Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Southwest Region/Tonto National Forest MB-R3-12-13 December 2023

Tonto National Forest
Land Management Plan

Coconino, Gila, Maricopa, Pinal, and Yavapai Counties, Arizona

Cover Photo: View of Battleship Mountain in the Superstition Wilderness, credit: Kim Stahl

Tonto National Forest
Land Management Plan

Responsible Official: Neil Bosworth, Forest Supervisor
Tonto National Forest
2324 East McDowell Road
Phoenix, AZ 85006

For additional Information: Tonto National Forest
2324 East McDowell Road
Phoenix, AZ 85006
602-225-5200
www.fs.usda.gov/goto/tontoplan

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Chapter 1. Introduction

This land and resource management plan (referred to as the forest plan throughout this document) guides the Tonto National Forest in fulfilling its stewardship responsibilities to best meet the current and future needs of the people and communities we serve. This plan provides the vision, strategy, and constraints that guide integrated resource management, provide for ecological sustainability, and contribute to social and economic sustainability on the forest and within the broader landscape.

Plan Organization

Chapter 1. Introduction briefly describes the purpose and framework of the land management plan, including, a description of the plan area, social and economic context, key ecosystem services, need for change, and forest plan framework and organization, which includes a description of plan components and other plan content.

Chapter 2. Forestwide Plan Direction includes the following plan components that are applicable forestwide: 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 are all combined in this chapter. This includes plan components that allow ecosystems to adapt to climate change and for the management of key ecosystem services.

Chapter 3. Management Area Plan Direction contains the plan components applicable to specific areas that call for management that is in addition to, or deviates from, forestwide plan direction. A management area represents a management emphasis for an area or several similar areas on the landscape. Management direction is based on applicable authorities and the specific purposes for which the area was created, recommended, or designated.

Chapter 4. Monitoring outlines the monitoring of plan implementation and 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 plan provides a framework for subsequent monitoring and evaluation designed to inform adaptive management.

References includes a list of the in-text citations used in the main text of the document. It includes information such as author, year of publication, title, and publisher and/or web address.

Appendix A. Maps includes maps of the management areas listed in Chapter 3.

Appendix B. Proposed Probable and Possible Future Actions contains a list of probable actions, as established through objectives, and possible actions as identified in management approaches. Possible actions are the types of projects that the forest may accomplish over the life of the plan 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.

Appendix C. Species Common Name Crosswalk contains a list of species common names used throughout the forest plan and their associated scientific names.

Purpose of the Plan

The Tonto National Forest is a unit of the United States Forest Service, 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 to achieve the agency mission is the Land and Resource Management Plan (also referred to as the "forest plan").

The National Forest Management Act of 1976 requires each national forest to develop a land management plan and amend or revise the plan every 10 to 15 years. The previous Tonto National Forest Plan was originally approved in 1985 and went through 31 amendments to accommodate situations in specific projects or to reflect changes in social, economic, or ecological conditions.

A forest plan guides and constrains Forest Service personnel and resource management, not the public. Management of National Forest System 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 land management plans but can if needed for clarity. Any constraint on the public needs to be imposed by law or regulation, or through the issuance of an order by the responsible official under 36 CFR part 261, Subpart B.

The forest plan is the result of a plan revision process conducted in accordance with the 2012 Land Management Planning Rule (36 CFR 219) and its 2015 planning directives (FSH 1909.12). Development of this forest plan was an iterative process utilizing best available scientific information (36 CFR 219.3), 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 members of our forest communities.

Plan Area Description and Context

The Tonto National Forest is one of six national forests in Arizona. It is the fifth largest national forest in the United States covering 2,965,716 acres of rugged and spectacularly beautiful country. It is in central Arizona, bordered by Phoenix to the south, the Mogollon Rim to the north, and the San Carlos and Fort Apache Indian Reservations to the east. It is divided into six ranger districts: Cave Creek, Globe, Mesa, Payson, Pleasant Valley, and Tonto Basin.

The Tonto National Forest overlaps five counties: 23 percent in Maricopa County, 59 percent in Gila County, 11 percent in Yavapai County, seven percent in Pinal County, and 0.01 percent in Coconino

County. The Tonto abuts the Prescott National Forest to the northwest, the Coconino National Forest to the north, and Apache Sitgreaves National Forest to the northeast (see figure 1). This forest plan covers all of the National Forest System lands within the Tonto National Forest boundary, excluding the Sierra Ancha Experimental Forest which is managed by the Rocky Mountain Research Station.

The Tonto National Forest has a rich heritage reaching thousands of years into the past. Originally home to several prehistoric Indian groups who hunted and gathered wild plants in the Mazatzal and Sierra Ancha Mountains and along the Salt and Verde Rivers and their tributaries, it was colonized more than a thousand years ago by a related group of people known today as the Hohokam.

The forest plan area contains historic properties that demonstrate human occupation and use for approximately the past 11,000 years (Wood *et al.* 1989). Occupation and use of the present Tonto National Forest area by various Native American groups covers this entire time span and continues today with traditional use areas that connect the past with living communities. The forest plan area has been managed by the USDA Forest Service for a little more than 100 years. Traditional communities continue to use the Tonto National Forest for economic, social, and religious purposes.

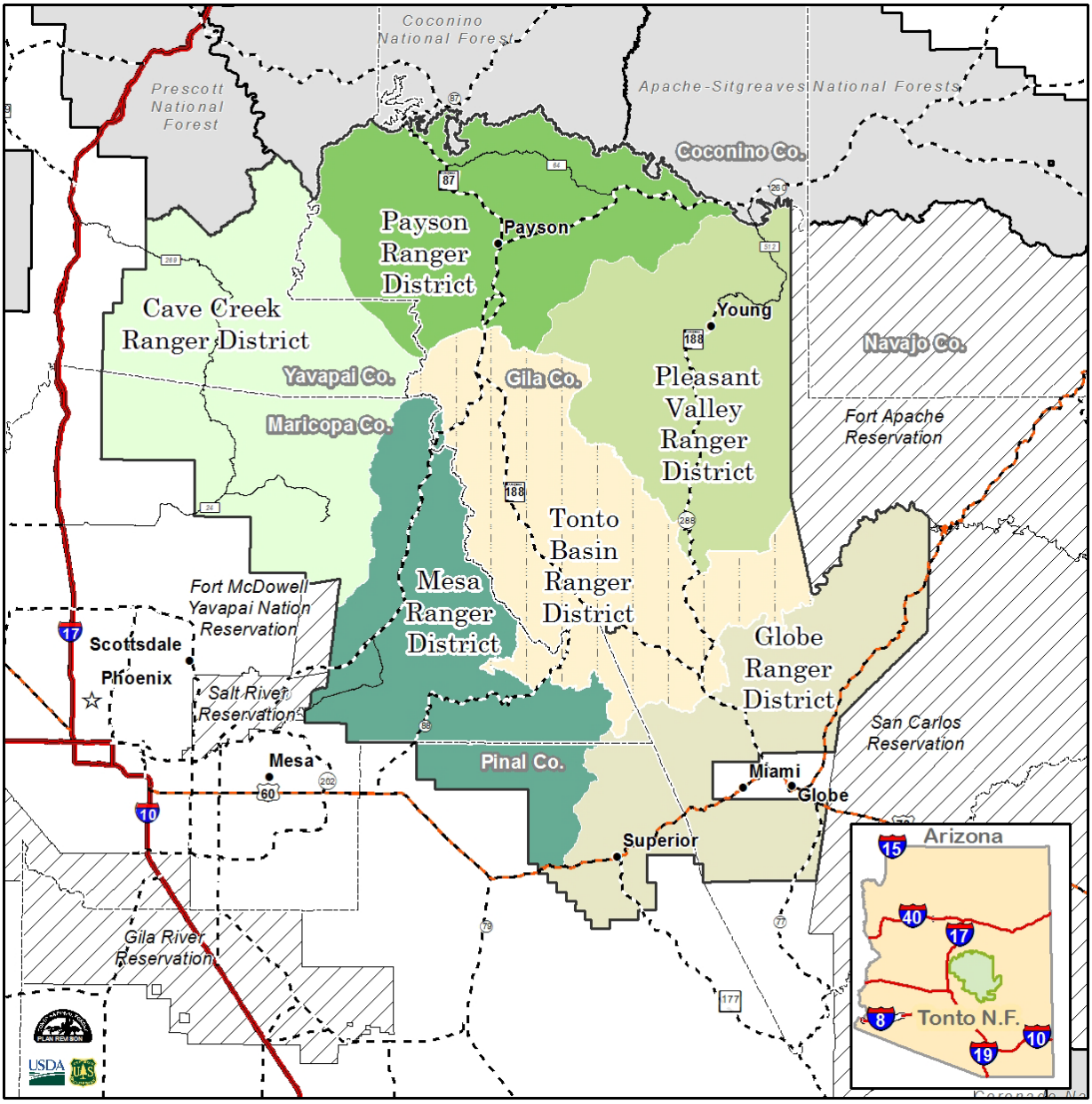

Figure 1. Tonto National Forest vicinity map

Present evidence (e.g., artifacts and ruins) indicates the continuous human use and occupation of the Tonto National Forest going back to nearly the earliest introduction of people into the Southwest. During most of this time, it was only lightly occupied by hunters and gatherers who developed a sustainable relationship with the environment that appears to have been quite successful for at least 9,000 years. About 2,000 years ago, that hunting and gathering relationship changed, and the land became home to more settled populations. The descendants of these early people are found today among the O'odham Tribes of southern Arizona living on the Salt River Pima-Maricopa Indian Community and Gila River Indian Community Reservations and among the Hopi and Zuni Tribes of northern Arizona and western New Mexico (Wood *et al.* 1989).

By about 1,500 AD, the area began to be settled again, this time by people unrelated to the prehistoric occupants. One of these groups, the Apache, came into the area from the northeast and eventually spread south from the Mogollon Rim nearly to the Salt River Valley. The other group was the Yavapai, who arrived from the west, eventually settling in the western and southern parts of the current Tonto National Forest area. Some areas of the Tonto were occupied by both groups. The Apache and Yavapai were primarily hunters and gatherers who lived much like the archaic people had thousands of years before them (Wood *et al.* 1989). By the time of European contact, they had begun to practice small-scale agriculture in addition to hunting and gathering.

The historic era on what is now the Tonto National Forest began with the initial interface between Europeans and the Yavapai and Apache. During the Civil War, nonnative Americans began exploring central Arizona for gold and silver (Wood *et al.* 1989). Conflicts between these new settlers and the Native Americans arose, particularly after the nonnatives began settling in, and taking over, hunting and gathering areas to use for grazing cattle and sheep. A prolonged period of warfare between the Apache and Yavapai and the U.S. Army resulted in removal of the native people from what would become the Tonto National Forest.

After this period, nonnative settlement grew quickly, spurred initially by mining with settlements rising up in several locations to exploit gold, silver, and copper operations. Right behind the miners came the ranchers, eager to exploit new markets created by the mining communities. Eventually the gold and silver ran out. However, copper became a major economic force in the development of mining districts anchored by historic towns and cities in and around the Forest such as Globe, Miami, and Superior. Elsewhere on the Tonto National Forest, emphasis shifted to ranching. Sheep were an important element in the new economy for several generations but, over time, cattle became the predominate livestock.

The Tonto National Forest was created in 1905 to protect the Salt River Watershed. Seventy percent of all surface water on National Forests in the Southwest is on the Tonto National Forest (Lee *et al.* 2005). The Tonto also became the location for the first major reclamation project in the United States: the construction of Roosevelt Dam in Tonto Basin (Marcus 1983). This dam was built to supply electricity and manage the flow of water into the canals of the Salt River Valley. The building of the dam and the creation of the national forest to protect it and provide water to Phoenix and Mesa were critical elements in the political process that gave statehood to Arizona (Salt River Project 2011).

The water and flood control provided by Roosevelt Dam resulted in a population explosion in the Salt River Valley. The Salt River Valley included the rapidly growing city of Phoenix, which was founded to provide hay to the cavalry stationed at Fort McDowell on the Verde River. The small Latter-day Saints (also known as Mormon) settlement of Mesa developed into a major agricultural center following sometimes literally, in the footsteps of the prehistoric Hohokam irrigations system fed by the Salt River. This growth also changed the face of the Tonto National Forest. By the end of the 1920s, three more massive dams were constructed on the Salt River and two on the Verde River (Wood *et al.* 1989).

The Tonto National Forest produces an average of 350,000 acre-feet of water each year. The six major reservoirs on the forest have the combined capacity to store more than two million acre-feet of water. To put this supply in context, in Arizona the average family of four uses about 0.45 acre-feet of water per year and about 4.5 acre-free of water is applied to grow an acre of cotton. In 2015, 56 percent of the water supply for the city of Phoenix came from the Salt and Verde Rivers, which are protected by the Tonto National Forest (Arizona Department of Water Resources 2019; Friswold 2016). Management efforts are directed at protecting both water quality and watershed and riparian area conditions.

Currently, the Tonto National Forest serves as recreational oasis for millions of visitors at the edge of the Phoenix Metropolitan area, one of the largest cities and fastest growing locations in the United States. The Tonto 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.

Communities such as Payson, Globe, Superior, and Young benefit from surrounding National Forest System lands that provide wood product harvesting, mining, recreation opportunities, and livestock grazing. Forest Service management supports the continued relationship between the Tonto National Forest and local communities, while its economic influence reaches beyond those nearby communities to the Phoenix Metro Valley.

Distinctive Roles and Contributions

Every forest in the National Forest System provides distinctive roles and contributions to the surrounding local area and larger region. The diversity of vegetation, from Saguaro-cactus-studded deserts to pine forested mountains, reflects the change in altitude across the Tonto National Forest from 1,300 up to 7,900 feet elevation. This allows for outstanding recreational opportunities throughout the year, whether on lake beaches or in the cool pine forests. The social and economic environment surrounding the Tonto National Forest is as diverse as the natural environment. It includes large urban areas and many rural communities that rely on the goods and services provided by the Forest, such as forage for livestock production, water for consumption, recreation opportunities, and forest products.

Of primary and increasing importance are the watersheds and the ability to capture the precipitation that recharges aquifers, supplying domestic water sources to the cities and towns surrounding the Tonto National Forest. The Forest contributes to the supply of water used by households, industry, power suppliers, and agriculture, helping to sustain human populations in and around several rural communities, towns, and cities in central Arizona—in addition to the greater Phoenix area, the 10th largest metropolitan area in the country. The Salt and Verde Rivers are major sources of surface water supplying the Phoenix metropolitan area.

Firewood from the Tonto National Forest is how many people heat their homes at a large economic savings over propane, natural gas, and electricity. Other wood products that come off the forest, such

as manzanita, novelty wood, and plant materials, are also important cultural and social products gathered. Although the forest is not heavily timbered, about four million board feet of saw logs, fuel wood, and other forest wood products are selectively harvested each year. The forest has increased the number of treatments it implements to improve forest health, reduce the undesirable effects of wildland fire, and make forest products more available by intending to treat 10 – 20 million board feet annually.

The lands within what is now the Tonto National Forest continue to provide the opportunity for collecting plants and other natural resources for subsistence and medicinal use and for conducting ceremonial activities important to Native American Tribes. Native American Tribes may also have an interest in natural, historical, cultural, and other resources of the Tonto National Forest, with an emphasis on restoration to pre-reservation conditions. The Tonto National Forest regularly consults with the Ak Chin Indian Community, 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, Tohono O'odham Nation, Tonto Apache Tribe, White Mountain Apache Tribe, Yavapai-Apache Nation, and Yavapai-Prescott Tribe.

Most visitors come to know the Tonto National Forest through their direct recreation experiences. The Tonto National Forest is one of the most-visited "urban" forests in the United States, with approximately three million visitors annually (National Visitor Use Monitoring 2016). These visitors come to enjoy the array of year-round recreation opportunities. In the winter, national and international visitors flock to Arizona to share the multi-hued stone canyons and Sonoran Desert environments of the Tonto's lower elevations with Arizona residents. In the summer, visitors and residents seek refuge from the heat at the Salt and Verde Rivers and their chain of six man-made lakes. Visitors also head to the high country to camp amidst the cool shade of tall pines and fish the meandering trout streams under the Mogollon Rim. Visitation of cultural sites on the Tonto has long been, and continues to be, one of the primary sources for cultural services available to visitors, particularly when those resources have been enhanced by interpretive developments and outreach activities. Outfitting and guiding services on the Tonto provide an important link between visitors and the ecological treasures of the Tonto.

Eight designated wilderness areas, encompassing 588,575 acres on the Forest, are managed to protect the unique natural character of the land and to ensure that primitive recreational opportunities exist for the public. These areas on the Tonto National Forest contribute to ecological sustainability by providing large expanses of natural landscapes that reflect ecological conditions that would normally be associated with the area without human intervention. In addition, portions of the Verde River and Fossil Creek have been designated as wild and scenic rivers to preserve outstandingly remarkable values in a free-flowing condition for the enjoyment of present and future generations. Both designated wilderness and wild and scenic rivers contribute to the economic sustainability of the surrounding communities by drawing visitors interested in experiences provided through these

designations and through the potential to access funding from individuals and groups with an interest in preserving these resources.

Wildlife, fish, and plant species are a key part of the unique character inherent to the Tonto National Forest. The Forest contributes to the recovery of 19 federally-listed threatened and endangered species, as well as designated critical habitat, and is a signatory on conservation agreements for Arizona bugbane and Sonoran Desert tortoise. The Tonto National Forest also supports 12 species of native fish, accounting for 39 percent of all stream reaches in Arizona with five or more native fish (Lee *et al.* 2005). Additionally, the regional forester has identified 52 species of conservation concern (SCC) in the planning area. Maintaining quality habitat to support and improve wildlife diversity is a primary management consideration. Fish and wildlife are enjoyed by the many visitors who come to the forest to hunt, fish, and view wildlife in the dramatic landscapes of the southwest. The Forest provides diverse opportunities for the public to enjoy fish and wildlife by managing habitats that support healthy populations of animals, and by providing access to these wild areas. While hunting, fishing, and wildlife viewing are well recognized as recreational activities, they also contribute to social, cultural, and economic components of the neighboring communities.

Many areas of the Tonto National Forest are highly mineralized, and the Forest Service has an important role in administering mineral exploration and extraction while minimizing surface resource impacts, consistent with mining regulations and policy. The Forest has a rich history of producing copper, gold, silver, lead, zinc, uranium, molybdenum, manganese, asbestos, mercury, and many other metals and minerals. This history spans over 150 years and includes 38 mineral districts with recorded production.

Approximately 26,000 head of cattle are permitted to graze on the Tonto National Forest. Because of its year-round availability, permitted use is extremely high, and land allotments must be carefully managed to avoid over-utilization and declining productivity of the range. Rangelands on the Forest are valued for ecosystem services beyond their traditional value as a forage production system. Additional ecosystem services include the potential to store carbon in the soil and plant biomass, and food production. Further, the process of herding and managing the forage-consuming livestock has high cultural and social value for many Arizonans and often helps contribute to local economies.

With some of Arizona's more prominent peaks located on the Tonto, the national forest supports an important communication link for the state. Radio, television, and telephone networks use the electronic sites on these mountains to facilitate state and national communications. Many of the high-capacity transmission lines that bring Phoenix its power also cross the Tonto National Forest.

Balancing conflicting resource needs and providing for comprehensive multi-use management, consistent with the conservation ethic, is a continuous objective in administering the resources of the Tonto National Forest.

Key Ecosystem Services

Ecosystems on the Tonto National Forest provide many benefits to people; due in part to the features and landscapes found on the forest. The forest is home to six large reservoirs, numerous ecotonal zones, riparian communities, important rivers, and beautiful geologic features and mountain ranges.

Key ecosystem services are the benefits that people obtain from ecosystems. They are a product of functioning ecosystems that affect social, cultural, and economic conditions both on the forest and the broader landscape. The Millennium Ecosystem Assessment groups these services into four broad categories: provisioning, such as the production of food and water; regulating, such as the control of climate and disease; supporting, such as nutrient cycles and crop pollination; and cultural, such as spiritual and recreational benefits (Assessment, M.E. 2005). Ecosystem services provide a useful framework for land and resource planning by helping the public and land managers identify and understand services provided by a landscape, and human use and dependence on those services (Smith *et al.* 2011). Consideration ensures that the complete value of the forest is incorporated into the planning process.

During the assessment process, the Tonto National Forest identified five key ecosystem services provided by resources within the forest plan area. Key ecosystem services on the Tonto National Forest include:

- water for consumption;
- water for recreation;
- habitat for hunting, fishing, and watchable wildlife;
- forage for livestock; and
- cultural heritage.

The key ecosystem services identified and evaluated were chosen because they (1) were characterized as important to the public as a resource that they either valued or were concerned with; and/or (2) have been identified as important by forest leadership. Key ecosystem services were considered in the development of plan components to ensure their availability in the future. See associated sections in Chapter 2. Forestwide Plan Direction. These key ecosystem services are important in the broader landscape outside of the forest plan area and are influenced by the forest plan.

Adaptive Planning and Monitoring

Forest planning is a continuous process that includes: (1) assessment; (2) plan development, amendment, and revision; and (3) monitoring. The intent of this forest planning framework is to create an integrated approach to the management of resources and uses, incorporate the landscape-scale context for management, allow the Forest Service to adapt to changing conditions, and improve management based on monitoring and new information.

An adaptive forest plan recognizes that there is always uncertainty about the future of natural systems and the timing and type of disturbances. Social conditions and human values regarding the management of national forests are also likely to change. Given that the setting for land management plan implementation will change over time, the forest plan incorporates an effective monitoring program that is capable of detecting change, with an adaptive flexibility to respond to those detected changes. The forest plan monitoring plan (Chapter 4) recognizes key management questions and identifies measurable indicators that can inform the questions. When conditions change beyond what was anticipated in the forest plan, a responsive process using narrow amendments can be used to adjust plans between revisions.

The planning framework creates a structure within which land managers and partners work together to understand what is happening on the landscape. It is intended to establish a flexible plan that allows a national forest to adapt management to changing conditions and improve management based on new information and monitoring.

The forest plan monitoring phase comes after the land management plan has been revised. The monitoring phase includes:

a. Designing management activities proposed to implement the forest plan in a way that will yield specific information and support learning.

b. Analyzing monitoring results using scientific methods that reduce uncertainty and improve understanding of system behavior. Well-designed monitoring programs and management activities contribute to better scientific analysis of these results. Monitoring and analysis also evaluate progress to achieving desired conditions and objectives of the forest plan and the assumptions used in developing the plan.

c. Learning from the results of the analysis and share how the results either confirm or modify the existing assumptions or provide feedback on management effectiveness. Learning is proactively shared with land managers and the public.

d. Adapting planning and management activities based on learning from the results of the analysis. This adaptation takes the form of modifying assumptions, models, data, and understanding of the system. This knowledge is then used to inform the planning process that leads to adjustment of plans and projects.

Use of Best Available Scientific Information

The 2012 Planning Rule requires the responsible official use the best available scientific information to inform the development of the forest plan, including plan components, the monitoring plan, and plan decisions. The Rule does not require that scientific information be developed, but that it should be based on scientific information that is already available. New studies or the development of new information is only required by other laws or regulation. In the context of the best available scientific information, the word available means that the information currently exists in a form useful for the planning process, without further data collection, modification, or validation. Analysis or

interpretation of the best available scientific information may be needed to place it in the appropriate context for planning.

Development of this revised plan, under the 2012 Planning Rule and directives, was an iterative process utilizing best available scientific information, regional guidance, internal feedback, and collaboration with a wide variety of government agencies, federally recognized tribes, non-governmental organizations, and publics. The foundation from which the plan components were developed for the forest plan was provided by the assessment[1] of the Tonto National Forest and best available scientific information and analysis therein. From this foundation, the interdisciplinary team used the best available scientific information to develop the proposed action and the alternatives and analysis in the environmental impact statement (December 2019).

Refer to the final environmental impact statement and draft record of decision for a full list of references. The planning record includes all the references and materials used in determining the best available scientific information for each resource in the forest plan. This information was determined to be accurate, reliable, and relevant to issues being considered.

Need to Change the 1985 Forest Plan

To accurately revise the 1985 forest plan, there needed to be a good understanding about which direction to move towards, or the need to change. Since the release of the Tonto National Forest Land and Resource Management Plan in 1985 (1985 Forest Plan) (USDA Forest Service 1985), the Tonto National Forest and surrounding communities experienced considerable socioeconomic and ecological change and there were significant improvements in science and technology. As a result of dynamic conditions, the forest plan must be a flexible and adaptable document.

The conditions, trends, and sustainability of the ecological, social, and economic resources on the Tonto National Forest were published in the March 2017 (USDA Forest Service 2017a and b[2]) as part of the assessment required by the 2012 Planning Rule (36 CFR 219). The assessment helped identify portions of the 1985 Forest Plan that were working well and meeting desired management conditions, and those that were not and needed to be changed through the forest plan revision process.

Using the results and trends from the assessment report, the Tonto National Forest developed themes describing overarching needs and concepts to be considered and addressed through the forest plan revision process to create sustainable resources, goods, and services. These themes were to:

- maintain, improve, or restore ecosystems on the Tonto National Forest;

[1] The conditions, trends, and sustainability of the ecological, social, and economic resources on the Tonto National Forest were published in March 2017 (USDA Forest Service 2017a) as part of the assessment required by the 2012 Planning Rule (36 CFR 219).

[2] These documents are available on the planning website https://www.fs.usda.gov/main/tonto/landmanagement/planning (see Final Assessment Report of Conditions, Trends, and Risks to Sustainability Volume I and Volume II).

- provide for plant and animal habitat diversity, including at-risk species;
- increase resiliency of ecosystems and incorporate adaptive management;
- sustainably manage water resources;
- facilitate accessible, sustainable, and diverse recreation opportunities to a growing public,
- preserve the unique cultural and historic character of the land while providing opportunities to engage with local heritage;
- ensure the sustainability of key ecosystem services and forest attributes that contribute to values associated with the Tonto;
- recognize and enhance the Tonto's role in contributing to local economies;
- emphasize on-going collaborative efforts and partnerships while striving to develop new and long-lasting relationships;
- develop a monitoring strategy that provides information for rapid responses to changing conditions; and
- allow for adapting to fluctuations in forest budgets over the life of the forest plan when planning towards desired conditions.

The Tonto National Forest utilized the results of the assessment and discussions with resource specialists and members of the public on the themes above to develop needs to change statements. These statements, found in the Tonto National Forest Needs to Change document (USDA Forest Service 2017c), paint a picture of the strategic changes necessary to address issues identified by the assessment and present a vision for future management of the Tonto National Forest. The needs to change statements are broken down by those that are applicable to: a) all resources; b) ecological sustainability; and c) social, cultural, and economic sustainability.

Applicable to All Resources

Generally, there is a need for plan components that incorporate best available scientific information and reduce the complexity of plan components related to management areas that fragment the landscape by their arrangement, boundaries, and differing management direction. There is also a need for plan components to be adaptable to future changes in technology, tools, and communication style demands and for management approaches to emphasize public education about the Tonto National Forest's diverse ecological, social, and economic resources, multiple-use philosophy, public laws and regulations, and management strategies. There is a need for a monitoring program that tracks progress toward desired conditions and allows for responsive adaptive management with available resources.

There is also a need to incorporate plan components to focus on the necessity to strengthen existing relationships, promote new ones, and incorporate strategies that prioritize partnerships, emphasize better coordination and collaboration with other forests, local governments, and tribes.

Ecological Sustainability

There is a need for the revised forest plan to incorporate changes that help with the ecological sustainability of the forest. This would require desired conditions and other plan components that support ecosystem integrity and habitat diversity at multiple spatial scales. There is a need to incorporate plan components that increase ecosystem resiliency[3] to changing environmental conditions and stressors, including the impacts of exotic and invasive species.

The forest plan should incorporate management approaches that prioritize native plant material development for revegetation, restoration, and rehabilitation to provide for the conservation of ecosystem diversity and maintain healthy ecosystem functions. The revised forest plan should emphasize landscape scale restoration efforts across the forest, and promote a diversity of seral states where appropriate, vegetation function, and species composition. Additionally, there is a need to recognize fire-adapted ecosystems, the role of fire on the landscape, and its use as a management tool, including planned and unplanned ignitions.

There is a need for management approaches to address current and foreseeable stressors in desert ecosystems and to better understand post-disturbance recovery of desert species. This includes the need to develop standards and guidelines that promote the maintenance, restoration, and monitoring of soil condition and function (e.g., hydrology, stability, and nutrient cycling) by improving and maintaining sufficient ground cover.

There is a need to develop plan components for the long-term health and sustainability of watersheds, including desired conditions that identify appropriate riparian characteristics (e.g., biodiversity, connectivity, water availability) to promote functionality and resiliency. This requires standards and guidelines that minimize ecological impacts of multiple uses in riparian areas and reduce pollutant runoff into streams. Plan components developed for watershed and riparian health should focus on the sustainable stewardship of groundwater and groundwater dependent ecosystems[4] (e.g., springs, wetlands, riparian areas, and perennial waters) and their interconnections to ensure stream channels and floodplains are dynamic and resilient to disturbances.

For wildlife on the Tonto, there is a need to develop plan components that address terrestrial and aquatic habitat linkages and connectivity for species migration and movement across the landscape.

[3] Resiliency is the ability of an ecosystem and its component parts to absorb, or recover from the effects of disturbances through preservation, restoration, or improvement of its essential structures and functions and redundancy of ecological patterns across the landscape. In the context of climate change adaptation, strategies should Increase ecosystem resilience by minimizing the severity of climate change impacts, reducing the vulnerability, and/or increasing the adaptive capacity of ecosystem elements.

[4] Groundwater dependent ecosystems are communities of plants and animals whose extent and life processes are dependent on access to or discharge of groundwater and can include springs, wetlands, and perennial, intermittent or ephemeral streams. (USDA Forest Service 2022)

Plan components need to provide for conservation and recovery of federally recognized species, as well as maintain viable populations of species of conservation concern.

