds before recreating on public lands.

Soils

Description

Soil is the foundation for life. Functioning ecosystems and all vegetation depend on healthy soils. Soils within the Tonto NF include a wide variety of taxonomic classifications, reflecting the influences of several separate, but interacting soil forming factors including parent material, climate, topography, and organisms over time. As a result, soil characteristics range from shallow, weakly developed, rocky soils on plateaus, mesas, cliffs, escarpments, and ridges to deeper, more productive soils on alluvial fans, plains, and in valley bottoms. Also soil properties greatly affects the response to precipitation as it infiltrates, moves through, and is stored in ground. This role in the hydrologic cycle is crucial for the maintenance healthy ecosystems. Also the Tonto National Forest use much information for the Terrestrial Ecological Unit Inventory (TEUI); which is defined as the systematic description, classification (soil, vegetation, climate, geomorphology and geology), mapping, and interpretation of ecological types (USDA, 1996).

Desired Conditions

- Soil productivity, function, and inherent physical, chemical, and biological processes remain intact or are enhanced. Soils can readily absorb, store, and transmit water vertically and horizontally; accept, hold, and release nutrients; and resist erosion.
- Vegetative cover and litter are distributed across the soil surface in adequate amounts to limit erosion and contribute to soil development, productivity and carbon cycling. Soil cover and herbaceous vegetation protect soil, facilitate infiltration, and contribute to plant and animal diversity and ecosystem function.
- In forested areas, logs and other woody material are retained and distributed across the soil surface to facilitate soil productivity (nutrient cycline) and maintain key habitat features.
- Soil productivity is not inhibited by non-native invasive plant species.
- Soils are free from contaminants that could alter ecosystem integrity or affect public health.
- Soils do not exhibit accelerated or unnatural signs of water or wind erosion (e.g., pedestaling, rills, and gullies).

Standards

- Best Management Practices and Soil Quality Monitoring will be implemented for ground disturbing activities to ensure long-term soil productivity and satisfactory soil condition (soil health).

Guidelines

- Ground-disturbing management activities should be designed to minimize impacts to soil resources (e.g., soil compaction and soil loss).
- In project areas where ground disturbance could affect biological soil crusts, select areas should be identified and protected to allow soil crusts to repopulate after project activities are completed.
- In areas where soils have a severe erosion hazard rating, are poorly drained or saturated, or unsatisfactory soil condition, new activities that encourage concentrated use (e.g., recreation, log

landings, construction, stock tanks, mineral blocks, corrals, and cattle collection areas) should be avoided.

Management Approaches

- Work collaboratively with other agencies and groups that facilitate soil conservation and watershed improvement projects.
- Educate the public on the importance of staying on trails and not disturbing natural plant communities including biological soil crusts (e.g., Don’t Bust the Crust!).
- Update the Terrestrial Ecological Unite Inventory which provides the basis for planning project activities. Work with other land management agencies and other partners to share data and improve existing soil information, especially after large-scale soil disturbances.
- Work to improve impaired and unsatisfactory soil condition ratings (as defined by TEUI) where management has resulted in degraded conditions.

Air Quality

Description

Air quality on the forest is connected to a number of valued services, including fresh air and clear views. Pollution (e.g., industrial sources, dust, and smoke from wildfires) generated both on and off the forest can impact these services. Other impacts may include pollution, such as fertilization or acid deposition, which ultimately affect other forest resources (e.g., species, water quality).

Desired Conditions

- Air quality on the Tonto NF meets State and Federal air quality standards. Visibility in Class I areas meets regional haze regulations.
- Night skies are clear and dark, providing for stargazing and professional astronomy.
- Biotic components are not significantly impacted by atmospheric deposition of pollutants.

Guidelines

- Project design for prescribed burns and strategies for wildfires incorporate emission reduction techniques, such as those listed in Arizona Administrative Code R18-2 Article 15, to reduce negative impacts to air quality, subject to economic constraints, technical feasibility, safety criteria, and land management objectives.
- Dust abatement should occur during construction and road projects where dust is a potential effect.

Management Approaches

- To promote public awareness and protection of human health and safety, notify stakeholders and the public about potential smoke from fire activities through methods of advanced notification through the media and smoke warning signs along roads when visibility may be reduced due to wildland fire.
- Coordinate with ADEQ during prescribed burns to comply with State and Federal regulatory requirements for emissions and impacts to Class I areas.
- Coordinate with ADEQ during wildfires to ensure ADEQ is aware of potential smoke impacts to receptors.
- Consider design features, best management practices (BMPs), or mitigation measures to reduce fugitive dust where needed.

Cultural and Historic Resources

Description

The Tonto National Forest contains cultural and historic resources that document almost continuous human presence for at least the past 12,000 years. American Indians ancestral to the ethnic affiliations of the contemporary Apache, Hopi, Pima, Yavapai and Zuni have inhabited or utilized forest resources over much of that time. Europeans began to occupy the area over 400 years ago, and many of the historic sites reflect the use and occupation by Apache and Yavapai hunters, gatherers, and farmers, Anglo ranchers, stockmen, miners and prospectors, Basque and other Iberian and Latin American sheepherders, and the current land-managing agency, USDA Forest Service. All of these populations can exist today as traditional and living communities.

Many cultural resources are also considered traditionally significant to tribes associated with the lands in the plan area. Numerous cultural sites on the forest are significant social and economic contributors to their local areas, region, and nation. They provide opportunities for cultural tourism, education, and research. They are also necessary to maintain the cultural identity of the traditional communities within the Tonto NF.

A Forest-wide Cultural Resources Assessment and Management Plan (CRAMP) was prepared in consultation with the State Historic Preservation Office (SHPO) in 1989. The CRAMP contains a cultural resource overview that covers all Forest lands and a framework for the identification, classification, and evaluation of known and predicted properties. It also considers in detail the interactions between cultural and other resources.

Cultural resources are nonrenewable as they cannot be replaced. Forest Service management activities, public use, and natural processes have impacted cultural resources. The conditions of cultural resources on the Tonto NF are most notably impacted by water/wind erosion, livestock grazing, recreation, construction, vehicular traffic, and vandalism. Once the resources have been disturbed, damaged, moved, 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. Damage from vandalism continues to be a management issue.

Heritage tourism is a valuable cultural service growing in popularity on the Tonto. Cultural sites that have been enhanced by interpretive developments and outreach activities, are useful in engaging and educating about our historic past. Cultural Heritage has been identified as one of the Key Ecosystem Services on the Tonto NF.

Desired Conditions

- Cultural resources and historic properties are stable and maintained in a manner that preserves the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. They are not threatened by human disturbances, and are protected from the effects of wildland fire (prescribed and wildfire including human caused and natural ignitions) or other natural processes.
- Access and use of cultural resources with strong connections to living communities are available to those communities for cultural practices.
- Heritage-based recreation opportunities are available, such as exploration and interpretation opportunities at historic routes and locations. The public has opportunities to learn about,

appreciate, and understand cultural resources, as well as resources significant to traditional and living communities, through the identification, protection, and preservation of cultural resources.

- Heritage programs, interpretive presentations, publications, and interactive learning opportunities provide the scientific community and the public with opportunities to learn about, understand, and experience the Forest's prehistory and history.
- Buildings and infrastructure listed on or eligible for the NRHP are maintained to preserve any of the characteristics that qualify the property for listing in the NRHP (i.e. the property's location, design, setting, materials, workmanship, feeling, or association), while also fulfilling their roles as administrative and recreational facilities and other infrastructure functions.
- Management activities implement mitigation measures that do not damage significant cultural resources, including traditional cultural properties.

Standards

- Cultural resources will be managed in coordination with the Arizona State Historic Preservation Officer (SHPO), in accordance with any extant programmatic agreement (PA) between SHPO and the Forest.
- During the conduct of undertakings (e.g., actions, financial support, and authorizations) the preferred management of sites listed in, nominated to, or eligible for the National Register of Historic Places (NRHP) is avoidance and protection. In situations where this is not possible, SHPO will be consulted in order to determine the best use of the resource (such as data recovery and/or interpretation).
- The management of historic properties and landscapes (including traditional cultural properties) is considered with other resource objectives (ecosystem restoration, rangeland management, recreation). The interaction between cultural and other resources for any specific undertaking will be evaluated in project-level analysis.

Guidelines

- Cultural resources (including artifacts) should be preserved in place, except when endangered. When this is not possible, artifacts and records should be curated following current professional standards.
- Where human and natural caused disturbances (e.g., erosion and bioturbation) damage significant cultural resources (including traditional cultural properties), mitigation measures should be implemented as part of adjacent project-specific work or as part of annual Heritage program administration.

Management Approaches

- Provide opportunities for volunteers and partners (e.g., American Indian tribes, Arizona Site Steward Program, Arizona Preservation Foundation, Arizona Archaeological Council, National Trust for Historic Preservation, National Park Service, and local museums) to identify, study, protect, and monitor archaeological sites and artifact collections and achieve desired conditions.
- Collaborate with American Indian tribes and other traditional communities to manage historic sites and other traditional areas of importance while conserving anonymity of such sites where

appropriate, and to identify mitigation measures for historic properties, traditional cultural properties, and cultural landscapes during management activities.

- Work with partners (e.g., American Indian tribes, Arizona Site Steward Program, Arizona Preservation Foundation, Arizona Archaeological Council, National Trust for Historic Preservation, National Park Service, and local museums) to identify, study, protect, and monitor archaeological sites and artifact collections.
- When adverse effects to cultural resources occur involve known communities to whom the resources are important in the resolution of adverse effects.
- Consider prioritizing non-project related surveys as follows: (1) areas where eligible cultural resources are threatened or on-going impacts are unknown and need to be assessed; (2) areas indicated to have high cultural value or high density of cultural resources; (3) areas of importance to traditional communities; and (4) areas where additional survey will contribute to a greater regional understanding of a specific area.
- Find teaching opportunities to educate on the identification, management, and protection of significant cultural resources.
- Coordinate with state and local governments to develop heritage tourism programs that promote cultural awareness and strengthen local economies.
- Maintain the Passport in Time (PIT) program or develop similar opportunities for the public to assist the Forest in the protection, management, and documentation of significant cultural resources.
- Consider restoration of select significant historic structures for appropriate recreation or interpretive use (e.g., Cabins with a View program).
- Consider updating interpretive sites (e.g., Sears-Kay Ruin, Shoofly Ruin, Rye Creek Ruin) to enhance visitor experiences and educational opportunities.

Tribal Relations and Areas of Tribal Importance

Description

The Forest carries out its government-to-government trust responsibilities under a variety of Federal authorities. Tribal rights and interests are honored and protected in Tonto National Forest operations on the basis of treaty obligations, trust relationships, mandates in laws and Executive orders, and the United Nations Declaration on the Rights of Indigenous Peoples. Tonto NF recognizes that tribes have cultural ties to and knowledge about lands now managed by the Forest Service. The Tonto National Forest provides every Tribe with the opportunity for timely and meaningful government-to-government consultation on project activities which may have tribal implications.

The Tonto National Forest consults with the Fort McDowell Yavapai Nation, Gila River Indian Community, Hopi Tribe, Mescalero Apache Tribe, Pueblo of Zuni, Salt River Pima Maricopa Indian Community, San Carlos Apache Tribe, Tonto Apache Tribe, White Mountain Apache Tribe, Yavapai-Apache Nation, and the Yavapai-Prescott Indian Tribe.

Numerous cultural resources on the Forest are considered culturally significant or sacred by federally-recognized Indian Tribes. A variety of laws, regulations and policies provide direction for tribal consultation and for managing cultural resources. Section 106 of the National Historic Preservation Act of 1966 lays out the legal framework for considering the effects to historic properties, preserving them, and consulting with appropriate tribes on federal undertakings. To streamline this process during routine land management activities, the Tonto adheres to the Region 3 First Amended Programmatic Agreement with the Arizona State Historic Preservation Office.

Desired Conditions

- The uniqueness and values of the tribal cultures in the Southwest and the traditional uses important for maintaining these cultures are recognized and valued as important.
- Locations identified as important by American Indian tribes are acknowledged and are managed with an emphasis on the resilience and protection of natural and cultural resources.
- Areas identified as important to tribes (e.g., traditional cultural properties and sacred sites) are unimpaired. Sacred sites and traditional cultural properties are managed to preserve the character and use of these places.
- Tribal members have open access to all Forest land for traditional activities, including access to traditional resource gathering areas and to places having religious, cultural, and/or historical significance, including but not limited to traditional cultural properties, sacred sites, shrines, and clan origin places.
- Tribes have access to sacred sites, traditional cultural properties, and collection areas for individual and group prayer, traditional ceremonies, and rituals. There are opportunities for solitude and privacy for ceremonial activities.
- Forest Service and Tribal landscape restoration activities complement one another to meet common goals. Traditionally used resources are not depleted and are available for future generations.
- Forest resources important for traditional needs (e.g., plants, pinon nuts, and acorns), as well as for subsistence practices and economic support of tribal communities, are available and

sustainable. Forest make resources available upon request to support the economies of local tribes.