Social, Cultural, and Economic Sustainability

There are also needs of the revised forest plan to incorporate changes that help with the social, cultural, and economic sustainability of the Tonto National Forest. There is a need for desired conditions that recognize the Tonto's role in contributing to local economies through multiple-use related activities and products (e.g., recreation, tourism, timber, and grazing). Plan components are needed to promote infrastructure (e.g., roads, trails, recreation, and administrative facilities) that is maintained at a sustainable level for multiple use activities. Because of the contributions of the Tonto National Forest to our local communities, there is a need to include plan components for the forest's key ecosystem services including: water for consumption; water for recreation; habitat for hunting, fishing, and watchable wildlife; sustainable and productive rangelands; and cultural heritage.

There is a need for plan components that incorporate a wide range of silvicultural practices to promote forest health, resiliency, and sustainability, including the availability of forest products (e.g., firewood, medicinal and ceremonial plants, and edible plants). There is a need for plan components to allow flexibility in rangeland management to react to changing conditions such as drought, fire, social and economic needs to maintain or restore ecological integrity of rangelands.

There is a need to include plan components for sustainable recreation management, including flexible and efficient management of special uses, to ensure that recreation resources are integrated into all resource management decisions. Plan components address user conflicts (e.g., recreational shooting and hikers, equestrians, and cyclists, and between motorized and nonmotorized users) and changing trends in services, activities, and types of facilities desired by the public while taking the long-term sustainability of recreation infrastructure (e.g., trails, facilities, and roads) into consideration.

The forest plan should incorporate desired conditions that address transmission corridors and renewable energy generation, including wind, solar, biomass, and geothermal, while protecting natural resources, cultural and sacred sites, traditional tribal activities, and scenery. There is a need for plan components regarding the use of salable materials (e.g., commercial contracts and personal uses like rock hounding).

There is a need for plan components aimed at managing for Native American traditional cultural properties and sacred sites, and non-Native American traditional cultural properties, while conserving anonymity of such sites across the forest. Plan components should consider the value and importance of areas that may be identified as a sacred site or part of an important cultural landscape by tribe. That said, management approaches are needed to protect historic properties and tribal use that could be damaged or destroyed if the wrong kind of fire burns through them. There is a need for desired conditions in the forest plan that address the alignment of heritage resources management objectives (e.g., the management of historic properties and landscapes, sacred sites, contemporary uses) with

other resource management objectives (e.g., ecosystem restoration, rangeland management, and recreation).

Plan components related to National Forest System lands acquisitions, disposals, and exchanges are developed along with plan components that encourage the protection of existing public access and address the acquisition of new public access opportunities. Additionally, there is a need for management approaches on addressing known and suspected trespass and encroachment issues present on the Tonto National Forest.

Forest Plan Framework and Organization

The forest plan provides broad, program-level direction for management of National Forest System lands and resources. The forest plan outlines desired conditions for the resources on the Tonto National Forest and provides management direction for how projects will address future risks to sustainability of resources, goods, and services the forest produces. 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 forest plan.

A land management 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);
- does not affect valid existing rights established by statute or legal instruments; and
- does not repeat laws, regulations, or program management policies, practices, and procedures that are in the Forest Service directive system, unless needed to help with forest management.

Plan Components and Other Plan Content

A forest plan consists of plan components and other plan content. Each of these is discussed below:

Plan Components

Plan components guide future project and activity decision-making, are required in the forest plan, and are the main substance of the document. They include desired conditions, objectives, standards, guidelines, suitability of lands, and goals. Plan components should: (1) provide a strategic and practical framework for managing the Tonto National Forest; (2) should be applicable to the resources

and issues of the forest; and (3) should reflect the forest's distinctive roles and contributions. As a whole, the set of plan components must provide for social, economic, and ecological sustainability and multiple uses. Plan components were developed collaboratively with input from a variety of external and internal stakeholders, with broad interdisciplinary representation. Plan components do not need to reiterate existing law, regulation, or policy, although some is repeated here to emphasize it. Desired conditions are the only plan component required for each resource. An interdisciplinary team refined the final form and organization of the forest plan to be understandable, useable, and integrated. The forest plan components are described as:

Desired conditions are specific social, economic, and ecological conditions of the forest plan area, or a portion of the forest 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 (36 CFR 219.7(e)(1)(i)).

Desired conditions help frame the purpose and need during project-level planning. Desired conditions are not commitments or final decisions approving projects and activities. The desired conditions for some resources may currently exist, but for other resources they may only be achievable over a long period of time.

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 (36 CFR 219.7(e)(1)(ii)). 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 and in implementation the Tonto National Forest may exceed the measurable component in the given time period.

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

Standards can be thought of as the sideboards the Tonto National Forest will operate within as we develop projects. They are mandatory constraints on project and activity decision-making established to help achieve or maintain the desired conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements (36 CFR 219.7(e)(1)(iii)). 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 (36 CFR 219.7(e)(1)(iv)). Guidelines serve the

same purpose as standards, but they differ from standards in that they provide flexibility in defining compliance, while standards are absolute constraints. In other words, guidelines are mandatory with some flexibility on how they are implemented, so long as they are meeting the intent of the existing guideline. Projects may deviate from the exact language of the guideline so long as they are meeting purpose of the guideline and any deviation from the purpose or intent 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 forest plan also identifies lands within the forest plan area as not suitable for uses that are not compatible with desired conditions for those lands. Identifying suitability of lands for a use in the plan indicates that the use may be appropriate but does not make a specific commitment to authorize that use. Final suitability determinations for specific authorizations occur at the project- or activity-level decision-making process. Generally, the lands on the national forest are suitable for all uses and management activities appropriate for national forests unless identified as not suitable. 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 (section 219.11) (36 CFR 219.7(e)(1)(v)).

Goals are broad statements of intent, other than desired conditions, usually related to process or interaction with the public. Goals are expressed in broad, general terms, but do not include completion dates like an objective (36 CFR 219.7(e)(2)). Goals were not utilized in the Tonto National Forest Draft Land and Resource Management Plan.

Other Plan Content

Every plan must have management areas or geographic areas or both. The forest plan may identify designated or recommended areas as management areas or geographic areas. Management areas were used in the forest plan to represent deviations in forest management and to identify designated and recommended areas. See Chapter 3 for management areas and associated plan components.

The forest plan also contains “other required plan content,” including identification of priority watersheds, identification of the roles and contributions of the forest plan area, a plan monitoring program, and proposed and possible future actions. Other plan content is not plan components.

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

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

Required Plan Content

Priority watersheds: Every plan must identify watersheds that are impaired or at risk for priority maintenance or restoration. See the Watershed and Water Resources section in Chapter 2. Forestwide Plan Direction.

Distinctive Roles and contributions: Every plan must describe the roles and contributions of the forest plan area to ecological, social, and economic sustainability within the broader landscape. See Chapter 1. Introduction.

Monitoring program: Every plan must include a plan 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 forest plan area may be needed. See Chapter 4. Monitoring.

Proposed probable and possible future actions: Every plan must describe proposed and possible actions that may occur during the life of the forest plan in 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. See Appendix B. Proposed Probable and Possible Future Actions.

Optional Forest Plan Content

Management approaches 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 and coordination activities, or future inventories or assessments. Not every resource topic area has a management approach heading as they are not required or a plan component. Changes to management approaches do not require plan amendments.

Background and/or 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 forest plan. These sources[5] are important in designing projects and activities to achieve desired conditions.

[5] Many are posted on the Tonto National Forest website https://www.fs.usda.gov/resources/tonto/landmanagement/resourcemanagement and are also available in the project record.

Plan Codes

The plan uses a coding system to reference plan components more easily and to determine where the plan components apply. Codes consist of a series of letters and numbers to establish what resource area and plan component is being referenced. The coding is structured in an AA-BB-CC-## format.

The first series of letters reference a specific resource area (e.g., ERU for ecological response units or REC for recreation), see table 1. The middle two series of letters reference the sub-resource (level 2 and level 3) of the specific resource area, if present. These can include lands of specific character or use type (e.g., DES for desert ecosystems or DIS-WB for dispersed recreation water-based) found within the resource. The last series of letters reference the type of plan component or other type of plan content (e.g., **DC** for desired condition, **O** for objective, **S** for standard, **G** for guideline, and **MA** for management approach). Each code then ends with a number that aligns with the individual plan component to differentiate between similar type plan components. All plan components have an associated code, but it is important to note that they may not include every series of letters within the coding structure.

Table 1. Acronyms used for plan codes

Acronym	Term
ALSMA	Apache Leap Special Management Area
AQ	Air Quality
CUH	Cultural and Historic Resources
CVK	Caves and Karsts
DWMA	Designated Wilderness Management Area
DWSRMA	Designated Wild and Scenic Rivers Management Area
EG	Energy Production and Delivery
ERU	Vegetation and Ecological Response Units
ERU-DES	Desert Ecosystems
ERU-IC	Interior Chaparral
ERU-MCD	Mixed Conifer–Frequent Fire
ERU-MCW	Wet Mixed Conifer-Mixed Conifer with Aspen
ERU-MEWMPO	Madrean Encinal Woodland and Madrean Pinyon Oak
ERU-PJC	Pinyon-Juniper Evergreen Shrub
ERU-PJJUG	Pinyon-Juniper Grass and Juniper Grass
ERU-PJO	Pinyon-Juniper Woodland
ERU-PPE	Ponderosa Pine-Evergreen Oak
ERU-PPF	Ponderosa Pine Forest
ERU-SDG	Semi-Desert Grasslands
EWSRMA	Eligible Wild and Scenic Rivers Management Area
FC	Facilities
FF	Fire and Fuels
FP	Forestry and Forest Products
GRZ	Rangelands, Forage, and Grazing
INS	Invasive Species
IRAMA	Inventoried Roadless Areas Management Area
LA	Lands and Access
LRMA	Lakes and Rivers Management Area
MMAM	Mining, Minerals, and Abandoned Mines
NTMA	National Trails Management Area
PV	Partnerships and Volunteers
RD	Roads
REC	Recreation
REC-DEV	Developed Recreation
REC-DIS	Dispersed Recreation
REC-DIS-MO	Motorized Recreation
REC-DIS-NMO	Nonmotorized Recreation
REC-DIS-RS	Recreational Shooting
REC-DIS-WB	Water Based Recreation
REC-WR	Wildlife Based Recreation
RERU	Riparian Ecological Response Units
RMZ	Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones
RNBAMA	Designated and Recommended Research Natural Areas and Botanical Areas Management Area
RWMA	Recommended Wilderness Management Area
SC	Scenery
SCMA	Significant Caves Management Area
SL	Soils
SRHMA	Salt River Horse Management Area
SU	Special Uses
SWBMA	Saguaro Wild Burro Territory Management Area
TRB	Tribal Relations and Areas of Tribal Importance
WAT	Watersheds and Water Resources
WFP	Wildlife, Fish, and Plants

Examples of the coding system for each different resource levels can be seen in figure 2 and figure 3.

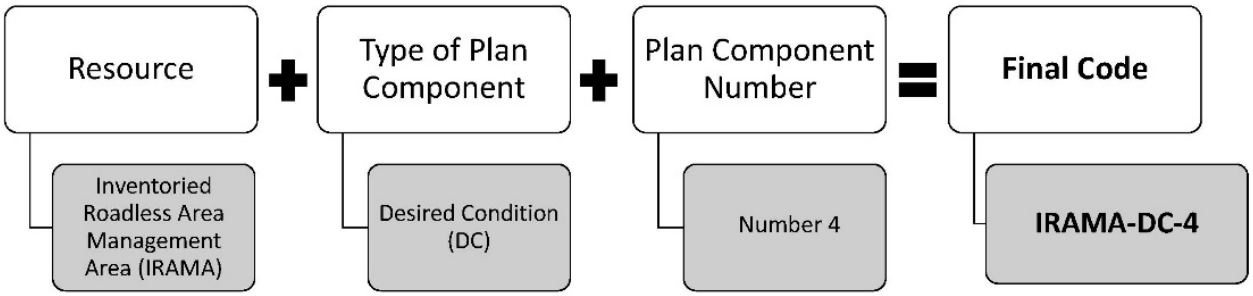

Figure 2. Example of plan component code for inventoried roadless area desired condition

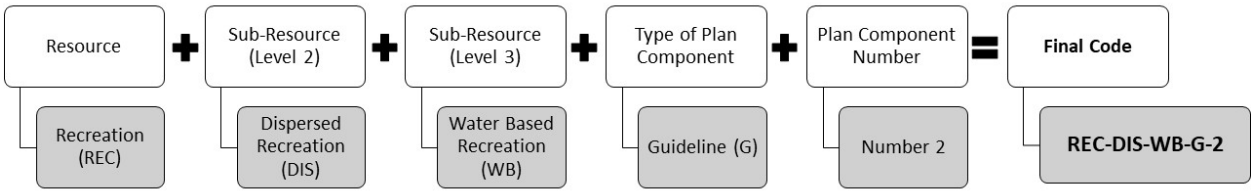

Figure 3. Example of plan component code for a guideline related to water-based recreation

To help with readability, plan components in Chapter 2 are listed by resource with management direction headers that are shaded in green and accompanied by codes (acronyms). The green shading and codes distinguish the plan components from other sections of the plan. Management approaches are shaded in orange for readability.

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 best available scientific 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 from project- and plan-level monitoring regarding the effectiveness of management strategies.

To ensure a project is consistent with the plan, its design and implementation should consider its setting, any management areas it overlaps, and plan guidance related to any resources or conditions that maybe be present in the area (e.g., cultural resources, invasive species, riparian areas, and wildlife). Additionally, they should consider any potential conflicts with other authorized projects and activities. While not every project will move all resource areas towards desired conditions, all standards and guidelines contained in the plan must be met as a project requirement, or a plan amendment is needed. Project design should be consistent with forest-wide plan direction except where superseded by 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. The monitoring plan contained in Chapter 4 of this document, in conjunction with project-level monitoring, will provide the framework to support adaptive management on the Tonto National Forest.

Interrelationships of Forest Plan Content

This plan is not an assemblage of program plans that have unique plan components for every resource. What is important is that resource plan components are looked at as a whole and combined to meet the requirements for ecological integrity, diversity of plant and animal communities, multiple-use management, ecologically sustainable production of goods and services, and they contribute to economic and social sustainability.

To effectively manage to the desired conditions of a resource, project planners and decision makers must ensure they use the entire plan and not just the plan components listed for that resource. Effective integrated resource management recognizes the interdependency of ecological, social, cultural, and economic resources and how management of one resource can influence the management or condition of other resources.

At the end of many resource descriptions, there is a paragraph that lists other resources identified as the most important related resources to the section. It is recommended that these are reviewed, as well as other resources not listed, but considered important to a specific project by project planners and decision makers.

Consistency of Projects with the Forest Plan

All projects and activities authorized by the Forest Service must be consistent with the land management plan (16 USC 1604(i) and 36 CFR 219.15(b-c)). If a proposed project or activity is not consistent with a plan component, the responsible official has the following options (subject to valid existing rights):

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

The following criteria should be used in determining if a project or activity is consistent with the forest plan (36 CFR 219.15(d)):

1. **Desired conditions and objectives**. A project is consistent with plan desired conditions and objectives when it:

    a. Maintains or makes progress toward attaining one or more plan desired conditions or objectives applicable to the project;

    b. Has no effect or only a negligible adverse effect on the maintenance or attainment of applicable desired conditions or objectives;

    c. Does not foreclose the opportunity to maintain or achieve any of the applicable desired conditions or objectives over the long term, even if the project (or an activity authorized by the project) would have an adverse short-term effect on one or more desired conditions or objectives; or

    d. Maintains or makes progress toward attaining one or more of the plan's desired conditions or objectives even if the project or activity would have an adverse but negligible effect on other desired conditions or objectives.

The project decision document should include an explicit finding that the project is consistent with the plan's desired conditions and objectives and briefly explain the basis for that finding. In providing this brief explanation, the project decision document does not need to explicitly address every desired condition and objective set forth in the plan. Rather, a general explanation is all that is needed, so long as the consistency finding is made based on a consideration of one of the four factors noted above.

When a categorical exclusion from the National Environmental Policy Act documentation applies and there is no project decision document, the finding and explanation should be in the project record.

2. **Standards**. A project or activity is consistent with a standard if the project or activity is designed in exact accord with the standard. The project documentation should confirm that the project or activity is designed in exact accord with all applicable plan standards.[6] The responsible official can make a single finding of consistency with all applicable standards, rather than there needing to be individual findings.

3. **Guidelines**. A project or activity must be consistent with all guidelines applicable to the type of project or activity and its location in the plan area. A project or activity can be consistent with a guideline in either of two ways:

[6] For timber projects there should positive findings for meeting the timber standards and guidelines because the 2012 Planning Rule requires plans to have direction to meet those NFMA requirements. There must be specific findings that the project meets the requirements. So, if there is clearcutting, there must be an explanation why in this situation, clearcutting is the optimum method to use. Also, while the National Environmental Policy Act analysis describes the effects to soils, watershed, and other resources, there must be a finding that these resources will not be “irreversibly damaged.”

a. The project or activity is designed exactly in accord with the guideline, or

b. A project or activity design varies from the exact words of the guideline but is as effective in meeting the purpose of the guideline to contribute to the maintenance or attainment of relevant desired conditions and objectives.

The project documentation should briefly explain how the project is consistent with the applicable plan guidelines. When the project is designed in exact accord with all applicable guidelines, the project documentation should simply confirm that fact in a single finding of consistency with all applicable guidelines. When the project varies from the exact guidance of one or more applicable guidelines, the project documentation should explain how the project design is as effective in meeting the purpose or intent of the guideline(s) as the exact guidance in the guideline(s).

4. **Suitability**. A project with the purpose of timber production may only occur in an area identified as suitable for timber production (16 U.S.C. 1604(k)). Except for projects with a purpose of timber production, a project or activity can be consistent with plan suitability determinations in either of two ways:

    a. The project or activity is a use for which the area is specifically identified in the plan as suitable; or

    b. The project or activity is not a use for which the area is specifically identified in the plan as suitable, but is not a use precluded by a "not suitable" determination.

The project documentation should confirm that the project or activity conforms to items 1 or 2 above. Any substantive changes to plan components require a plan amendment[7], with appropriate analysis as required under the National Environmental Policy Act. Administrative changes[8] can be used to make changes, such as updates to data and maps, management approaches, and relevant background information; to fix typographical errors; or to update other required content of a plan (content that are not plan components). The public will be notified of all administrative changes to the forest plan.

Plans include other content, such as, background, collaboration strategies, context, existing conditions, introduction, monitoring questions, other referenced information or guidance, program emphasis, program guidance, program priorities, possible actions, roles and contributions, management challenges, or strategies, but such other content are not matters to which project consistency is required.

[7] A plan may be amended at any time. Plan amendments may be broad or narrow, depending on the need for change, and should be used to keep plans current and help units adapt to new information or changing conditions. Except when an administrative change is appropriate, a plan amendment is required to add, modify, or remove one or more plan components, or to change how or where one or more plan components apply to all or part of the plan area (including management areas or geographic areas). (36 CFR 219.13(a))

[8] An administrative change is any change to a plan that is not a plan amendment or plan revision. Administrative changes include corrections of clerical errors to any part of the plan, conformance of the plan to new statutory or regulatory requirements, or changes to other content in the plan (§ 219.7(f)). (36 CFR 219.13(c))

Chapter 2. Forestwide Plan Direction

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

The 2012 Planning Rule sets forth the direction to: "maintain and restore National Forest System land and water ecosystems while providing for ecosystem services and multiple uses. The planning rule is designed to ensure that plans provide for the sustainability of ecosystems and resources; meet the need for forest restoration and conservation, watershed protection, and species diversity and conservation; and assist the Agency in providing a sustainable flow of benefits, services, and uses of National Forest System lands that provide jobs and contribute to the economic and social sustainability of communities." (36 CFR 219).

Management of the Tonto National Forest involves many distinct resources that are integrated with each other. In this chapter each resource is presented in an individual section with management direction and associated plan content (narratives and management approaches). Socioeconomic resources (e.g., timber/forest products, grazing, cultural resources and traditional land uses, and recreation) are presented in the first half of this chapter. Ecological resources (e.g., vegetation, soil, water, air, and wildlife) are presented in the second half of this chapter. In the beginning of this chapter, a partnerships and volunteers section emphasize the importance of relationships in management of each resource. Despite this resource-by-resource structure, it is important to recognize that land management encompasses multiple resources that are uniquely distinct yet intricately entwined. To serve the myriad of Tonto National Forest users and effectively manage resources, it is critical to know how one resource impacts the other; therefore, the plan is presented all as one, striving to represent the symbiotic relationship each resource has with the other.

The plan components are organized by section, distinguished by headings that are shaded in green, and accompanied by acronyms for codes to distinguish them from other sections of the plan. Management approaches are not plan components but are shaded in orange for readability. More information about plan components and other plan content can be found in Chapter 1. Introduction under Plan Framework and Organization.

Partnerships and Volunteers (PV)

Relationships are a key factor that will 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 essential to help care for the land and serve the people. Partnering with others across boundaries creates a dynamic of shared work, assets, and ideas that lead to ecological, social, and cultural projects that benefit the greater forest community. While the forest plan does not provide direction beyond the scope of managing Tonto National Forest resources, partners and volunteers can be part of strategies that help to achieve desired resource conditions.

Desired Conditions (PV-DC)

01 Partners and volunteers work effectively to increase capacity for managing forest resources, assist in communicating with and educating the public, and achieve restoration and sustainable recreation goals.

02 Staff and leadership work effectively with partners and local communities, seizing on opportunities to improve natural resource management and recreational experiences.

03 Open communication with partners about expectations and partnering opportunities exists for growth in relationships.

04 The Tonto National Forest and its diverse communities and partners are engaged and work 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 forest provides.

05 Shared responsibility, stewardship, and strong connections exists between the Tonto National Forest, our partners, and communities on projects leading to greater outcomes and benefits to forest users and the communities we serve.

Objectives (PV-O)

01 Develop at least one new partnership each year with an organization or club who will provide quality long-term volunteer services and projects for the Tonto.

Management Approaches for Partnerships and Volunteers (PV-MA)

01 Work collaboratively with partners and volunteers on forest issues and enable them to take action to move projects forward when they can provide funding, volunteers, and other resources for environmental analysis or project implementation.

02 Use a collaborative approach when developing and implementing projects by forming partnerships with other Federal and State agencies, local professional organizations, for-profit and not-for-profit organizations, and strategic partners and volunteers.

03 Work to implement methods to recruit, train, and coordinate volunteers that are consistent across the Tonto National Forest.

04 Consider ways to engage underrepresented communities in forest projects and activities.

Recreation (REC)

Rising from the Sonoran Desert to the ponderosa pine-covered slopes of the Mogollon Rim, the Tonto offers year-round recreation opportunities across different elevations and vegetation. Its landscape ranges from the legendary Sonoran Desert with its unique flora and fauna to a mixed conifer forest. Nestled in its canyons and valleys are six man-made lakes, or reservoirs, that many visitors seek out to escape from the summer heat. The Tonto has high recreational use year-round and is often referred to as an urban forest for its proximity to the Phoenix metropolitan area and the forest's approximately 2.5 million visitors annually (National Visitor Use Monitoring 2016).

Outdoor recreation is a multi-billion-dollar industry, continuously growing, and a vital economic opportunity for the communities the Tonto serves. More than three out of every four Americans participate in outdoor recreation each year. The Tonto National Forest offers many diverse recreation opportunities including hiking, mountain biking, horseback riding, rock climbing, off-highway vehicle recreation, motorized and nonmotorized boating, whitewater paddling, hunting, and fishing, wildlife viewing, scenic driving, developed and dispersed camping, backpacking, target shooting, back country aviation and much more. Every year, new forms of recreation often emerge on the forest.

The overarching goal for the recreation program is to provide sustainable recreation opportunities for its visitors. Sustainable recreation is defined as the set of recreation settings and opportunities on the National Forest System that is ecologically, economically, and socially sustainable for present and future generations. On the Tonto National Forest, it is a management philosophy that considers the individual and social benefits of recreation; the integrity of the landscapes, environment, and resources necessary to provide exceptional recreational opportunities; and the benefits to local communities whose economies are often dependent on outdoor recreation and tourism on public lands.

Recreational settings and experiences are defined by the recreation opportunity spectrum (ROS)[9] which identifies various levels of development available for recreational activities. The spectrum uses physical, biological, social, and managerial classes, ranging from primeval to paved to guide recreation planning and management. These recreation opportunity spectrum classes ranging from least to most developed are primitive, semi-primitive nonmotorized, semi-primitive motorized, roaded natural, rural, and urban[10].

Desired recreation opportunity spectrum classes are mapped forestwide at a broad scale. Local inconsistencies may exist. The map of desired recreation opportunity spectrum classes can be updated in the future to resolve these inconsistencies or to account for changed conditions. Finer-

[9] Details about the recreation opportunity spectrum can be found here: https://www.fs.usda.gov/detail/tonto/landmanagement/planning/?cid=stelprdb5412121.

[10] The recreation classes included in the recreation opportunity spectrum are defined in FSM 2300, chapter 2310, section 2311.

scale project design may identify more precise boundaries for desired ROS settings than are represented on the forestwide allocation map.

The plan components below apply to all recreation (e.g., developed recreation and dispersed recreation). Refer to Special Uses section in Chapter 2. Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (REC-DC)

01 Recreation contributes to enhanced quality of life for all our visitors and the communities we serve. Recreation opportunities support healthy lifestyles and local businesses and jobs, contribute to vibrant local economies, and conserve water quality, at-risk species habitat, landscapes, and cultural resources.

02 Recreation and recreation-related projects support the public we serve, and the Tonto National Forest has a reputation of being an "amazing place that you have to visit…" All are invited and feel welcome.

03 Recreation on the forest is sustainable and responds to changes in science, technology, and best management practices when implementing new projects and updating or upgrading existing infrastructure.

04 The Forest offers a diversity of high-quality developed and dispersed recreation opportunities.

05 Recreational opportunities are successfully achieved through cooperative and collaborative engagement with our partners, individuals, organizations, and the communities we serve.

06 Public information about the recreational opportunities on the Forest as well as the rules, regulations, and expectations for visiting them is clear and informative.

07 Conflicts among various recreation users and with other multiple uses are infrequent and easily resolved.

08 Recreation sites are managed to standard and free of litter, graffiti, vandalism, theft, illegal activity, and trash dumping to enhance the recreation experience.

09 Recreation serves as a gateway to connect visitors and communities to nature and each other.

10 Environmental programs, nature programs, and other guided services, are available locally to connect people with nature, teach new skills, provide challenge and adventure, and instill a lifetime appreciation for public lands and outdoor recreation. Opportunities are available for everyone regardless of socioeconomic status or individual ability.

Objectives (REC-O)

01 During each ten-year period of the plan, rehabilitate[11] five to seven areas on the Tonto where dispersed recreation is causing erosion, sanitation issues, or other adverse effects on natural resources.

02 During the ten-year period following plan approval, implement at least three strategies to raise awareness of discouraged practices (e.g., illegal dumping, unsafe shooting practices, driving on closed roads) to promote visitor safety and natural resource protection.

03 Within ten years of plan approval, develop or modify one to four systems[12] of sustainable, designated motorized trails (e.g., motorcycle, jeep, and off-highway vehicle trails) to adequately provide for these user groups and reduce user conflicts.

04 Within ten years of plan approval, develop or modify one to four systems[13] of sustainable, designated nonmotorized trails (e.g., mountain biking, equestrian, hiking) to adequately provide for these user groups and reduce user conflicts.

05 Every five years take appropriate action (e.g., close, decommission, or convert) on at least ten miles of motorized and/or nonmotorized trails[14] that may not offer recreational value (e.g., unsustainable, low-use, or have no remarkable destination value) or are not needed for administrative use.

06 Within five years of plan approval, conduct forest closure for public nudity at all trailheads and developed recreation sites (e.g., campgrounds, camping areas, picnic areas, day use sites, and boating sites).

Standards (REC-S)

01 Camping on National Forest System lands within the Tonto National Forest will be limited to 14 days within a 30-day period, except as allowed by permit or written authorization.

Guidelines (REC-G)

01 Trails should be marked consistent with Forest Service marking policies.

02 Kiosks and interpretive signs should be consistent across the Forest and should be designed to suit the scenic and cultural character of the surrounding landscape, unless reviewed and approved by the forest.

[11] Rehabilitate can be defined as to reestablish the natural landscape, ecosystem, or artificial improvements through sustainable ecological, social, or economic management practices based off the activity and use in the area. Examples include planting seed and small vegetation in an area that has experienced soil compaction and vegetation trampling from vehicles where there are no designated roads or motorized trails.

[12] A System (of trails) is a group or collection of trails or roads that are interconnected, defined access points, similar recreation destination values.

[13] A System (of trails) is a group or collection of trails or roads that are interconnected, defined access points, similar recreation destination values.

[14] Designated trails / routes

03 Recreation developments and improvements should be planned, designed, and managed for activities and capacities that minimize resource damage (e.g., soil erosion and vegetation trampling) and are consistent with or move the area toward desired scenic integrity objectives[15].

04 Newly developed and dispersed recreation sites, facilities, and authorized activities should be designed and located in places so as not to degrade water quality, sensitive environments, or prevent wildlife access to water.

05 Information about public safety, fee information, rules, and regulations, should be posted at recreation sites and other high-visitation access points, kept up to date with relevant information, and maintained to be visually appealing.

06 In recreation areas popular with multilingual visitors, information should be provided in both English and other appropriate languages for multilingual interpretation.

07 Land use ethics (e.g., Leave No Trace and pack-it-in pack-it-out) should be promoted for all recreation opportunities and settings.

08 Overnight camping should not be authorized at day use sites, including trailheads, unless posted open.

09 Recreation facilities and improvements should be designed to minimize conflicts between forest users and wildlife (e.g., bear-proof dumpsters or capped pipe used for fences and signposts).

10 All project-level decisions, implementation activities, and management activities should be consistent with or move the area toward the appropriate desired recreation opportunity spectrum (ROS)[16] class, or current protocol over the long-term[17].

Management Approaches for Recreation (REC-MA)

01 Utilize a sustainable recreation approach consistent with the most recent Tonto Sustainable Recreation Action Plan, or similar strategy, including the completion of the actions and objectives outlined in the action plan.

02 Increase public awareness and compliance in rehabilitation or restoration areas by posting information to redirect use away from sites.

03 Develop and utilize Local Sustainable Recreation Collaboratives, or other similar working groups, comprised of municipal, county and state governments, special interest recreation groups, interested organizations and individuals, and the forest to address recreation opportunities and challenges and identify solutions that meet the needs of the recreating public and of the communities we serve.

[15] Information on scenic integrity objectives can be found in the scenery section of the Land Management Plan.

[16] Details about the recreation opportunity spectrum can be found here: https://www.fs.usda.gov/detail/tonto/landmanagement/planning/?cid=stelprdb5412121.

[17] Short-term and long-term timeframes are determined during project level, site-specific project planning.

04 Encourage marketing and tourism organizations (such as chambers of commerce, boards of tourism) to promote tourism and recreational opportunities on the forest through websites, brochures, conferences, and other educational/informative outlets.

05 Promote shared stewardship by continuing to develop partnerships and volunteer opportunities, and by taking advantage of opportunities to engage with the public.

06 Collaborate with Federal, State, and local governments, for-profit and non-profit organizations, permit holders, communities, clubs, and individuals on topics that relate to sustainable recreation (e.g., forest stewardship, conservation education and volunteerism, visitor satisfaction, recreation opportunities, and recreation impacts). Develop interpretive materials and conservation education programs in conjunction with our partners and communities to help visitors understand their relationship with the natural environment. Use current technology and media sources to connect to forest users.

07 Promote established programs (e.g., Leave No Trace, Kids in the Woods, Passport in Time, Discovery Agents, and Bear Aware) and develop new conservation education programs that help connect people to nature and encourage responsible use at various locations (e.g., schools, youth activities, fairs, and volunteer events).

08 Consider the use of permit and reservation systems to preserve the integrity of the Tonto National Forest'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 off-highway vehicle areas).

09 Evaluate whether new recreation infrastructure developments qualify for recreation fees or can be managed through formal partnership agreements, permits, or other contractual instruments. Periodically evaluate whether existing recreation infrastructure may also qualify to change to these types of management.

10 Utilize shared interests and ideas of forest users to connect people to recreation management and facilitate conversations related to sustainable recreation and conservation (e.g., place-based collaboratives and cross-boundary planning).

11 Utilize National Visitor Use Monitoring Surveys, or similar user satisfaction surveys, to adapt management where deficiencies are identified and increase user satisfaction.

Developed Recreation (REC-DEV)

The suite of developed recreation sites on the forest includes its developed campgrounds, developed boat launches, and developed picnic and day use sites. Most, but not all of these sites, are found along the shorelines of Roosevelt, Apache, Canyon, Saguaro and Bartlett lakes and along the Lower Salt and Lower Verde rivers. Developed recreation sites are characterized by high levels of development where each site contains an assemblage of amenities such as bathrooms/toilets, parking areas, trash service, running water, picnic tables and interpretive kiosks in day use sites and tent pads, running water, fire rings, bathrooms/toilets, trash, RV dump stations, and picnic tables in campgrounds. Boat launches

are characterized by amenities such as paved ramps, vessel boarding docks, parking, bathrooms/toilets, trash service and more. Many of these highly developed sites are eligible for developed recreation site fees under the Federal Lands Recreation Enhancement Act.

Refer to the Recreation and Water-Based Recreation sections in Chapter 2. Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (REC-DEV-DC)

01 Developed recreation sites provide amenities appropriate to the setting. Amenities (e.g., water systems, fee machines, showers, toilets, grills, dump stations, and fire rings) function as intended with minimum downtime and inconvenience to visitors.

02 Developed recreation provides accessible opportunities and valuable services to the public.

03 The overall capacity of developed sites across the forest meets demand in high use seasons, including the accommodation of large groups where appropriate.

04 Developed campsites provide opportunities for both vehicle-based camping and tent camping.

05 Vegetation in developed sites enhances the recreational setting, scenic value, and user safety.

Objective (REC-DEV-O)

01 Within one year of plan approval, complete an occupancy and use order to establish quiet hours within developed campgrounds between 10pm and 6am[18].

Standards (REC-DEV-S)

01 Required amenities[19] (e.g., toilet facilities, trash receptacles) are provided for visitor use at sites where fees are charged.

02 Developed recreation sites shall be operated at current health and safety standards, as outlined in the Forest Service publication “Cleaning Recreation Sites,” or more recent technical report.

Guidelines (REC-DEV-G)

01 Recreation site overflow areas should be used during periods of high use where the short-term nature of the use is not likely to result in long-term resource damage and will not in conflict with active closure orders.

[18] Quiet Hours enforceable under 36 CFR § 261.4 (Disorderly Conduct), 36 CFR § 261.10i & ii (Occupancy and Use)

[19] Required amenities for fee sites are identified in the Federal Lands Recreation Enhancement Act https://www.fs.usda.gov/passespermits/about-rec-fees.shtml.

Management Approaches for Developed Recreation (REC-DEV-MA)

01 When evaluating to operate or close a site, consider the volume of use and public demands, resource protection needs, opportunities for public-private partnerships, equitable geographic distribution, and operating costs.

02 Consider incorporating sustainable operations (e.g., solar panels, electric maintenance vehicles, recycling receptacles, and trash can compaction models) at developed recreation sites.

03 Consider additional fee areas to maintain and manage developed facilities, particularly in high use areas.

04 Utilize accessibility guidelines and Architectural Barriers Act criteria when building or modifying recreation infrastructure.

05 Aspire to achieve 80 percent fee compliance in fee sites and provide on-site payment methods for public convenience, where practicable.

06 Consider decommissioning developed campgrounds and recreation sites that are deemed unsustainable, low-use, or have no remarkable destination value.

Dispersed Recreation (REC-DIS)

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, off-highway vehicle use, equestrian use, mountain biking, and aircraft access.

Refer to the full Recreation section in Chapter 2. Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (REC-DIS-DC)

01 Dispersed recreation provides visitors with diverse opportunities to recreate on land and water with minimal impacts to other natural resources (e.g., riparian areas, streams, lakes, and wetlands).

02 Recreation opportunities are available for both nonmotorized and motorized recreation activities throughout the Forest including hiking, mountain biking, horseback riding, rock climbing, off-highway vehicle recreation, hunting, fishing, camping, and other popular recreational uses.

03 Dispersed camping sites have minimal improvements and provide a more primitive camping experience.

04 Expansion of dispersed sites and evidence of overuse is infrequent. Resource impacts due to recreation use (e.g., soil compaction or lack of vegetation) are minimized.

05 Motorized and nonmotorized trail systems provide diverse opportunities (e.g., interconnecting loops, connections to other destinations, and varying lengths and challenges).

06 Unauthorized user-created trails are not evident on the landscape.

Standards (REC-DIS-S)

01 To prevent resource damage and user conflicts, dispersed recreation sites that occur along designated National Forest System trails will be managed to be consistent with respective trail management objectives[20].

Guidelines (REC-DIS-G)

01 Dispersed recreation sites should be closed, or effects mitigated when:

a. Preventative and routine maintenance is unsustainable;

b. There are persistent user conflicts; and/or

c. Damage to natural resources from recreation is occurring and there are conflicts with other resource (e.g., riparian areas) desired conditions.

02 Design, construction, realignment, and maintenance of motorized and nonmotorized trails should be consistent with sustainable trail building guidelines, minimize adverse resource impacts (e.g., soil erosion, soil compaction, sedimentation in creeks, and damage to riparian habitats), minimize user conflict, and enhance the recreation experience.

03 Newly constructed motorized and nonmotorized trails should not be located in or crossing the riparian management zone (which includes riparian areas, meadows, wetlands, seeps, springs, streams, and connected floodplains supporting riparian vegetation), meadows, sacred sites, or areas with high concentrations of significant archeological sites, unless the purpose is to provide for resource protection.

04 National Forest System trails should not be used for management activities (e.g., fire, timber, and range management) that negatively impact trail management objectives, unless alternatives entail greater resource damage. Adverse impacts to trail features should be restored as part of project completion.

Management Approaches for Dispersed Recreation (REC-DIS-MA)

01 Consider using educational techniques (e.g., brochures, signs, websites, and social media) to enhance visitor knowledge of proper recreation etiquette.

02 Utilize existing agency protocol, or work with partners to develop and utilize a forestwide protocol, to assess the sustainability, objectives, and use of National Forest System trails and dispersed campsites, and prioritize work needed to address resource damage and user conflicts.

03 Encourage campers with saddle or pack animals to carry certified weed-free cubed, pelleted, or rolled feed to limit overuse of the vegetation and discourage establishment or spread of invasive species.

[20] Trail Management Objectives can be found in (Forest Service Handbook 2309.18)

04 When designing and constructing new trails, consider separating motorized and nonmotorized opportunities.

05 Consider additional facilities at high-use areas such as toilets and other recreational infrastructure when fees are supported or when the user community is willing to pay the cost of installation and maintenance through a formal partnership agreement, permit, or other contractual tool.

06 Utilize collaborative partnerships where volunteers plan, lead, and execute a majority of motorized and nonmotorized trail and airstrip maintenance.

07 Utilize closure orders where dispersed recreation activities have caused resource damage.

08 Work with partners to identify recreation opportunities along the Great Western Millennium Trail.[21]

09 Consider using natural barriers to mitigate adverse effects in and around dispersed recreation areas.

Motorized Recreation (REC-DIS-MO)

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

Refer to the Roads, and the full Recreation section, specifically Dispersed Recreation and Water-Based Recreation, in Chapter 2. Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (REC-DIS-MO-DC)

01 The motorized trail system provides a variety of opportunities, settings, and technical challenges for users while remaining sustainable.

02 Motorized trailheads and staging areas are located in areas convenient for the public and designed to minimize dust.

03 Motorized trails and staging areas are sustainable and resource damage (e.g., soil erosion, vegetation trampling, and litter accumulation) related to these recreation areas is minimized.

04 Motorized use is managed consistent with state laws.

05 Airstrips provide aircraft access for dispersed recreation opportunities.

[21] The Great Western Trail was designated as a National Millennium Trail under Executive Order 13072. The trail system traverses 4,455 miles through Arizona, Utah, Idaho, Wyoming, and Montana with a portion of it on the Cave Creek and Mesa Ranger Districts.

Standards (REC-DIS-MO-S)

01 Motorized vehicle travel shall be managed to occur only on the designated system of National Forest System roads, motorized trails, and motorized areas per the motor vehicle use map.

02 Newly constructed motorized trails will follow current sustainable construction and design standards for motorized trail building principles to mitigate erosion and to promote sustainable design.

03 Motorized recreation trailheads that serve as day use staging areas shall be managed for parking and loading or unloading off-highway vehicles.

Guidelines (REC-DIS-MO-G)

01 When natural barriers are not effective or efficient, other barriers and/or signage should be used to control unauthorized use in areas with a high potential for illegal cross-country motorized vehicle operation.

02 Motorized use should be actively managed through a set of engineering, monitoring, education, control, partnership, and enforcement strategies which respond to population and visitor use increase.

03 Unsustainable motorized trails that have low use, no remarkable destination value, and/or are duplicate trails to the same destination, should be decommissioned and rehabilitated to improve environmental resource conditions and reduce negative impacts to ecological natural resources.

04 When fences intersect motorized trails, pass-through areas should be provided consistent with managed uses of the trail.

Management Approaches for Motorized Recreation (REC-DIS-MO-MA)

01 Consider proposals for improving motorized recreation opportunities including new loop trails, connector trails that create loops, staging areas, and trailheads.

02 Consider public involvement when new motorized recreation infrastructure is proposed in proximity to residential areas.

03 Consider implementing off-highway vehicle permit zones to increase public awareness and improve compliance in areas with high user conflicts or resource damage.

04 Consider investing in the resources necessary for motorized recreation management to address user demands and resource impacts associated with motorized recreation.

05 Consider incorporating dust abatement in design elements for new projects (e.g., trailheads, staging areas).

06 Work with other Federal and State agencies, stakeholders, and organizations to inform the demands and trends for motorized recreation and help with signage and enforcement.

Nonmotorized Recreation (REC-DIS-NMO)

Nonmotorized recreation includes a wide range of recreation activities which are not dependent upon developed facilities or motorized equipment (e.g., hiking, backpacking, rock climbing, equestrian use, or mountain biking).

Refer to the full Recreation, Dispersed Recreation, Water-based Recreation, and Scenery sections in Chapter 2. Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (REC-DIS-NMO-DC)

01 Nonmotorized trails provide a variety of opportunities for public travel, recreation uses, traditional and cultural uses, and land management and resource protection activities.

02 Level of development for trails and trailheads is appropriate to the site conditions, use, and setting. Trails vary in length and challenge, with links that provide “loop” opportunities and connect communities and other public lands. Trailhead locations are appropriate for current and anticipated use levels.

03 An adequate sign system provides for traveler orientation, location information, and to promote compliance with rules and regulations.

04 Unauthorized permanent fixed anchors for rock climbing and rappelling are not present on the landscape or natural features.

Guidelines (REC-DIS-NMO-G)

01 Trail maintenance and management priorities should be based on user demand and the need to minimize resource damage, provide appropriate and meaningful recreation opportunities, and to accommodate administrative needs.

02 Where new and existing designated trails encounter springs, trails should be designed and maintained to minimize negative impacts to the spring (e.g., erosion, trampling, compaction, and introduction of invasive species and disease) while still allowing access for wildlife.

03 Nonmotorized system trails should be decommissioned or improved when:

a. Trails have deteriorated to the point where they are a hazard to public health and safety;

b. There are persistent user conflicts causing public health and safety concerns;

c. Unacceptable resource damage is occurring based on other resources’ desired conditions; or

d. It has become evident that the trail is unsustainable and does not add value to the trail system.

04 Permanent fixed anchors or bolts for rock climbing and rappelling should be allowed where resource conflicts do not exist (e.g., at-risk species, scenic integrity[22], cultural resources) and removable protection[23] is not practicable for safe ascent or descent.

05 Infrastructure related to equestrian use (e.g., hitching posts, trailer-accessible parking) should be provided in areas with high demand for horseback recreation as commensurate with other resources. User conflicts with other recreation user groups should be considered when determining an appropriate number of features to install.

06 When fences intersect nonmotorized trails, pass-through areas should be provided consistent with managed uses of the trail.

Management Approaches for Nonmotorized Recreation (REC-DIS-NMO-MA)

01 Promote educational programs (e.g., "don't bust the crust") to encourage those participating in nonmotorized recreation to use only National Forest System trails.

02 Develop and implement a strategy for a sustainable, "right-sized, forestwide, nonmotorized trail system".

03 The Forest works with partners, user groups, and volunteers to maintain trails, including the Adopt-A-Trail Program. To facilitate trail maintenance, partnerships are in place prior to construction of new nonmotorized trails.

04 Collaborate with established local and national climbing, caving, and canyoneering organizations to monitor popular and desirable climbing areas and develop best practices and management plans for these areas (e.g., cave management plans, climbing management plans, vertical trails, individual route applications, and canyoneering routes).

05 Coordinate with local partners and climbing groups to either remove or implement maintenance and replacement of existing fixed anchors and bolts and to consider new areas when necessary to meet demands for rock climbing and rappelling while meeting public safety and natural resource desired conditions and where compatible with other National Forest uses.

06 Work with partner organizations and user groups to expand public education on safe recreational climbing practices and the use of permanent fixed anchors and bolts. Coordinate enforcement efforts with partner agencies, user groups, clubs, and local organizations to increase public education and build "self-regulation" within the recreational climbing community.

Water-Based Recreation (REC-DIS-WB)

Water-based recreational opportunities on the Tonto National Forest attract visitors and provide benefits to people at local and regional scales. The Tonto National Forest offers a variety of water-

[22] More information can be found in the Scenery section. A map of scenic integrity objectives is available on the Tonto National Forest website under Scenery at: https://www.fs.usda.gov/detail/tonto/landmanagement/planning/?cid=stelprdb5412120.

[23] Removable protection is defined as removable anchors and other temporary equipment.

based and on-shore activities adjacent to rivers, streams, and reservoirs. Water features provide the physical settings for many different outdoor recreation activities: creeks and rivers for swimming, fishing, 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 (e.g., Fossil Creek, East Verde River, Tonto Creek, Canyon Creek), the Salt River Lakes (Roosevelt, Apache, Canyon, and Saguaro), and the Verde River Lakes (Bartlett and Horseshoe) to experience water-based recreation.

Water for recreation is one of the key ecosystem services provided by the Tonto National Forest. The plan components for Water-Based Recreation and Watersheds and Water Resources help provide this service for the future. See Chapter 1. Introduction for more information about key ecosystem services.

Refer to the full Recreation, Developed Recreation, and Dispersed Recreation sections in Chapter 2. Forestwide Plan Direction and the Lakes and Rivers Management Area in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (REC-DIS-WB-DC)

01 Water based recreation provides social, cultural, and economic benefits to the public.

02 Designated water access points and amenities within developed sites reflect user demands, site capacity, and water accessibility.

03 Sustainable water-based recreation opportunities are provided on the Tonto, while riparian areas remain largely undisturbed from recreational impacts (e.g., camping and access points) with the exception of the Lakes and Rivers Management Area.

04 Boat launches and/or docks are maintained to standard.

Guidelines (REC-DIS-WB-G)

01 Management activities should prevent and/or minimize the spread of invasive species (e.g., Quagga mussel, apple snail, or whirling disease).

Management Approaches for Water Based Recreation (REC-DIS-WB-MA)

01 Coordinate with Arizona Game and Fish Department to manage boating opportunities (e.g., boat registration, facilities, and enforcement) and invasive species management on the Forest.

02 Work with partners, Federal and State agencies, and local governments to monitor water quality and ensure water quality standards for direct human contact are not being violated.

03 Work with partners and stakeholders to promote safe water-based recreation and provide opportunities for the future.

Recreational Shooting (REC-DIS-RS)

Recreational shooting is defined as any shooting other than in lawful pursuit of game that is carried out in a safe manner, does not cause resource damage, and does not result in litter. This includes

discharging a firearm, air rifle, or gas gun, including paint ball guns. Restrictions on recreational shooting do 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.

Currently users determine where they want to shoot on the Tonto National Forest with few restrictions. Exceptions include areas closed by special order or near occupied areas or public facilities. Shooting areas are typically in off-highway vehicle use areas which can cause user conflicts and safety concerns due to proximity of off-highway vehicle use to common shooting areas. Excessive trash accumulation occurs in most areas where shooting is frequent.

Refer to the full Recreation section in Chapter 2. Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (REC-DIS-RS-DC)

01 Recreational shooting opportunities are available and address user demand while minimizing public safety concerns, environmental impacts, resource damage, and litter.

02 Conflicts with other uses are minimal.

03 Approved target types and other restrictions are clearly communicated to forest users.

04 The shooting of, or targets attached to, natural features (e.g., cacti, trees, and caves), cultural resources, range improvements, or other property of the United States (e.g., signs and structures) does not occur.

05 Recreational shooting does not occur in areas where risks to public health and safety and conflicts with other National Forest uses are not able to be mitigated.

Objectives (REC-DIS-RS-O)

01 Within two years of plan approval, complete recreational shooting closure on behalf of public safety and in compliance with the Dingell Act[24], in the following areas:

   a. Within a minimum of one quarter mile from developed recreation sites;

   b. Within a minimum of one quarter mile from occupied private property, residences, or administrative sites;

   c. Within the Lakes and Rivers Management Area; and

   d. Within any designated off highway vehicle areas, including "tot lots," and special recreation permit areas along shorelines as identified in the motor vehicle use map (MVUM).

[24] The John D. Dingell Act of 2019 (Dingell Act) is an omnibus land act that protected public lands and modified management provisions. See also the Forest Service handbook 5309.11, section 34 for the directives related to recreational shooting.

Standards (REC-DIS-RS-S)

01 Management of recreational shooting will be consistent with Federal and State laws regarding the use of firearms.

Guidelines (REC-DIS-RS-G)

01 An approved list of target types and target shooting restrictions should be posted online and provided at entrances for areas that are frequently used for shooting.

02 Areas restricted from recreational shooting should be clearly identified and communicated through a variety of outlets, including media and educational materials.

Management Approaches for Recreational Shooting (REC-DIS-RS-MA)

01 Work with partners to identify and improve recreational shooting opportunities based on public needs. Collaborate with partners to develop criteria for determining where recreational shooting is appropriate and where it is not appropriate.

02 Consider permitted and developed shooting ranges and other management tools to meet demands for recreational shooting while also meeting public safety and natural resource protection objectives.

03 Work with partners to expand public education on safe recreational shooting practices and “Leave No Trace” standards.

04 Coordinate enforcement efforts with law enforcement agencies to increase public education and build “self-regulation” within the recreational shooting community.

05 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).

06 Work with partners to identify areas in need of signage, increased enforcement, and a list of appropriate target types.

Wildlife-related Recreation (REC-WR)

Many people have an interest in and use the Tonto National Forest to hunt, fish, and view wildlife. These activities, often important family traditions, can form long-term connections to the land and its wildlife. As such, habitat for hunting, fishing, and watchable wildlife has been identified as a key ecosystem service on the Tonto National Forest. Wildlife-based recreation contributes significantly to local economies, while the Pittman-Robertson Act and the Dingell-Johnson Act, which tax hunting and fishing equipment, help fund fish and wildlife conservation. These contributions support full and part-time jobs, increase Federal income tax receipts, increase retail sales, and hospitality sales in the cities and counties where these opportunities are available. Hunting and fishing are fundamental components of wildlife conservation and management in Arizona.

The Tonto National Forest provides diverse opportunities for high-quality hunting, fishing, and wildlife viewing. Nine of the ten big game species in the state occur on the Forest, including: black bear, bighorn sheep, elk, javalina, turkey, mountain lion, pronghorn, mule deer, and white-tailed deer. Seven of nine small game species have abundant habitat on the Forest, and there are also opportunities to hunt waterfowl, predators, and furbearers.

Similarly, fishing opportunities are abundant. Arizona Game and Fish Department manages some twenty-seven sport fish species in the State, and the Tonto National Forest provides angling opportunities for most of those species in stream and lake habitats. The Forest Service is working with partners to restore Gila Trout in the headwater streams on the Mogollon Rim, which will increase the recreational fishing opportunities for Gila trout on the Tonto. The Tonto National Forest provides a great opportunity to fish native roundtail chub in portions of Fossil Creek.

Wildlife viewing is a popular recreational activity on the Tonto National Forest. For example, Mount Ord is an ideal place to observe nuthatches, hairy woodpeckers, and black bears; in the Payson and Pleasant Valley ranger districts deer and elk are more common than some of the other districts. Near Roosevelt Lake, spring populations of water birds are common, including grebes, cormorants, ducks, great blue herons, egrets, and coots. Aquatic birds are plentiful at the adjacent to the Salt and Verde Rivers, as are eagles, ospreys, Gambel's quail, and curve-billed thrashers. Bighorn sheep are frequently seen on cliffs along the Salt River Lakes (Apache, Canyon, and Saguaro) along with Fish Creek. Christmas bird counts are popular, with many counts along the Salt and Verde River corridors based out of Adams Mesa and the southwestern shore of Saguaro Lake. White-crowned sparrows and ruby-crowned kinglets are numerous (Arizona Watchable Wildlife Tourism Association 2015).

Biodiversity and habitat for hunting, fishing, and watchable wildlife is one of the key ecosystem services provided by the Tonto National Forest. The plan components for Wildlife-Related Recreation and Wildlife, Fish, and Plants help provide this service for the future. See Chapter 1. Introduction for more information about key ecosystem services.

Refer to the Wildlife, Fish, and Plants, full Recreation, Developed Recreation, and Dispersed Recreation sections in Chapter 2. Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (REC-WR-DC)

01 Ecological conditions on the Forest support plentiful and diverse opportunities for hunting, fishing, and wildlife watching, and contribute to local economies.

02 Access to a range of opportunities for hunting, fishing, and wildlife watching are available.

03 Forest visitors have a variety of opportunities to view, experience, appreciate, and learn about the fish and wildlife resources of the Forest.

Guidelines (REC-WR-G)

01 Motorized big game retrieval should be managed to occur only along designated routes open to the public as depicted in the motor vehicle use map (MVUM).

02 Design elements (e.g., seasonal restrictions, distance buffers, and personnel training) should be utilized for projects and activities that might negatively affect populations of economically important species.

03 Wildlife connectivity for economically important and other species should be maintained and/or enhanced.

Management Approaches for Wildlife-related Recreation (REC-WR-MA)

01 Work in collaboration with Arizona Game and Fish Department to:

a. Maintain and/or enhance habitat for economically import species.

b. Reintroduce species of interest into historical home ranges.

c. Coordinate fish and wildlife management activities (e.g., reintroductions, introductions, or transplants; control or eradication of nonnative species; habitat enhancement; and the management of sport and native fishes).

d. Plan and prioritize projects that achieve desired conditions for hunting, fishing, and watchable wildlife species and habitats on the Forest.

e. Establish short and long-term goals consistent with agency missions to foster healthy and productive populations of native and non-native sportfish and game species.

02 Develop and maintain partnerships and programs that promote local recreation through hunting, fishing, and watchable wildlife.

03 Identify and enhance watchable wildlife opportunities on the forest and work with partners to provide information on watchable wildlife programs and opportunities.

04 Consider current user demands and future trends for wildlife related recreation using economic studies and other best available science.

05 Consider recommendations of wildlife planning efforts (e.g., Arizona Game and Fish's State Wildlife Action Plan and Cold Water Fisheries Plan, the North American Waterfowl Management Plan), and other range-wide management plans for big game, upland game, and aquatics species.

06 Encourage public interest in fishing for native sport fish species.

Special Uses (SU)

Recreation special use authorizations are issued 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 authorized activities on the Tonto National Forest include recreation events, noncommercial group uses, marinas, resorts, organization camps, recreation residences, commercial filming, and outfitting and guiding. Outfitting and guiding authorizations 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 nonmotorized boating, tubing, mountain biking, canyoneering, bird watching, fishing, hunting, and educational wilderness experiences. Issuing recreation special use authorizations 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. Direction for management of recreation special use authorizations is specified in the 2300 and 2700 Forest Service directives under the given use type.

Lands special use authorizations are issued 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 that cannot be reasonably accommodated on private lands. Activities, such as research and monitoring are also authorized uses. Communication sites are critical to ensuring public and private user communications are operational 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 National Forest System lands. Requests to use National Forest System lands for communication and electronic sites have increased over the past few years and will likely continue to increase. More demand for utility lines, renewable energy sources, community infrastructure, and private land access on National Forest System lands is also expected.

Refer to Energy Production and Delivery, Lands and Access, and Recreation sections in Chapter 2: Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (SU-DC)

01 Recreational special uses enhance the outdoor experiences of Forest visitors and provide unique opportunities and services. Authorized activities will adhere to regulations that advocate for public safety and reduce impacts to ecological and cultural resources and other Forest users (e.g., carpooling reduces impacts to air quality and crowding at busy parking lots, interpretation and instruction provides protection to sensitive cultural resources and vegetation). Special use activities support the public's need and demonstrated demands for specific recreation and commercial opportunities or services.

02 The number of special use authorizations issued, including outfitters and guides, balances public demand with desired conditions for ecological resources, and augments the variety of suitable outdoor recreation experiences on the Tonto National Forest.

03 Commercial recreation special uses provide an equal opportunity for local businesses to compete for high-demand activities and services.

04 User conflicts between outfitting and guiding activities are infrequent.

05 The authorization and administration of lands special uses to individuals, companies, groups, other Federal agencies, and State or local governments maintains natural resource values and protects public health and safety.

06 Utility corridors and communications sites are sized to fit the intended use and obsolete or unused facilities are removed and rehabilitated.

Standards (SU-S)

01 Activities that include visits to archaeological sites shall identify the site locations in the special use authorization and follow Leave No Trace ethics as outlined in the operating plan.

02 Conflicting uses will not be authorized in communication sites, transportation, or utility corridors.

03 Authorizations for utilities must incorporate an operating plan or an operating agreement which describes means of access, requirements for road construction, reconstruction, and maintenance responsibilities and incorporates design elements to minimize resource damage (e.g., dust abatement, preventing the spread of invasive weeds) from these activities.

04 Authorized boat tours for watercraft in excess of 25 feet long shall be limited to one per reservoir.

05 Requests for new authorizations or expansion of existing services and/or permitted areas will be evaluated on a case-by-case basis using the criteria for new commercial public services. Preference will be given to existing permit holders who are in compliance with their existing permits.

06 All river-running outfitter and guide authorizations will be restricted to no more than two groups entering the Upper Salt River Canyon Wilderness per day.

Guidelines (SU-G)

01 Utilities should utilize existing facilities, roads, sites, and corridors unless new sites can provide better social and/or ecological resource benefits.

02 Organized recreation events and noncommercial group uses authorized under special use permit should be limited to designated National Forest System trails and roads, suitable developed sites and group sites, and pre-disturbed areas that can provide safety for participants and the public. Authorizations should promote responsible land use (e.g., Leave No Trace ethics and pack-it-in pack-it-out).

03 Special use activities that negatively impact the experience of other visitors should be scheduled outside of high-use periods.

04 Special use permits should not authorize camping at cultural sites, trailheads (except those trailheads with designated dispersed sites), sensitive species areas, or interpretive sites.

05 Special use permits should not authorize the use of domestic sheep or goats where there is a risk of contact with bighorn sheep.

06 Nonmotorized watercraft uses on the Lower Salt River should be managed to utilize all existing developed water access points and provide equal opportunity to multiple businesses.

07 Utility line corridors should be designed to blend with the existing character of the landscape.

08 Proposals for special uses (e.g., apiaries) that may negatively impact public safety, native fish, wildlife, and plant species (especially at-risk species) should include design elements to mitigate such risks prior to authorization or not be authorized.

Management Approaches for Special Uses (SU-MA)

01 Recreation special use proposals that request outfitting and guiding activities in high-demand or heavily impacted areas will be reviewed and handled to the most current management plans, or practices, for that area or activity and will be re-evaluated as needed.