- Traditional uses such as the collection of medicinal plants and wild plant foods are valued as important uses. Traditional resources are preserved sustainably in place wherever feasible and plant populations of tribally important species are available for traditional uses.
- Social, cultural, and economic resources provide a setting for educating tribal youth in culture, history, and land stewardship, and for exchanging information between tribal elders and youth.
- Consultation with Tribes occurs at the early stages of planning and project design. Memoranda of Understanding are utilized where useful to improve Forest Service relationships with tribal partners.

Standards

- The Forest Service shall maintain the confidentiality of culturally sensitive information provided by tribes with the express expectation of confidentiality, unless permission to share information is given.
- Tribal concerns are considered in planning and decisions, especially when activities will affect tribally important places.
- Once identified by a tribe, the forest will ensure identified traditional cultural properties receive due consideration in project planning as required by section 106 of the National Historic Preservation Act of 1966.

Guidelines

- Requests for temporary closure orders for cultural and traditional purposes should be accommodated to protect the privacy of tribal activities for traditional and cultural purposes.
- Sacred sites should be considered during the project planning process and protected from adverse effects during the implementation of management and permitted activities.
- Ethnographies, oral history studies, and traditional cultural property investigations should be conducted to preserve information and inform project management.
- Requests for reburial of American Indian human remains and cultural items by Tribes should be accommodated.
- Tribal traditional use of medicinal plants and other botanical resources should be considered when authorizing commercial harvesting and recreation.
- The physical and scenic integrity of high places (e.g., mountain tops and view sheds) that the Tribes regard as sacred sites, traditional cultural properties, or as part of important cultural landscapes should be considered when making project decisions or issuing special use authorizations regarding the approval, location, and maintenance of telecommunication sites, and the facilities within.
- Tribal perspectives, needs, and concerns, as well as traditional knowledge, should be incorporated into project design, decisions, implementation, and monitoring, as appropriate.
- Activities and uses should be administered in a manner that is sensitive to traditional American Indian beliefs and cultural practices.

Management Approaches

- The Forest Service and Tribes maintain respectful, transparent, and collaborative relationships.
- Work with American Indian tribes to understand their needs and build respectful, collaborative relationships; to develop ways of accomplishing mutually desired conditions and objectives; and to collaborate in ecosystem restoration efforts.
- Coordinate with American Indian tribes to develop collaborative proposals and implement projects of mutual benefit, across shared boundaries, and using available federally-authorized or advocated programs.
- Cooperatively develop interpretive and educational exhibits that focus on the history of the lands managed by the Tonto National Forest in collaboration with American Indian tribes to provide the public with a greater understanding and appreciation of our shared history, culture, and traditions.
- Identify opportunities where locations on the Forest can provide a setting for the education of youth in culture, history, land stewardship, and the health benefits of outdoor activities.
- Provide training to Forest employees to gain an understanding of the unique legal relationship between the Federal Government and Indian Tribes; American Indian laws, customs, traditions, and values; and the tools available for protecting and managing sacred sites and traditional cultural properties.

Recreation

Description

Outdoor recreation is a continuously growing and diverse enterprise that is a vital cornerstone of communities. More than three out of every four Americans participate in active outdoor recreation each year. Arizona offers spectacular recreation opportunities, and outdoor recreation contributes millions of dollars annually to the Arizona economy.

The Tonto National Forest rises from the Sonoran Desert to the cool pine covered slopes of the Mogollon Rim (Rim Country). A year-round forest, the landscape ranges from the legendary Sonoran Desert with its unique flora and fauna to a mixed conifer forest connected by a series of breathtaking drives. Nestled in the canyons and valleys are lakes and reservoirs supporting warm water fisheries and a full range of water-based recreation activities. The Tonto NF offers an oasis for millions of visitor at the edge of the Phoenix Metropolitan center, one of the largest cities and rapidly growing areas in the United States. The Forest provides a place for visitors to escape from the busy urban environment into a diversity of year-round outdoor recreation opportunities. While there is easy access for intensive day use activities, the rugged backcountry offers challenges and solitude accessible only by primitive roads and trails.

There are numerous opportunities for hiking, biking, horseback riding, off-highway vehicle use, rock-climbing, back country air strips, recreational shooting, hang gliding, hunting, fishing, watchable wildlife, and boating. Camping is also a popular recreation activity, done by tent, car, RV, or any other habitable source. Every year, there are emerging new types of recreation and opportunities that take place on the forest.

The Forest plays a vital role in maintaining healthy ecosystems, which contribute to local quality of life, and to quality recreational experiences. We derive strength from the people we serve, and lasting partnerships with individuals, organizations, and communities play a critical role in the Tonto NF's success in recreation management.

Desired Conditions

- High quality recreation settings, a variety of developed and dispersed recreation and tourism uses, activities, and year-round opportunities satisfy a diverse group of visitor desires and expectations while protecting natural resource values
- The sustainable recreation program is consistent with serving public needs, management needs, and other natural and cultural resources values.
- A strong, resilient partnership/volunteer program that supports public and agency needs. .
- Interpretation and visitor education programs serve multiple resource needs, engages youth and adults, grows volunteers, and creates strong partnerships with local agencies, communities, and private groups. Programs help visitors understand how to reduce their impacts on the ecosystem, and why it is important, and the Forest is relevant to forest users.
- Information provided to the public provides clear direction and information about the recreational opportunities on the Forest.
- Interpretive features help people learn about the special places they visit. Heritage sites provide unique opportunities for visitors to connect with the past.
- Conflicts among various recreation users and with other forest users are rare and easily resolved.

- Offer a diversity of high-quality recreation opportunities and well utilized and properly maintained areas in such a manner as not to create resource damage.
- Recreation opportunities are adaptable to changing uses and trends, and are available commensurate with public interest, resource capacity, and other natural and cultural resource values.
- Vandalism, theft, illegal activity, trash dumping, and resource damage at recreation sites or from recreation uses are minimized.
- Noise from motorized vehicles is infrequent in locations away from areas of higher road density. In other areas, the presence and impact of people and machines is unobtrusive.

Guidelines

- Recreation developments and improvements should be planned, designed, and managed for activities and capacities that do not cause unacceptable resource damage or adversely impact the landscape character.
- Developed and dispersed recreation sites and other authorized activities should not be located in places that prevent wildlife accessibility to water.
- Public safety, fee information, rules and regulations information should be posted at recreation sites.
- All project-level decisions, implementation activities, and management activities for all resources should consider the Recreation Opportunity Spectrum (ROS) settings or current protocol.
- Land use ethics (e.g., Leave No Trace and pack-it-in pack-it-out) should be promoted at all recreation sites.
- Visitor centers are open to the public on busy days and provide places where visitors can find information and learn about natural and cultural resources on the Tonto National Forest.
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- Sign plans for scenic byways and other popular areas should be developed provide improved visitor information and a consistent Forest Service image and should follow the most current versions of the Forest Service sign and poster guidelines and the Built Environment Image Guide.
- The design, construction, and maintenance of roads and trails are consistent with user desires, enhance the recreation experience, diminish user conflicts, and minimize damage to other resources.
- Use the Tonto Recreation Site Analysis, current Forest Service Outdoor Recreation Accessibility Guidelines, and current Forest Service Trail Accessibility Guidelines to improve accessibility for visitors.
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Management Approaches

- Develop partnerships and collaboration with agencies, groups, communities, volunteers, permit holders, and other individuals to increase forest stewardship, ecological awareness, volunteerism,

user satisfaction, promote a sustainable recreation program, and support local recreation-based economic development.

- Develop a strong, resilient partnership/volunteer program that continues to expand, with trained and skilled employees.
- Strengthen ties between the Forest and the communities it serves. This includes serving as a gateway to connect visitors and communities to distinct recreation opportunities across the forest, creating opportunities for local groups and youth programs, being accessible to all regardless of socioeconomic status or individual ability, and contributing to the nonmaterial benefits people derive from the forest, including spiritual enrichment, and aesthetic experiences.
- Develop interpretive facilities and conservation education programs in conjunction with our partners and communities to provide opportunities for visitors and the increasingly urban population in central and southeastern Arizona to learn about and appreciate nature and wild places. Use current technology and media sources to connect to forest users.
- Promote established programs (e.g., Leave No Trace, Kids in the Woods, Passport in Time, Discovery Agents, Bear Aware) and develop new conservation education programs that help connect people to nature and encourage responsible use at schools, youth activities, fairs, volunteer events, etc.
- Provide for multilingual interpretation and look for opportunities to partner with local communities. In recreation areas popular with Spanish-speaking visitors, information may be provided in both English and Spanish.
- Increase recreation opportunities within the capacity of the land to accommodate the growing population of central and southeastern Arizona by fully utilizing existing developed recreation sites and encouraging use at underutilized recreation sites.
- Consider the use of permit and reservation systems to preserve the integrity of the Tonto's natural resources and to reduce visitor conflicts where recreation impacts cannot otherwise be reasonably managed (e.g., wilderness areas, popular recreational shooting locations, popular OHV areas).
- The Forest may adopt design standards and best management practices for emerging recreation activities as they become available. Adopting management policies for new forms of recreation may be considered as time allows and in accordance with the desired interest these new forms attract in relation to other known recreation uses and resource concerns.
- Manage recreation at a landscape level to allow for effective response to changing needs and resource conditions.
- Manage for food and other items that attract wildlife to prevent negative interactions and reliance on humans.

Developed Rec

Description

Developed recreation are activities that are dependent upon facilities provided by the Forest, and occur in developed Forest Service sites. Examples of developed recreation areas are campgrounds, picnic areas, day use sites, and Forest service sites with one or more of the following amenities; picnic tables, restroom facilities, parking lots, drinking water, buildings/structures, signs, trash receptacles, roads.

Desired Conditions

- Developed recreation opportunities are characterized by different levels of development and amenities appropriate to the setting. Visitor satisfaction and resource protection are considered for the forest's abundant variety of recreation sites.
- Developed campsites meet the minimum needs of vehicle-based camping. The overall capacity of sites meets demand in high use seasons, including accommodating large groups if appropriate to the setting.
- Developed recreation sites Recreation fees are consistent across the Forest and based on the amenities provided.
- Healthy forest vegetation (e.g., species, size, and age) in developed sites complements recreational activities, scenic values, and safety.

Standards

- The maximum allowable occupancy of National Forest system lands within the Tonto National Forest will be managed as 14 days within a 90 day period, except as allowed by permit.

Guidelines

- Developed trailheads and day use sites should not be designated for overnight use.
- Developed recreation sites should be operated at current health and safety standards, as outlined in the Forest Service publication "Cleaning Recreation Sites" or more recent technical report.
- Recreation site overflow areas should be considered during periods of high use where the short-term nature of the use is not likely to result in long-term resource damage and not in conflict with active closure orders.
- For developed campsites, the forest should ensure adequate amenities are provided for visitor use (e.g., toilet buildings, trash receptacles).

Management Approaches

- Determine the operation or closure of a site based on volume of use, resource protection, opportunities for public-private partnerships, equitable geographic distribution, and operating costs.
- Consider installing receptacles for recycling at developed recreation sites. Consider incorporating sustainable operations where possible, e.g., solar panels, electric maintenance vehicles, and trash can compaction models at developed recreation sites.
- Fee areas and concessionaires may be used to maintain and manage developed facilities, particularly in high use areas.
- Review and complete accessibility assessments for compliance with Forest Service Outdoor Recreation Accessibility Guidelines and the Architectural Barriers Act on all developed recreation sites.
- Changes in use trends should be considered when reconstruction or new construction occurs during the design phase. Recreation sites considered for reconstruction may be prioritized based on site conditions and use levels and updated as funding allows.

Dispersed Rec

Description

Dispersed recreation occurs throughout the forest, outside of developed Forest Service recreation sites, and involves activities which are not dependent upon developed facilities or sites. Examples include but are not limited to hiking, backpacking, hunting, wildlife viewing, rock climbing, equestrian use, or mountain biking.

Desired Conditions

- Dispersed recreation areas provide visitors with natural, tranquil settings,.
- Dispersed recreation activities do not impact the quality of natural habitats, including riparian areas, streams, lakes, and wetlands .
- Dispersed sites provide an inviting, more primitive place to camp. Expansion of individual sites and evidence of overuse is minimal. Resource impacts due to recreation use, such as soil compaction or lack of vegetation, are minimized.
- Motorized access for dispersed camping or firewood gathering occurs near designated roads.
- Dispersed recreation sites that occur alongdesignated National Forest System trails are consistent with respective trail management objectives to prevent resource damage and user conflicts.
- Motorized and non-motorized trail systems consist of interconnecting loops and trails that connect other NF destinations. Motorized and non-motorized opportunities are generally separated.

Guidelines

- Dispersed camping should not be allowed within 100 feet of water resources (e.g., riparian areas, streams, and wetlands).
- Resource protection should be prioritized when creating improvements or minor developments in dispersed recreation areas.
- When mitigating adverse effects to dispersed recreation areas, native vegetation and natural barriers should be used.
- Trails should be designed, constructed, rerouted, or maintained utilizing current best management practices to promote sustainable design while providing desired recreation opportunities and other resource needs.
- National Forest System trails should not be used for management activities that negatively impact trail conditions, unless alternatives entail greater resource damage. Adverse impacts to system trails should be mitigated upon project completion.
- When trails intersect with fences, recreation user-specific pass-through areas should be provided when possible to allow for easier passage.
- Dispersed recreation areas should be closed or effects mitigated when:
    - Campsite conditions have deteriorated;
    - There are persistent user conflicts; and/or
    - Unacceptable environmental damage is occurring.