02 Work cooperatively with the Arizona Game and Fish Department to manage fishing and hunting outfitting and guiding operations, recreation events, and tournaments.

03 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.

04 Consider using special use authorization terms and conditions as a means of protecting water dependent resources (refer to the Watersheds and Water Resources section) on the forest.

05 When applicant objectives can be met outside of designated wilderness, consider authorizing activities in locations outside of wilderness before authorizing locations within wilderness areas.

06 Consider managing existing outfitting and guiding authorizations to standard[25] before issuing new proposals.

[25] As defined in FSM 2716.5 and NRM Special Uses Data System - User Guide Chapter 5 Pg. 91-95

Energy Production and Delivery (EG)

The Tonto National Forest has a long history of hydroelectric production beginning with the Salt River Project and the Childs/Irving Power Plants in the early 1900s. The Forest also has the potential to host or facilitate the development of other alternate or renewable energy sources which may include solar, wind, and biomass. Construction and maintenance of facilities and/or transmission lines could provide employment while energy produced or transmitted provides direct benefits in power generation. Wind and solar energy are clean technology which do not release hydrocarbons to the atmosphere and as such do not contribute to global warming.

Refer to the Special Uses and Lands and Access sections of Chapter 2: Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (EG-DC)

01 Energy corridors throughout the planning area improve the delivery of electricity and enhance the western electric transmission grid by improving reliability, reducing congestion, and contributing to the national electrical grid.

02 Exploration, development, production, and transmission of renewable energy resources contribute social and economic benefits to local communities and are conducted in a manner that minimizes adverse long-term impacts to Tonto resources and uses, ecosystem health, and watershed conditions.

03 Energy rights-of-way allow for the operation and maintenance of the facilities and infrastructure as well as desired vegetative conditions and land uses.

Standards (EG-S)

01 Conflicting uses of activities in energy corridors will not be authorized.

Guidelines (EG-G)

01 New electrical distribution lines and smaller pipelines, or similar utility, should occur along or within existing road systems or other previously disturbed areas.

02 Solar energy projects should give priority consideration to previously disturbed sites to prevent unnecessary environmental and scenic disturbances.

03 Energy corridors should be planned to avoid or limit disturbance in or near riparian areas, surface water, shallow groundwater, unstable areas, or wetlands.

04 New energy facilities and transmission corridors should avoid locations in areas identified as having a demonstrated high risk to at-risk species, cultural resources, or other resources.

05 The Tonto National Forest staff should authorize proposals to use existing energy corridors without alternative-route analysis, subject to site-specific environmental analysis.

06 New distribution lines and telephone lines should be buried, unless one or more of the following applies:

a. scenic integrity objectives of the area can be met using an overhead line;

b. burial is not feasible due to geologic hazard, unfavorable geologic conditions, or presence of cultural resources;

c. it would result in greater long-term site disturbance; or

d. it is not technically feasible.

Management Approaches for Energy Production and Delivery (EG-MA)

01 Work with partners to identify new transmission line corridors that will minimize impacts to the landscape and also offer mitigation measures.

Rangelands, Forage, and Grazing (GRZ)

Rangelands are grasslands, shrublands, forests and woodlands, wetlands, and deserts that can be grazed by domestic livestock or wild animals. Livestock grazing can be used to manage rangelands by harvesting available forage to produce livestock, managing plant composition, or reducing fuel loads. Sustainable and productive rangelands are one of the key ecosystem services on the Tonto National Forest. Rangelands contribute to a traditional western way of life and are essential for the survival of many small ranching operations and contribute to the economics of the surrounding communities. Rangelands and the associated range improvements (e.g., ponds, troughs, fences, corrals, windmills) provide scenery and recreational (e.g., 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 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.

Rangelands are divided into 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 is subject to change. At the time of plan implementation, the goldfield allotment is closed. Over the last decade, the Tonto National Forest has worked with partners and permittees to reduce grazing pressure on sensitive environments (e.g., critical areas, riparian area). Currently, the Tonto National Forest manages the rangeland resources to balance livestock numbers with forage capacity.

The Tonto uses adaptive management to manage the rangeland resources. Allotment management plans have been prepared and are reviewed and revised as needed in conformance with National Environmental Policy Act (NEPA). In general, the Tonto manages grazing at conservative use levels. This grazing intensity (based on percent use of forage by weight at the end of the growing season) should provide for plant integrity, density, diversity, and sustainability and regeneration over time (Holechek and Galt 2000; Holechek et al 2011; Heady 1994). New or revised allotment management plans typically include new or modified fences, corrals, salt locations, and artificial water sources

designed to make progress towards the desired conditions in the plan to promote healthy soil, watershed and riparian conditions, and consider wildlife interactions, and wildlife movement.

Within the scope of the site-specific NEPA allotment grazing decisions, adjustments are made annually through the annual operating instructions to respond to changing conditions and move towards desired conditions. Authorized number of livestock, pasture season of use and timing, salt locations, and pasture rest periods may be adjusted as needed through the annual operating instructions. Information from monitoring such as frequency plots, canopy cover, pace frequency transects, photo points, and allotment inspections inform appropriate adjustments. Other factors such as weather patterns, likelihood of plant regrowth, and previous years' utilization levels, are also considered in annual operating instructions development.

If repeat monitoring indicates annual adjustments are not achieving the desired effects, further adjustments may be made to the allotment management plan or term grazing permit. Permitted number of livestock as well as grazing intensity may be adjusted up or down according to the grazing decision to move towards desired conditions.

Forage production by rangelands is one of the key ecosystem services provided by the Tonto National Forest. The plan components for Rangelands, Forage, and Grazing help provide this service for the future. See Chapter 1. Introduction for more information about key ecosystem services.

Refer to the Vegetation Ecological Response Units, Riparian Ecological Response Units, Watersheds and Water Resources, Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones, and Wildlife, Fish, and Plants sections in Chapter 2. Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (GRZ-DC)

01 Sustainable livestock grazing contributes to the long-term socioeconomic diversity and stability of local communities.

02 Rangelands are resilient to disturbances, fluctuations, and extremes in the natural environment (e.g., fire, flooding, drought, climate variability).

03 Livestock grazing allows for healthy, diverse plant communities[26], satisfactory soil and water conditions, and sustains the quality and quantity of fish and wildlife habitat.

04 Livestock management and range improvements sustain or improve other resources.

Objectives (GRZ-O)

01 At least two water troughs or open storage tanks per ranger district will be fitted with wildlife escape ramps each year until all troughs and tanks have ramps.

[26] Desired conditions for plant communities can be found in the Vegetation and Ecological Response Units section.

02 At least one vacant allotment will be evaluated for one of the following options every two years, until there are no vacant allotments. If additional allotments become vacant (waived without preference) they will be evaluated for one or a combination of the following options within two years:

a. Convert to forage reserves to improve resource management flexibility;

b. Grant to current or new permitted livestock producer; or

c. Close to permitted grazing, in whole or in part.

Standards (GRZ-S)

01 Livestock use in and around riparian areas will be evaluated on an allotment-specific basis. Design elements (e.g., deferment, herding, and fencing) will be implemented where needed.

Guidelines (GRZ-G)

01 Range improvements should be maintained[27] to provide their intended function and extend the useful life of the improvement. Range improvements should be removed or decommissioned when no longer needed.

02 Salt or mineral supplements should not be placed near riparian, wetland, karst features, or other areas where livestock concentrations are undesired.

03 Drought preparedness should be emphasized in allotment management plans and may include flexible stocking rates/livestock classes, flexible rotation schedules, and other strategies for dealing with climate variability.

04 Livestock rotations should avoid grazing the same areas during the growing season at the same time, year after year.

05 Wildlife escape ramps should be installed in all livestock water troughs and open storage tanks.

06 Efforts (e.g., coordination with permittees, 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. Allotment conversions from cattle to domestic sheep or goats should not be allowed in areas adjacent to or inhabited by bighorn sheep.

07 Allotments and other areas closed to permitted livestock grazing should remain closed[28].

08 When unauthorized livestock[29] are found occupying National Forest lands, the owner should be promptly notified to remove them and prevent them from re-entering National Forest lands. If the owner is unknown or uncooperative, impoundment procedures should be initiated[30].

[27] Maintenance specifications for range improvements are defined in the grazing permit.

[28] Closed means an area or allotment will no longer be authorized for livestock grazing. Allotments are closed by project level decisions.

[29] Unauthorized livestock are livestock grazing the forest owned by someone not holding a grazing permit.

[30] More information on this process can be found at 36 CFR 222.50(h).

09 An adaptive management approach[31] incorporating best available scientific information should be used when evaluating stocking rates.

Management Approaches for Rangelands, Forage, and Grazing (GRZ-MA)

01 Coordinate permittees' grazing schedules with planned prescribed fire treatments to ensure there will be sufficient fuel to allow burn objectives to be met and forage available for permittee.

02 Forest managers continually work with permittees to adjust timing, intensity, and frequency of livestock grazing to respond to changing resource conditions (e.g., fire, flooding, drought, high fuel loading).

03 Consider allowing structural range improvements to be added or removed to meet desired conditions in conformance with applicable laws and regulations in the Allotment Management Plan.

04 Range managers use a cooperative approach working with permittees, local, county, State, and Federal government entities, and non-government organizations and develop partnerships to facilitate flexible and balanced permitted use.

05 Encourage the development of water sources in uplands (including wells) where possible to improve or restore riparian areas.

06 Work with partners (e.g., University of Arizona and Friends of the Tonto) to complete rangeland monitoring using currently accepted protocols (e.g., Reading the Range and riparian photo points).

07 Utilize post-fire resource assessments (e.g., burned area emergency response assessments) to determine timing for the restocking of livestock in the burned area post-fire. Consider the post-fire condition of ecological resources (e.g., vegetation, soil, riparian, and watershed conditions) and the functionality of range improvements before restocking.

08 Coordinate with partners, permittees, and other stakeholders to monitor and/or address unauthorized livestock use across all allotments, including closed and vacant.

09 Production, utilization, and other monitoring and assessment techniques are considered when developing stocking rates. Where current stocking rates are not available (e.g., vacant or rested allotments and pastures) production and other inventories may be used more broadly.

10 Work with agencies and partners to identify, maintain, and implement projects that increase water availability across the landscape for livestock and wildlife.

11 Consider targeted grazing to reduce high fuel loading.

[31] One example of an appropriate form of adaptive management is what is known as "stock and monitor". The stock and monitor approach involves measuring the effects of actual stocking levels over time (either short-term or long-term) on utilization and utilization patterns, composition of vegetation, vigor, soil cover, and other factors (including wildlife) to see if changes in stocking and/or management are needed (Smith *et al*. 2012).

Cultural and Historic Resources (CUH)

The Tonto National Forest contains cultural and historic resources that document almost continuous human presence for at least the past 12,000 years. Indigenous populations ancestral to the contemporary Apache, Hopi, O'odham, 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 Hispanic sheepherders, and the current land-managing agency, USDA Forest Service. All these populations can exist today as traditional and living communities.

Many cultural resources[32] 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 as well as traditional cultural practices. These sites are necessary to maintain the cultural identity of the traditional communities within the Tonto National Forest.

A forestwide Cultural Resources Assessment and Management Plan was prepared in consultation with the State Historic Preservation Office in 1989. The Cultural Resources Assessment and Management Plan 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 National Forest are most notably impacted by water/wind erosion, livestock grazing, mining and mineral related activities, recreation, construction, off-highway vehicle and other 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 and theft continue 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.

[32] Chapter 2360.5 of the Forest Service Manual defines cultural resource as: "An object or definite location of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence. Cultural resources are prehistoric, historic, archaeological, or architectural sites, structures, places, or objects and traditional cultural properties. In this chapter, cultural resources include the entire spectrum of resources for which the Heritage Program is responsible from artifacts to cultural landscapes without regard to eligibility for listing on the National Register of Historic Places."

Cultural heritage is one of the key ecosystem services provided by the Tonto National Forest. The plan components for Cultural and historic resources help provide this service for the future. See Chapter 1. Introduction for more information about key ecosystem services.

Refer to the Tribal Relations and Areas of Tribal Importance and Forestry and Forest Products sections in Chapter 2. Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (CUH-DC)

01 Historic properties, including traditional cultural properties, retain all of the characteristics that qualify the property for listing in the National Register of Historic Places and convey its historical significance, including any aspects of the property's integrity (e.g., location, design, setting, materials, workmanship, feeling, or association) that have been identified as supporting its eligibility.

02 Historic properties are not threatened by human disturbances.

03 Access and use of cultural resources important to living communities are available to those communities for cultural practices.

04 Heritage-based recreation opportunities are available (e.g., exploration and interpretation opportunities) and continue to provide an ecosystem service on the Tonto. The public has opportunities to learn about, appreciate, and understand cultural resources, as well as resources significant to living communities.

05 Heritage programs, interpretive presentations, publications, and interactive learning opportunities provide the scientific community and the public with opportunities to learn about, understand, appreciate, and experience the Forest's prehistory and history.

06 Buildings and infrastructure listed on or eligible for the National Register of Historic Places (NRHP) continue to preserve any of the characteristics that qualify the property for listing in the NRHP (e.g., 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.

07 Cultural resources (including artifacts) are preserved in place.

08 The Forest has been inventoried for cultural properties at a level that meets current professional standards.

Standards (CUH-S)

01 Historic properties will be managed in accordance with the National Historic Preservation Act and other applicable laws.

02 Historic properties[33] are considered when working to achieve other resource objectives (ecosystem restoration, rangeland management, recreation).

Guidelines (CUH-G)

01 Sites listed in, nominated to, or eligible for the National Register of Historic Places (NRHP) and American Indian sacred sites should be managed for avoidance or protection during undertakings[34], where practicable.

02 When cultural resources cannot be preserved in place, artifacts and records should be curated following current professional standards.

03 When human remains or other cultural items, as defined under the Native American Graves Protection and Repatriation Act, are encountered during cultural resource investigations, affiliated communities should be notified, and appropriate actions taken.[35]

04 Forest activities (e.g., dispersed and developed recreation, road construction, and range improvements) should be managed to minimize adverse impacts (e.g., disturbance, damage, movement of, alterations, or removal) to cultural and historic resources, as directed by the National Historic Preservation Act (NHPA) as amended.

05 When adverse effects to historic properties occur, known affected communities should be involved in the resolution of adverse effects.

Management Approaches for Cultural and Historic Resources (CUH-MA)

06 Collaborate with American Indian tribes and other traditional[36] communities (e.g., descendants of Basque sheepherders, Chinese immigrant laborers, Latin American miners) to manage cultural and historic resources while conserving anonymity of such sites where appropriate, and to identify design elements for such properties.

[33] Section 300308 (formerly Section 301) of the National Historic Act defines historic properties to be "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register, including artifacts, records, and material remains related to such a property or resource." Historic properties also include traditional cultural properties, which are cultural resources that are eligible for inclusion in the National Register of Historic Places because of their association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community.

[34] An undertaking, per 36 CFR 800.16 (y), means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval.

[35] As outlined in the Native American Graves Protection and Repatriation Act of 1990.

[36] "Traditional" is used here in the manner described in National Register Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties, which states: "'Traditional' in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice."

07 Work with partners and volunteers (e.g., American Indian tribes, Arizona Site Steward Program, Arizona Preservation Foundation, Arizona Archaeological Council, National Trust for Historic Preservation, National Park Service, Bureau of Indian Affairs, Bureau of Land Management, U.S. Fish and Wildlife, and local museums) to identify, study, protect, and monitor archaeological sites and artifact collections.

08 Prioritize baseline Heritage program work, and focus National Historic Preservation Act Section 110 survey considering the following:

a. areas where eligible cultural resources are threatened or on-going impacts are unknown and need to be assessed;

b. areas indicated to have high cultural value or high density of cultural resources;

c. areas of importance to traditional communities; and

d. areas where additional survey will contribute to a greater regional understanding of a specific area.

09 Find teaching opportunities, both internally and externally, to educate employees, permittees, contractors, and public groups on the identification, management, impacts to, and protection of significant cultural resources.

10 Work with stakeholders to determine heritage tourism opportunities, educational needs, and other benefits to the public. Work with state and local governments, historic preservation groups, historical societies, and other interested stakeholders to identify best management practices and design elements to minimize adverse effects to historic properties, promote cultural awareness, and strengthen local economies.

11 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.

12 Consider restoration of select significant historic structures for appropriate recreation or interpretive use (e.g., Rooms with a View cabin rental program).

13 Consider maintaining and updating existing interpretive sites (e.g., Sears-Kay Ruin, Shoofly Ruin, Rye Creek Ruin) to enhance visitor experiences and educational opportunities.

14 Consider incorporating repair or restoration actions as part of adjacent project-specific work or as part of annual Heritage program administration where human and/or natural caused disturbances (e.g., flooding) have damaged historic properties.

15 Consult with the Arizona State Historic Preservation Officer in the management of historic properties, utilizing any applicable programmatic agreements.

Tribal Relations and Areas of Tribal Importance (TRB)

The Forest carries out its government-to-government trust responsibilities under a variety of Federal authorities. Tribal rights and interests are considered in Tonto National Forest operations based on treaty obligations, trust relationships, and mandates in laws and Executive orders. The Tonto National Forest recognizes that there are tribes with cultural ties to and knowledge about lands now managed by the Forest Service. The Tonto National Forest provides those tribes with the opportunity for timely and meaningful government-to-government consultation on project activities which may affect them. The Tonto National Forest currently consults with the Ak Chin Indian Community, 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, Tohono O'odham Nation, Tonto Apache Tribe, White Mountain Apache Tribe, Yavapai-Apache Nation, and Yavapai-Prescott 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, as amended in 1992, lays out the legal framework for considering the effects to historic properties and consulting with appropriate Tribes on Federal undertakings.

Refer to the Vegetation Ecological Response Units, Fire and Fuels, Cultural and Historic Resources, and Forest Products sections in Chapter 2. Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (TRB-DC)

01 Locations identified as important by American Indian tribes are acknowledged and there is an emphasis on the resilience and protection of natural and cultural resources and to preserve the character and use of these places.

02 Tribal members have open access to Forest land for traditional activities, including access to traditional resource gathering areas and to places having religious, cultural, and/or historical significance (e.g., traditional cultural properties, sacred sites, shrines, and clan origin places).

03 Restoration is performed in consideration of tribal values and traditional resources are recognized and acknowledged by the Forest. Tribal and Forest landscape restoration activities complement one another to meet common goals.

04 Forest products (e.g., pinon nuts, Emory oak, and acorns) important for traditional needs, subsistence practices, and economic support of tribal communities are available and sustainable. Traditional products are preserved sustainably in place wherever feasible and plant populations of tribally important species are available for traditional uses.

05 Social, cultural, and economic resources on the Forest provide a setting for educating tribal youth in culture, history, and land stewardship, and for exchanging information between tribal elders and youth.

Standards (TRB-S)

01 The Forest Service shall maintain the confidentiality of culturally sensitive information provided by tribes, unless permission to share information is given in compliance with the Cultural and Heritage Cooperation Authority (25 USC 32A[37]).

02 Tribal interests and concerns are considered in management activities.

03 The Forest will ensure traditional cultural properties identified by a tribe and determined eligible under Section 106 of the National Historic Preservation Act, receive due consideration in project planning.

04 The responsible official shall work with American Indian tribes to comply with the Cultural and Heritage Cooperation Authority (25 USC 32A) under which the tribes may request temporary closures of specific areas for traditional cultural purposes.

Guidelines (TRB-G)

01 Sacred sites and areas of tribal importance should be considered during the project planning process and during the implementation of management activities and permitted uses.

02 Tribal access to and availability of traditional medicinal plants and other botanical resources should be considered when authorizing commercial harvesting and special uses.

03 Ethnographies, oral history studies, and traditional resource surveys should be used to preserve information and inform project management.

04 The physical and scenic quality 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 new special use authorizations.

05 Requests for reburial on the Forest of American Indian human remains and/or cultural items should be considered in consultation with the affiliated tribes.

Management Approaches for Tribal Relations and Areas of Tribal Importance (TRB-MA)

01 Work cooperatively with tribes to develop management protocols to address the restoration and sustainability of traditionally important plants and ensure that healthy sustainable plant populations are available for traditional uses. Work with tribes to identify and locate species of interest (e.g., citizen science iNaturalist project).

[37] 25 USC 32A Section 3056 limits disclosure under the Freedom of Information Act of resources, cultural items, uses, or activities that have a traditional and cultural purpose; and are provided by an Indian or Indian Tribe under an express expectation of confidentiality. For other limitations on disclosure, see also Section 9 of the Archaeological Resources Protection Act of 1979 (ARPA), 16 U.S.C. § 470hh and its implementing regulations at 43 C.F.R. § 7.18, as well as 36 C.F.R. § 800.11 (c)(1), pursuant to Section 304 of the National Historic Preservation Act of 1966, as amended (NHPA), 54 U.S.C. § 307103

02 Consider developing and maintaining memoranda of understanding or other agreements to formalize work with American Indian tribes and to identify community needs and build respectful, collaborative relationships to achieve mutually desired conditions.

03 Provide training opportunities for Forest Service employees to gain a broader understanding of the unique legal relationship between the Federal Government and federally recognized tribes and tribal customs, traditions, and values.

04 Work with American Indian tribes to build respectful, collaborative relationships; to develop ways of accomplishing desired conditions and goals; and to collaborate in ecosystem restoration efforts.

05 Actively seek opportunities to employ tribal work crews to assist with land restoration and other projects.

06 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.

07 Develop, coordinate, and/or support programs focused on getting tribal members, including youth, involved in education activities on the Forest.

08 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 history, culture, and traditions.

09 Leverage opportunities for developing and/or supporting tribal monitoring programs to better identify, protect, and manage historic properties, sacred sites, areas of tribal importance, and culturally significant forest products.

10 Consider traditional ecological knowledge during project design, decisions, implementation, and monitoring.

11 Consult with tribes early and throughout the process of project planning and design.

Forestry and Forest Products (FP)

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 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 National Forest 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 negative impacts of wildfires on communities and to restore fire-adapted ecosystems to healthy conditions. The Four-Forest Restoration Initiative project, a collaborative effort to restore forest ecosystems on portions of four national forests—Coconino, Kaibab, Apache-Sitgreaves, and Tonto—was developed to create landscape-scale restoration approaches that will provide for fuels reduction, forest health, and wildlife and plant diversity. A key objective is doing this while creating sustainable landscape scale ecosystems that maintain landscape desired conditions over time. The Tonto National Forest 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 at a landscape scale.

Timber Suitability and Projected Harvest Levels

The National Forest Management Act and the 2012 Planning Rule require a timber suitability analysis of National Forest System lands. Timber production is the purposeful growing, tending, harvesting, and regeneration of regulated crops of trees for industrial or consumer use. Timber production is a land management strategy to manage forests for perpetual sustained yield, yielding a periodic production of timber products. It does not imply maximizing timber yield, only that periodic harvest and regeneration of forestlands will be planned and scheduled on a periodic perpetual basis. Timber production may only occur on National Forest System lands that are identified as being suitable for timber production. Timber harvest may occur on all National Forest System lands where not specifically prohibited (e.g., designated wilderness), including those not suited for timber production. These are lands where periodic timber harvest is unpredictable, unnecessary, or undesirable to achieve management goals, but harvest is permitted where necessary to achieve plan or project-level resource protection or enhancement objectives. The timber suitability analysis resulted in the identification of 188,851 acres suitable for timber production.

The sustained yield limit (SYL) is an estimate of the amount of timber which could be sustainably harvested from National Forest System forested lands annually in perpetuity. It limits the volume of timber which could be sold from a National Forest Unit except under certain circumstances as defined

by the National Forest Management Act of 1976 (16 USC 1600, 36 CFR 219.11(d)(6)). The sustained yield limit for the Tonto National Forest was determined to be 37 million cubic feet per decade.

The projected harvest levels (projected timber sale quantity and projected wood sale quantity) were calculated based on plan objectives and considering the operational capacity of the Tonto National Forest. These are the estimated amounts of commercial and other wood products that are expected to be produced under the plan's direction. Projected harvest levels are calculated for both the projected timber sale quantity (PTSQ) and the projected wood sale quantity (PWSQ). Projected timber sale quantity was determined to be 3.4 and 4.2 million cubic feet for the first and second decade, respectively. Projected wood sale quantity was determined to be 4.1 and 4.9 million cubic feet for the first and second decade, respectively.

See the Forestry and Forest Products section in volume 1 of the draft environmental impact statement and Appendix B: Description of the Analysis Process in volume 3 for more information on the timber suitability analysis, the calculation of PTSQ and PWSQ, and the map of suitable timberlands. Refer to the Vegetation Ecological Response Units and Fire and Fuels sections in Chapter 2. Forestwide Plan Direction for additional applicable plan direction.

Desired Conditions (FP-DC)

01 Personal and commercial timber harvest contributes to watershed health, function, and resilience, enhance wildlife habitat, creates small and large businesses and employment opportunities, and provides wood products.

02 Personal and commercial timber harvest supplement other restoration and maintenance treatments in forested vegetation communities at a scale that achieves and maintains landscape desired conditions over time.

03 A sustainable supply of commodities (e.g., timber, fuelwood, boughs, Christmas trees, seeds, and other special forest products), are available to businesses and individuals.

04 Forest products (e.g., Emory oak and pinyon nuts) are available and accessible for tribal communities and culturally important activities.

05 Harvest of dead and dying trees balance economic value with the needs of wildlife habitat, soil productivity, and ecosystem functions.

Objectives (FP-O)

01 Provide at least 34,000 CCF (hundred cubic feet) or 15,400 MBF (thousand board feet) of timber every ten years to contribute to forest product industry.

Standards (FP-S)

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

02 No harvest for the purpose of timber production will occur on lands not suited for timber production. Timber harvest may occur on these lands to meet other resource objectives and move toward achieving desired ecological conditions.

03 The regeneration harvest of even-aged[38] stands of trees is limited to stands that generally have reached the culmination of mean annual increment (CMAI) of growth, or stands that are unsustainable due to severe damage or disease. 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.

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

05 Even-aged timber harvest methods shall be used only where a completed interdisciplinary team review (and environmental analysis) determines them to be appropriate, and clearcutting will only be used where it is determined to be the optimum method to manage towards desired conditions over the long term.

06 Even-aged regeneration cuts will be shaped and blended with the natural terrain and provide for the protection of soil, watershed, fish, wildlife, recreation, and aesthetic resources.

07 Even-aged harvest shall only 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 that may be created in one harvest operation will be limited to 40 acres or less, unless specific conditions require larger openings (e.g., forest health or achieving other desired ecological conditions). Specific projects in which an interdisciplinary review indicate that a larger opening is desired will require Regional Forester approval on a case-by-case basis.

08 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,[39] unless the departure is justified and approved in accordance with direction found in Forest Service Handbook 1909.12, Chapter 60, section 64.33. This limit may be measured on a decadal basis.

09 Harvesting systems shall primarily be selected for their ability to move toward achieving desired conditions (e.g., vegetation, watershed, and riparian) and not for their ability to provide the greatest dollar return or unit output of timber, while remaining as economical as possible.

[38] Even-aged Methods are a planned sequence of treatments designed to maintain and regenerate a stand with predominately one age class (Forest Service Manual 2400 Forest Management, Chapter 2470 Silvicultural Practices, 2407.5 Definitions).

[39] A sustained yield is the amount of a timber that can be harvested or obtained without causing depletion of the resource over time.

Guidelines (FP-G)

01 Timber harvests may include uneven-aged[40] or even-aged methods that reflect the scale of natural disturbances and should be designed to move towards achieving, or maintaining, desired conditions (e.g., size class distribution, species composition, patch size, fuel reduction, and pathogens).

02 Timber and firewood harvests should be tailored to meet the needs and capabilities of local industry, businesses, and individuals.

03 Forest treatments should focus on uneven-aged management consistent with desired conditions for ecological response units.[41]

04 Firewood harvest within woodland ecological response units should be designed to be consistent with maintaining or moving toward ecological desired conditions.

05 Timber harvest and mechanical fuels treatments should be designed to develop or manage vegetation and coarse 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.

06 Log landing areas should be located outside of sensitive environments (e.g., riparian areas, wetlands and natural meadows, archeological sites, karst formations, and sensitive species areas). When landings must be located in these areas, effects to the sensitive resource should be mitigated.

07 Collection permits should not be authorized for rare plant species, species of conservation concern, or state protected species[42] if the species cannot withstand collection and if the collection will result in significant negative impacts to populations on the Forest. Collection requests should be considered when the results of the research will aid management of the collected species and for traditional tribal uses.

08 Permits for the removal of agaves stalks should not be authorized. Exceptions may be made for limited research purposes and traditional tribal uses.

[40] Uneven-aged Method is the regeneration and maintenance of stands with a multi-aged structure by removing some trees in all size classes either singly or in groups or in strips. (Forest Service Manua 2400 Forest Management, Chapter 2470 Silvicultural Practices, 2407.5 Definitions) Uneven-aged Silvicultural System is a planned sequence of treatments designed to regenerate or maintain a stand with three or more age classes. Includes single-tree selection, and group selection regeneration methods. (Forest Service Manua 2400 Forest Management, Chapter 2470 Silvicultural Practices, 2407.5 Definitions) The defining characteristic of an uneven-aged stand is that it has three or more age classes at all times.

[41] Ecological response units are mapped ecosystem types based off biophysical themes that represent the range of conditions (e.g., dominant species, vegetation associations, soils, landscape features, and climate) that prevail under natural disturbance regimes (e.g., fire and insects and disease).

[42] As identified in the Arizona Native Plant Law (1993).

09 When forest product and research collection permits are issued, seed collection and cuttings (rather than whole plant removal) should be the preferred collection methods for rare plants. An exception would be when whole plant removal is required to meet the needs of the permit holder 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[43] of specific species.

Management Approaches for Forestry and Forest Products (FP-MA)

01 Consider preparing pest and invasive species control plans in coordination with forest health and pest management specialists that contain appropriate design elements to mitigate any pest or invasive species concerns. (e.g., planting resistant tree species, maintaining species diversity, removing damaged trees or invasive species, and using pesticides). Utilize monitoring of procedures and results to inform future pest and invasive species control plans.

02 Coordinate with tribes during the planning of forest restoration projects to promote the persistence of plants used for traditional, cultural, and ceremonial purposes.

03 Consider designing small timber contracts to accommodate small operations based in local communities.

04 Consider ways to inform the public of the effects from illegal wood cutting, to ensure the sustainability of quality habitat over the long-term.

[43] Wilding permits authorize the collection of certain species of live plants and trees from National Forest lands for personal use.

Scenery (SC)

Scenery is the arrangement of the natural elements of the landscape along with components of the built environment. Scenery varies depending on existing natural features including vegetation, water features, landforms and geology, cultural features, and human alterations (e.g., buildings, structures, manipulations of the land or vegetation). The Tonto National Forest serves as a scenic backdrop for many local communities in central Arizona. Scenic quality defines the region's character and contributes to the quality of life and the positive experiences people seek on the Forest. Managing scenery is important to protect the naturalness of the scenic character.

The Tonto National Forest uses the scenery management system as a communicative tool for integrating scenery with the values and needs of other resource disciplines. Under this system, places are based on people's shared image of specific geographic areas and serve as the primary unit for the Tonto National Forest scenery management system inventory. Places establish the physical context of recreation settings. Places serve well as an interdisciplinary analysis unit, to foster open public dialog, provide geographic focus and a shared understanding of resource issues, and build supportive relationships necessary for community-based ecosystem stewardship. Places focus on the aesthetic, recreational, and social values of a geographic area, reflecting its history, culture, social meaning, and human attachments to the land, as well as the bio-physical attributes of an area. During the process of identifying places, the physical boundaries are of less importance than their core values. These values create a "sense of place" and make each place important and unique. Key attributes of places may range widely and can include social, emotional, mental, spiritual, political, economic, aesthetic, occupational, recreational, biological, and physical aspects. These places encompass multiple jurisdictions and ownerships.

Scenic character "is the unique combination of the physical, biological, and cultural images that give each place its positive scenic identity and contributes to sense of place. Scenic character provides a frame of reference from which to determine scenic attractiveness and to measure scenic integrity" (36 CFR 219.10(b)(1)(i)). By identifying the existing valued attributes, scenic character provides a frame of reference to determine scenic attractiveness, measure scenic integrity, and describe the recreation setting. Scenic character is described throughout this plan through introductory descriptions and desired conditions.

Refer to the Recreation, Energy Production and Delivery, Rangelands, Forage, and Grazing, Tribal Relations and Areas of Tribal Importance, Forestry and Forest Products, Mining, Minerals, and Abandoned Mines, Facilities, Vegetation Ecological Response Units, and Fire and Fuels in Chapter 2. Forestwide Plan Direction and the sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (SC-DC)

01 The forest contains a variety of landscapes representing the desired scenic character[44] that contributes to visitors' sense of place and connection with nature.

02 The forest appears predominantly natural and includes cultural landscapes valued by forest users and local communities for their scenic and traditional values.

03 High quality scenery dominates the landscape in areas valued by the public (e.g., state designated scenic routes, major roads, developed recreation sites, wilderness, national scenic trails, and wild and scenic rivers).

04 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.

05 Scenery is managed for present and future generations, is resilient to changing conditions, and supports ecological, social, and economic sustainability on the forest and in surrounding communities.

Guidelines (SC-G)

01 Management activities and newly constructed features (e.g., facilities and infrastructure) should minimize visual disturbances and be consistent with or move the area towards achieving scenic integrity objectives[45] (as defined in the Scenery Management System, or similar protocol).

02 Projects should include design elements to address negative impacts to scenic resources.

03 Management activities that result in short-term impacts inconsistent with the scenic integrity objectives, as defined in the scenery management system or similar protocol, should achieve, or move the project towards, the desired scenic integrity objectives over the long-term[46].

Management Approaches for Scenery (SC-MA)

01 Where management activities have short-term negative impacts to scenery, consider displaying interpretive or informational signs.

02 Consider setting priorities for rehabilitation of areas where existing scenic integrity is below the scenic integrity objective (as defined in the Scenery Management System, or similar protocol).

03 Work with partners, Federal and State agencies, local governments, and Tribes to protect and enhance scenic character on the Tonto National Forest.

[44] Desired scenic character descriptions and more information about the Scenery Management System can be found on the Tonto National Forest website at: https://www.fs.usda.gov/detail/tonto/landmanagement/planning/?cid=stelprdb5412120.

[45] Scenic integrity objectives are available on the Tonto National Forest website under Scenery at: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5412126.pdf.

[46] Short-term and long-term timeframes are determined during site-specific project planning.

04 Make the scenery management inventory and scenic integrity objective maps available to neighboring land management agencies, State agencies, communities, other partners, and the public for consideration in their projects and plans.

05 Use the Forest Service Built Environment Image Guide, or similar guide, as a reference in construction or reconstruction of Forest Service facilities to ensure consistency with the scenic character of the Southwestern Region.

Mining, Minerals, and Abandoned Mines (MMAM)

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. No leasable mineral authorization or applications are currently located within the Tonto National Forest. The potential for development of fluid minerals is low; the geologic depositional environment is not conducive to hydrocarbon generation.

Salable materials, also known as mineral materials and/or common variety minerals, found on the forest include sand and gravel, decomposed granite, and building stone. The Tonto 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 National Forest System 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. Regulation allows for commercial sales of mineral material; however, we do not currently have active commercial mineral material sites. Mineral materials may be acquired under the Materials Act of 1947 (30 U.S.C. 601–604).

Minerals that are not salable or leasable (e.g., gold, silver, copper, tungsten, uranium) 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 Mining Law of 1872 (30 U.S.C. 22, et seq), as amended. Locatable minerals can be claimed, explored, and mined on public lands under the 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.

Abandoned mine lands occur throughout the forest. Abandoned mines are the remains of former mining operations. The Forest Service's Abandoned Mine Lands program identifies mine features posing a danger to the public, which are prioritized and identified for closure or remediation. The classification as abandoned applies when there are no entities or individuals left operating the mining activity or who have financial ties to the mine. The significance of this classification is that for most abandoned sites there is no money from the original operators available to clean up the sites. Although occasionally a responsible party can be found to contribute funds toward cleanup, the major burden falls on the Forest Service to finance cleanup and remediation. Bats and other wildlife are known to use abandoned mine features for habitat.

Desired Conditions (MMAM-DC)

01 Mining and mineral activities comply with law, regulation, and policy in the development of mineral resources. Minimize 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.

02 Reclaimed mining and mineral sites provide for public safety and the protection of forest resources. They possess a resilient forest ecosystem suitable to permanent post mining landform.

03 Salable materials on National Forest System lands are 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.

04 Opportunities for rock hounding and mineral collection are available to forest users.

05 Abandoned mines disturbed by past mineral exploration and mine development have been returned to stable conditions and do not pose health, safety, or environmental hazards.

Objective (MMAM-O)

01 Implement closures of at least ten abandoned mines every five years.

Standards (MMAM-S)

01 Plans of operation shall be required for all mineral operations that will likely cause significant[47] disturbance of surface resources.

02 Required reclamation activities shall be designed to establish resilient post-mining ecosystems consistent with the pre-mining ecological response unit or to an ecological response unit identified as achievable.

03 All exploration drill/core holes and water production or monitoring wells reasonably incident to mining operations or required design elements and monitoring measures shall be abandoned in accordance with current State and Federal regulations and attested to by a licensed Professional Engineer or Geologist on site during the abandonment.

Guidelines (MMAM-G)

01 Salable materials (e.g., sand and gravel) should not be removed from the riparian management zone without adequate engineering controls[48] to protect surface waters.

[47] Significant disturbance means that, based on past experience, direct evidence, or sound scientific projection, the District Ranger reasonably expects that the proposed operations would result in impacts which more probably than not need to be avoided or ameliorated by means such as reclamation, bonding, timing restrictions, and other measure to minimize adverse environmental impacts to National Forest System resources.

[48] Adequate Engineering controls are controls designed to maintain or improve surface waters in the riparian management zone (e.g., temporary diversion of the existing channel around an active excavation area or wildlife exclosure fencing) to prevent degradation of the riparian area during the project.

02 Requests for personal and commercial mineral material sales should be considered where consistent with other resource desired conditions.

03 Placer mining should avoid damaging riparian vegetation, degrading water quality, and negatively impacting channel stability.

04 Surface reclamation and revegetation plans for smaller scale mineral activities (e.g., drilling programs or smaller scale open pits), should plan for a natural species succession appropriate to the reclaimed landform and vegetative community for the identified Ecological Response Unit, to include identifying appropriate species to use in revegetation of disturbed areas.

05 Reclamation should be carried out in logical succession throughout the operational sequence, concurrently where feasible.

06 Abandoned mine features (e.g., adits, shafts, and stopes) should be closed[49] when a feature poses a danger to the public. If the feature is determined to contain wildlife habitat (e.g., maternity roosts or hibernacula for bats) or contain cultural resources, gating should be considered. Installed gates should conform to bat-friendly standards and be designed in such a way to allow for the safe passage of wildlife.

Management Approaches for Mining, Minerals, and Abandoned Mines (MMAM-MA)

01 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 to ensure effective reclamation.

02 Work with proponents to list the Tonto National Forest as “Landowner” on all Arizona Department of Water Resources form (e.g., Notice of Intent to Drill and Abandon an Exploration/Specialty Well) and provide copies of submitted forms to minerals administrator.

03 Seek opportunities to work with proponents to expand and share knowledge of local natural resources (e.g., proactive data collection and sharing and development of conservation measures).

04 Develop general guidelines and informational brochures for public dissemination on rock hounding[50] and mineral collecting on Forest.

05 Encourage proponents and/or contractors to utilize local resources for economic benefit of the community.

[49] Closed abandoned mine features are features that have blocked openings (e.g., fences, warning signs, sealed mine openings with gates, expanding foam, or backfill) to prevent access and exposure to associated hazards that may include falls into openings, rotten timbers, toxic air, and forgotten explosives.

[50] Rock hounding is the recreational study and hobby of collecting rocks and mineral specimens from their natural environment.

06 Encourage large-scale mine sites to convert to other productive uses (e.g., renewable energy production, agricultural, or recreational types of uses) where reclamation to the original Ecological Response Unit is impracticable.

Roads (RD)

There are approximately 4,200 miles of motorized routes on the Tonto National Forest. These roads have various maintenance levels (ML), from closed to all motorized uses (ML1) 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, roadsides, and surfaces, bridges, culverts, drainages, signage, and clearing of brush and overgrowth. Roads are maintained to provide access for land management needs, protect natural resources, and to best serve the public.

In addition to National Forest System roads, there are approximately 470 miles of roads and highways that traverse the Tonto National Forest, that are under the jurisdiction and management of state and county public road authorities. These roads serve as arterials providing access across the state and primary access to national forest destinations via connecting National Forest System roads.

Refer to the Motorized Recreation section in Chapter 2. Forestwide Plan Direction for additional applicable plan direction on motorized trails.

Desired Conditions (RD-DC)

01 The Forest's transportation system and infrastructure accommodate needs for public access, land management, resource protection, and user safety, while contributing to social and economic sustainability.

02 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.

03 Roads provide recreation opportunities and access to a variety of recreation settings and places.

04 National Forest System roads have minimal adverse environmental impacts to soil, riparian areas, watercourses, native vegetation, and at-risk species.

05 Unauthorized routes are not apparent on the landscape.

06 Roads have a water drainage system that minimizes delivering sediment and pollutants to water bodies.

Objectives (RD-O)

01 Decommission[51] 100 to 600 miles of a combination of unauthorized routes and national forest system roads identified through the travel management process every ten years.

02 Grade surfaces and clean culverts and ditches on at least 500 miles of open National Forest System roads annually.

[51] Decommission includes activities that result in restoration of unneeded roads to a more natural state using one or more of the options found per FSM 7734.

Standards (RD-S)

01 Motor vehicle use by the public is only authorized as designated by the motor vehicle use map,[52] except as authorized.

02 Commercial users must maintain roads commensurate with their use to prevent resource damage and deterioration of the road system.

03 Road construction and maintenance will incorporate Best Management Practices (BMPs).[53]

04 Temporary roads shall be constructed, decommissioned, and rehabilitated as part of the same project.

Guidelines (RD-G)

01 New roads should not be constructed in areas where a primitive recreation opportunity spectrum (ROS)[54] class is desired.

02 Construction of temporary roads should be avoided in areas where a semiprimitive nonmotorized recreation opportunity spectrum (ROS) class is desired unless required by a valid permitted activity or management activity. If authorized, roads should be constructed and maintained at the lowest maintenance level needed for the intended use, then rehabilitated.

03 Decommissioned roads should be returned to their natural condition.

04 When designing or maintaining bridges, design elements that reduce mortality and are beneficial to wildlife (e.g., habitat connectivity, roost sites) should be incorporated.

05 New or reconstructed roads should be located outside of the riparian management zone, or other important water resources (e.g., meadows, wetlands, seeps, and springs), in order to prevent resource damage. If road construction in riparian areas is unavoidable, it should be designed and implemented to minimize effects to natural waterflow, aquatic species, channel morphology, water quality, and native riparian vegetation. The number of stream crossings should be minimized to reduce negative impacts to natural resources.

06 New or redesigned stream crossings (e.g., bridges and culverts) should be wide enough to pass the bankfull[55] without obstructing or confining the flow.

[52] The motor vehicle use map identifies roads, trails, and areas where motorized travel is allowed.

[53] National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1: National Core BMP Technical Guide (2012), defines Best Management Practices (BMPs) for water quality as methods, measures, or practices selected by an agency to meet its nonpoint source control needs.

[54] Or current protocol.

[55] Bankfull is the incipient elevation on the bank where flooding begins. In many stream systems the bankfull stage is associated with flow that just fills the channel to the top of its banks and at a point where the water begins to overflow onto a floodplain (Zeedyk and Clothier 2009).

07 New or reconstructed roads, culverts, and other water crossing infrastructure should be designed and located to allow for passage of aquatic species and the naturally occurring sediment and debris transported by the stream.

08 Roads should be closed, or impacts mitigated if geologic hazards (e.g., landslides, rock falls, or flooding) or hazard trees occur.

09 When temporary roads are necessary, stream crossings should be designated to mitigate sedimentation and gradient changes and impacts to channel stability. These crossings should be designated by the appropriate resource specialists and installed and removed while protecting existing adjacent features.

10 Reconstruction and rehabilitation of existing roads should be prioritized over new construction.

11 Construction of new and relocated roads should avoid areas with high mass wasting[56] potential, (e.g., high landslide prone areas).

Management Approaches for Roads (RD-MA)

01 Develop partnerships with various interest and user groups to participate in evaluation, planning, and maintenance programs for roads.

02 Prioritize decommissioning of roads or user created routes that impact flow regimes, are redundant routes, cause mass movement of soils and sediment, are built within the riparian management zone, or have substantial negative impacts to at-risk species.

03 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.

04 Utilize the Arizona Department of Transportation Guidelines for Highways on Bureau of Land Management and National Forest System lands, or similar document, when designing, constructing, or maintaining highways that traverse forest land.

[56] Mass wasting is the downhill movement of rock and soil material due to gravity.

Facilities (FC)

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

Desired Conditions (FC-DC)

01 Forest facilities (e.g., buildings, campgrounds, water and wastewater systems, and dams) provide for health and safety of forest users.

02 The construction and operation of facilities has minimal long-term impacts to surrounding soil and vegetation.

03 Surrounding vegetation conditions and building materials aid in the protection of infrastructure from wildfires and do not consist of invasive vegetation.

04 Facilities are energy-efficient, durable, well maintained, and serve their intended use category.

05 Facilities are in compliance with applicable accessibility guidelines and current building or occupancy standards.

06 Recreation and administrative sites complement the forest's scenery desired conditions and do not cause damage to ecologically sensitive environments.

07 Developed recreation facilities (e.g., campgrounds and picnic areas) provide a range of visitor needs; most areas have simple facilities (e.g., picnic tables and vault toilets), while some offer additional amenities (e.g., paved roads, flush toilets, and shower facilities).

08 Developed recreation and dispersed recreation sites are capable of supporting appropriate visitor use. The number, layout, and size of constructed facilities are appropriate for the use level and activity types that occur at each site.

Standards (FC-S)

01 All infrastructure with employee, volunteer, and public occupancy shall be subject to the Occupational Safety and Health Administrative standards.

Guidelines (FC-G)

01 Emerging technologies and sustainable design concepts should be incorporated in new facility design and maintenance and renovation of existing facilities.

02 Construction of new facilities in sensitive environments (e.g., floodplains, wetlands) should be avoided or area of disturbance minimized, where practicable.

03 Facility design and construction should consider measures to minimize negative impacts to wildlife, fish, and rare plants (e.g., no reflective surfaces that would cause confusion and collision by birds or accommodate appropriate movement for fish and other aquatic organisms).

04 Facilities should be planned, designed, and managed to prevent resource damage and not adversely impact the surrounding scenic character.

05 Excess facilities should be transferred to other uses or ownerships or decommissioned in efforts to reduce maintenance backlog and infrastructure deterioration and to protect public health and safety.

06 Landscape maintenance around facilities should focus on vegetation that poses a threat to the facility and its function.

Management Approaches for Facilities (FC-MA)

01 Consider developing a comprehensive preventative maintenance program for buildings and infrastructure to minimize major unplanned repairs or replacements.

02 Consider prioritizing infrastructure investments for current needs and long-term planning goals as identified in the facilities master plan, sustainable recreation plan, other resource documentation, and health and safety requirements.

Lands and Access (LA)

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.

Forest access is provided through a system of nonmotorized 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 (LA-DC)

01 Land ownership adjustments (e.g., purchase, donation, exchange, or other authority) improve management activities (e.g., consolidating ownership, reducing wildlife-human conflicts, providing for wildlife habitat connectivity, improving public access, protection of cultural resources, and retaining or acquiring key lands for fish, wildlife, and rare plants).

02 The landownership pattern 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.

03 Land status records facilitate the resolution of landownership cases related to title claims, trespass, and unauthorized uses and to protect public access and achieve effective management of National Forest System lands.

04 Forest boundaries and designated areas (e.g., wilderness areas) are clearly and appropriately marked.

05 Occupancy trespass on Tonto National Forest lands does not exist.

06 Road and trail authorizations provide access to and/or across National Forest System land are available where needed.

Standards (LA-S)

01 Authorize a single road access to private property or to a road user association, regardless of subdivision, when the proposal meets the requirements of law, regulation, and policy.

Guidelines (LA-G)

01 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:

a. 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);

b. The conveyance or acquisition would reduce conflicts between Forest Service and private-landowner objectives, especially when conflicts are adversely impacting National Forest System management;

c. Lands with important characteristics (e.g., cultural resources, riparian and wildlife habitat, and watershed protection) would enhance National Forest mission, including access;

d. Lands would improve administration and reduce trespass;

e. Lands would add significantly to available National Forest goods and services;

f. Lands in mineralized areas have low potential for a future patent and the mineral estate would be donated to the United States (only applicable to acquisition by exchange); or

g. Lands consist of surface waters that would benefit the economic and social interests of the public.

02 The Forest should proactively respond to threats to federally owned property rights (e.g., encroachment, trespass).

Management Approaches for Lands and Access (LA-MA)

01 Develop a strategy to address known and suspected trespass and encroachment issues present on the Forest.

02 While addressing access problems on the Forest, seek cooperation of private landowners through acquiring easements.

03 Consult with interested state and local governments on Forest decisions regarding permits and easements with planning and zoning ordinances where local and Forest objectives are complementary.

Vegetation and Ecological Response Units (ERU)

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 (table 2). Management direction is described for vegetation communities and ecosystems using ecological response units. Ecological response units are mapped ecosystem types based off biophysical themes that represent the range of conditions (e.g., dominant species, vegetation associations, soils, landscape features, and climate) that prevail under natural disturbance regimes (e.g., fire, insects, and disease). Each ecological response unit 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 2. Ecological response units by system type

System Type	Ecological Response Units	Acres	Elevation (feet)
Shrublands/Deserts	Mojave Sonoran Desert Scrub, Sonora-Mojave Mixed-Salt Desert Scrub	791,284	1,300 – 5,800
Shrublands/Interior Chaparral	Interior Chaparral	290,771	2,300 – 7,800
Grasslands/Semi-desert grassland	Semi-Desert Grassland	340,983	1,800 – 6,800
Woodlands	Pinyon-Juniper Woodland, Pinyon-Juniper Grassland, Juniper Grassland, Pinyon-Juniper Evergreen Oak, Madrean Encinal Woodland	1,035,449	2,200 – 7,800
Forests	Madrean Pinyon-Oak, Ponderosa Pine-Evergreen Oak, Ponderosa Pine Forest, Mixed Conifer-Frequent Fire, Wet Mixed Conifer	302,436	1,700 – 5,100

A fundamental component of most landscapes, and in the descriptions of the ecological response units referenced throughout the plan, is a ‘fire regime’. Fire interacts with other disturbances, such as insects, drought, wind, and other weather-related events to create spatial and temporal patterns that maintain an ecosystem within a certain range of conditions. A simple definition for ‘fire regime’ is the role fire plays in an ecosystem. A fire regime has multiple attributes, which include intensity, severity, size, seasonality, and multiple other variables. However, fire regimes are often described by characterizing severity (fire effects) and frequency (intervals between fires). Table 3 describes commonly referenced fire regimes that are used in this analysis (Barrett *et al.* 2010). In this analysis, patch size is also used as a metric for describing desired conditions and existing conditions for ecological response units on the Tonto National Forest.

In frequent fire regimes the average fire return interval is less than 35 years, and fire has a profound influence on ecosystem dynamics, including seedling dynamics, canopy structure dynamics, understory plant species diversity, species richness and mosaics, nutrient cycling, soil properties, plant growth, vertebrate and invertebrate diversity, and many other ecosystem properties and characteristics (Swetnam and Baison 1996). The effects of just one or two fires are insufficient to

evaluate the role of fire in a frequent fire regime because it is the cumulative impacts of multiple, mostly low severity fires that define those ecosystems. In a frequent fire regime, the effects of fire can be difficult to identify if only one or two fires are considered.

Table 3. Fire regimes adapted from (Barrett *et al.* 2010) and representative ecological response units (ERUs)

Group	Frequency (years)	Severity[1]	Severity Description	Representative ERUs and general descriptions
I	0 – 35	Low to mixed	Stand replacement is less than 25 percent of the dominant overstory vegetation.	Ponderosa pine forest, most Ponderosa Pine/Evergreen Oak, mixed conifer with frequent fire, Juniper Grass, in these systems, it is mostly the herbaceous surface vegetation that carries the fire
II	0 – 35	High	High severity replaces greater than 75 percent of dominant overstory.	Semi-Desert Grassland. Herbaceous surface fuels, sometimes with a shrubby component, are what carries the fire and, in most fires more than 75 percent is topkilled.
III	35 - 100	Mixed to Low	Generally mixed-severity; may also include low severity fires.	Some mixed conifer with frequent fire, Madrean Pinyon/Oak Woodland, fires intervals and severity are more variable than in Fire Regimes I and II.
IV	35 - 200	High	High severity.	Pinyon – Juniper Evergreen Shrub, some mixed conifer with aspen. This fire regime is similar to III, but with longer return intervals, higher average severity, and usually larger patch size.
V	200+	High or any severity	Any severity may be included, but mostly replacement severity; may include any severity with this frequency	All desert ERUs. In some places, Pinyon/Juniper Woodland has no known fire history, and may be considered to have a Fire Regime V

1 - Note: 'Severity' is not a reference to mortality, though there is often a correlation. Severity is a description of the effects of a fire, while intensity describes the behavior of a fire.

Desired conditions for ecological response units are presented at three spatial scales: the landscape scale, mid-scale, and fine-scale (figure 4). For woodland and forest ecological response units, the landscape scale is 1,000 to 10,000 acres or larger, the mid-scale is ten to 1,000 acres, and the fine-scale is less than ten acres. For shrublands (semi-desert grassland, and desert ecological response units), the landscape scale is 1,000s to 10,000 acres or larger, the mid-scale is 100s to 1,000s 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 ecological response unit describes a range of conditions (e.g., cacti and grass ranges from ten to 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/ecological response unit towards these targets/ranges for desired conditions.

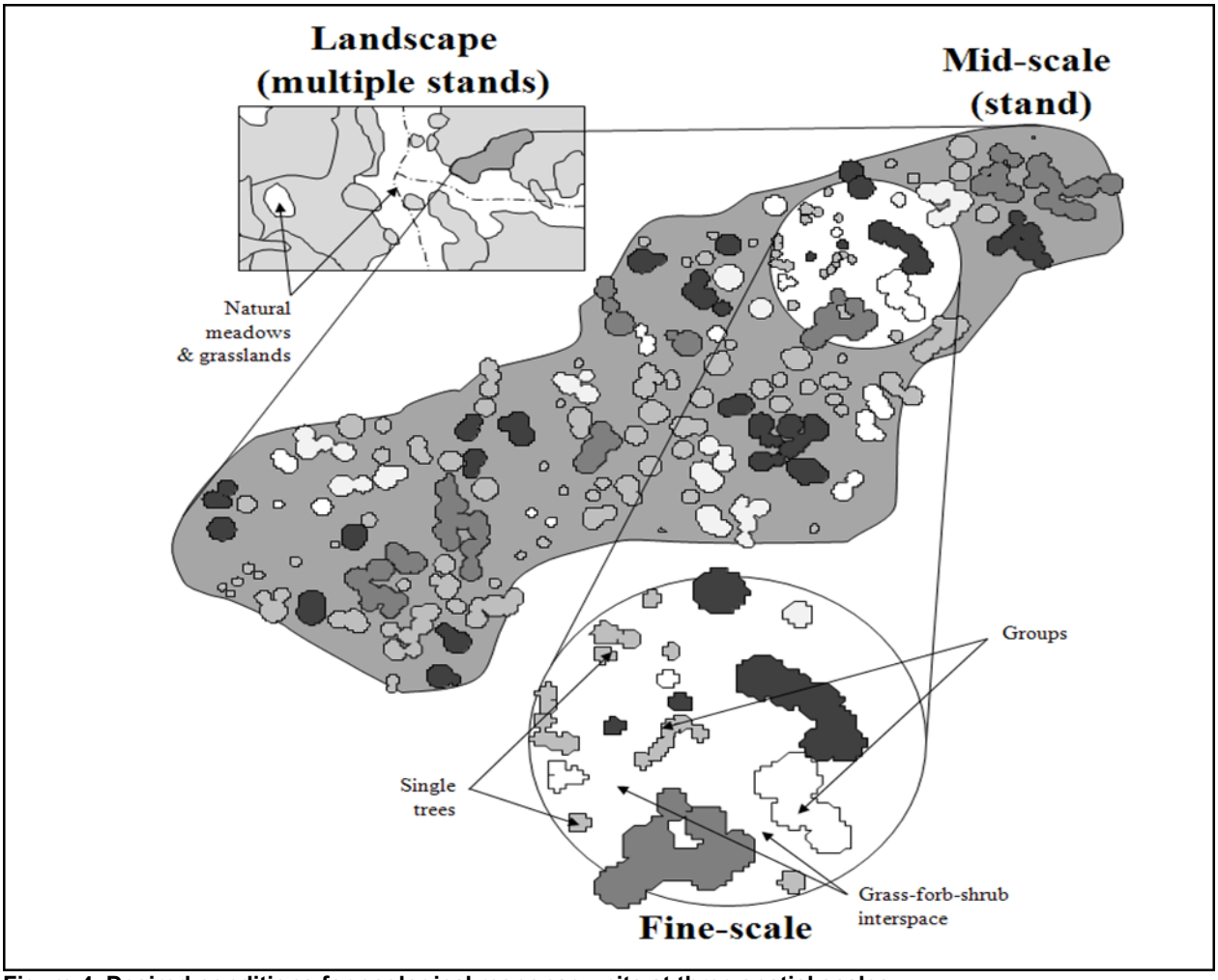

Figure 4. Desired conditions for ecological response units at three spatial scales

Woodland ecological response units, mostly the pinyon-juniper types, are the most abundant on the Forest – representing a combined 34 percent of the Tonto National Forest. Desert ecological response units make up 29 percent of the forest. Out of the forested ecological response units, the ponderosa pine evergreen oak ecological response unit is the most common while the ponderosa pine forest and mixed-conifer ecological response units are the least common on the Forest. The semi-desert grassland ecological response unit makes up twelve percent of the forest.

The plan components which follow apply to all upland (does not include riparian) ecological response units. Refer to the twelve individual ecological response unit sections as well as Forest Products, Fire and Fuels, and Invasive Species sections in Chapter 2. Forestwide Plan Direction for additional applicable plan direction. Additionally, a crosswalk of common-to-scientific names for species used in this section can be found in Appendix C. Species Common Name Crosswalk.

All Upland Ecological Response Units (ERU)

Desired Conditions (ERU-DC)

01 At the landscape scale, a mosaic of different vegetation conditions (structure and composition) and diversity of landscape features (e.g., openings and water bodies) promote resiliency and ecosystem function. These heterogeneous conditions also create natural fire breaks, thereby reducing the severity and extent of uncharacteristic or undesirable fire effects.

02 A diversity of seral states is present and approach desired seral state distributions by ecological response unit. Seral state proportions, per the Region 3 Seral State Proportions Supplement, are applied at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.

03 Old growth within woodland and forested ecological response units (ponderosa pine forest, ponderosa pine-evergreen oak, mixed conifer–frequent fire, pinyon-juniper grass and juniper grass, pinyon-juniper woodland, pinyon-juniper evergreen shrub, Madrean Encinal woodland and Madrean pinyon oak) 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). Desired conditions for wet mixed conifer/mixed conifer with aspen differ somewhat from the other forested ecological response units listed here and can be found under Landscape Scale Desired Conditions for wet mixed conifer/mixed conifer with aspen.

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

05 Terrestrial ecological response units are functioning properly and are resilient to the frequency, extent, intensity, and severity of disturbances (e.g., insects, diseases, and fire). Natural and human disturbances provide desired overall plant density, species composition (mix of species), structure, coarse woody debris, and nutrient cycling.