- Dispersed camping near cultural sites, sensitive wildlife areas, interpretive sites, and water resources should be discouraged.
- Barriers and signage to control unauthorized use in areas with a high potential for illegal cross-country motorized vehicle use should be used.
- Information should be posted to redirect use and encourage public compliance in rehabilitation efforts.

Management Approaches

- Educational techniques (e.g., brochures, signs, websites, and social media) are used to enhance visitor knowledge of proper non-motorized and motorized trail use etiquette.
- Utilize management tools (e.g., increased signage, visitor contacts, or education efforts) to educate about appropriate trail use.
- Develop a Forest-wide protocol to assess the sustainability, objective, and use of NFS trails and dispersed campsites, and prioritizes work needed to address resource issues and conflicts in use.
- Encourage campers with saddle or pack animals to carry weed-free cubed, pelleted, or rolled feed to limit overuse of the vegetation and discourage establishment or spread of noxious weeds.

Recreational Shooting

Description

Recreational shooting is defined as any shooting other than in lawful pursuit of game. This includes discharging a firearm, air rifle, or gas gun, including paint ball guns. Restrictions on recreational shooting does not limit one's ability to carry or possess a legal firearm. For the purposes of this section, Recreational Shooting will also include recreational archery or discharging any other implement capable of taking human life, causing injury, or damaging property.

Desired Conditions

- Recreational shooting opportunities are provided and balance user demand with public safety, environmental impacts, and other values and uses of the National Forest.
- Provide for safe recreational shooting opportunities that minimize resource damage, minimize litter, and reduce conflicts with other uses of the National Forest. This could include designating shooting areas, authorizing the construction of shooting ranges, improving popular shooting areas, creating permit zones, managing an area specifically for recreational shooting use, or other.
- Forest users follow current forest direction for approved target types and other restrictions.

Standards

- Recreational shooting is prohibited in areas not compatible with public safety, environmental protection and other national forest use objectives. These areas will be clearly identified and communicated through a variety of media and educational materials.
- Management of recreational shooting will be consistent with federal and state laws regarding the use of firearms.
- Do not authorize shooting of, or targets to be attached to natural features (e.g., cacti, trees, and caves), cultural resources, or other property of the United States (e.g., signs and structures).

Guidelines

- An approved list of target types should be posted online and provided at all designated shooting areas or areas managed for such use.
- In general, recreational shooting should be restricted, or prohibited, in areas:
    - Within a minimum of one quarter mile from developed recreation sites;
    - Within a minimum of one quarter mile from private inholdings, private property, or residences;
    - Within a minimum of one quarter mile from Lakes and Rivers Special Management Areas
    - Within a minimum of one quarter mile from high use areas (areas that are extremely crowded and blocked with traffic or people). This does not include areas that are managed for recreational shooting;
    - Within any designated off highway vehicle areas, including "tot lots";
    - Within designated permit zones unless the permitted activity is livestock grazing or recreational shooting.

Management Approaches

- Work with partners to identify recreational shooting opportunities, identify additional public need, or improve recreational shooting opportunities on the forest.
- Consider the use of improved and/or designated shooting areas, permitted and developed shooting ranges, special permit zones, and other management tools to meet demand for recreational shooting while meeting public safety and natural resource protection objectives and where compatible with other national forest uses and objectives.
- Work with partner agencies and groups to expand public education surrounding safe recreational shooting practices and "Leave no Trace" standards. Coordinate enforcement efforts with partner agencies and groups to highlight public education and build "self-regulation" with the recreational shooting community.
- Consider recreational shooting restrictions in areas that may cause harm to species of conservation concern, cultural resources (e.g., rock art and other archaeological artifacts), cause resource damage, or endanger public safety (e.g., high-use areas).

Motorized Use

Description

Motorized use is the operation of motorized vehicles (e.g., all-terrain vehicles, off highway vehicles, or motorcycles) for recreation as opposed to transportation. Motorized use is a popular recreational opportunity that occurs on roads and trails throughout the forest.

Desired Conditions

- Opportunities exist for motorized recreation where designated, with varying experiences for a variety of vehicle classes. Forest visitors can enjoy semi-primitive motorized recreation and explore the backcountry in off-highway vehicles along designated routes.

- The trail system provides a variety of opportunities and settings for visitors while being sustainable with minimal maintenance needs. Visitors and citizens make use of motorized trail system and "unofficial" trails are not evident.
- OHV trailheads provide a relatively dust-free environment that prevents erosion. Trailheads efficiently provide parking and access to trails where they are most critically needed.
- Motorized use is consistent with existing regulations. Control systems, such as law enforcement activity or citizen interactions, ensure resource impacts are minimized as population and visitor use increase.
- Roads, bridges, and trails are well marked and provide safe, reasonable access for public travel, recreation uses, traditional and cultural uses, and land management and resource protection activities, as well as contributing to the social and economic sustainability of local communities.
- An adequate sign system provides for traveler safety, location information, and compliance rules and regulations.
- Road and trail infrastructure has minimal adverse impacts on ecological and cultural resources. Trails that adversely impact cultural resources or sensitive wildlife habitats are closed or alternative travel routes are developed.
- Unneeded roads, trails, and routes are closed to motor vehicle use and naturalized to reduce impacts to ecological resources.
- New motorized trails avoid hilltops, ridges, and any landform with greater than 10% in surface grade in efforts to mitigate potential erosion, and to promote sustainable design principles.

Standards

- Motorized vehicle travel shall be managed to occur only on the designated system of NFS roads and motorized trails and designated motorized areas.
- 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.
- Motorized uses are prohibited in Primitive ROS settings, unless reasonably incident to valid existing rights.
- Motorized uses are limited to necessary administrative activities, permitted activities, and emergency access in Semi-primitive Non-motorized ROS settings.
- In Semi-primitive Non-motorized ROS settings, no new permanent motorized routes or areas shall be constructed or designated. Temporary motorized routes or road construction in Semi-primitive Non-motorized settings must be rehabilitated.

Guidelines

- Trail markings, kiosks, and interpretive signage should be designed to complement the scenic and cultural character of the surrounding landscape.

Management Approaches

- Explore options for improving off-highway vehicle opportunities by developing or connecting motorized trails.

Non-Motorized Use

Description

Non-motorized use includes a wide range of activities which are not dependent upon developed facilities or motorized equipment, including hiking, backpacking, hunting, wildlife viewing, rock climbing, equestrian use, or mountain biking.

Desired Conditions

- The trail system provides a variety of opportunities and settings for visitors while being sustainable with minimum maintenance needs and accommodating to use levels compatible with other resource values.
- Trail and trailhead level of development is appropriate to the site conditions, use, and setting. Trails vary in length and challenge and provide linkages to local neighborhoods, communities, and other public lands.
- The design, construction, and maintenance of trails are consistent with user demands, enhance the recreation experience, diminish user conflicts, and minimize damage to other resources.
- Use of National Forest System trails is consistent with the respective trail management objectives to prevent resource damage and user conflicts. Trails that are found to adversely impact natural and cultural resources are evaluated for closure and alternative travel routes or locations are developed where feasible.
- Where new and existing designated trails encounter springs, trails are designed and maintained to prevent erosion, trampling, compaction, and inadvertent introduction of invasive and undesirable plants, animals, and disease to the spring, while still allowing access by wildlife.

Guidelines

- National Forest System trails should not be used for timber harvest activities (e.g., landings and skid trails). Impacts to system trails should be avoided, and mitigated upon project completion if unavoidable.
- Newly constructedtrails should avoid travelling through meadows, wetlands, seeps, springs, streams, riparian areas, floodplains, sacred sites, and areas with high concentrations of significant archeological sites unless purpose is to provide for resource protection.
- Non-morotized travel opportunities should be provided where such access is currently unavailable (e.g., constructing new trails or improving existing trails).

Management Approaches

- Trail management objectives are prepared for new trails added to the National Forest System Trails and are updated as needed for existing National Forest System Trails.
- Trail management priorities are based on providing user safety, preventing erosion, providing appropriate and meaningful recreation opportunities, and accommodating administrative needs.

- Encourage those participating in non-motorized cross country travel by uses other than hiker and pedestrian use, such as those on horseback, to use only National Forest System trails.

Water Based

Description

The Tonto National Forest offers a variety of water-based and on-shore activities adjacent to rivers, streams and reservoirs. Water for recreation was identified as a key ecosystem service for the Tonto NF. Water features provide the physical settings for many different outdoor recreation activities – creeks and rivers for swimming, fishing, water kayaking, canoeing, rafting, and tubing; and reservoirs for fishing, motor boating, jet skiing, water skiing, and wakeboarding. Six of the ten largest lakes/reservoirs contained entirely in the state are found on the forest. Visitors from across the state travel to Mogollon Rim area streams (East Verde River, Tonto Creek, Canyon Creek, etc.), the Salt River Lakes (Roosevelt, Apache, Canyon, and Saguaro), and the Verde River Lakes (Bartlett and Horseshoe) to experience water-based recreation and relax near the water.

Desired Conditions

- Recreation opportunities are provided for all types of water-based activities and user conflicts are rare and easily resolved.
- Water access points and developed sites at and near waterbodies are provided. Buoys, boat launches, and docks provide for safe recreational opportunities.
- Visitation levels do not result in overcrowding and provide safety for visitors while remaining consistent with desired conditions for the use area.
- Water-based recreation opportunities are enjoyed by the public, yet the majority of the riparian areas remain largely undisturbed from long-term recreational impacts (e.g., camping and access points).

Guidelines

- Management activities should take measures to prevent the spread of aquatic parasites, invasive species, or disease (e.g., Quagga mussel or whirling disease).

Management Approaches

- Coordinate with Arizona Game and Fish Department to manage boating opportunities (boat registration, facilities, and enforcement, etc.) on the forest.
- Work with the State of Arizona to monitor water quality and ensure water quality standards for primary contact recreation are not being violated, providing safe and sanitary recreational opportunities.
- Work with partners and stakeholders to help manage for safety and health of the public and water resources to ensure ample opportunities for water based recreation in the future.
- Work cooperatively with the Coconino and Prescott National Forests to administer and track authorized activities within the designated Wild and Scenic segments of the Verde River.

Hunting/Fishing/Watchable Wildlife (Wildlife-based Recreation)

Description

Many people, some of whom have long-term connections to the forests, have an interest in and use of the Tonto due to their traditional ties, such as hunting, fishing and wildlife viewing. Habitat for Hunting, Fishing, and Watchable Wildlife has been identified as a key ecosystem service on the Tonto NF.

Wildlife-based recreation creates significant economic contributions, additionally acts like the Pittman Roberston Act (e.g., taxes on ammo) and the Dingle Johnson Act (ie. Taxes on fishing equipment) help to fund fish and wildlife conservation and restoration and remains of economic importance on forest lands. These contributions relate to trip expenditures, equipment purchased, rental activities, food, fuel, beverages, lodging, ammunition, hunting supplies, etc. These contributions support full and part-time jobs, increase federal income tax receipts, increase retail sales, hospitality sales, etc. in the cities and counties where these opportunities are available.

People enjoy high-quality hunting, fishing, and wildlife viewing on the Tonto NF. Nine of the 10 big game species in the State occur on the forest, including: black bear, bighorn sheep, elk, javelina, turkey, mountain lion, pronghorn, mule deer, and white-tailed deer. Bison is the only big game species that does not occur. Seven of the nine small game species have abundant habitat on the forest, and there are also opportunities to hunt waterfowl, predators, and furbearers.

Fishing opportunities are abundant. AGFD manages about 27 sport fish species in the State, and the Tonto NF provides angling opportunities for most of those species in stream and lake habitats. Of the 27 sport fish species, most have been introduced to the State from elsewhere, but Apache trout, desert sucker, and roundtail chub are native sport fish. Gila trout were native to the Verde watershed on the forest but have become extirpated in these locations. The forest provides a unique opportunity to fish for naïve roundtail chub in portions of Fossil Creek.

Wildlife viewing is one of the most popular recreational activities on the forest. Three wildlife viewing areas on the forest are identified in the wildlife viewing publications for Arizona: Mormon Lake-Doug Morrison Overlook, Kendrick Park Watchable Wildlife Trail, and Upper and Lower Lake Mary. The National Audubon Society recognizes Anderson Mesa, Boyce Thompson, the Salt River, and the Verde River as a globally important bird areas (IBA). Lower Oak Creek as a State IBA, and Mogollon Rim Snowmelt Draws as an identified but not yet designated IBA.

Desired Conditions

- Ecological and social conditions on the forest support plentiful and diverse opportunities for hunting, fishing, and watching wildlife. Wildlife-based recreation generally does not conflict with other land uses.
- Areas providing opportunities for hunting, fishing, and watching wildlife are accessible to a variety of users. Residents and visitors have ample opportunities to view, experience, appreciate, and learn about the wildlife and fish resources of the Forest.
- Reservoirs, streams, rivers, and lakes provide ample opportunities for fishing and other wildlife related recreation.
- Desirable, nonnative species (both fish and wildlife) provide hunting and fishing opportunities, but do not jeopardize the persistence of native species (including SCC) and are not in conflict with the recovery of federally listed species.
- Developed recreation sites provide opportunities for those participating in wildlife-based recreation opportunities to camp, obtain information, and participate in day-use activities (e.g., fishing piers and wildlife viewing sites).
- The forest is known for high quality hunting and fishing opportunities. There is more emphasis, interest, and opportunity to fish for native sport fish.

- Blinds, stands, cameras, and other structures brought in by the public for purposes related to hunting, fishing, and watchable wildlife are temporary and portable and do not have long-term effects on vegetation and wildlife.

Guidelines

- Big game retrieval should be allowed as specified by the Tonto National Forest Travel Management Plan or similar protocol.
- Nonnative sport fish and habitats should be managed in locations and ways that not pose substantial risk to native species.

Management Approaches

- Develop partnerships and collaboration with agencies, academia, groups, communities, volunteers, permit holders and other individuals to increase forest stewardship, ecological and economic awareness, volunteerism, user satisfaction, and promote and support local recreation based economic development through hunting, fishing and watchable wildlife.
- Work with partners to provide education and information on watchable wildlife programs and opportunities.
- Consider current and future demand and trends for wildlife based recreation using economic studies and other related science available.
- Work collaboratively with AGFD to plan and prioritize projects to achieve desired conditions for hunting, fishing, and watchable wildlife species and habitats on the forest.
- Coordinate with the AGFD on fish and wildlife management activities (e.g., reintroductions, introductions, or transplants; control or eradication of nonnative species; and the management of sport and native fishes).

Special Uses

Description

Recreation special use authorizations are authorized when the proposed activities support the Forest Service mission, meet demonstrated public needs, and are consistent with the desired conditions for the use area. The most common activities on the Tonto National Forest include recreation events, noncommercial group uses, marinas, resorts, organization camps, recreation residences, and outfitting and guiding. Outfitting and guiding permits can be issued for a variety of activities including, but not limited to, hiking, backpacking, horseback riding and packing, off-highway vehicle use, motorized and non-motorized boating, tubing, mountain biking, canyoneering, bird watching, fishing, hunting, and educational wilderness experiences. Issuing recreation special use permits enables the Forest Service and its partners to serve visitors and local communities by providing a variety of quality outdoor recreation experiences that promote the responsible use and enjoyment of outdoor lands and waters. The administration of recreation special uses permits seeks to minimize impacts to Forest resources, minimize user conflicts, and address safety concerns for Forest visitors and the permit holder. Most of the direction for management of recreation special use permits is specified in the 2300 and 2700 Forest Service directives under the given use type.

Lands special use authorizations are authorized for infrastructure related uses, such as communication sites, utilities (e.g., electrical, communication, and internet lines), pipelines (e.g., natural gas, water), road access, sanitation, and alternative energy development. Activities, such as research and monitoring and commercial filming, are also permitted uses. Communication sites are critical to ensuring good communications across Arizona and contributing to national infrastructure systems. Utility and energy transmission rights-of-way, along with communication sites, are generally long-term commitments of NFS lands. Requests to use NFS lands for communication and electronic sites have increased over the past few years, and will likely increase. More demand for utility lines, renewable energy sources, community infrastructure, and private land access on NFS lands is also expected.

Desired Conditions

- Special uses enhance the recreation experiences of Forest visitors and provide unique opportunities and services. Authorized activities provide for public health and safety and have minimal impact to ecological and cultural resources.
- Special use activities support the public's need and demonstrated demands for specific recreation opportunities or services.
- Commercial recreation special uses provide an equal opportunity for local businesses to compete for high-demand activities and services.
- User conflicts between outfitting and guiding activities are minimized and authorized activities do not exceed carrying capacities.
- Permitted activities do not conflict with the experiences of other Forest users and conflicts with unauthorized uses are easily resolved.
- The authorization and administration of uses of public lands by individuals, companies, groups, other Federal agencies, and State or local governments is conducted in a manner that protects natural resource values and public health and safety.
-

- The number of special use authorizations, including outfitters and guides, balance public demand with Forest resources, and augments the variety of suitable outdoor recreation experiences on the Tonto National Forest.

Standards

- Activities that include visits to archaeological sites shall identify the site locations in the special use permit and follow Leave No Trace ethics as outlined in the Operating Plan.
- Authorize only one access route to each private property inholding. No new access points to private property will be authorized if a parcel is subdivided.
- Authorizations for utilities must incorporate requirements for road construction, reconstructions, reclamation, and maintenance that minimize resource damage.
- Roads, utilities, and communication sites and corridors are consolidated on existing or small rights-of-way to have minimal impacts on natural resources.
- Recreation residences will not be rebuilt if destroyed by fire, flooding, or natural disaster.
- Limit authorized boat tours for watercraft in excess of 25 feet long to one per reservoir.

Guidelines

- Existing utility rights-of-way should be used to their capacity, before evaluating new routes.
- Organized recreation events and noncommercial group uses authorized under special use permit should be limited to designated NFS trails and roads, suitable developed sites, or where resource impacts are determined to be minimal.
- Authorizations should promote responsible land use (e.g., Leave No Trace ethics and the pack-it-in pack-it-out).
- Special-use activities that negatively impact the experience of other visitors should be scheduled outside of normally high-use periods.
- Dispersed camping should not be authorized at cultural sites, trailheads (except those trailheads with designated dispersed sites already in use), sensitive wildlife areas, or interpretive sites.
- All river-running outfitter and guide authorizations should be limited to no more than five (5) groups entering the Upper Salt River corridor from Friday through Sunday (plus legal holidays) and no more than three (3) entries per day from Monday through Thursday.
- All river-running outfitter and guide authorizations should be restricted to no more than two (2) groups entering the Upper Salt River corridor per day.

Management Approaches

- Consider authorizing recreation special use permits for high-demand outfitting and guiding activities based on the results of a capacity study and current administrative capabilities, to be re-evaluated as needed.
- Manage non-motorized watercraft uses on the Lower Salt River to provide equal opportunity to multiple businesses while utilizing all existing developed water access points. Refer to the area's capacity study for maximum number of authorizations to be issued and user day limitations for each permit (if deemed applicable from the study).

- Work cooperatively with the Coconino and Prescott National Forests to administer and track authorized activities within the designated Wild and Scenic segments of the Verde River.
- Work cooperatively with the Arizona Game and Fish Department to manage fishing and hunting outfitting and guiding operations, recreation events, and tournaments.
- Requests for expansion of services and/or permitted areas will be evaluated on a case-by-case basis using the criteria for new commercial public services.
- Continue to administer existing recreation special use permits to assure compliance and to assure that a quality public service is provided consistent with Forest Service desired conditions for the use area.

Rangelands, Forage, and Grazing

Description

Rangelands are shrublands, woodlands, wetlands, and deserts that are grazed by domestic livestock or wild animals. Livestock grazing can be used to manage rangelands by harvesting forage to produce livestock, changing plant composition, or reducing fuel loads. Sustainable and productive rangelands are one of the key ecosystem services on the Tonto NF. Rangelands contribute to a traditional western way of life and are essential for the survival of many small ranching operations. Rangelands and the associated range improvements (i.e., ponds, troughs, fences, corrals, windmills, etc.) provide scenery and recreational (for example, hunting, wildlife viewing) opportunities to the public and provide habitat for numerous species.

Congress has designated grazing as an important use of National Forest System lands through various legislative acts (Multiple Use Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976). Regulations include that "forage-producing National Forest System lands will be managed for livestock grazing and the allotment management plans will be prepared consistent with land management plans" (36 CFR 33 222.2) and "all grazing and livestock use on National Forest System lands … must be authorized by a grazing or livestock use permit" (36 CFR 222.3). Ranchers are issued permits to graze a specific number of livestock in designated areas. Ranchers holding grazing permits are referred to as permittees.

Rangelands are divided into logical grazing units called allotments. Allotment boundaries often follow topographical features such as ridgelines or creeks and may or may not be fenced entirely. Allotments are further subdivided into pastures, and most allotments follow some kind of rotational grazing system where livestock are moved through different pastures as the year progresses. Allotment and pasture boundaries are changed administratively as needed.

Nearly the entire Tonto National Forest is divided into grazing allotments; however, a few allotments are considered vacant (no current permittee) or closed (no longer authorized for permitted livestock grazing). Status of allotments are dynamic so a list of open, vacant, and closed allotments in this plan would not be useful. Over the last decade, the Tonto NF has worked with partners and permittees to reduce grazing pressure on sensitive areas (e.g., critical areas, riparian area). Currently, the Tonto NF manages the rangeland resources to balance livestock numbers with forage capacity.

Desired Conditions

- Sustainable livestock grazing contributes to the long-term socioeconomic diversity and stability of local communities.
- Rangelands are resilient to disturbances, fluctuations, and extremes in the natural environment (e.g.,e.g., fire, flood, drought, climate variability).
- Livestock grazing and associated management activities promote healthy, diverse plant communities, satisfactory soil conditions, and maintain or improve wildlife habitat.
- Livestock management and range improvements prevent livestock from negatively impacting other resources.

Standards

- Range improvement maintenance is assigned in Allotment Management Plans and include maintenance specifications that prevent livestock from negatively impacting ecological and cultural resources and extend the useful life of the improvement.
- Range improvements are maintained to standards outlined in grazing permits or are removed or decommissioned when no longer needed.

Guidelines

- Grazing use should be managed at conservative levels (30 to 40 percent) using rotational grazing systems.
- Salt or mineral supplements should not be placed within a quarter mile of riparian or wetland areas or other areas where livestock concentrations are undesired.
- New spring developments should not completely dewater the spring and should maintain a residual flow for riparian obligate vegetation and wildlife species.
- Drought preparedness is emphasized in Allotment Management Plans and may include flexible stocking rates/livestock classes, flexible rotation schedules, and other strategies for dealing with climate variability.
- Livestock use should avoid grazing the same wetland/riparian areas at the same time, year after year. Exceptions to this may include, but are not limited to, trailing systems that may be adjacent to wetland/riparian areas due to topography constraints.
- Vacant allotments and permits that are waived without preference should be evaluated for one of the following options:
    - Conversion to forage reserves to improve resource management flexibility.
    - Grant to nearby permittees to form logical grazing management units.
    - Closure to permitted grazing, in whole or in part.
- Allotments comprised of large percentages of Desert Ecological Response Units (Sonora-Mojave Mixed Salt Desert Scrub, Sonoran Paloverde-Mixed Cactus Desert Scrub, and Sonoran Mid-Elevation Desert Scrub) should be closed, in whole or in part, as they become vacant.

Management Approaches

- Forest managers work continually with permittees to adjust timing, intensity, and frequency of livestock grazing to respond to changing resource conditions; grazing pressures that affect sedimentation on soil compaction; excessive impacts to wetlands and riparian areas; and needs of the grazing permittees.
- Range managers use a cooperative approach, work with permittees, local, county, state, and federal government entities, and non-government organizations and develop partnerships to facilitate flexible and balanced permitted use.
- The Tonto NF uses an adaptive management strategy to manage the rangeland resources. Allotment management plans and associated grazing authorization decisions are updated as needed to conform to the National Environmental Policy Act (NEPA) and other applicable laws. .

- Within the scope of the grazing decisions, fine-tune adjustments are made annually through the annual operating instructions. Information from monitoring informs appropriate adjustments. Grazing intensity in combination with other factors such as weather patterns, likelihood of plant regrowth, and previous years' utilization levels is used in determinations. Authorized numbers may be adjusted accordingly. The grazing decision and associated allotment management plan is implemented through the term grazing permit and annual operating instructions (AOI). The AOI may also change season of use and pasture rest periods.
- Allotment Management Plans allow structural range improvements to be added or removed as needed to meet desired conditions in conformance with applicable laws and regulations.
- When utilizing prescribed burns for restoring perennial grasslands, allow areas to rest from grazing (some may only require 3 or less growing seasons while others may require more growing seasons) to build sufficient fuel loads based on site potential (based on the Terrestrial Ecological Unit or other suitable scientific protocol or method.

Forestry and Forest Products

Description

Forest products include wood (timber, biomass, fuelwood) and special forest products. Special forest products include seed, Christmas trees and boughs, decorative tree or shrub limbs, manzanita, wildlings (e.g., transplanted trees, shrubs, or herbaceous plants), dry cones, mistletoe, agave and yucca stalks, post, poles, stays, novelty wood, burls and ceremonial products. National Forest System (NFS) lands were reserved with the intent of providing goods, including production of a sustainable supply of forest products and services to satisfy public needs over the long term.

The total volume of wood products sold by the Tonto NF has fluctuated over time. Demand for woody material from the Tonto National Forest is largely driven by fuelwood needs, though saw-timber harvest has been increasing steadily since 2005. The need and desire for firewood by families and communities has remained stable to slightly increasing over the last five years. Currently, there is a directional emphasis to reduce the impacts of wildfires on communities and to restore fire-adapted ecosystems to healthy conditions. Tonto NF seeks to integrate a timber and forest products program that supports industry and the general public, with managing for ecosystem health, restoring watersheds, improving wildlife habitats, and reducing hazardous fuels.

National Forest Management Act timber requirements as per FSH1909.12 Chapter 60 still need to be added to this section.