06 Fire frequency and severity are within, or trending towards, characteristic ranges, with some exceptions in the wildland-urban interface as described below.

07 Fire interacts with other disturbances, such as insects, drought, wind, and other weather-related events to create spatial and temporal patterns that maintain an ecosystem within a characteristic range of conditions, with some exceptions in the wildland-urban interface.

08 Patch sizes are at or trending towards the characteristic range of patch size for each ecological response unit.

09 Vegetative ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values characteristic for each ecological response unit. In areas of high vulnerability to climate change, based on 100-year climate projections (Triepke *et al.* 2016), tree basal area is restored or

maintained at the low end of the desired range to mitigate water stress.[57] In these areas, early-mid seral species 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.

10 Ecosystem function is supported by native plant communities and have little or no invasive species. If invasive or exotic species are present, they are not detrimental to natural diversity, or ecosystem function for any ecological response unit.

11 Upland vegetation and riparian zones are ecologically connected based on natural patterns that are consistent with landforms and topography and provide for upland and aquatic species movements and genetic exchange.

12 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 (e.g., fire or climate).

13 Vegetative cover and litter[58] 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, regulate moisture infiltration, and contribute to plant and animal diversity and support ecological integrity, though the cover may fluctuate occasionally within the natural fire regime.

14 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.

15 Based off site potential, native plants provide nectar, floral diversity, and pollen throughout the seasons that pollinator species are active. Site conditions promote pollinator success and survival.

16 In the wildland-urban interface, or where private lands or infrastructure are adjacent to National Forest System lands:

a. Wildland fires in the wildland-urban interface do not result in the loss of life or property.

b. Wildland fires in the wildland-urban interface are mostly low intensity/low severity surface fires. Firefighters are able to safely and efficiently suppress wildfires in the wildland-urban interface.

[57] For ranges, see following desired condition descriptions for forest and woodland ecological response units.

[58] Litter is the top layer of the biomass and organic material on the ground of a forest, shrubland or grassland above the duff layer (if there is a duff layer). It may include fallen leaves, needles, bark, fruits, berries, pine cones, dead herbaceous material (grasses and forbs), and a variety of accumulated dead organic matter which is unaltered, or only slightly decomposed. This layer typically does not include large twigs and larger stems.

c. In forested vegetation communities, the percent of the area occupied by interspace with grass/forb/shrub vegetation is on the upper end of, or above, the range given in the vegetation community desired conditions. Trees within groups may be more widely spaced with less interlocking of the crowns than desirable in adjacent forest lands. Interspaces between tree groups are of sufficient size to discourage isolated group torching from spreading as a crown fire to other groups. The tree basal area in the wildland-urban interface is on the lower end of the range given in the vegetation community desired conditions. When wildland-urban interface intersects vegetation types with a mixed or high-severity fire regime, such as interior chaparral, characteristic ecosystem function is modified to promote low intensity/low severity surface fires.

d. Higher fuel loading or tree densities may be desired in areas where it provides for important fine scale habitat structure, as long as it meets the overall intent of protecting wildland-urban interface values.

e. Ladder fuels are nearly absent.

f. Logs and snags, which often pose fire control problems, are present in the wildland-urban interface, but at the lower end of the range given in the appropriate vegetation community desired conditions.

g. Dead and down fuel load is between one and 40 tons per acre, depending on ecological response unit, with lower amounts in frequent fire-adapted ecological response units, and higher amounts in infrequent fire types. This light fuel load applies even in vegetation types with higher reference fuel loads, such as wet mixed conifer, to provide improved fire protection to human developments deemed to have special significance.

h. When wildland-urban interface intersects vegetation types with a mixed or high-severity fire regime, characteristic ecosystem function is modified to promote low intensity/low severity fire, but with sufficient cover to meet the needs of a variety of wildlife species.

Objectives (ERU-O)

01 In frequent-fire forested ecological response units (ponderosa pine forest, ponderosa pine-evergreen oak, and mixed conifer-frequent fire), emphasize treatments within the ponderosa pine-evergreen oak ecological response unit by treating:

a. 50,000 to 122,000 acres over a ten-year period with both mechanical treatments and fire. About 22 percent would be treated with prescribed fire, with the expectation that the rest would be treated with wildfire.

b. 105,000 to 325,000 acres over a ten-year period with only fire (no mechanical treatment). About 22 percent of these acres would be treated with prescribed fire, with the expectation that the rest would be treated with wildfire.

02 In woodland ecological response units, emphasize treatments within the frequent fire woodlands (pinyon-juniper grass, juniper grass, and Madrean pinyon oak) as follows:

a. 400 to 2,000 acres over a ten-year period with both mechanical treatments and fire. About 22 percent would be treated with prescribed fire, with the expectation that the rest would be treated wildfire.

b. 20,000 to 200,000 acres with only fire (no mechanical treatments) over a ten-year period. About 22 percent would be treated with prescribed fire, with the expectation that the rest would be treated by wildfire.

03 Restore[59] at least 500 acres of semi-desert grasslands, over a ten-year period.

04 Survey, inventory, or treat 10,000 to 15,000 acres of invasive species[60] (e.g., buffelgrass, fountain grass, and red brome) in desert ecological response units (Sonoran Desert plant communities and Sonora-Mojave mixed-salt desert scrub) over a 10-year period.

Guidelines (ERU-G)

01 Naturally ignited fires should be allowed to function in their natural ecological role in fire-adapted ecological response units when burning conditions facilitate progress toward desired conditions. Where it can be done safely, wildfire should be actively suppressed when the expected effects do not facilitate progress towards desired conditions or where necessary to protect life, property, and threatens identified values.

02 When seeding is desirable 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 weed-free plant materials (e.g., sterile barely) 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.

03 Ground-disturbing activities that increase the risk of invasion by exotic and invasive plant species should include measures to eradicate or limit the spread of these species before, during and/or following the activity and implement measures to limit the potential for spread into unoccupied areas.

04 In areas within woodland and forest ecological response units where there is little understory and mechanical treatments are proposed, slash treatments (e.g., lop and scatter and mastication) should be used to move herbaceous vegetation growth, watershed condition, soil productivity towards desired conditions, and minimize long-term impacts from invasive species. Desired and potential fire behavior and severity, soil burn severity, firefighter safety, and wildlife and livestock movement should inform any decision to leave slash on site.

05 In forest and woodland ecological response units, 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.

[59] The term "restore" as defined in Forest Service Handbook 1909.12 Land Management Planning Handbook, Chapter- Zero Code is to renew by the process of restoration. Ecological Restoration, as defined in Forest Service Handbook 1909.12 Land Management Planning Handbook, Chapter- Zero Code.

[60] See the Invasive Species section in Chapter 2: Forestwide Plan Direction for more information.

06 In forest and woodland ecological response units, hand piles should be retained across the landscape for several years, rather than immediately being burned, to increase small mammal occupancy in areas where coarse woody debris is deficient and to provide nesting habitat and cover for birds, small mammals, reptiles, and invertebrates. The number and distribution of retained hand piles should be balanced with potential threats from bark beetles and fire concerns.

07 In woodland and forest ecological response units, large accumulations of green material (e.g., slash and wind-thrown trees) should be managed to reduce the risk of uncharacteristic bark beetle outbreaks.

08 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. Treatments should mimic desired conditions for patch sizes. Treatments for mitigating adverse impacts should not completely eliminate mistletoe but, rather, they should typically be aimed at reducing infection levels across the stand and increasing host vigor.

09 Vegetation management activities should retain old trees[61], snags, and downed logs in and near stream channels and riparian areas to provide for wildlife habitat and recruitment of large woody material.

10 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. e.g., clear cutting better mimics the kind of fire that is typical in chaparral or pinyon-juniper evergreen shrub than thinning. In woodland or grassland ecosystems, removal of encroaching woody growth would be an effective treatment in moving those areas towards desired conditions.

11 In forested ecological response units 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.

12 In forested and woodland ecological response units, strategies developed for re-establishing desired conditions should include snags, downed logs, and other woody components that collect drifting seeds, provide shade, cooler temperatures, moisture retention, and protection from ungulate herbivory.

13 The primary objectives of first, second, and sometimes third entry burns in frequent fire ecological response units from which fire has been withheld for several cycles should be to restructure the fuel profile so it can support the kinds of fire that the ecological response unit evolved with. Fire effects, fire behavior, and emissions in these initial burns may not be within the historic range of variability, and seasonality and timing is less important than for maintenance burns.

[61] Old trees are generally greater than 150 years of age, however old age varies by species, and identification will occur at the project level.

Management Approaches Vegetation and Ecological Response Units (ERU-MA)

01 Work with partners on collaborative plant conservation programs and projects aimed at restoring native plant communities and ecosystem resiliency.

02 Support new and existing partnerships 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).

03 Use a risk assessment, hazard index, or similar methodology to identify areas with the greatest need for treatment to mitigate the potential for detrimental fire effects. It should be updated at least every two years as management activities, natural disturbances, or other changes in condition change the need for treatment.

04 Work closely with the U.S. Fish and Wildlife Service to address the habitat needs of the Mexican spotted owl by minimizing unnatural disturbance and providing nest/roost habitat, which includes managing for areas of closed canopy and desired levels of key structural elements (e.g., large old trees, snags, and downed woody material) in forested ecological response units. Forested ecological response units provide Mexican spotted owl habitat as discussed under the most recent, approved recovery plan for the Mexican spotted owl.

05 Work with partners and other experts in the field to proactively promote research and monitoring that will assist in the adaptive management related to climate change.

Desert Ecosystems (ERU-DES)

Desert communities on the Tonto range in elevation from 1,300 up to 5,800 feet (table 4). The predominant species are shrubs, desert trees, and succulents, with lesser amounts of grasses and forbs. Desert ecosystems are described from three ecological response units. The Mojave Sonoran desert scrub ecological response unit represents a broad inclusion of Mojave Desert and Sonoran Desert plant communities, but on the Tonto National Forest, this ecological response unit is more representative of Sonoran Desert plant communities characterized by two provisional subclasses: the Sonora mid-elevation desert scrub and Sonoran palo verde-mixed cactus desert scrub. The third desert ecological response unit is the Sonora-Mojave mixed-salt desert scrub.

Table 4. Desert ecological response units

Ecological Response Unit	Ecological Response Unit Code	Acres	Elevation (feet)
Sonora-Mojave mixed-salt desert scrub	SDS	21,095	1,900 – 3,200
Sonoran palo verde-mixed cactus desert scrub	MSDS-SP	656,632	1,300 – 5,800
Sonoran mid-elevation desert scrub	MSDS-SOS	113,557	1,700 – 5,100

In all Sonoran Desert ecosystems, fire was rare to absent, and many/most desert species and ecosystems do not have adaptations to fire, so that even low-intensity fire will usually produce high severity effects. Prior to Euro-American settlement, fires that did occur were ignited by lightning or Native Americans. Sonoran Desert communities lacked contiguous fuel sources, which usually limited

fire spread to the patch of vegetation where they started (Paysen *et al.* 2000; Wahlberg *et al.* 2017 (in draft)).

Invasive, exotic grasses, such as red brome and buffelgrass, burn easily and are increasingly common in the Sonoran Desert. These species, combined with additional exotic species, that include Sahara mustard, and filaree, as well as native species, such as globe mallow and wooly and blond plantain, contribute to fine fuels that are easily ignited in this vegetation type, creating large areas of contiguous fuels, and resulting in more and larger fires in these plant communities (Brooks and Pyke 2001; Abella 2010). The risk of uncharacteristic fire is especially high when precipitation from October through May is unusually high, increasing the total production and cover of annual exotic species to several times that of a typical year. The problem is exacerbated by increasing numbers of human started wildfires as visitation increases, particularly along highways and roads that run through desert areas.

Sonoran Mid-Elevation Desert Scrub

Sonoran mid-elevation desert scrub is found at higher elevations than Sonoran paloverde-mixed cactus desert scrub where palo verde tend to be less common (frost-sensitive) and includes species such as buckwheat, jojoba, crucifixion thorn and creosote bush.

Sonoran Palo Verde-Mixed Cactus Desert Scrub

Generally Sonoran palo verde-mixed cactus desert scrub is found at low to mid elevations and has a diverse assemblage of vegetation including the saguaro cactus, creosote bush, chollas, prickly pear cactus, bursage, palo verde and crucifixion thorn, ironwood, and tall shrubs such as catclaw, wolfberry, jojoba, and teddy-bear cactus. Creosote bush is well represented at some areas, but usually eclipsed by brittlebush on warm slopes while some north exposures are dominated by spikemoss.

Sonora-Mojave Mixed Salt Desert Scrub

The Sonora-Mojave mixed-salt desert scrub ecological response unit 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 *Atriplex sp. Graminoid* species may occasionally include *alkali sacaton* or desert salt grass at varying densities.

The plan components below apply to all desert ecosystems. Refer to the All Upland Ecological Response Units, Invasive Species, Forestry and Forest Products, and Fire and Fuels sections for additional applicable plan direction.

Landscape Scale Desired Conditions (ERU-DES-DC)

01 The desired seral states, canopy cover, and structural states for the Mojave Sonoran desert scrub ecological response unit are as presented in table 5. On a landscape scale, patch size should be between about 4,212 and 8,125 acres. Vegetative ground cover should average about ten percent, though it can be less than one percent on barren rocky substrate.

Table 5. Mojave Sonoran Desert scrub ecological response unit (ERU) desired vegetation conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
5	Annual grasses and forbs	10-25	Open
20	Cacti and perennial grasses	10-25	Open
75	Cacti and shrubs	over 60	Closed
under 1	Exotic annual and perennial grasses	under 1	Absent-sparse

02 The desired seral states, canopy cover, and structural states for the Sonora-Mojave Mixed Salt Desert Scrub ecological response unit are as presented in table 6. Patch size was not assessed for this ecological response unit. Vegetative ground cover should average about ten percent.

Table 6. Sonora-Mojave Mixed Salt Desert Scrub ecological response unit (ERU) desired vegetation conditions

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

03 Fires are infrequent and localized, with mean fire return intervals estimated at over 200 years.

04 The presence of non-native species does not significantly affect native species richness or the habitat of native flora and fauna.

05 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 (e.g., the majority of soils, greater than 66 percent on average are rated as functioning properly).

06 Arroyos and gullies with accelerated erosion in desert ecological response units are stabilizing and recovering.

07 Saguaros, mesquite trees, and other vegetation large enough to sustain cavity nesting birds are present across the landscape (measured from species-specific needs/requirements during project planning).

08 Large and old Saguaros are healthy and present on the landscape based on their site potential.

Midscale Desired Conditions (ERU-DES-DC)

09 Plants form beneficial relationships with soil microbes and cryptogrammic soil crusts are intact in all desert ecological response units. Roots are covered with soil and there is little evidence of plants perched above the soil with exposed roots (pedestalling).

10 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 ecological response units.

11 Important desert plant communities are present across the forest based of the ecological response unit and site potential (based off similarity to site potential measured from terrestrial ecological unit inventory 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.

12 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 ecological response units.

Management Approaches for Desert Ecosystems (ERU-DES-MA)

01 Document and track current and ongoing research studies of Sonoran Desert ecosystems to better inform management of the response of desert plant species, plant communities, and ecological processes to unnatural disturbances (e.g., fire, livestock grazing, climate change, invasive species, and off-highway vehicle impacts).

02 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.

03 Work with partners and researchers to accomplish mapping, inventorying, and surveying invasive species to meet forest plan objectives. Develop data products such as invasive species cover and extent for the forest using remote sensing or other similar technologies.

04 Use an index, or other quantitative measure, to evaluate the condition of the Sonoran Desert (areas of high vs. of low ecological integrity) that can be shared with partners to facilitate adaptive management. The index uses metrics and data that can be updated and managed by the forest every year or two to inform management activities and priorities in the Sonoran Desert.

Semi-Desert Grasslands (ERU-SDG)

The semi-desert grassland ecological response unit 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 vary. Some areas on the Forest may be difficult to identify as 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. The plan components below apply to semi-desert grasslands. Refer to the All Upland Ecological Response Units, Invasive Species, Forestry and Forest Products, and Fire and Fuels sections for additional applicable plan direction.

Landscape Scale Desired Conditions for Semi-Desert Grasslands (ERU-SDG-DC)

01 The desired seral states, canopy cover, and structural states for the semi-desert grassland ecological response unit are as presented in Table 7.

Table 7. Semi-Desert Grassland ecological response unit (ERU) desired vegetation conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
20 – 25	Recently disturbed, grass and forbs, and shrub resprouts	Shrub, Tree under 10	Sparse
70 – 75	Majority of vegetation is late successional herbaceous perennial grasses	Shrub, Tree under 10	Sparse
0 – 5	Shrub and tree encroachment and herb dominance (includes departure states)	Shrub, Tree 10-30	Open
0	Closed shrub/tree, with herb layer dominated by early seral vegetation, ruderal	Shrub over 30	Closed
0	Herb layer dominated by exotics – namely grasses	Shrub, Tree under 10	Open

02 Grasslands are connected based on the distribution of soils with most occurring on Aridisols, and some minor inclusions of Vertisols. Entisols support desert grasslands at valley plains and drainages where fluvial processes are taking place.[62]

03 Native herbaceous vegetation and ground cover provides fine fuels that support stand replacement fires, with fire return intervals ranging from two to about 30 years, but usually averaging between 2.5 to ten years (Wahlberg *et al.* 2017 (in draft); Schussman and Gori 2004, Mau-Crimmins *et al.* 2005). Vegetative ground cover averages around 28 percent, with some variability relating to soils, topography, and time since fire. Fire maintains productivity and reduces encroachment by woody species.

04 Patch size averages about 1,000 acres, with some site-specific variability relating to soils and topography.

05 The presence of non-native species does not affect fire behavior or effects and does not increase the potential for uncharacteristic or undesirable fire behavior and effects.

06 The presence of non-native species does not significantly affect native species diversity and composition.

07 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 (terrestrial ecological unit inventory data or other suitable scientific protocol or method).

[62] Aridsols are soils of dry climate, low in organic matter that are never moist for as long as three consecutive months. Entisols may be found in virtually any climate on very recent geomorphic surfaces. Vertisols have high shrink-swell potential and have distinct wet and dry periods throughout the year.

Midscale Desired Conditions (ERU-SDG-DC)

08 While a number of subclasses or types exists within the semi-desert grassland ecological response unit, the Piedmont subclass is well represented on the Forest based off site potential. This subclass is found at mountain fronts along alluvial fans (cone shaped deposit of sediment) with dominant grasses such as black grama, bush muhly, and desert fluffgrass.

09 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 (ERU-SDG-G)

01 Maintenance of intact perennial grasslands (areas with abundant native grasses and productive soils) should be prioritized over areas with high shrub encroachment and degraded soil conditions during restoration projects.

Management Approaches for Semi-Desert Grasslands (ERU-SDG-MA)

01 Collaborate with partners and stakeholders on grassland restoration, grassland connectivity, and education.

02 Work with partners and research institutions to develop effective management approaches for restoring native perennial grasslands and ecological integrity in areas where non-native plant species (e.g., Lehmann lovegrass, buffelgrass, and fountain grass) are abundant.

03 Develop and refining state-and-transition models to incorporate restoration pathways that would inform management and potential treatment regimes.

04 Identify priority areas for restoration; such as areas with high restoration potential (native perennial grasslands) versus areas with low restoration potential (very high woody encroachment).

05 Consider treating areas through a combination of treatments based on site specific conditions; may include, but are not limited to fire, mechanical, re-seeding native grasses, invasive species treatments, and grazing management.

Interior Chaparral (ERU-IC)

The interior chaparral ecological response unit 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 ecological response unit). Species composition and dominance varies across the landscape depending on fire history, soils, topography, and climate and include, but is not limited to, manzanita, crucifixion thorn, desert ceanothus, mountain mahogany, little-leaved mountain mahogany, Antelope bushes, silktassles, Stansbury cliffrose, shrub live oak, and sumacs.

While forb densities are generally low (except after brief periods following burns), the following forbs are found at various abundance: Palmer's, Eaton's, and Toadflax Penstemon, Wright's verbena, goldenrod, purple nightshade, white dalea, and scarlet starglory. Naturalized species include hoarhound. Drier, rockier, and more open areas may have one or more thornscrub species, such as wait-a-bit and catclaw acacia. Sonoran scrub and semi-desert species, such as jojba, crucifixion thorn, and banana yucca, agaves, and beargrass are also present in these areas. Where shrub canopy is open to moderate, native grasses and forbs fill the intershrub spaces. Common grasses include sideoats grama, hairy grama, blue grama, three-awns, cane bluestem, plains lovegrass, and muhlys. 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 smoke, or the heat of a fire 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 thirteen 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 five 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, sugar sumac and half-shrubs such as broom snake-weed. Soil types vary with most derived from granite and basalt and less consisting of schist, limestone, and shale.

Shrub Live Oak Mountain Mahogany

The shrub live oak mountain mahogany association occurs primarily on north exposures at elevation ranges from 3,200 to 4,200 feet at slopes ranging from seven 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 replacing 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 3,600 to 5,700 feet at slopes ranging from two 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, Arizona cypress – shrub live oak, Yerbasanta – desert ceanothus, Pringle manzanita, and Arizona oak – yellow leaf silktassel – Emory oak. Manzanita associations are generally found at higher elevations.

The plan components below apply to all interior chaparral. Refer to the All Upland Ecological Response Units, Invasive Species, Forestry and Forest Products, and Fire and Fuels sections for additional applicable plan direction.

Landscape Scale Desired Conditions (ERU-IC-DC)

01 The desired seral states, canopy cover, and structural states for the interior chaparral ecological response units are as presented in Table 8.

Table 8. Interior Chaparral ecological response unit (ERU) desired vegetation conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
2	Recently disturbed, grass and forbs, and shrub resprouts	Shrub under 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 over 60	Closed

02 Interior chaparral vegetation supports fire regime IV where stand-replacing fires at 35-to-100-year fire return intervals creates patches between 1,000 and 2,000 acres, with some site-specific variability relating to soils and topography.[63] Native fire-adapted species re-sprout vigorously after fire, helping to prevent excessive erosion. The presence of non-native plants does not alter the fire regime or increase the potential for uncharacteristic or undesirable fire behavior and effects.

03 The presence of non-native species does not significantly affect native species diversity and composition.

04 Vegetative ground cover averages around 54 percent, with some variability relating to soils, topography, and time since fire. Fire maintains productivity and reduces encroachment by trees from adjacent ecological response units.

05 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).

06 Fire (severity and frequency) encourages important obligate seeders (Wright's silktassel and hollyleaf buckthorn), facultative seeders (sugar sumac), and obligate resprouters (e.g., shrub live

[63] Tonto National Forest Terrestrial Ecological Unit Inventory data

oak), with some variability based on site potential (based off similarity to site potential measured from Terrestrial Ecological Unit Inventory data or other suitable scientific protocol or method).[64]

07 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 (about 20 tons per acre).

Midscale Desired Conditions (ERU-IC-DC)

08 Shrub canopy cover varies from less than 40 percent on dry sites to more than 80 percent on the wetter sites.

09 Important plant associations are present across the forest based of site potential (based off similarity to site potential measured from Terrestrial Ecological Unit Inventory 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 (ERU-IC-DC)

10 At smaller extents, locally important species such as hollyleaf buckthorn, Stansbury cliffrose, desert olive, and singleleaf ash, are present based on-site potential (determined by Terrestrial Ecological Unit Inventory data or other appropriate ecological data)

11 Important forage species for wildlife, such as Wright's buckwheat and desert ceanothus, are well-represented and distributed based on site potential and capability (determined by Terrestrial Ecological Unit Inventory data or other appropriate ecological data).

Pinyon-Juniper Woodland (ERU-PJO)

The pinyon-juniper woodland (persistent) 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 evidence of 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, and 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 two-needle pinyon, single leaf pinyon, Utah juniper, oneseed juniper, and alligator juniper. One-seed juniper is most common juniper species; however, there are areas with

[64] Obligate seeder species are those that do not resprout from fire, rather they establish from seed stored in the seedbank. Obligate resprouter species are those that survive after fire and re-establish through prolific resprouting. Facultative seeders recruit both from seed and resprouting after fire.

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.

The plan components below apply to all pinyon-juniper woodlands. Refer to the All Upland Ecological Response Units, Invasive Species, Forestry and Forest Products, and Fire and Fuels sections for additional applicable plan direction.

Landscape Scale Desired Conditions for Pinyon-Juniper Woodland (ERU-PJO-DC)

01 Pinyon-juniper woodlands is characterized by even-aged patches of pinyons and junipers that at the landscape scale form multi-aged woodlands.

02 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, and V).

03 Snags and older trees (some older than 300 years) with dead limbs and/or tops are scattered across the landscape. Snags eight inches and above at diameter at root collar average five snags per acre, while snags eighteen inches and above average one snag per acre. Coarse woody debris increases with succession and averages two to five tons per acre.

04 The desired seral states, canopy cover, and structural states for the pinyon-juniper woodland ecological response unit are as presented in Table 9.

Table 9. Pinyon-Juniper Woodland ecological response unit (ERU) desired vegetation conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
10	Recently disturbed, grass and forbs, and shrub resprouts	Tree under 10	Sparse-Open
15	Dominated by trees 5.0 - 9.9 inches diameter	over 30	Closed
5	Dominated by trees 0 - 9.9 inches diameter	10-29.9	Open
10	Dominated by trees over 10.0 inches diameter	10-29.9	Open
60	Dominated by trees over 10.0 inches diameter	over 30	Closed

Midscale Desired Conditions (ERU-PJO-DC)

05 Tree density and canopy cover are high, shrubs are sparse to moderate, and herbaceous cover is low and discontinuous. The amount of shrub cover depends on the terrestrial ecological unit inventory.

06 Trees occur in even-aged patches ranging from young to old, where patch size of these woodlands ranges from tens to hundreds of acres.

07 Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about five and fifteen percent (based on terrestrial ecological unit or other suitable scientific protocol or method).

Pinyon-Juniper Grass and Juniper Grass (ERU-PJJUG)

The pinyon-Juniper Grass ecological response unit occurs in what were historically more open woodlands with grassy understories. The pinyon-juniper 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, Utah juniper, Rocky Mountain juniper, alligator juniper and two-needle pinyon. 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 surface fuel 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. Mollic soils are common for this ecological response unit and support a dense herbaceous matrix of native grasses (mostly perennials) and forbs. Typical disturbances include fire, insects, and disease. Juniper grass is a fire regime II, with mostly low severity fire and an average fire frequency of less than 35 years. 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.

The plan components below apply to pinyon-juniper grass and juniper grass. Refer to the All Upland Ecological Response Units, Invasive Species, Forestry and Forest Products, and Fire and Fuels sections for additional applicable plan direction.

Landscape Scale Desired Conditions (ERU-PJJUG-DC)

01 The desired seral states, canopy cover, and structural states for the Pinyon-Juniper Grass and Juniper Grass ecological response units are as presented in Table 10.

Table 10. Pinyon-Juniper Grass and Juniper Grass ecological response units (ERU) desired vegetation conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
10	Recently disturbed, grass and forbs, and shrub resprouts	Tree under 10	Sparse-Open
15	Dominated by trees 5.0 - 9.9 inches diameter	over 30	Closed
5	Dominated by trees 0 - 9.9 inches diameter	10-29.9	Open
10	Dominated by trees over 10.0 inches diameter	10-29.9	Open

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
60	Dominated by trees over 10.0 inches diameter	over 30 percent	Closed

02 Fires are typically frequent and low-severity (fire regime I).

Midscale Desired Conditions (ERU-PJJUG-DC)

03 Snags are scattered, with snags eight inches and above at root collar diameter averaging five snags per acre, while snags eighteen inches and above average one snag per acre (Weisz and Vandendriesche 2011). Coarse woody debris increases with succession and averages one to three tons per acre.

04 Scattered shrubs and a dense herbaceous understory including native grasses, forbs and annuals are present to support frequent surface fires.

05 Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values averaging between about ten and 30 percent depending on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986).

06 Shrubs average less than 30 percent canopy cover.

Fine-scale Desired Conditions (ERU-PJJUG-DC)

07 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.

08 Patch sizes of woodlands range from individual trees and clumps that are less than one-tenth acre, to tree groups of approximately an acre. Occasionally patches of even-aged woodland structure are present, based upon disturbance events and regeneration establishment. A small percentage may be predisposed to larger even-aged patches, based on physical site conditions that favor mixed-severity and stand replacement fire and other disturbances.

Guidelines (ERU-PJJUG-G)

01 Multiple characteristics of the site should be considered to determine mitigation and management to prevent long term damage to Mollisols.

Madrean Encinal Woodland and Madrean Pinyon-Oak (ERU-MEWMPO)

The Madrean woodland vegetation community is collectively composed of the Madrean pinyon-oak and Madrean encinal woodland. While the Madrean woodlands are concentrated in the Madrean region of northern Mexico and southeastern Arizona, these types extend into other ecoregions of Arizona and New Mexico. Communities similar to the Madrean pinyon-oak, in physiognomy, dynamics, and dominance by evergreen oaks and pinyon, extend as far north as central Arizona and central New Mexico. Madrean pinyon-oak is a subcategory of the Madrean pine-oak (LANDFIRE 2010, Schussman 2006) that represents only the woodland life zone, separate from its montane counterpart

– ponderosa pine-evergreen oak. Madrean encinal woodland often occurs below Madrean pinyon-oak, at the interface with semi-desert grassland.

The Madrean woodlands generally occur at elevations between 4,500 and 7,500 feet (LANDFIRE 2010; Wahlberg *et al*. 2014) 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. Typical tree form oaks within Madrean woodlands on the Tonto National Forest include Arizona white oak and Emory oak. Interior chaparral species may be present in some locations but do not co-dominate. A shrub layer is present and often contains species such as silktassles, and ceanothus species. The herb layer is dominated by warm-season grasses such as threeawns, blue grama, sideoats grama, Rothrock's grama, Arizona cottontop, curly-mesquite, green sprangletop, and muhly grasses.

The plan components below apply to all Madrean encinal woodland and Madrean pinyon-oak. Refer to the All Upland Ecological Response Units, Invasive Species, Forestry and Forest Products, and Fire and Fuels sections for additional applicable plan direction.