Desired Conditions

- Private and commercial timber harvest contribute to watershed health, function, and resilience, enhance wildlife habitat, create small and large business and employment opportunities, and provide wood products.
- Private and commercial timber harvest supplement other restoration and maintenance treatments in forested vegetation communities at a scale that achieves landscape desired conditions.
- A sustainable supply of commodities, including timber, fuelwood, boughs, Christmas trees, seeds, and other special forest products, are available to businesses and individuals in a manner that effectively contributes to watershed health and the restoration and maintenance of desired vegetation conditions.
- Forest products are available for traditional communities and culturally important activities.
- Harvest of dead and dying trees balance economic value with the needs of wildlife habitat, soil productivity, and ecosystem functions.

Objectives

- Provide at least XXX,XXX CCF[5] (hundred cubic feet) of timber every 10 years to contribute to local forest product industry.

Standards

- Timber harvest and vegetation manipulation shall only occur where soil, slope, and watersheds will not be irreversibly damaged, and protection must be provided for streams, streambanks,

[5] The Forest will determine the appropriate amount of timber for forest product industry after the timber suitability analysis is completed at a later time during plan revision.

shorelines, lakes, wetlands, other waterbodies, fish, wildlife, recreation, cave and karst formations, cultural, and aesthetic resources.

- The regeneration harvest of even-aged stands of trees is limited to stands that generally have reached the culmination of mean annual increment (CMAI) of growth. This requirement would apply only to regeneration harvest of even-aged stands on lands identified as suited for timber production and where timber production is the primary purpose for the harvest.
- Regeneration timber harvest shall only occur where there is reasonable assurance of adequate restocking within 5 years of harvest.
- Even-aged timber harvest methods shall be used only where an interdisciplinary review determines them to be appropriate, and the removal of the majority of overstory vegetation will only be used where it is determined to be the optimum method.
- Even-aged regeneration cuts will be shaped and blended with the natural terrain.
- Even-aged harvest should be used where determined to be appropriate based on project specific conditions and the desired conditions for vegetation, wildlife habitat, scenery and other resources. Maximum size of openings will be limited to 40 acres or less, unless specific conditions require larger openings (e.g., forest health, meadow restoration, or achieving other desired ecological conditions). Specific projects in which an interdisciplinary review indicate that a larger opening is required will require Regional Forester approval on a case by case basis.
- The quantity of timber that may be sold is limited to an amount equal to or less than that which can be removed from such forest annually in perpetuity on a sustained yield basis. This limit may be measured on a decadal basis.
- Harvesting systems shall primarily be selected for their ability to move toward achieving ecological (e.g., vegetation, watershed, and riparian) desired conditions and not for their ability to provide the greatest dollar return or unit output of timber.

Guidelines

- Timber harvests may include uneven-aged or even-aged methods that reflect the scale of natural disturbances and should be designed to achieve desired conditions (e.g., size class distribution, species composition, patch size, fuel reduction, insect and disease).
- Forest treatments should focus on uneven-aged management using restoration principles in frequent-fire Ecological Response Units (ERUs). Desired forest structure should consist of approximately equal areas of young, mid-aged, old tree groupings with openings and interspaces.
- Designation of firewood areas in woodland ERU's should be appropriately based on project specific conditions and the desired conditions for the vegetation, wildlife habitat, scenery and other resources.
- Rare plant species, limited in distribution and or Species of Conservation Concern should not be collected unless the forest has information that the species can withstand collection and will persist on the forest. Research collection request should be considered when the results of the research will aid management of the collected species.
- Timber harvest and mechanical fuels treatments should be designed to develop or manage vegetation and course woody debris within the range of the desired conditions (e.g., snags, large

woody debris). If these attributes were not present in the stand before the activity, treatments should be designed to help meet those requirements in the future.

- Log landing areas should be located outside of designated sensitive areas (e.g., riparian areas, wetlands and natural meadows, archeological sites, karst formations, threatened and endangered critical habitat, and along Scenery Management System Concern Level I roads). When landings must be located in these areas, effects to the sensitive resource should be mitigated.
- To maintain rare plant populations, seed collection and cuttings (rather than whole plant removal) should be the preferred collection methods when forest product and research collection permits are issued. An exception would be when whole plant removal is required to meet the needs of the permittee and removal would not have the potential to negatively impact rare plant populations. This guideline does not apply to pre-cleared areas for wilding permits of specific species.
- Permits for cutting stalks off of agaves should not be issued in order to protect stalks used as nesting and overwintering habitat for key pollinators of desert ecosystems such as carpenter bees. Exceptions may be made for limited research purposes and traditional tribal uses.

Management Approaches

- During the planning of forest restoration projects, discussions with tribes that collect plants for traditional, cultural, and ceremonial purposes should be encouraged, to promote the plants' persistence.
- Use a collaborative approach when developing and implementing projects by forming partnerships with other federal and state agencies, local professional organizations and user groups (e.g., Fish and Wildlife Service, Arizona Game and Fish, State Historic Preservation Office, State and Tribal Forestry, National Speleological Society).
- Uneven-aged selection cutting methods are the primary silvicultural prescription that will be applied over the majority of the landscape, however, consider using even-aged management prescriptions as a strategy for achieving the desired uneven-aged conditions over the long term and/or at the landscape scale when necessary. Even-aged prescriptions are appropriate when they would increase or maintain a trajectory toward desired conditions, such as when mistletoe infections are moderate to severe and the ability of the area to achieve the desired conditions has been significantly impaired.
- Consider designing small timber contracts to accommodate small operations based in local communities.
- Consider preparing pest and invasive species control plans with forest health specialists that contain appropriate mitigation measures (e.g., planting resistant tree species, maintaining species diversity, removing damaged trees or invasive species, and using pesticides) and monitoring procedures. Monitoring may include:
    - Measuring effectiveness of treated areas.
    - Determining effects on non-target organisms.
    - Determining effects on water quality.
    - Determining effects of pesticide that enters the soil or air.

- Consider treatments within infrequent-fire vegetation communities (e.g., Interior Chaparral, Pinyon-Juniper Evergreen Shrub, and Pinyon-Juniper Woodland) for ecological and socioeconomic benefits.
- Consider ways to inform the public of the effects from illegal wood cutting, to ensure the sustainability of quality habitat over the long-term.

Scenery

Description

Scenery is the general appearance of place, landscapes, or features of a landscape. Scenery varies depending on existing natural features including vegetation, water features, landform and geology, cultural features, and human alterations (e.g., buildings, structures, manipulations of the land or vegetation). People value scenery with natural appearing landscapes. The Tonto National Forest serves as a scenic backdrop for many local communities in central Arizona. The scenic quality defines the regions character and contributes to the positive experiences people seek on the forest. In most national forest settings, managing the scenery is important to protect the naturalness of the existing landscape character. Scenic values and characteristics are important in creating a sense of place for local residents and visitors alike.

Desired Conditions

- Scenery management, scenic character, and scenery values are integrated into the design, planning, and implementation of all resource management decisions.
- The forest contains a variety of ecologically sound, resilient, and visually appealing landscapes that sustain scenic character in ways that contribute to visitors' sense of place and connection with nature.
- The forest appears predominantly natural and includes cultural landscapes valued by forest users and local communities for their scenic, and traditional values.
- High quality scenery dominates the landscape in areas the public values highly for scenery. These highly valued scenic areas include scenic byways, major roads and trails, developed recreation sites, Wilderness and Wild and Scenic rivers.
- Scenery reflects ecosystem diversity, enhances recreation settings, and contributes to the quality of life for local residents and communities, as well as forest users from outside the area.
- Scenery is enhanced or maintained to have resilience to changing conditions, while supporting ecological, social, and economic sustainability on the forest and surrounding landscapes.

Guidelines

- Newly constructed features, facilities, and management activities should be planned and designed to complement the natural appearing landscape, closely following the form, line, color, texture, and pattern common to the desired scenic character.
- Management activities should minimize visual disturbances and be consistent with or move the area towards achieving scenic integrity objectives (as defined in the Scenery Management System).
- Management activities that result in short-term impacts inconsistent with the scenic integrity objectives should achieve the scenic integrity objectives over the long-term. Short-term and long-term timeframes should be defined during site specific project planning.
- Projects should include mitigation measures to address negative impacts to scenic resources.

- Effects to scenery from prescribed fire should be considered during project planning and implementation. Efforts should be made to minimize high intensity fire along areas valued highly by the public for scenery.

Management Approaches

- The Scenery Management System (SMS) is a tool for inventorying and managing scenic resources. Consider using this system to incorporate scenery management principles into the planning, design, and implementation of projects and management activities.
- Consider displaying interpretive or informational signs at sites with impacts to scenery to inform the public about the nature and consequences of such projects or events.
- Cooperate with other entities, such as the Arizona Department of Transportation, Tribal and local, state, and federal governments, and commercial and private entities to protect scenic integrity on, and adjacent to, the Tonto National Forest, including along scenic byways.
- Consider the use of best environmental design practices to advance environmentally sustainable design solutions.
- Set priorities for rehabilitation of areas where existing scenic integrity is lower than the scenic integrity map.

Caves

Description

Caves are natural biophysical features that include any naturally occurring void, cavity, recess, or system of interconnected passages beneath the surface of the Earth or within a cliff or ledge that is large enough to permit a person to enter, whether the entrance is excavated or naturally formed (16 USC Ch. 63 Sec. 4302). This definition includes any fissure (large crack), lava tube, natural pit, sinkhole, karst feature or other opening which is an extension of a cave entrance or which is an integral part of the cave.

Cave resources include any material or substance occurring naturally in caves such as plant and animal life, paleontological deposits, sediments, minerals, cave formations, and cave relief features. Many caves also have important traditional cultural significance to regional area tribes and pueblos. Most cave resources are not replaceable and not renewable.

Caves provide specialized seasonal and year-round habitats for a variety of wildlife species, including bats, cliff-nesting birds, snails, reptiles, amphibians, migratory hominids, and insects. Other small and large mammals also use caves opportunistically.

Desired Conditions

- Cave provides microclimate and geological features for associated species that require specialized niches for roosting and overwintering.
- Caves provide undisturbed habitat for native bat species, particularly in locations known to be used for maternity or hibernation roost.
- Archaeological, geological, and biological features of caves are not disturbed by visitors.
- Features, characteristics, values, or opportunities for which caves have been designated or nominated as “significant” are preserved.

Guidelines

- Environments in caves should not be altered except where necessary to protect associated natural resources or to protect health and safety. Where closures are necessary to protect human health and safety, closures should preserve habitats for wildlife, including roosting bats, and avoid direct impacts to bats. If bats or other species are present, closure structures, such as wildlife friendly gates that meet the most current recommendations should be used, to allow species to continue to use the cave. If gates are used, a lock and/or removable bar should be installed to allow future access for authorized personnel.
- Project design for subsurface geologic features should include protections to minimize disruptions to hydrogeology, cave microbiology, and other aspects of cave ecology.
- The most current Forest Service guidance or most recent decontamination procedures adopted from the Fish and Wild Service (FWS) should be used in caves to avoid spread of white-nose syndrome (WNS) or other diseases.
- Projects involving caves should include measures for the protection and conservation of archaeological, biological, and geological resources.

Management Approaches

- Consider the development of a response plan for WNS through continued collaboration with the US Fish and Wildlife Service (USFWS), Bat Conservation International, AZ Department of Game and Fish (AZGFD), the National Speleological Society, and others with interests in conservation management for bat species.
- Consider working with public affairs, recreation, invasive species, minerals staffs; state and other federal agency partners; and the public to internally and externally increase awareness regarding WNS and other significant pathogens at local and regional levels. Include a focus on best management practices for the prevention of outbreaks.
- Foster collaboration and exchange of information between governmental agencies, partners, and other stakeholders to address conservation topics and educate the public on cave resources, grottos, and associated species.
- Foster relationship with caving partners (specifically, Central Arizona Grotto of the National Speleological Society) to engage in cave inventory, survey, mapping, monitoring, management planning, and identification/nomination of significant caves.

Mining, Minerals and Energy

Description

Minerals of economic interest are classified as leasable, salable, or locatable. Coal, oil shale, oil and gas, phosphate, potash, sodium, geothermal resources, and all other minerals that may be acquired under the Mineral Leasing Act of 1920 (30 U.S.C. 181), as amended, are referred to as leasable minerals. Common varieties of sand, stone, gravel, pumicite, and clay that may be acquired under the Materials Act of 1947 (30 U.S.C. 601–604) are considered salable minerals or mineral materials. Minerals that are not salable or leasable (e.g., gold, silver, copper, tungsten, uranium, et al) are referred to as locatable minerals. Locatable mineral deposits include most metallic mineral deposits and certain nonmetallic and industrial minerals. Locatable minerals are subject to the General Mining Act of 1872 (30 U.S.C. 22-42), as amended. Locatable minerals can be claimed, explored, and mined on public lands under the General Mining Law of 1872. The Forest Service follows regulations under 36 CFR 228, Subpart A for locatable minerals, to minimize adverse impacts on National Forest System surface resources. It is Forest Service policy to administer responsible, environmentally sound energy and mineral development and reclamation on the Tonto National Forest.

Locatable mineral resources occur on all ranger districts with several active locatable mines on Globe Ranger District. Inactive mines and numerous abandoned mines occur throughout the forest.

Saleable materials found on forest include sand and gravel, decomposed granite, and building stone. The forest provides opportunity for local communities to extract these materials at the discretion of the Authorizing Officer (Forest Supervisor or District Ranger, as appropriate). Currently, the Arizona Department of Transportation and other local government agencies have permits to use mineral materials from forest lands. There are provisions in the regulations to allow for public access to small quantities of mineral materials for personal use at the discretion of the Authorizing Officer.

Renewable energy sources on the Tonto NF are limited to solar power and hydropower. There are several dams along the Lower Salt River that generate hydropower. Due to terrain and accessibility issues, the forest is considered to have low wind power potential. The forest does have good potential to provide solar power as a source of renewable energy.

Desired Conditions

- Energy, mineral, and mining activities comply with law, policy, and regulation in the development of minerals in a manner that minimizes adverse environmental impacts to surface and groundwater resources, watershed and forest ecosystem health, wildlife and wildlife habitat, scenic character, and other desired conditions applicable to the area.
- Reclamation of energy, mining, and mineral activity sites that provide for public safety and the protection of forest resources, and returns disturbed sites to as natural shaping habitat development progression as practicable.
- Manage energy, mining, and mineral activity site reclamation to establish sustainable post mining land uses.
- Make mineral materials on National Forest lands available to the public and to local, State, and Federal government agencies where reasonable protection of, or mitigation of effects on, other resources is assured, and where removal is not prohibited.

- Information on Forest Service operating requirements and opportunities for recreational gold prospecting, gold panning, and related activities, such as rock hounding and mineral collection, are made available to forest users.

Objectives

- Complete at least one environmental review of an inactive mine closure every two years.

Standards

- Plans of operation shall be required for all locatable and leasable mineral operations that will likely cause significant disturbance of surface resources.
- Site-specific reclamation plans shall be prepared as part of all plans of operation. These plans must be developed in accordance with other resource policies (e.g., soils, vegetation, climate, water, wildlife, or slope stability). Ensure that seed mixes, vegetation, and soil used for reclamation are representative of the local ecosystem.
- Structures and/or occupancy for mining purposes will be limited to only those that are necessary and incidental to approved mining operations.
- An environmental analysis is conducted for all planned disposals of mineral materials from the forest.
- Mineral materials such as gravel will not be removed within water resource features to ensure satisfactory conditions.

Guidelines

- Restoration and reclamation of surface disturbance associated with mineral activities should be implemented to return sites to other productive uses. Surface reclamation and revegetation plans should plan for a natural species succession appropriate to the reclaimed landform in order to establish sustainable forest vegetative communities and natural habitats.
- Reclamation should be carried out concurrently with mining. Restoration of the environment should take place at the earliest opportunity for each area on a mine site.
- Reclamation bonding should be commensurate with requirements of site-specific reclamation plans. Existing reclamation plans should be reviewed and the bond instrument should be updated.
- Requests for personal and commercial mineral material sales should be considered where consistent with other resource desired conditions.
- If adits, shafts, and other inactive mine workings are determined to be used by bats and other wildlife species or contain cultural resources, gating should be an alternative to destruction.
- Streambed material disturbed by placer mineral operations should be replaced into its source location to ensure stream stability.
- Consider design features, best management practices (BMPs), or mitigation measures to minimize adverse impacts on National Forest System surface resources.

Management Approaches

- Consider the potential to use sites for mineral collection areas during the development of a reclamation plan.

- Consider the potential to use operating and reclamation plans to protect and restore surface resources through the phased introduction and monitoring of pioneer and successor species for vegetative communities. Utilize adaptive management principles to ensure effective reclamation.
- Seek opportunities to work with proponents to expand knowledge of local natural resources, such as proactive data collection and sharing, and development of conservation measures.
- Using existing law, regulation and policy, develop general guidelines and informational brochures for public dissemination on Forest.

Roads

Description

There are approximately 4200 miles of roads on the Tonto National Forest. These roads have various maintenance levels, from those only available for administrative purposes to those that offer a high level of comfort and are open for all users. The construction and maintenance of the road system includes the roadbed, bridges, culverts, drainages, signage, and clearing of brush and overgrowth. Roads are maintained to provide access for land management needs and to best serve the public.

Desired Conditions

- The Forest's transportation system and infrastructure balance the needs for public access, land management, resource protection, user safety, and cost effectiveness while contributing to social and economic sustainability.
- Where appropriate, the Forest's transportation system is interconnected with federal, state, and local public roads and trails to facilitate access to lands, infrastructure (e.g., buildings, recreation facilities, water and wastewater systems, reservoirs, electronic and communication sites, and utility lines), and inholdings.
- National Forest System roads and trails provide recreation opportunities and access to recreation settings and places the public highly values.
- Roads and trails have minimal adverse environmental impacts.
- Unnecessary roads are returned to their natural condition.
- Unauthorized trails and unnecessary forest system roads or trails are not present on the landscape.
- Roads are located away from watercourses.
- Forest roads have a water drainage system that minimizes delivering sediment and pollutants to water bodies.

Standards

- Motor vehicle use by the public is only allowed as designated by the Motor Vehicle Use Map (MVUM). The MVUM identifies roads, trails, and areas where motorized travel is allowed.
- Commercial users must maintain roads commensurate with their use to prevent resource damage and deterioration of the road system.
- Road construction and maintenance will incorporate Best Management Practices.

Guidelines

- No new motorized routes or areas should be constructed in areas designated as Primitive in the Recreation Opportunity Spectrum (ROS).
- Construction of temporary roads in areas designated as Semi-Primitive Non-Motorized (ROS) should be avoided unless required by a valid permitted activity or management action. If authorized, roads should be constructed and maintained at the lowest maintenance level needed for the intended use.

- Bridges and transportation infrastructure found to serve as important habitat for at-risk species should not be demolished unless demolition is necessary for public safety.
- New and existing roads intersecting streams and fish habitat should accommodate appropriate movement for fish and other aquatic organisms.
- The footprint of new roads and trails constructed in the riparian area should be minimized.
- Mitigate or close roads impacted by geologic hazards (e.g., landslides, rock falls, or flooding) or hazard trees.
- Roads, culvert, and other water crossing infrastructure should be designed and located to allow for aquatic species organism passage unless a purpose of the crossing is to prevent movement of non-native species into upstream reaches.
- When temporary roads are necessary, designated stream crossings should be constructed to mitigate sedimentation and gradient changes and maintain bank stability. These crossings should be designated by the appropriate resource specialists and removed after use.
- New or redesigned stream crossings, such as bridges and culverts, should be wide enough to pass the bankfull width unimpeded.

Management Approaches

- Partnerships are developed with various interest and user groups to participate in evaluation, planning, and maintenance programs for both roads and trails.
- Prioritize decommissioning of roads and trails that impact flow regimes, are redundant routes, cause mass movement of soils and sediment, are built close to waterbodies, or have substantial negative impacts to at-risk species.
- Identify and keep road and trail management objectives current for all roads and trails on the Forest's transportation system.
- When designing or maintaining bridges consider incorporating design elements that reduce mortality and are beneficial to wildlife (e.g., habitat connectivity, roost sites).
- Expand partnerships with other federal, state, county and local government agencies, as well as associations, non-government organizations, outfitters and guides, local businesses, and other community groups, to leverage resources for mutual benefit to enhance and maintain forest roads.
- Prioritize the reconstruction and rehabilitation of existing roads over new construction.

Facilities

Description

The Forest manages a variety of buildings and infrastructure for a variety of purposes. These include administrative facilities (offices, warehouses, employee housing, and fire facilities) and public recreational facilities (visitor centers, campground or picnic area restrooms, storage buildings, etc.), associated water and wastewater treatment systems, dams, and electronic and communication towers.

Desired Conditions

- Forest facilities (e.g., buildings, campgrounds, water and wastewater systems, dams, etc.) provide for use and long-term sustainability of forest resources while protecting resources, health and safety.
- The construction and operation of facilities has minimal long-term impacts to soil and vegetation.
- Surrounding vegetative conditions and building material aid in the protection of infrastructure from wildfire.
- Facilities are energy-efficient, durable, maintained regularly, and serve their intended purpose.
- Facilities are in compliance with applicable accessibility guidelines and current building or occupancy standards.
- Recreation facilities are clean, in good repair, and provide a safe setting for visitors. Most meet accessibility guidelines.
- Recreation sites are designed and maintained to complement the forests scenic value, integrity, and character, and built so use does not cause damage to ecologically sensitive areas. Facilities are built with the emphasis on blending with the natural landscape.
- Developed recreation facilities such as campgrounds and picnic areas provide a range of visitor needs; most areas have simple facilities such as picnic tables and vault toilets, while some offer additional amenities such as paved roads, flush toilets, and shower facilities.
- Developed recreation areas are safe, well-organized, and capable of supporting concentrated visitor use. The number and size of constructed facilities are appropriate for the use level and activity types that occur at each site.

Standards

- Clearing of vegetation along rights-of-way, facilities, and special uses is limited to that which poses a hazard to the facility and its function.
- Underutilized facilities are transferred to other uses or ownerships, or decommissioned and disposed of.

Guidelines

- Emerging technologies and sustainable design concepts should be incorporated in new and existing facility design, maintenance, and renovation in order to improve energy efficiency, improve economy, conserve natural resources, improve functionality, and ensure consistency with the scenic character of the Tonto National Forest.

- Construction of new facilities in floodplains, wetlands, and other environmentally sensitive areas should be avoided. If unavoidable the disturbance should be minimized.
- Facility design and construction should consider measures to prevent or mitigate conflict or mortality of wildlife, fish, and rare plants.
- Facilities should be planned, designed, and managed to prevent resource damage, and should not adversely impact the scenic character.
- Constructed features should be maintained to support the functions for which they were built. When no longer utilized they should be decommissioned in efforts to minimize maintenance backlog and infrastructure deterioration, and to protect public health and safety.
- All infrastructure with employee occupancy shall be subject to the Occupational Safety and Health Administrative standards.

Management Approaches

- Develop and implement comprehensive preventative maintenance program for buildings and infrastructure to minimize major unplanned repairs or replacements.
- Prioritize infrastructure needs and investments for current need and long-term planning goals as identified in the facilities master plan, sustainable recreation plan, and other resource documentation, and health and safety requirements for employees and visiting public.

Lands and Access

Description

Land ownership is the basic pattern of public and private ownership of both surface and subsurface estates. Land status is defined as the ownership record of title to lands, including withdrawals, rights, and privileges affecting or influencing the use and management of National Forest System lands. Land status refers to the use or specific designations of a geographic area that provide general guidance and policy for the management of a defined geographic area. This guidance can take the form of use restrictions (such as withdrawals or dedication) and encumbrances (such as rights-of-way acquired or granted, reservations, outstanding rights, partial interests, or easements). Land status differs from land ownership. Land use is the current use of land, such as residential, commercial, industrial, or agricultural use, and access is transportation access to or through the Tonto National Forest, including pedestrian access from properties adjacent to the Tonto.

Forest access is provided through a system of non-motorized and motorized roads and trails. Gaining access to the forest by roads and trails is important for local residents to continue their traditional uses, which are integral in maintaining the social and cultural fabric of many communities. Local businesses and communities benefit from visitors who can safely access and experience the forest. Additionally, administrative access supports the ability of the forest to implement project work and promote health to the forest.

Desired Conditions

- The Tonto NF lands exist as a mostly contiguous land base that supports forest land resource desired conditions, reduces future management costs, responds to urban and community needs, protects critical resource areas, and increases recreation opportunities.
- The forest has a landownership pattern that supports forest land and resource goals and objectives, reduces future management costs, responds to urban and community needs, protects critical resource areas, increases recreation opportunities, and improves legal public access.
- The forest has a robust survey program and well maintained land status records to facilitate the resolution of landownership cases related to title claims, trespass, and unauthorized uses and to protect public access and achieve effective management of NFS lands.
- Forest boundaries, and other boundaries of areas with special management direction (e.g., designated wilderness) are clearly and appropriately marked.
- Land ownership patterns allow for accessibility, continuity, efficient management, and resource protection on and through Forest lands.
- Existing legal public access rights are protected and improved.
- Rights-of-way easements provide for adequate access to lands within the forest. Owners of private inholdings have reasonable and appropriate access through the Forest to their property.
- Adequate administrative access is provided so that multiple agency jurisdictional authorities are maintained and management responsibilities between agencies are upheld.

Standards

- Conflicting uses of activities in transportation and utility corridors will not be authorized.

- Utility and transmission line corridors will be designed to blend with the existing character of the landscape.