Landscape Scale Desired Conditions (ERU-MEWMPO-DC)

01 The desired seral states, canopy cover, and structural states for the Madrean Encinal Woodland ecological response unit are as presented in Table 11.

Table 11. Madrean Encinal Woodland ecological response unit (ERU) desired vegetation conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
10	Recently disturbed, grass and forbs, and shrub resprouts	Tree under 10	Sparse-Open
15	Dominated by trees 5.0 - 9.9 inches diameter	over 30	Closed
5	Dominated by trees 0 - 9.9 inches diameter	10-29.9	Open
10	Dominated by trees over 10.0 inches diameter	10-29.9	Open
60	Dominated by trees over 10.0 inches diameter	over 30	Closed

02 The desired seral states, canopy cover, and structural states for the Madrean pinyon-oak ecological response unit are as presented in Table 12.

Table 12. Madrean Pinyon-Oak ecological response unit (ERU) desired vegetation conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
4	Recently disturbed, grass and forbs, and shrub resprouts	Tree under 10	Sparse-Open
5	Seedling/sapling; resprouter dominated	Varies	Open-Closed
13	Young with grass understory	Varies	Open

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
3	Young with grass understory	Varies	Closed
60	Medium to large, old w/grass understory	Varies	Open
15	Old with grass understory	Varies	Closed

03 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 eight inches or greater at diameter breast height (dbh) average four snags per acre, while snags eighteen inches or greater average one snag per acre. Large oak snags (over ten inches) are a well-distributed component. Coarse woody debris increases with forest succession and averages two to three tons per acre.

04 The Madrean types are relatively homogenous in structure, generally uneven-aged and open, with occasional patches of even-aged structure.

05 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, regulate infiltration, and contribute to plant and animal diversity and to ecosystem function.

06 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.

07 The amount of shrub cover depends on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986).

Midscale Desired Conditions (ERU-MEWMPO-DC)

08 The majority of woodland is in open condition with tree cover averaging between ten and 40 percent depending on site productivity and past disturbance, with tree cover in canyons and drainage bottoms nearer the upper end of this range. A lesser amount is in closed canopy condition characteristic of the reference condition. Patch sizes range from less than one acre to tens of acres, applicable at both mid and fine scales.

09 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.

10 Mixed-severity fire and other disturbance occasionally favor the development of even-aged patches at both the mid and fine scales.

11 Snags eight inches or greater at dbh average four snags per acre, while snags eighteen inches or greater average one snag per acre (Weisz et al. 2011). Large oak snags (over ten inches) are a well-

distributed component. Coarse woody debris increases with forest succession and averages two to three tons per acre.

12 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.

13 Shrubs occur in low to moderate densities which does not inhibit tree regeneration.

14 Ground cover consists of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values between about one and 20 percent (based on Terrestrial Ecological Unit or other suitable scientific protocol or method).

Fine-scale Desired Conditions (ERU-MEWMPO-DC)

15 At the fine-scale, forest arrangement is in individual trees, small clumps, and groups of trees interspersed within variably sized openings of grass/forbs/shrub vegetation associations similar to historic patterns.

16 Tree groups vary in size and number depending on climate, soil type, and past disturbance. The more biologically productive sites contain more trees per group and more groups per acre, as a result patch sizes can vary from less than one acre to tens of acres.

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

Pinyon-Juniper Evergreen Shrub (ERU-PJC)

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, single leaf pinyon, Utah juniper, oneseed juniper, alligator juniper, Manzanita spp., mountain mahogany, Antelope bushes, silktassles, Stansbury cliffrose, turbinella oak, and sumacs. 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.

The plan components below apply to all pinyon-juniper evergreen shrub. Refer to the All Upland Ecological Response Units, Invasive Species, Forestry and Forest Products, and Fire and Fuels sections for additional applicable plan direction.

Landscape Scale Desired Conditions (ERU-PJC-DC)

01 The desired seral states, canopy cover, and structural states for the pinyon juniper evergreen shrub ecological response unit are as presented in Table 13.

Table 13. Pinyon-Juniper Evergreen Shrub ecological response unit (ERU) desired vegetation conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
5	Recently disturbed, grass and forbs, and shrub resprouts	Tree under 10	Sparse-Open
0	Dominated by trees 5.0 - 9.9 inches diameter	over 30	Closed
55	Dominated by trees 0 - 9.9 inches diameter	10-29.9	Open
40	Dominated by trees over 10.0 inches diameter	10-29.9	Open
0	Dominated by trees over 10.0 inches diameter	over 30	Closed

02 Pinyon-juniper evergreen shrub is a mix of trees and shrubs that occurs as a series of vegetation states that move from herbaceous-dominated to shrub-dominated to tree-dominated over time. Pinyon trees are occasionally absent, but one or more juniper species is always present.

03 Fires are typically mixed-severity with a moderate frequency (fire regime III). Some evergreen shrub types exhibit occasional high severity fires (fire regime IV).

Midscale Desired Conditions (ERU-PJC-DC)

04 Snags and old trees with dead limbs/tops are scattered, with snags eight inches and above at root collar diameter averaging three snags per acre, while snags eighteen inches and above average one snag per acre (Weisz and Vandendriesche 2011). Large dead wood is present, and coarse woody debris averages two to four tons per acre.

05 The understory is dominated by low to moderate density shrubs depending on successional stage, overall averaging greater than 30 percent canopy cover. The shrub component consists of one or a mix of evergreen oak, manzanita, mountain mahogany, sumac, and other shrub species, which are well-distributed. Native perennial grasses and annual and perennial forbs are present in the interspaces.

06 Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about five and fifteen percent depending on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986).

Fine-scale Desired Conditions (ERU-PJC-DC)

07 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.

08 The patch size of woodlands ranges from one to tens of acres, and can include patches of even-aged woodland structure, based upon disturbance events and regeneration establishment.

Management Approaches for Pinyon-Juniper Evergreen Shrub (ERU-PJC-MA)

01 Emphasize coordination with local partners and stakeholders to reduce the risk of uncharacteristic or undesirable fires that are hazardous to values in the wildland-urban interface on the Tonto National Forest and adjacent lands of other ownerships.

Ponderosa Pine-Evergreen Oak (ERU-PPE)

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 to 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 and can be distinguished from the ponderosa pine forest ecological response unit by well-represented evergreen oaks (e.g., Emory oak and Arizona white oak), alligator juniper, and pinyon pine. In some areas, ponderosa pine-evergreen oak communities can alternatively be dominated or codominated by Chihuahuan pine. In terms of disturbance, the ponderosa pine-evergreen oak averages 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, turbinella oak, skunkbush sumac, and mountain mahogany. Depending on site conditions, shrubs and perennial grasses have varying importance in vegetation response to disturbance. Site potential, fire history, and the importance of perennial grasses versus shrubs in the understory vary, affecting forest structure and the disturbance regime (Wahlberg et al. 2017 (in draft)). Historically this ecological response unit had over 10 percent tree canopy cover, with the exception of patches of early successional plant communities following high severity fire. 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 ecological response unit 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 more

mixed severity fire. 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.

The plan components below apply to all ponderosa pine-evergreen oak. Applicable guidelines are listed after the subclasses.

Refer to the All Upland Ecological Response Units, Invasive Species, Forestry and Forest Products, and Fire and Fuels sections for additional applicable plan direction.

Ponderosa Pine-Evergreen Oak Perennial Grass Subclass (ERU-PPE-PG)

Landscape Scale Desired Conditions (ERU-PPE-PG-DC)

01 The desired seral states, canopy cover, and structural states for the ponderosa pine-evergreen oak ecological response unit are as presented in Table 14.

Table 14. Ponderosa Pine-Evergreen Oak (includes perennial grass and shrub subclasses) ecological response unit (ERU) desired vegetation conditions.

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
4	Recently disturbed, grass and forbs, and shrub resprouts	Tree under 10	Sparse-Open
3	Dominated by trees 5.0 - 9.9 inches diameter	over 30	Closed
24	Dominated by trees 5.0 - 9.9 inches diameter	10-29.9	Open
60	Dominated by trees over 10.0 inches diameter	10-29.9	Open
4	Dominated by trees over 10.0 inches diameter	over 30	Closed
5	Dominated by trees 0 - 4.9 inches diameter	over 10	Open

02 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.

03 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.

04 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.

05 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 (over three-inch diameter), all well-distributed throughout the landscape.

06 Dwarf-mistletoe occurs in less than fifteen percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures.

07 Grasses, forbs, shrubs, and needle cast (fine fuels), and small trees maintain the natural fire regime.

08 Organic ground cover and herbaceous vegetation provide protection of soil, regulate infiltration, and contribute to plant and animal diversity and to ecosystem function.

09 Shrubs average less than 30 percent cover.

10 Frequent, primarily low severity fires (Fire Regime I) are characteristic. Natural and anthropogenic disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.

Midscale Desired Conditions (ERU-PPE-PG-DC)

11 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.

12 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. Occasionally patches of even-aged forest structure are present, based upon disturbance events and regeneration establishment. A small percentage of the landscape may be predisposed to larger even-aged patches, based on physical site conditions that favor mixed-severity and stand replacement fire and other disturbances. The mix of natural disturbances sustains the overall age and structural distribution. Patch sizes range from less than one acre to tens of acres.

13 Ponderosa pine snags are typically eighteen inches or greater at dbh and average one to two snags per acre, while snags greater than eight inches average five snags per acre (Weisz *et al*. 2011). Large oak snags (over ten inches) are a well-distributed component. Downed logs (over twelve-inch diameter at mid-point, over eight feet long) average three logs per acre. Coarse woody debris, including downed logs, ranges from three to ten tons per acre.

14 Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about five and fifteen percent depending on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986). 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.

15 Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests contain ten 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.

Fine-scale Desired Conditions (ERU-PPE-PG-DC)

16 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 one acre. Groups at the mid-to old-age stages consist of two to approximately 40 trees.

Ponderosa Pine-Evergreen Shrub Subclass (ERU-PPE-SS)

Landscape Scale Desired Conditions (ERU-PPE-SS-DC)

01 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.

02 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 (over three-inch diameter), all well-distributed throughout the landscape.

03 The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances and climate variability. Dwarf-mistletoe occurs in less than fifteen percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures. Limited grasses, forbs, and a moderate density of shrubs, needle cast, and small trees maintain the natural fire regime.

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

05 Low to mixed-severity fires (fire regimes I and III) are characteristic in this type. Natural and anthropogenic disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.

Midscale Desired Conditions (ERU-PPE-SS-DC)

06 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.

07 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 one acre to tens of acres. Occasionally patches of even-aged forest structure are present, based upon disturbance events and regeneration establishment. A small percentage of the landscape may be predisposed to larger even-aged patches, based on physical site conditions that favor mixed-severity and stand replacement fire and other disturbances.

08 Ponderosa pine snags are typically eighteen inches or greater at dbh and average one to two snags per acre, while snags greater than eight inches average five snags per acre (Weisz et al. 2011); large oak snags (over ten inches) are a well-distributed component. Downed logs (over twelve-inch diameter at mid-point, over eight feet long) average three logs per acre. Coarse woody debris, including downed logs, ranges from three to ten tons per acre.

09 Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about five and fifteen percent depending on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986).

10 Fires are of low to mixed-severity burning on the forest floor as well as in the overstory. Crown fires occur in small patches.

11 Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests contain ten 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.

Fine-scale Desired Conditions (ERU-PPE-SS-DC)

12 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 one half acre.

Guidelines for both subclasses of Ponderosa Pine-Evergreen Oak (ERU-PPE-G)

01 Large Emory oak, Arizona oak, and Gambel oak trees[65] and snags should be sustained to promote old-growth attributes.

02 Management activities should leave an average of one to two snags greater than eighteen inches per acre, when these components exist on the landscape prior to treatment.

Ponderosa Pine Forest (ERU-PPF)

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 an understory of grasses and forbs, with shrub density varying according to site specific conditions, such as plant associations or land use. This type may occur as savannah with extensive grasslands interspersed between widely spaced clumps or individual trees. The historical fire regime that was dominated primarily by frequent, low-severity/low-intensity surface fires with occasional small area of mixed severity is widely documented.

The plan components below apply to the ponderosa pine forest vegetation community. Refer to the All Upland Ecological Response Units, Invasive Species, Forestry and Forest Products, and Fire and Fuels sections for additional applicable plan direction.

Landscape Scale Desired Conditions (ERU-PPF-DC)

01 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.

02 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

[65] Per the Four Forest Restoration Initiative Old Growth Protection and Large Tree Retention Strategy (2011), or similar protocol

trees, and coarse woody debris (over three-inch diameter), all well-distributed throughout the landscape.

03 Frequent, low severity fires (Fire Regime I) are characteristic in this type. Natural and anthropogenic disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.

04 The desired seral states, canopy cover, and structural states for the ponderosa pine forest ecological response unit are as presented in Table 15.

Table 15. Ponderosa Pine Forest ecological response unit (ERU) desired vegetation conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
2	Recently disturbed, grass and forbs, and shrub resprouts	Tree under 10	sparse-open
2	Dominated by trees 5.0 - 9.9 inches diameter	10-29.9	open
80	Dominated by trees 10.0 - 20.0 inches or greater diameter	10-29.9	open, multi-storied
2	Dominated by trees 0 - 4.9 inches diameter	10-30 or greater	open and closed
2	Dominated by trees 5.0 - 9.9 inches diameter	over 30	closed
12	Dominated by trees 10.0 - 20.0 inches or greater diameter	over 30	closed, multi-storied

05 Dwarf-mistletoe occurs in less than fifteen percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures. Grasses, forbs, shrubs, and needle cast (fine fuels), and small trees maintain the natural fire regime. Organic ground cover and herbaceous vegetation provide protection of soil, regulate infiltration, and contribute to plant and animal diversity and to ecosystem function. The amount of shrub cover depends on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986).

Midscale Desired Conditions (ERU-PPF-DC)

06 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 (Reynolds *et al*. 2013). Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values ranging between about five and 20 percent depending on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986).

07 The mosaic of tree groups generally comprises an uneven-aged forest with all age classes present. Occasionally patches of even-aged forest structure are present, based upon disturbance events

and regeneration establishment. A small percentage of the landscape may be predisposed to larger even-aged patches, based on physical site conditions that favor mixed-severity and stand replacement fire and other disturbances. Disturbances sustain the overall age and structural distribution.

08 Ponderosa pine snags are typically eighteen inches or greater at dbh and average one to two snags per acre. In the Gambel oak subtype, large oak snags (over ten inches) are a well-distributed component. Downed logs (over twelve-inch diameter at mid-point, over eight feet long) average three logs per acre. Coarse woody debris, including downed logs, ranges from three to ten tons per acre.

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

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

Fine-scale Desired Conditions (ERU-PPF-DC)

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

Guidelines for Ponderosa Pine Forest (ERU-PPF-G)

01 Management activities should leave an average of one to two snags greater than eighteen inches per acre.

Mixed Conifer–Frequent Fire (ERU-MCD)

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 feet, 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 in an open forest structure (less than 30 percent tree cover), with minor occurrence of aspen, Douglas-fir, white fir, and Southwestern white pine. Aspen is rare on the Tonto but 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, and white fir,) 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. The frequent fires that typify this ecological response unit are primarily low severity and are generally not limited by lack of fuel connectivity or high fuel moistures.

The plan components below apply to the mixed conifer-frequent fire vegetation community. Refer to the All Upland Ecological Response Units, Invasive Species, Forestry and Forest Products, and Fire and Fuels sections for additional applicable plan direction.

Landscape Scale Desired Conditions (ERU-MCD-DC)

01 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 (over three-inch diameter), all well-distributed throughout the landscape.

02 The desired seral states, canopy cover, and structural states for the mixed conifer-frequent fire ecological response unit are as presented in Table 16.

Table 16. Mixed Conifer–Frequent Fire ecological response unit (ERU) desired vegetation conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
9	Early development, all structures from Recently disturbed, grass and forbs to 0 - 4.9-inch trees	Tree under 10	Sparse-Open
3	Dominated by trees 5.0 - 9.9 inches diameter	over 30	Closed
3	Dominated by trees 5.0 - 9.9 inches diameter	10-29.9	Open, Multi-Storied
60	Dominated by trees 10.0 - 20.0 inches or greater diameter	10-29.9	Open, Multi-Storied
25	Dominated by trees 10.0 - 20.0 inches or greater diameter	over 30	Closed
0	Historically rare, Dominated by trees 10.0 - 20.0 inches or greater diameter	10-29.9	Open, 1-2 Storied

03 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; occasional patches of even-aged 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.

04 Dwarf-mistletoe occurs in less than fifteen percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures.

05 Grasses, forbs, shrubs, needle cast (e.g., fine fuels), and small trees maintain the natural fire regime. Organic ground cover (e.g., leaf litter/needle cast) and herbaceous vegetation provide protection of soil, regulate infiltration, and contribute to plant and animal diversity and to ecosystem function.

06 The amount of shrub cover depends on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986).

07 Frequent, low severity fires (fire regime I) are characteristic. Natural and anthropogenic disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.

Midscale Desired Conditions (ERU-MCD-DC)

08 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 50 percent in more productive sites to 90 percent in the less productive sites. Tree density within forested areas generally ranges from 30 to 125 square foot basal area per acre.

09 The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages. Occasionally small patches (generally less than 60 acres) of even-aged forest structure are present, based upon disturbance events and regeneration establishment. A small percentage of the landscape may be predisposed to larger even-aged patches, based on physical site conditions that favor mixed-severity and stand replacement fire and other disturbances. Disturbances sustain the overall age and structural distribution. Snags are typically eighteen inches or greater at dbh and average three per acre. Smaller snags, eight inches and above at dbh, average eight snags per acre. Downed logs (over twelve-inch diameter at mid-point, over eight feet long) average three per acre within forested areas. Coarse woody debris, including downed logs, ranges from five to fifteen tons per acre.

10 Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values ranging between about five and 20 percent depending on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986). Fires burn primarily on the forest floor and do not spread between tree groups as crown fire.

11 Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests contain ten 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.

Fine-scale Desired Conditions (ERU-MCD-DC)

12 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 one acre. Groups at the mid- to old-age stages consist of two to approximately 50 trees per group.

Guidelines (ERU-MCD-G)

01 Management activities should leave an average of one to two snags greater than eighteen inches per acre.

Wet Mixed Conifer–Mixed Conifer with Aspen (ERU-MCW)

The Wet Mixed Conifer-Mixed Conifer with Aspen ecological response unit is not very common on the Tonto. This ecological response unit is found in the cooler wetter sites within the mixed conifer life zone, where fires are less frequent and are characterized by more mixed to high severities. The distinguishing feature of wet mixed conifer–mixed conifer with aspen is the presence of quaking aspen in a post-disturbance seral state. Dominant and codominant vegetation in wet mixed conifer–mixed conifer with aspen varies by elevation and moisture availability. Ponderosa pine occurs incidentally or is absent, while Douglas-fir, southwestern white pine, white fir, and blue spruce are dominant or codominant.

The plan components below apply to all wet mixed conifer–mixed conifer with aspen. Refer to the All Upland Ecological Response Units, Invasive Species, Forestry and Forest Products, and Fire and Fuels sections for additional applicable plan direction.

Landscape Scale Desired Conditions (ERU-MCW-DC)

01 The desired seral states, canopy cover, and structural states for the wet mixed conifer–mixed conifer with aspen are as presented in Table 17.

Table 17. Wet Mixed Conifer–Mixed Conifer with Aspen ecological response unit (ERU) desired vegetation conditions

Seral Stage Percent of ERU	Seral Stage Description	Canopy Cover (percent)	Structure Class
7	Early development, all structures from Recently disturbed, grass and forbs to 0 - 4.9-inch trees	Tree under 10 percent	Sparse-Open
21	All Aspen and deciduous tree mix, all size classes	Varies	All storiedness
18	Dominated by trees 0.0 - 9.0 inches diameter	10-30.0 percent or greater	All storiedness
14	Dominated by trees 10.0 - 20.0 inches diameter	over 30 percent	Closed
40	Dominated by trees 20.0 inches or greater diameter	over 30 percent	Closed, 3 or more stories

02 The wet mixed conifer forest vegetation community is a mosaic of structural and seral stages ranging from young trees through old (Table 17). The landscape arrangement is an assemblage of variably sized and aged patches of trees and other vegetation associations similar to historic patterns. Tree patches are comprised of variable species composition depending on forest seral stages. Patch sizes vary but are frequently in the hundreds of acres, with rare disturbances in the thousands of acres. Canopies are generally more closed than in dry mixed conifer. An understory consisting of native grass, forbs, and/or shrubs is present. The amount of shrub cover depends on the Terrestrial Ecological Unit Inventory data (USDA Forest Service 1986).

03 Old growth generally occurs over large areas as stands. Old growth includes 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).

04 Snags 18 inches or greater at dbh range from one to five snags per acre, with the lower range of snags of this size associated with early seral stages and the upper range associated with late seral stages. Snag density in general (over 8 inches dbh) averages 20 per acre. Coarse woody debris, including downed logs, vary by seral stage, with averages ranging from five to 20 tons per acre for early-seral stages; 20 to 40 tons per acre for mid-seral stages; and 35 tons per acre or greater for late-seral stages.

05 The wet mixed conifer forest vegetation community is composed predominantly of vigorous trees, but older 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. Number of snags and the amount of downed logs (over twelve-inch diameter at mid-point, over eight feet long) and coarse woody debris (over three-inch diameter) vary by seral stage.

06 Organic ground cover and herbaceous vegetation provide protection of soil, regulate infiltration, and contribute to plant and animal diversity and ecosystem function.

07 Mixed-severity fire (fire regime III) is characteristic, especially at lower elevations of this type. High severity fires (fire regime IV and V) rarely occur and are typically at higher elevations of this type.

Midscale Desired Conditions (ERU-MCW-DC)

08 The size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Groups and patches of tens of acres or less are relatively common. A mosaic of groups and patches of trees, primarily even-aged, and variable in size, species composition, and age is present. Openness and prevalence of some species (e.g., aspen) is dependent on seral stages. Grass, forb, shrub openings created by disturbance, may comprise ten to 100 percent of the mid-scale area depending on the disturbances and on time since disturbance. Aspen is occasionally present in large patches. Density ranges from 20 to 180 or greater square foot basal area per acre based upon age and site productivity and depending upon time since disturbance and seral stages of groups and patches.

09 Fire severity is mixed or high, with a fire return interval of 35 to 200 or more years (fire regimes III, IV, and V). Fires and other disturbances maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling. Under wetter conditions, fires exhibit smoldering low-intensity surface behavior with some passive crown fire (single tree and isolated group torching). Under drier conditions, fires exhibit passive to active crown fire behavior with conifer tree mortality up to 100 percent across mid-scale patches. In areas with more contiguous high elevations, high severity fires in Wet Mixed Conifer-Mixed Conifer with Aspen generally do not exceed 1,000-acre patches of mortality.

10 To improve the sustainability of this ecological response unit, desired conditions for wet mixed conifer–mixed conifer with aspen on the Tonto National Forest will be for high severity fires that generally do not exceed 250-acre patches of mortality.[66] Other smaller disturbances occur more frequently.

11 Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about five and 20 percent depending on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986).

12 Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests typically contain ten percent or greater tree density (basal area) relative to PFAs than goshawk foraging areas and the general forest. Nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the wet mixed conifer type.

Fine-scale Desired Conditions (ERU-MCW-DC)

13 In mid-aged and older forests, trees are typically variably spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages. Small openings are present as a result of disturbances.

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

Guidelines (ERU-MCW-G)

01 Management activities should leave an average of one to five snags greater than eighteen inches per acre.

[66] The Tonto National Forest only has about 6,800 acres of wet mixed conifer–mixed conifer with aspen that occurs mostly in two big patches, some of which was burned with high severity in 2016.

Riparian Ecological Response Units (RERU)

Riparian ecological response units were developed from the Riparian Mapping Project (Triepke et al. 2014). The Riparian Mapping Project leveraged recently developed technical capabilities to map riparian plant communities across Forests and Grasslands of the USDA Forest Service Southwestern Region (Arizona and New Mexico). Valley bottom models provided spatial hypotheses from which to base photo interpretation of riparian vegetation types and to map the total extent of riparian communities at the scale of 1:12,000, with a map legend of 24 map units and four subclass themes across. High resolution infrared photography and other ancillary references were used to develop and corroborate inferences of riparian settings. Local partners provided riparian data, field validation, and review as a key part of map development.

The following riparian ecological response units are present on the tonto: Arizona Alder-Willow, Arizona Walnut, Desert Willow, Fremont Cottonwood-Conifer, Fremont Cottonwood-Oak, Fremont Cottonwood/Shrub, Herbaceous, Narrowleaf Cottonwood/Shrub, Ponderosa Pine/Willow, and Sycamore – Fremont Cottonwood. See the Regional Riparian Mapping Project report (Triepke *et al*. 2014) for a detailed description of each riparian ecological response unit. Mapping methods, ecosystem typing, and classification may change based on the best available scientific information, however plan direction will still apply to any new system of riparian ecosystem typing for the forest because the plan direction is broadly described for riparian plant communities on the Forest.

When using riparian ecological response units or other riparian mapping data for project planning, it should be noted that these classifications represent potential plant associations based on climate, soils, and other environmental data. 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).

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[67] 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

[67] 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.

requiring shallow groundwater levels), so dominance by upland plants at the riparian zone may indicate a declining water table and or drought conditions.

The spatial scales for describing desired conditions for riparian vegetation is different than upland vegetation. Desired conditions for riparian areas are generally described at the landscape scale that describes conditions across three or more subwatersheds (6th-level hydrologic unit).

Standards and guidelines provide the sideboards necessary to achieve desired conditions. There are a number of potential indicators that can be used in evaluating compliance with a standard or guideline for riparian areas such as seral state diversity, riparian woody regeneration, ground cover or bare ground, the abundance and diversity of facultative and wetland obligate riparian plant species based on site potential, soil conditions, stream channel conditions, and aquatic conditions. This is not an exhaustive list as the best available scientific information should inform the consideration of additional indicators. See the Regional Desired Conditions for Riparian and Aquatic Systems guide (USDA Forest Service 2019a)[68] for other applicable indicators and measures. Proper function condition assessments or other similar protocols should be used to evaluate current riparian conditions. Additionally, vegetation and soils inventory data (Terrestrial Ecological Unit Inventory data; or other similar data) that describes potential riparian plant communities and physical attributes should be used as a baseline of which to measure departure from.

The plan components below apply to riparian ecological response units. Refer to the Forestry and Forest Products; All Upland Ecological Response Units; Fire and Fuels; Watersheds and Water Resources; Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones; Invasive Species and Lakes and Rivers Management Area sections for additional applicable plan direction.

Desired Conditions (RERU-DC)

01 Riparian plant communities consist mostly of native species, provide habitat, and help maintain temperatures necessary for maintaining populations and dispersal of both aquatic and terrestrial species.

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

03 Ground cover (includes herbaceous and woody plants) is present in adequate abundance to promote and maintain ecological integrity (measured based on site potential; Terrestrial Ecological Unit Inventory data or other suitable scientific data).

04 A diversity of seral states is present and approach desired seral state distributions by Riparian Ecological Response Unit. Seral state proportions, per the Region 3 Seral State Proportions

[68] This guide supplements the Riparian and Aquatic Ecosystem Strategy (RAES) of the Southwestern Region (USDA Forest Service 2019) by establishing desired conditions, particularly for resources involving vegetation, fire, stream hydrology, and groundwater-fed systems.

Supplement,[69] are applied at the landscape scale, where low overall departure from reference proportions is a positive indicator of ecosystem condition.

05 Well-established mesquite stands and forests, or bosques,[70] generally located at abandoned channels (a former stream channel that is no longer part of the active channel) or terraces, are retained and connected to upland vegetation where the potential exists (based on riparian ecological response unit, Terrestrial Ecological Unit Inventory data or other suitable dataset).

06 Riparian areas include a mix of species that indicates maintenance of riparian soil moisture characteristics (based on Terrestrial Ecological Unit Inventory or other suitable scientific protocol or method).

07 Riparian areas provide functional soil and water resources, consistent with their flood regime and flood potential, and provide diverse habitats for native species. Riparian areas are in or trending toward proper functioning condition or other suitable scientific protocol or method.

08 Invasive species (e.g., tamarisk, Russian olive, exotic forbs, and grasses) are not degrading ecological conditions. Invasive species are treated where site conditions can support native riparian plant communities.

09 Upland vegetation is not encroaching on riparian vegetation at uncharacteristic levels (a natural level of upland vegetation within the riparian zone) does intergrade. The riparian vegetation has achieved its potential extent and exhibits low departure from reference conditions.

10 Periodic flooding (frequency and magnitude) and scouring promotes diverse riparian plant communities consisting of emergent, herbaceous, shrub, and tree species of all ages and size classes (based on site potential; Terrestrial Ecological Unit Inventory or other suitable scientific data) and provide conditions necessary for the recruitment and natural succession of riparian dependent species. Flooding and scour occur at a frequency and magnitude that at least support regeneration of phreatophyte[71] vegetation common to each ecological response unit.

11 Fires typically burn infrequently, with mixed severity, and are generally localized. Fire frequency is related to that of adjacent cover types but is less frequent in riparian areas because of higher fuel moisture, vegetation that is not flammable as often as adjacent vegetation, and soil moisture. Most acres in the surrounding watershed exhibits low departure from reference conditions, unless that would pose a threat to lives, property, infrastructure, or resources.

[69] The Region 3 Seral State Proportions Supplement describes the regional guidelines for desired seral state distributions for ecological response units and how departure from reference conditions is measured and evaluated.

[70] Mesquite bosques refer to well developed and structured mesquite forests, generally found along floodplains and terraces of low elevation riparian areas in the Sonoran Desert.

[71] A phreatophyte refers to trees that are deep-rooted and able to obtain a substantial amount of their water needs from the zone of saturation (phreatic zone) of the water table.

12 The risk of undesirable fire behavior and effects is low (low departure from reference conditions) in the adjacent uplands (riparian corridor), reducing the likelihood of increased flooding, run-off, and damage to nearby riparian areas.