Guidelines

- When there are opportunities to acquire or convey non-federal lands by purchase or exchange, where lands are valuable for National Forest System purposes, the Forest Service should consider whether:
    - The conveyance or acquisition would reduce Forest Service administrative costs and improve management efficiency (e.g., reducing miles of landline boundaries and numbers of corners, special uses, title claims, rights-of-way grants and easements, numbers of allotments, and intermingled-ownership livestock pastures).
    - The conveyance or acquisition would reduce conflicts between Forest Service and private-landowner objectives, especially when conflicts are adversely impacting National Forest System management.
- Opportunities to acquire nonfederal lands by purchase or exchange, where lands are valuable for National Forest System purposes, should be considered when involving:
    - Lands with important characteristics that would enhance National Forest purposes, including access
    - Lands that will improve administration and reduce trespass
    - Lands that will add significantly to available National Forest goods and services
    - Lands that, if acquired, would reduce conflict between Forest Service and private-landowner objectives
    - Lands in mineralized areas that have low potential for a future patent, and where the mineral estate will be donated to the United States (only applicable to acquisition by exchange).
- The Tonto National Forest should bury electrical-utility lines of 33 kilovolts or less, and telephone lines, unless one or more of the following applies:
    - Scenic Integrity Objectives of the area can be met using an overhead line
    - Burial is not feasible due to geologic hazard or unfavorable geologic conditions
    - It would result in greater long-term site disturbance
    - It is not technically feasible.
- The forest should authorize proposals to use existing utility corridors without alternative-route analysis, subject to site-specific environmental analysis.
- The forest should consolidate occupancy of transportation or utility corridors and sites wherever possible and compatible.
- The Forest should proactively respond to threats to federally owned property rights (e.g., encroachment, trespass)

Management Approaches

- Consider developing a strategy to address issues related to known and suspected trespass and encroachment issues present on the forest.
- Update the existing landownership adjustment plan, which will identify lands desirable for acquisition, as well as identify parcels as suitable for exchange or sale.
- Seek cooperation of private landowners in the process of addressing access problems on the forest.
- Consult with local governments to synchronize Forest decisions for permits, leases, and easements with local planning and zoning ordinances where local and Forest objectives are complementary.

Chapter 3. Designated Areas and Management Areas Plan Direction

Designated Areas

Description

A designated area is an area or feature identified and managed to maintain its unique special character or purpose. These areas may be congressionally or administratively designated.

Desired Conditions

- Designated areas on the Forest retain the unique special character or purpose for which they were designated.

Wilderness

Description

The Tonto National Forest manages eight designated wilderness areas; Four Peaks (60,740 acres), Hell's Gate (37,440 acres), Mazatzal (252,500 acres), Pine Mountain (20,061), Salome (18,530 acres), Salt River Canyon (32,100 acres), Sierra Ancha (20,850 acres), and the Superstition Wilderness (160,200 acres). Wilderness areas are meant to be protected, have their wilderness character preserved, and administered for the use and enjoyment of the American people now and in the future. Wilderness areas are congressionally designated.

Desired Conditions

- Wilderness is valued by a broad segment of the public for the variety of ecosystem services and values it provides; including clean air and water, large blocks of protected wildlife habitat, primitive recreation opportunities, and other intrinsic, experiential, and symbolic values.
- Wilderness areas provide recreation opportunities where social encounters are infrequent and occur only with individuals or small groups so that there are opportunities for solitude. Visitors experience self-reliance, challenge, and risk while enjoying freedom to pursue primitive recreation activities.
- The environment within a wilderness is essentially unmodified. Natural occurring scenery dominates the landscape. Manmade features are rare and use natural or complimentary materials. They are present only when needed to provide for public safety or resource protection or reflect the historic and cultural landscape.
- Natural ecological processes are maintained with limited human intervention. Natural processes such as insect and disease and fires function in their natural ecological role. Invasive species are non-existent or in low abundance and do not disrupt ecological functions.
- Research conducted in wilderness does not have adverse effects to wilderness character.

Standards

- Management of designated wilderness shall comply with the most recent version of their respective management or implementation plans, when they exist.
- In designated wilderness, no more than 15 persons and 15 livestock are permitted within a single group unless otherwise noted in its management plan. Exceptions can include special use permits,

formal agreements, emergency services, and management activities for maintaining wilderness character.

- Outfitter-guide activities in wilderness shall include appropriate wilderness practices, such as Leave No Trace principles, and incorporate awareness for wilderness values in their interaction with clients and others.
- Non-conforming structures that are no longer in use and do not meet the desired conditions will be removed from wilderness.

Guidelines

- Management activities should be consistent in the long-term with the scenic integrity objective of Very High from the Scenery Management System (SMS) or equivalent protocol.
- A Minimum Requirements Analysis should be utilized when considering new activities and instances authorizing non-conforming uses.
- To protect wilderness character and scenic integrity, signage in wilderness should be limited to those that are essential for resource protection and user safety.
- Wilderness boundaries should be clearly identified through signage at official entry points and needed locations (e.g., informal access points), with features such as trail maps, boundary markers, and consistent signage.
- Limited use of non-colored blazes may be used where it is difficult to navigate the trail. Painted blazes should be removed.
- New trails constructed or designated in wilderness should be designed, built, and maintained as minimally to moderately developed (trail classes 1 or 2).
- Human-caused disturbed areas (e.g., compacted sites) that do not complement wilderness character to a natural appearance should be rehabilitated using native species or materials.
- Fire management activities should be consistent in meeting incident management objectives to minimize evidence of development in wilderness, this includes:
    - Spike camps should be located outside of wilderness,
    - Control lines and suppression action should be taken outside of wilderness,
    - Prescribed fire treatments should be designed to restore a natural fire regime that will increase the future likelihood that natural fires can be managed to achieve resource benefits.
- Maintenance and design of trails should be done in a sustainable manner to maintain wilderness character, reflect a primitive setting, and minimize impacts on wilderness, including trails leading into wilderness.

Management Approaches

- Where trends indicate that wilderness character is being degraded, consider adaptive management actions to improve wilderness character (e.g., promoting non-wilderness destinations, providing public information about periods of lower visitation, designating or restoring campsites to avoid overcrowding in high use areas, or evaluating the possible need for a permit system).

- Use proactive approaches in identifying and addressing visitor use management challenges before effects to resources become unacceptable.
- Collaborate with local partners, volunteers, Adopt-a-Trail organizations, and other entities to manage wilderness, including trail maintenance and construction.
- Wilderness management is guided by the elements outlined in the Forest Service's Wilderness Stewardship Performance Guidebook, or current protocol.
- Prioritize the decommissioning, realignment, or reconstruction of trails based on need, the amount of use it receives, and potential impacts on wilderness character and recreation opportunities.
- Prevent unauthorized use in wilderness with methods such as education, law enforcement, barriers and trail design.
- Dispatch a Resource Advisor-Fire Line (REAF) with a specialized knowledge of wilderness, or wilderness program specialist in the absence of a Wilderness REAF, to all fires in wilderness not suppressed during initial attack.
- Use interpretation and education to encourage visitors to adopt techniques, equipment, and ethics specific to wilderness. Utilize news releases, postings, permit issuance, and individual visitor contacts to inform visitors of areas of concentrated resource damage and use restrictions.

Wild & Scenic Rivers

Description

The Forest has two designated wild and scenic rivers; Fossil Creek 16.8 miles (9.3 miles are designated as Wild; 7.5 miles are designated as Recreational), and Verde River 40.5 miles (22.2 miles designated as Wild, 18.3 miles designated as Scenic). Wild and scenic rivers are meant to preserve outstanding free-flowing rivers, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values and are meant to be protected for the benefit and enjoyment of present and future generations. Wild and scenic rivers are congressionally designated.

Desired Conditions

- The outstandingly remarkable values, free-flowing condition, and classification of wild and scenic river corridors are preserved.

Standards

- Management of designated Wild, Scenic, and Recreational Rivers shall comply with the most recent version of their individual comprehensive river management plan (CRMP) or be managed to protect their ORVs and classification while completing a CRMP. The following CRMPs and any future versions shall be incorporated by reference and are part of the Forest Plan:
    - Fossil Creek Wild and Scenic River CRMP
    - Verde Wild and Scenic River CRMP
- Proposed water resources projects, including activities within the bed and banks and below the ordinary high water mark of the designated river, shall require a free flow analysis.
- Existing or new mining activity must minimize surface disturbance, sedimentation, pollution, and visual impairment.

Inventoried Roadless Areas

Description

Inventoried roadless areas (IRAs) contribute to ecological sustainability by providing clean drinking water and by functioning as biological strongholds for populations of threatened and endangered species. They provide large, relatively undisturbed landscapes that are important to biological diversity and the long-term survival of many at-risk species. They also serve as barriers against the spread of nonnative invasive plant species and provide reference areas for study and research. Inventoried roadless areas also contribute to social sustainability by providing opportunities for dispersed recreation, opportunities that diminish as open space and natural settings area developed elsewhere.

Desired Condition

- The roadless characteristics of each inventoried roadless area are not altered.

Arizona National Scenic Trail

Description

The Arizona National Scenic Trail (AZNST) stretches over 800 miles across Arizona from Mexico to the Utah border, showcasing the state's diverse vegetation, wildlife, wilderness and scenery, and providing unparalleled opportunities for hikers, mountain bikers, equestrians, and other trail users. The Omnibus Public Land Management Act of 2009 (P.L. 111-11) amended the National Trails System Act (P.L. 90-543) to designate the Arizona Trail as a national scenic trail.

The Tonto National Forest manages 200 miles of the AZNST on the Globe, Mesa, Tonto Basin, and Payson Ranger Districts.

Desired Conditions

- The AZNST is a well-defined trail in a highly scenic setting traversing the state of Arizona. The AZNST provides for high quality primitive hiking, equestrian opportunities, and other compatible non-motorized trail activities. Significant scenic, natural, historic, and cultural resources along the AZNST's corridor are conserved.
- Viewsheds from the AZNST have high scenic values. The AZNST provides visitors with expansive views of Arizona. The foreground of the AZNST (up to 0.5 mile on either side) appears natural and generally unaltered by human activities. The potential to view wildlife is high, and evidence of ecological processed such as fire as well as insects and disease exist.
- The AZNST has access points that provide various opportunities to select the type of terrain, scenery, and trail length (e.g., ranging from long distance to day use) that best provide for compatible outdoor recreation experiences.
    - Wild and remote backcountry segments of the AZNST provide opportunities for solitude, immersion in natural landscapes, and primitive outdoor recreation.
    - Front-country and easily accessible trail segments complement local community interests and needs and help contribute to their sense of place.
- Conflicts among trail users are infrequent.
- The AZNST is well maintained, signed, and passable. Alternate routes are made available in the case of temporary closures resulting from natural events (e.g., fire or flood) or land management activities.

Objectives

- All segments of the AZNST that are currently located on motorized roads will be relocated to non-motorized trails within 15 years.
- Portions of the AZNST within sensitive heritage sites will be relocated around the sites within 15 years.

Standards

- Management of the AZNST shall comply with the most recent version of the AZNST Comprehensive Management Plan.
- No common variety mineral extraction (e.g., limestone, gravel, etc.) shall occur within the AZNST corridor.
- Motorized events and motorized special use permits shall not be permitted or authorized on the AZNST.

Guidelines

- If management activities result in short-term impacts to the scenic character along the AZNST, mitigation measures should be included (e.g., screening, feathering, and other scenery management techniques) to minimize impacts at key locations (e.g., vistas) within the trail corridor.
- In order to promote a non-motorized setting, the AZNST should not be permanently re-located onto routes open to motor vehicle use.
- Trail facilities necessary to accommodate the amount and types of use anticipated on any given segment along the AZNST should be provided in order to protect resource values and for health and safety in order to preserve or promote a naturally appearing setting.
- To protect the AZNST's scenic values, special-use authorizations for new communication sites, utility corridors, and renewable energy sites should not be visually apparent within visible foreground (up to 0.5 miles).
- Linear utilities and rights-of-way should be limited to a single crossing per special use authorization of the AZNST unless additional crossings are documented as the only prudent and feasible alternative.
- New temporary and permanent road or motorized trail construction across or adjacent to the AZNST should be avoided unless necessary for resource protection, access to private lands, or to protect public health and safety.
- Special use permits that affect AZNST should include scenery management considerations.
- Management activities should maintain safe public access to AZNST.
- AZNST should be consistent with management direction in the trail establishment reports as well as the maintenance standards for trail class and use.
- Unplanned fires in the foreground (up to 0.5 miles) of the AZNST should be managed using minimum impact suppression tactics or other tactics appropriate for the protection on AZNST values. Prescribed fires in the foreground
- Use of national historic, scenic, and recreational trails for fireline should be avoided.

Management Approaches

- Work with volunteer groups, partners, local governments, and adjacent landowners to maintain AZNST corridor, the condition and character of the surrounding landscape, and to facilitate AZNST user support and reduces use conflict. Ensure that Incident Management teams are aware of the AZNST as a resource to be protected during wildfire suppression activities. Clearly identify fire suppression rehabilitation and long-term recovery of the AZNST corridor as high priorities for Incident management teams, BAER teams, and post-fire rehabilitation interdisciplinary teams.
- Establish appropriate visitor use levels for specific segments of the AZNST and take appropriate actions if there is a trend away from the desired condition.
- Identify and pursue opportunities to acquire lands or rights-of way within or adjacent to the AZNST as they become available.
- Provide consistent signage along the AZNST corridor at road crossings to adequately identify the AZNST and include interpretation at trailheads.
- Use side and connecting trails to access points of interest or Gateway Communities away from the AZNST.
- To protect the AZNST scenic values, consider not allowing highly visible, special-use authorizations for new communication sites, utility corridors, and renewable energy sites within the middle ground viewshed (up to four miles).
- Trail corridor protection strategies should closely follow the authorities of the National Trails System Act (16 USC 1246), using public lands whenever possible.
- Consider expansion of connector trails to accommodate user access when near towns and developed recreation facilities.

National Recreation Trails

Description

The Tonto National forest has two National Recreation Trail: Highline Trail (50 miles) on the Payson Ranger District and Six Shooter Canyon Trail (6 miles) on the Globe Ranger District. These trails offer spectaculat views and high quality recreation opportunities.

Desired Conditions

- National Recreation Trails provide a variety of opportunities for non-motorized recreation as well as a diversity of experiences with different levels of solitude, remoteness, and development.
- Conflicts among trail users are infrequent.
- Visitor access, use, and management activities maintain the recreational, ecological, cultural, traditional, and wildlife resource values for which the area is designated.
- Recreation opportunities support the needs and expectations of the diverse population in the surrounding area.

Guidelines

- Management activities within foreground views (up to 0.5 mile) from the trail should meet a Scenic Integrity Objective of at least high.

- Management activities in the middle ground (up to four miles) and background (from middle ground to horizon) should meet or exceed a Scenic Integrity Objective of at least Moderate.
- Special use permits that affect National Recreation trails should include scenery management considerations.
- Management activities should maintain safe public access to National Recreation trails.
- National Recreation trails should be consistent with management direction in the trail establishment reports as well as the maintenance standards for trail class and use.
- Trail corridor protection strategies should closely follow the authorities of the National Trails System Act (16 USC 1246), using public lands whenever possible.
- Avoid use of national historic, scenic, and recreational trails for fireline.

Management Approaches

- Work with volunteer groups, partners, local governments, and adjacent landowners: to maintain trail corridors, to maintain the condition and character of the surrounding landscape, and to facilitate support by trail users that promote Leave No Trace principles and reduces user conflict.

Scenic Byways

Experimental Forest

Description

The Sierra Ancha Experimental Forest is located within Tonto NF administrative boundary and is managed by the Rocky Mountain Research Station, not the Tonto NF. Desired Conditions

- The Sierra Ancha Experimental Forest is being managed to fulfill the direction in the establishment plan.

Research Natural Areas

Description

Research natural areas (RNAs) are part of a national network of ecological areas designated in perpetuity for research and education and/or to maintain biological diversity on National Forest System lands. RNAs are principally for non-manipulative research, observation, and study. There are 3 established Research Natural Areas (RNA) – Buckhorn Mountain, Bush Highway and Haufer Wash.

Desired Conditions

- The ecological features and values for which each RNA was established are protected.
- Research natural areas have excellent examples of the ecological features for which they were designated, with little evidence of human activity or disturbance. These areas provide opportunities for research, study, observations, monitoring, and for those educational activities that do not modify the conditions for which the areas were established.
- Visitor access and use occurs at levels that maintain the research, education, and biodiversity values of the established and proposed RNAs.
- Established and proposed research natural areas function as reference areas to study natural ecological processes and as baseline areas for measuring long-term ecological change. Natural conditions and processes are maintained.
- Genetic diversity in established and proposed research natural areas is preserved and maintained.

Standards

- Overnight camping and recreation campfires are prohibited in RNAs.
- Prohibit authorization of special use permits (e.g., commercial tours/outfitter guides) except in support of approved research or education in established RNAs.

Guidelines

- To support the area's purpose, human activities, permitted uses, and types and levels of access should be managed to protect the values for which they were designated, established, or proposed.
- In research natural areas, fire management activities should be designed and implemented to mimic natural fire processes, and should be compatible with ongoing research.
- Allotment management plans should have provisions to protect the uniqueness and/or ecological condition of these designated areas that occur within an active grazing allotment.

Management Approach

- Collaborate with appropriate agencies, partners, and universities regarding scientific opportunities in research natural areas and to help educate the public about their designated purposes and uses.

Significant Caves

Description

The Tonto National Forest contains many significant caves and karst resources. The National Caves Resources Management and Protection Act (P.L. 110-691) defines a significant cave as a cave located on National Forest System lands that has been evaluated and shown to possess features, characteristics, values, or opportunities in one or more of the following resource areas: biota; cultural; geologic-mineralogic-paleontologic; hydrologic; recreational; or educational-scientific for scientific, educational or recreational purposes; and which has been designated "significant" by the forest supervisor. The Forest Service implementation regulations for FCRPA establishes rules for determination of cave significance (36 CFR §290.3). Supervisors are responsible for nominating all known caves for determination of significance. Caves determined to be significant will be governed under provisions of the FCRPA with an objective to secure, protect, and preserve significant caves for the perpetual use, enjoyment, and benefit of all people, and to foster increased cooperation and exchange of information with those who utilize caves for scientific, educational, or recreational purposes.

Desired Conditions

- Current status of features, characteristics, values, or opportunities for which caves have been designated or nominated as "significant" are maintained.

Standards

- Specific information concerning significant caves on the Forest will not be made available to the public. This information will be treated as confidential and secured in such a manner as to prevent access by non-authorized individuals.

Management Approaches

- Consider working collaboratively with Central Arizona Grotto, and other speleological groups, in management activities such as seasonal surveys, closures, and wildlife-friendly gate development to protect significant cave characteristics.

- The Forest will utilize volunteers and cost-share agreements to complete projects when applicable. Responsibilities of volunteers will be established prior to the approval of their work agreement.

Management Areas

Description

A management area represents a management emphasis for an area or several similar areas on the landscape. Plan components for a management area may differ from forest-wide guidance by:

- Constraining an activity where forest-wide direction does not;
- Constraining an activity to a greater degree than forest-wide direction; or
- Providing for an exception to forest-wide direction, when forest-wide direction is in conflict with the management emphasis of the management area.

Eligible Wild & Scenic Rivers

Description

In the Tonto NF, all rivers were evaluated to determine their eligibility for inclusion in the National Wild & Scenic Rivers System. This evaluation resulted in 22 possible segments with outstandingly remarkable values (ORVs) on the Forest. Each river is assigned a preliminary classification of Wild, Scenic, or Recreational, based on the free flowing condition and development level in and around the river at the time it is deemed eligible.

Desired Conditions

- The free flowing condition and outstandingly remarkable values of eligible segments are preserved.
- Preliminary classifications remain intact until further study is conducted or until designation by Congress.
- Eligible wild rivers are free of impoundments and generally inaccessible except by trail, with watersheds or shoreline essentially primitive and water unpolluted.
- Eligible scenic river segments are free of impoundments, with watersheds or shoreline still largely primitive and undeveloped but accessible in places by roads.
- Eligible recreational river segments are accessible by road or railroad, may have some shoreline development and may have had an impoundment or diversion in the past.

Standards

- Eligible rivers shall be managed to protect or enhance existing ORVs and classifications until designated or released from consideration.
- For eligible wild segments, major public use areas such as campgrounds, interpretive centers, or administrative headquarters must be located outside of the river corridor (typically ¼ mile either side of river) for segments with wild classifications. Minimum facilities such as refuse containers may be provided to protect and enhance water qualities and other river values.
- For eligible scenic or recreational segments, facilities must be located and designed to harmonize with the natural and cultural settings, must protect river values including water quality, and must be screened from view to the extent possible.
- Any authorized project within ¼ mile of an eligible river segment must protect the outstandingly remarkable values and classification that provide the basis of the river's eligibility for inclusion in the system.

- Locatable minerals are subject to valid existing rights, existing or new mining activity on an identified eligible river are subject to regulations in 36 CFR Part 228 and must be conducted in a manner that minimizes surface disturbance, sedimentation, pollution, and visual impairment. Leasable minerals must include conditions necessary to protect the values of the river corridor that make it eligible for inclusion in the National System. Disposal of saleable mineral materials is prohibited for Wild classifications, and for Scenic and Recreational, allowed if the values of the river corridor that make it eligible for inclusion in the National System are protected.
- Any portion of a utility proposal that has the potential to affect the river's free flowing character must be evaluated as a water resources project.
- When any water resource project is considered, the project shall first be analyzed for effects on a rivers free flow, water quality, and identified ORV, with adverse effects to be prevented to the extent of the existing agency authority (such as special use authority).
- When management activities are proposed that may compromise the ORVs, potential classification, or free flowing character of an eligible Wild and Scenic river segment, a suitability study shall be completed for that eligible river segment prior to initiating activities.

Guidelines

- In eligible rivers classified as Recreational or Scenic, timber harvest should be allowed to maintain or restore the values for which the eligible river was identified.
- New roads or motorized trails should generally not be constructed within ¼ mile of a wild eligible river segment.
- When motorized use is necessary in any eligible segments, use should be carefully defined and impacts mitigated.
- Domestic livestock grazing should be managed to protect ORVs.
- Project management activities within an eligible wild and scenic river corridor should consider opportunities for enhancing ORVs.

Lakes and Rivers Management Area

Description

The Lakes and Rivers Management Area consists of Roosevelt Lake, Apache Lake, Canyon Lake, Saguaro Lake, Horseshoe Lake, Bartlett Lake, Verde River (below Bartlett Lake), and the Lower Salt River (below Saguaro Lake). Lakes on the Tonto National Forest provide 80% of water based recreation in Central Arizona. The lakes provide many recreation opportunities such as boating, fishing, picnicking, swimming, and camping. The Lower Salt River provides opportunity for tubing, fishing, picnicking, rafting, kayaking and can attract 7,000 recreationists on a busy day. The Verde River provides swimming, picnicking, and kayaking opportunities. Most access and facilities in these areas is highly developed including campgrounds, picnic sites, boat launches, fishing piers, and paved parking lots.

Fees are charged at most developed recreation sites in this area under the Federal Land Recreation Enhancement Act. Fees have been charged here since 1996. The current fee system is a combination of off-site vender sales and on-site fee machine sales. There are many Special Use Permits issued for marinas, resorts, and shuttle services that provide additional recreation opportunities and services to Forest visitors.

The purpose of the Lakes and Rivers Management Area is to provide additional guidance on the Forest's lakes and rivers in order to sustain the high-use recreation in the area while still working to protect the ecosystems surrounding these water resources.

Desired Conditions

- High quality and diverse recreation opportunities are provided while minimizing user conflicts and public health and safety issues. User conflicts affecting public safety hazards are mitigated.
- Recreational opportunities and information are easily accessible to the public, allowing for enjoyment and use by diverse demographics.
- Recreation sites in this area are managed in a way that minimizes congestion on highways and impacts to resources.
- Recreation sites are staffed at an appropriate level allowing for recreation sites to meet the reasonable expectations of the public.
- Capacity of use types is determined and managed to maintain sustainability of forest resources.
- Sustainable recreation practices are promoted across recreation sites allowing for the protection of natural resources despite the high levels of recreation.
- Fences are used to keep livestock out of developed recreation sites.
- Vegetation and invasive species are managed (e.g., removing reeds from developed recreation sites) to increase recreational opportunities.

Standards

- Management decisions in this area will be consistent with the latest approved Tonto Fee Program Proposal and Tonto Sustainable Recreation Plan, or other applicable protocols.
- Livestock shall not be authorized in developed recreation sites.
- Authorize only one commercial marina each at Bartlett, Saguaro, Canyon, Apache, and Roosevelt Lakes to be privately owned and operated under special use permit.
- Determine appropriate number of users for recreation areas to protect resources and provide for public health and safety.
- Identify areas to implement controls (e.g., permit system, shuttle system, or overflow parking) to control capacity issues.

Guidelines

- Authorized commercial services and vendors (e.g., marinas, restaurants, and resorts) should maintain natural setting that does not detract from the landscape.
- Signs and information should be provided in Spanish where practicable.

Management Approaches

- Work with partners to develop a transportation system that allows for access to the recreational opportunities provided and helps to reduce congestion of roadways and trails.
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- Work with law enforcement and partners to gather data to identify needs for special orders. Work with the public on major changes to management practices that aim to reduce public health and safety issues (e.g., alcohol abuse and litter).
- Work to eliminate or redirect activities that are not appropriate in and around high concentrations of people (e.g., drone use, recreational shooting, off-highway vehicle use, and excessive alcohol consumption).
- Educate the public and work with partners to ensure the accumulation of trash is kept at a level that is generally acceptable to public.
- Work with permit holders to develop a system of litter clean up and trash disposal and identify areas to implement a ban on disposable containers to reduce litter.
- Work with partners to ensure litter and human waste are kept at levels that do not contaminate the water beyond acceptable levels according to federal state and local laws.
- Prioritize sanitation and basic maintenance of facilities on fee sites in this management area. Contracts, volunteers, partners, employees and outside funding sources should all be utilized to maximize efficiencies and provide the public the best experience possible.
- Work with partners and volunteers to help maintain recreation sites, perform resource restoration, and provide education to the public.

Apache Leap Special Management Area

Description

Congress designated Apache Leap a special management area in December 2014 for the purpose of preserving the natural character of Apache Leap, allowing traditional uses by Indian tribes, and protecting and conserving the cultural and archaeological resources of the area.

The Apache Leap Special Management Area (SMA) is located on the eastern edge of the Town of Superior in the Globe Ranger District. The Apache Leap SMA includes approximately 839 acres of land currently under federal and private ownership. Upon completion of the Southeast Arizona Land Exchange (Section 3003 of PL 113-291), the Apache Leap SMA will include only federal lands.

The potential for this management area is currently being analyzed as part of the Apache Leap Special Management Plan and Environmental Assessment. A management area and associated plan components may be developed as appropriate depending on the decision.