13 Annual and perennial grasses, forbs, shrubs, and trees are present based on-site potential (based on Terrestrial Ecological Unit Inventory or other suitable scientific protocol or method) and exhibits low departure from reference conditions.

14 Riparian vegetation is healthy (e.g., few signs of stress, wilting or disease and have high reproductive output), or improving with limiting signs of compacted and degraded soils. Most soils (greater than 66 percent) are rated as satisfactory.

15 Woody species and herbaceous vegetation are present in adequate abundance/density to promote stream bank stability, specifically at stream systems most sensitive to loss of vegetation (e.g., Rosgen C-type streams).

16 The amount of coarse woody debris is similar to reference condition (low departure) and is adequately recruited to sustain replacement.

Guidelines (RERU-G)

01 Vegetation management (e.g., timber harvest, invasive species, and prescribed fire) should not result in long-term degradation to riparian ecological response units.

02 Livestock management practices should allow riparian vegetation to recover. Plant development or recovery sufficient to sustain healthy riparian areas should occur following each livestock use period.

03 Projects and activities should be designed and implemented to promote a diversity of age classes and natural succession of native riparian and wetland obligate species (e.g., cottonwood, willow, sycamore, ash, alder, sedges, grasses, and other wetland plants).

04 Large mature Freemont and narrowleaf cottonwood and Arizona sycamore trees should be protected from management activities. Projects occurring in these areas should incorporate restoration goals to ensure persistence of cottonwood and sycamore communities/forests.

Management Approaches for all Riparian Ecological Response Units (RERU-MA)

01 Use best available scientific information and adaptive management to better understand the effects of treatments in upper levels of watersheds on riparian areas lower down in the watershed.

02 Collect quantitative or qualitative data (e.g., photos of before-and-after-treatment conditions) on riparian fuels whenever possible.

Fire and Fuels (FF)

The 2009 Guidance for Implementation of Federal Wildland Fire Management Policy (USDA and USDOI 2009) provides the terminology related to fire used in this plan:

- *Wildland Fire*: "Wildland fire" is a general term describing any non-structural wildland fire occurring in vegetation or natural fuels, categorized in two distinct types:
- *Wildfire*: Unplanned ignition of a wildland fire or an escaped prescribed fire. Wildfire includes unplanned fires that are human-caused and those that are naturally ignited.
- *Prescribed Fire*: Prescribed fires are planned ignitions that are intentionally ignited by hand-held, mechanical, or aerial devices. "Prescribed fire" includes pile burning, jackpot burning, broadcast burns or other wildland fires originating from planned ignitions to meet specific objectives identified in a written, approved, burn plan for which the National Environmental Policy Act requirements (where applicable) have been met prior to ignition (National Wildfire Coordinating Group 2009, FSM 5100).
- *Fuel*: Combustible materials found in natural environments; it includes all live and dead vegetation, as well as duff, litter, and dead/down woody material.

Fire management includes the planning, strategies, and actions used before, during, and after wildland fire. The management of wildland fires improves the health, resilience, and sustainability of highly valued resources, including natural resources, cultural resources, communities, infrastructure, and other values that could be affected by wildland fire.

Wildfire management is based on objectives that are developed from current and expected fire behavior and effects, resource availability, and values at risk. Objectives are also influenced by social understanding and tolerance, and by adjoining and/or affected jurisdictions.

Daily management objectives often change as a fire spreads across the landscape, with parts of a fire being managed to meet protection objectives (suppression), and other parts managed to meet resource objectives.

Most of the vegetation on the Tonto National Forest is adapted to recurrent wildland fires started by lightning from spring and summer thunderstorms. Fire plays a vital role in maintaining ecosystem health. In fire adapted ecosystems, prescribed fire and wildfire are important tools for maintaining and/or restoring vegetative composition and structure.

The plan components below apply to fire and fuels. Vegetation Ecological Response Units (ERU) sections for additional applicable plan direction.

Desired Conditions (FF-DC)

01 Firefighter and public safety are the first priority in all fire management activities.

02 Fire management activities do not result in loss of life, damage to property or infrastructure, or degraded ecosystem function.

03 Wildland fires in the wildland-urban interface are mostly low intensity/low severity surface fires as ladder fuels are nearly absent. Firefighters are able to safely and efficiently suppress wildfires in the wildland-urban interface if needed.

04 In fire-adapted ecosystems, wildland fire improves, maintains, and/or protects public safety, ecosystem function, vegetation composition and structure, property and infrastructure, wildlife habitat, and socio-economic values.

05 Wildfire behavior and effects are within the natural range of variability unless it poses a threat to public safety, property, infrastructure, habitat, watersheds, or other values.

06 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.

07 In vegetation types that are fire adapted, wildland fire (both planned and unplanned) plays a natural ecological role in designated and recommended wilderness areas.

Standards (FF-S)

01 Wildfires shall be managed to meet resource objectives where and when expected fire effects and behavior would be beneficial and would not threaten lives, property, infrastructure, or resources.

02 Managers must use a decision support process (e.g., the Wildfire Decision Support System) to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risk, identify values at risk, define implementation actions, and document decisions and rationale for those decisions.

03 Project design for prescribed burns and strategies for wildfires shall 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.

04 Prescribed fires must be designed to move the area burned towards a natural fire regime that will increase the likelihood that future wildfires can be managed to achieve resource benefits, unless doing so threatens highly valued resources (e.g., natural resources, cultural resources, communities, infrastructure, and other values that could be affected by wildland fire).

05 Where the natural fire regime is high severity fire, fire planning will include consideration of first and second order fire effects outside of the area that is expected to burn (e.g., flooding, debris flows, invasive species infestations).

Guidelines (FF-G)

01 Where wildland fires on National Forest System lands could pose a threat to communities and community assets, particularly within the wildland-urban interface (e.g., power lines,

communication towers, developed recreation sites, adjacent private land, and structures), fuels should be manipulated to reduce the potential for undesirable fire behavior and effects.

02 When wildfires occur, response strategies should be developed based on the threat to lives, public and firefighter safety, and potential resource impacts.

03 All wildland fire activities should be conducted in a manner that minimizes disturbance to at-risk species, cultural resources, and other highly valued or at-risk resources, while keeping safety and risk management as a priority.

04 Temporary fire facilities (e.g., incident bases, camps, staging areas, helispots, and retardant batch plants) should be placed to minimize negative impacts in cultural sites and sensitive species areas (e.g., designated critical habitat, owl packs, at-risk plant sites, and riparian areas).

05 In advance of wildfire or prescribed fire, or as projects are being implemented, excessive fuel accumulation should be reduced around streams, springs, seeps, wetlands, and riparian areas to protect them from uncharacteristic or damaging fire effects.

06 Slash piles should not be placed within 300 feet of perennial or intermittent streams or within 100 feet of ephemeral streams unless local conditions suggest otherwise.

07 Ignitions should be located outside riparian management zones, unless local conditions suggest that ignitions within the riparian management zones would produce more desirable effects.

08 Within designated wilderness areas, wildfire management activities should minimize residual evidence of management activities. Fire management tactics (e.g., digging hand lines, limbing, and thinning) should be implemented outside of designated wilderness, unless approved by a qualified Agency Administrator.

Management Approaches for Fire and Fuels (FF-MA)

01 Fire and other resource managers take advantage of opportunities as they arise, and/or create opportunities to inform and educate the public about the benefits of wildland fire.

02 Coordinate and work with specialists (forest and/or fisheries biologist, riparian ecologist, soil scientist, hydrologist, or ecologist) to assess appropriate project design or mitigation related to slash piles and their placement near perennial and intermittent streams.

03 Wildland fire risk assessments may be used as a means to assess the potential risk posed by wildfire to specific highly valued resources and assets across large landscapes.

04 Use a risk-based support process (e.g., Potential Operational Delineations (PODS)) to facilitate informed and transparent decision making that will allow beneficial fires to burn under the right conditions, and informs aggressive strategies when fires need to be suppressed.

05 Wildland fire may be coordinated across jurisdictional boundaries when resource and protection objectives can be met for all jurisdictions.

06 Community wildfire protection plans, or similar assessments and management plans, are regularly integrated with plans in other Federal, State, county, local, and Tribal governments, and private landowners within the Tonto's boundary in order to mitigate the potential for negative impacts from wildfire. These plans identify and prioritize areas for treatment based on input from communities and multiple stakeholders and encourage communication between agency and partners.

07 Provide the public with information and/or educational opportunities on fire prevention, smoke management, and both the dangers and beneficial effects of wildland fire is an integral part of the Tonto National Forest fire management program. Incorporate strategies to inform the public about ongoing wildfires, and ongoing or upcoming prescribed fires.

08 Coordinate with Arizona Department of Environmental Quality during prescribed burns to comply with State and Federal regulatory requirements for emissions and impacts to class I areas.

09 Coordinate with Arizona Department of Environmental Quality during wildland fires to ensure awareness of potential smoke impacts to receptors.

10 Integrate wildland fire management with other programs to increase the effectiveness and efficiency of using fire as a tool to improve or maintain resource conditions, restore fire-adapted ecosystems to a resilient condition, and to protect values at risk.

Watersheds and Water Resources (WAT)

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 (Horseshoe, Bartlett, Roosevelt, Apache, Canyon, and Saguaro) have been constructed within the Forest to provide regulated 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 waterfowl.

Priority watersheds for the Tonto National Forest have been identified using the Forest Service National Watershed Condition Framework[72] as areas where plan objectives for restoration focus on maintaining or improving watershed condition. These priority watersheds will change over the life of the plan as projects implemented to improve watershed condition called “essential projects” within them are completed and the watershed condition has been improved or maintained and will be reevaluated periodically to focus restoration efforts on the Forest.

The Tonto National Forest 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. Approximately 390,000 acres of the forest lies within the Phoenix Active Management Area where groundwater use is managed more actively by the state than in areas outside of the active management areas. Well spacing and approval requirements are implemented within active management areas to prevent injury to adjoining well owners for wells that would pump more than 35 gallons per minute (gpm). Some limits on well

[72] To view the USDA Forest Service’s Watershed Condition Framework site, follow the link https://www.fs.usda.gov/naturalresources/watershed/condition_framework.shtml. There, one can find the Watershed Condition Framework, Water Condition Classification Technical Guide, Watershed Condition and Prioritization Interactive Maps, as well as the list of priority watersheds.

spacing are also implemented for wells that would pump less than 35 gpm (Arizona Administrative Code Rule 12-15, sections 1301-1308).

Constructed water features store or provide additional locations for surface water resources, which augment natural water sources. Structures include reservoirs, earthen stockponds, wildlife drinkers, and concrete or steel storage tanks or watering troughs fed by developed springs, groundwater wells, or stream diversions. These facilities provide recreation opportunities (e.g., hunting, fishing, camping, boating) and additional water sources for livestock and wildlife.

Surface water and groundwater for domestic, industrial, and agriculture uses (water for consumption) are key ecosystem services provided by the Tonto National Forest. Consumption of water resources is essential to the economy and quality of life of communities in and around the Tonto National Forest. The Forest 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. The plan components for watersheds and water resources help provide this service for the future. See Chapter 1. Introduction for more information about key ecosystem services.

Water resources on the Forest also contribute to local and regional economies by supporting water-based recreation. Six of the largest reservoirs in the state lie within the forest and support thriving water-based recreation opportunities. Streams and rivers draining the Mogollon Rim country are popular recreation destinations to escape the summer heat in the Phoenix metropolitan area, The Lower Salt River is also a popular area for water play in the summer. Water for recreation is one of the key ecosystem services provided by the Tonto National Forest. The plan components for Watersheds and Water Resources and Water-Based Recreation help provide this service for the future. See Chapter 1. Introduction for more information about key ecosystem services.

The plan components below apply to watersheds. Refer to the Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones section for additional applicable plan direction.

Desired Conditions (WAT-DC)

01 Watersheds support multiple uses (e.g., timber, recreation, grazing, cultural, mining) with no long-term decline in ecological conditions as measured by the Watershed Condition Framework or an equivalent method and provide high-quality water for downstream communities dependent on them.

02 Surface water and groundwater quality, meets or exceeds applicable state water quality standards, fully supports designated beneficial uses, maintains or moves ecological conditions to low departure from reference conditions, and meets the needs of downstream water users.

03 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, timing, and

duration of runoff within a natural range of variability and the movement of water and sediment from the surrounding uplands through the channel system sustains the health and function of the channel and riparian corridors as measured by the Watershed Condition Framework, National Riparian Core Protocol (Merritt *et al*. 2017) or another equivalent method.

04 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 as measured by the Watershed Condition Framework or another equivalent method.

05 The effects of climate variability and change are moderated by watershed conditions that support important ecosystem services (e.g., clean water, groundwater recharge, long-term soil productivity, and base flows in streams, springs, and wetlands).

06 Watersheds provide for recharge of aquifers and sustain groundwater quantity and quality.

07 Groundwater discharge maintains water table elevation, supports base flows and water temperature in streams, seeps, fens, springs, and other wetland resources, maintains site productivity and soil moisture characteristics for riparian vegetation, and sustains the function of surface and subsurface aquatic ecosystems.

08 Surface waters provide habitat for aquatic species and riparian species, contribute to connectivity for wildlife across the landscape, provide for local and urban potable[73] water supplies, agricultural uses (e.g., livestock watering and irrigation), and recreation.

09 Water rights to support ecosystem water needs on the Forest have been acquired.

Objectives (WAT-O)

01 Implement at least one essential project identified in the Watershed Restoration Action Plan[74] for each priority watershed every year.

02 Improve or maintain[75] watershed condition class of at least one 6th code (HUC12) watershed every five years, as defined in the Watershed Condition Framework.

03 Improve soil and water condition of at least 10,000 acres annually.

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

[73] Potable (drinkable) water is one of the key ecosystem services provided by water resources from the Tonto National Forest.

[74] Watershed Restoration Action Plans for priority watersheds are used to maintain or improve watershed condition and implement essential projects.

[75] Improving a watershed means the completion of essential projects within a Watershed Restoration Action Plan that result in a better condition class (i.e. from “impaired” to “functioning at risk” or “functioning at risk” to “functioning properly”). Maintaining a watershed means the completion of essential projects within a Watershed Restoration Action Plan that result in no change of condition class of a watershed (i.e. keep it as “functioning at risk” or “functioning properly”).”

05 Apply for state-based water rights for instream flow use for at least two streams threatened with dewatering, supporting highly valued resources (e.g., threatened or endangered species, species of conservation concern, river-based recreation) or containing unique qualities (e.g., a perennial stream in the Sonoran Desert) within each ten-year period.

Standards (WAT-S)

01 Project-specific best management practices (BMPs)[76] 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.

02 New authorizations for wells and pipelines on National Forest System lands shall only be considered where the water removed and/or transported by these facilities would not adversely impact springs, wetlands, riparian areas, surface flows, and other groundwater dependent ecosystems[77] on National Forest System lands.

03 Water rights, to support uses other than those supported by Federal reserved rights, will be secured through State of Arizona water rights procedures.

04 Activities in and around surface waters will use decontamination procedures that prevent the spread of detrimental parasites, pathogens (e.g., fungi, bacteria, protozoa), and invasive species.

Guidelines (WAT-G)

01 When existing groundwater wells on National Forest System lands are proposed for improvement that increase the amount of water pumped or deepen the well, adverse impacts to groundwater dependent ecosystems (e.g., wetlands, riparian areas, springs, streams, and fens) should be evaluated, and measures to eliminate, mitigate, or reduce impacts should be implemented.

02 When additional water supplies are necessary for Forest Service uses, existing infrastructure that could provide the supply should be evaluated for repairs or improvement prior to developing new sources of supply.

03 New wells on National Forest System lands and new pipelines across National Forest System lands should avoid adversely impacting nearby wells on adjoining private lands.

04 New water supply needs for Forest Service uses (e.g., livestock watering and recreation uses) should be met with groundwater supplies, provided that this development does not adversely impact groundwater dependent ecosystems or surface water resources.

[76] Best Management Practices as defined by 36 CFR 219.19 and described in USDA Forest Service (2012) National Best Management Practices for Water Quality Management on National Forest System Lands: Volume 1 - National Core BMP Technical Guide. Forest Service 990a.

[77] Groundwater dependent ecosystems are communities of plants, animals, and other organisms whose extent and life processes are dependent on access to or discharge of groundwater. (USDA Forest Service 2022).

05 Activities that could impact groundwater or surface water quality should be located outside Source Water Protection Areas[78] to prevent potential impacts.

06 New or reconstructed roads and motorized routes, infrastructure, recreation sites, or similar constructed facilities should not be located within floodplains or within 300 feet of water resource features (e.g., perennial and intermittent streams, springs, wetlands, and riparian areas), 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.

07 Consistent with existing water rights; permitted water uses, water diversions, or obstructions should allow sufficient water to pass downstream to preserve minimum levels of water flow that maintain riparian and aquatic desired conditions.

08 Watershed condition classification (using the Watershed Condition Framework or similar protocol) should be updated after large-scale disturbance events (e.g., wildfire).

09 To enhance the protection of human health and safety, watershed treatments should be implemented where protection of people, structures, and community infrastructure (e.g., roads, bridges, power corridors, and water supply) are at risk.

10 Watershed condition improvement projects should be integrated with other project activities. Prioritize projects that require minimal maintenance (e.g., cost of maintenance and time required for maintenance) and improve resiliency to climate change.

11 Where stressors degrading watershed condition can be identified, they should be eliminated or reduced, where feasible. Natural recovery of watershed conditions should be prioritized where it can be expected to occur.

12 Applications to the state by entities other than the Forest Service for water rights on National Forest System and adjacent lands should be evaluated where they could adversely affect National Forest System water rights. State procedures should be followed if adverse effects to those rights could occur.

13 Where Forest Service management contributes to designation of a water body an as impaired water body, recommendations in Total Maximum Daily Load (TMDL) assessments should be implemented to enable the Tonto to assist with meeting or exceeding water quality standards for the water body. Best management practices, watershed condition improvement treatments, or other identified water quality improvement practices should be utilized to improve water quality in impaired or non-attaining streams and water bodies without completed TMDL assessments where feasible.

[78] Source Water Protection Areas are areas that contribute water to wells or surface water intakes that are used for public water supply.

14 Groundwater and surface water on National Forest System lands should be managed as one hydrologically connected system.

Management Approaches for Watersheds and Water Resources (WAT-MA)

01 Work with forest leadership and partners to identify priority watersheds, develop watershed restoration action plans as well as other restoration activities to leverage resources, and to implement and monitor projects that improve vegetative composition, reduce erosion, and/or otherwise improve watershed function.

02 Complete an inventory of water sources where water rights exist or are needed and file water right applications for water sources needed for National Forest management purposes.

03 Select streams to ensure sufficient flow is provided for protection of riparian and aquatic species and their habitat, and for recreation. Streams prioritized for protection through instream flow water rights would be based on resource values supported by the streams and potential threats to dewatering.

04 Coordinate with Federal, State, and County agencies and with interested stakeholders with respect to water rights and ground and surface water issues (e.g., preservation, water quantity, and timing of flows).

05 Work with partners on developing appropriate environmental flows[79] for sensitive and/or high-risk areas using available tools and best available scientific information (e.g., Desert Flows Assessment: Environmental Water Needs of Riparian and Aquatic Ecosystems[80] (U.S. and Mexico).

06 Identify aquifers, including important recharge areas, within the forest boundary and consider these areas during project planning and implementation.

07 Manage groundwater quantity and quality on National Forest System lands in cooperation with appropriate State agencies.

08 Identify and inventory groundwater-dependent resources. Collaborate with external groups (e.g., U.S. Geological Survey, State, Tribal and local governments, State geological surveys, and universities) when locating, investigating, or assessing the hydrogeology and groundwater resources of National Forest System lands.

09 Identify and map Source Water Protection Areas on the Forest.

10 Use the Watershed Condition Framework, or other acceptable method, to assess and prioritize watersheds for restoration or maintenance activities.

[79] Necessary water flows to sustain water resources and the goods and services they provide to people.

[80] This document can be found at https://www.sciencebase.gov/catalog/item/599f6ae0e4b0e5eb065f98dc

Riparian Areas, Seeps, Spring, Wetlands, and Riparian Management Zones (RMZs)

Riparian Areas

Riparian areas are defined as three-dimensional ecotones [the transition zone between two adjoining communities] of interaction that include terrestrial and aquatic ecosystems that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain to the water, laterally into the terrestrial ecosystem, and along the water course at variable widths (36 CFR 219.19). 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 Ecosystems 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. Additionally, these systems are some of the most important habitats for plants and wildlife on the Tonto National Forest – providing water, forage, shelter, and habitat for nesting roosting, and bedding for species. "Among the 11 National Forests in the southwest, the Tonto National Forest contains 41% of all cottonwood-willow forest, 23% of all mixed broad-leaf deciduous riparian forest, and 20% of all montane willow riparian forest." (Lee *et al.* 2005)

Healthy riparian areas slow water movement from uplands and from flood flows which promotes infiltration into riparian area soils that can increase recharge alluvial and bedrock aquifers. Increased recharge during wet periods can also sustain groundwater discharge from these aquifers during dry seasons of the year to help maintain base flows during these periods. 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 connectivity, enabling aquatic and riparian organisms to move along stream and 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. Key disturbances in these systems include surface water withdrawals and impoundments, groundwater pumping, domestic livestock, nonnative wildlife, authorized and unauthorized livestock grazing, roads and motor vehicle activity, recreation pressure, and infestation by nonnative plants and animals. These disturbances can impact riparian ecosystem function.

The Tonto National Forest contains parts of two of the state's major rivers, the Salt and Verde Rivers and supports approximately 700 miles of perennial streams, 1,100 miles of intermittent streams, and 11,000 miles of ephemeral streams (data obtained from Tonto GIS data, which includes the National Hydrography Dataset). Two of Arizona's only wild and scenic rivers (Verde River and Fossil Creek) lie partly within the Forest. Stream ecosystems include perennial, intermittent, and ephemeral streams and rivers, their adjoining riparian areas, and associated floodplains. Perennial, intermittent, and ephemeral streams differ in the timing and duration of flow. Ephemeral streams flow for short duration in response to precipitation 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). Stream ecosystems moderate flood events and collect, filter and transport water, sediment, and organic material from upslope and upstream. Stream ecosystems provide unique habitats for plants, animals, and micro-organisms that are specialized to live in and around water – some of which require water for all or part of their life cycles (e.g., aquatic and semiaquatic species). Lush stream corridors and cool water sources also attract campers, hikers, and fishermen.

Springs and Seeps

Springs and seeps occur where groundwater intersects the land surface. They may contribute to stream flow or infiltrate through the overlying soil and underlying geology back to the groundwater. Spring systems are highly productive habitats that often lie in stark contrast to the surrounding uplands. Seeps are a particular type of spring with low flow that filters to the surface through permeable soils and substrates. Multiple types of springs occur on the Tonto National Forest 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 National Forest. 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 National Forest. 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. 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. Primary natural disturbances in these systems are drought, fire, herbivory by native wildlife, insects, and disease. Fire is an infrequent disturbance, occurring less frequently than in adjacent areas. Human-related disturbances include grazing by domestic livestock and nonnative wildlife, development and diversion via pipeline for

various uses, improperly located roads, off-road vehicle use, recreation, human caused fire (prescribed fires and wildfires), and nonnative invasive species.

Riparian Management Zones

The 2012 planning rule requires the forest plan to include plan components for riparian areas and establish riparian management zones (RMZ) around all lakes, perennial, and intermittent streams,[81] and open wetlands, within which the plan components in this section will apply, giving special attention to land and vegetation for approximately 100 feet from the edges of all perennial streams and lakes (36 CFR 219.8(a)(3)).

The first approximation of the riparian management zones will be based on riparian ecological response units (riparian ERUs)[82]. The following are the riparian ecological response units on the forest that make up the riparian management zones: Arizona Alder-Willow, Arizona Walnut, Desert Willow, Fremont Cottonwood-Conifer, Fremont Cottonwood-Oak, Fremont Cottonwood/Shrub, Herbaceous, Narrowleaf Cottonwood/Shrub, Ponderosa Pine/Willow, and Sycamore – Fremont Cottonwood. Any updates to the riparian ecological response units or any new mapping effort based on the best available science should be incorporated as the first approximation of the riparian management zones.

The riparian management zones will be further modified through site-specific delineations during project-level planning and implementation. Criteria that can be used to refine the riparian management zones include vegetation, fluvial geomorphology, hydrology, and downstream conditions. Vegetative indicators of riparian extent include species that: are adjacent to and influenced by stream-related processes, require consistent soil moisture, and are absent or rare in areas defined as uplands. Fluvial geomorphic indicators include break in slope, evidence of fluvial deposition, high water marks, and lack of upland soil formation. In the absence of vegetative or fluvial geomorphic indicators the hydrologic indicator of the 100-year recurrence interval flood may be used to indicate riparian extent. Finally, a riparian management zone can be modified to incorporate ephemeral channels with minimal riparian vegetation where there is evidence that those areas support riparian vegetation downstream due to subsurface flow through the stream channel or adjacent alluvial sediments as described in Forest Service Handbook 1909.12 (23.11e). Evidence of subsurface flow through an area includes groundwater at depths less than 10 meters and/or ephemeral channels with perennial or intermittent flow upstream and downstream of them.

The plan components below apply to all riparian areas, streams, springs, seeps, wetlands, and riparian management zones. Refer to the Watersheds and Water Resources, Riparian Ecological

[81] Includes drier intermittent riparian areas often referred to as “xeroriparian” or “Sonoran riparian scrublands” best represented by the Desert Willow Riparian ecological response units.

[82] See the Riparian ecological response units section for more information on what riparian ecological response units are and how they were derived/mapped.

Response Units, Soils, and Lakes and Rivers Management Area sections for additional applicable plan direction.

Desired Conditions (RMZ-DC)

01 Riparian areas (including streams, seeps, springs, and wetlands) exhibit low departure from reference conditions, are properly functioning, and therefore are resilient to disturbances.

02 Within their potential, riparian areas protect and enrich soils, stabilize banks and shorelines, and improve water quality by filtering and capturing sediment, filtering contaminants, and dissipating stream energy from flows.

03 Protective litter and plant cover is present in adequate abundance (based on reference conditions and site potential; Terrestrial Ecological Unit Inventory data or other suitable dataset) to allow higher stream terraces and floodplains to recycle nutrients, and resist erosion and compaction.

04 Livestock grazing does not impact the long-term health of riparian vegetation. Vigor and diversity maintains or moves riparian vegetation as represented by Terrestrial Ecological Unit Inventory site potential and other suitable references to low departure from desired conditions for riparian vegetation types.

05 Forest activities (e.g., vehicle use, recreation, ungulate and livestock grazing) do not negatively impact and move riparian areas away from desired conditions for vegetation, soils, and water (e.g., increase sedimentation and erosion, alter plant communities, or impair streambanks).

06 Stream flow regimes and sediment movement characteristics reflect the natural range of variability, maintain riparian ecosystems, channel and floodplain morphology, groundwater recharge, and water quality.

07 Riparian ecosystems exhibit connectivity between and within aquatic systems, riparian areas, and uplands that provide for movement and dispersal of species.

08 Spring recharge areas maintain or improve spring discharge.

09 Streambeds contain less than 30 percent fines (e.g., sand, silt, and clay) in riffle habitat (a rocky or shallow part of a stream or river with rough water) in cold water streams and less than 50 percent fines reach wide (generally 0.25 miles) in warm water streams for aquatic species.

Objectives (RMZ-O)

01 Complete active and passive restoration projects on at least 125 miles of streams every ten years to improve the ecological integrity of perennial and intermittent riparian ecosystems rated as nonfunctioning and functioning-at-risk.[83]

[83] Both nonfunctioning and functioning-at-risk are synonyms from the Proper Functioning Condition assessment framework and terms “Nonfunctional” and “Functional-at-risk.” Nonfunctioning riparian areas are highly degraded, and do not provide adequate vegetation, landform, or woody material to dissipate stream energy associated with moderately high flows, and thus are not reducing erosion or providing ecosystem services such

02 Improve[84] ten to fifteen individual springs during each ten-year period.

Standards (RMZ-S)

01 All projects shall identify and delineate the riparian management zone.

02 Refueling, maintaining equipment, and storing fuels[85] or other toxicants shall not occur in riparian management zones, except in the Lakes and Rivers Management Area.

03 Projects within the riparian management zone that use herbicides or pesticides should ensure that chemicals are not applied or drift into water resources.

Guidelines (RMZ-G)

01 New spring developments and redeveloped springs (not including maintenance) should employ the strategies outlined in RMRS-GTR 405[86] or the best available science associated with spring development (USDA Forest Service 2020) and should leave some water behind at the spring source.

02 Projects affecting perennial streams should be designed and constructed to allow for natural instream movement of aquatic species, except where barriers are necessary to preclude the movement of nonnative species.

03 In riparian management zones, projects and management activities should be designed and implemented to maintain or restore long-term natural streambank stability, native vegetation, floodplain, and soil function (for activities within the Lakes and Rivers Management Area, reference guideline MA-LRMA-G-03).

04 Downed woody material in stream channels should be left in place where appropriate (e.g., to create pools for fish habitat), except where it poses a risk to health and safety (e.g., debris jams).

05 Activities that modify stream channels currently in proper functioning condition (evaluated using Proper Functioning Condition[87] Assessment or similar protocol) that would result in a non-functioning system should not be authorized.

as improving water quality. Functional-at-risk riparian areas are limited in functioning condition, however existing hydrological, vegetative, or geomorphic attributes make them susceptible to impairment.

[84] Spring improvement refers to work that improves the ecological integrity of a spring. See the 2020 Forest Service General Technical Report "Rangeland Water Developments at Springs: Best Practices for Design, Rehabilitation, and Restoration."

[85] Storing fuels in the riparian management zone shall only be allowed on a temporary basis during the implementation of a management activity where it would be absolutely necessary to carry out the work.

[86] RMRS-GTR 405 is the 2020 Forest Service General Technical Report "Rangeland Water Developments at Springs: Best Practices for Design, Rehabilitation, and Restoration."

[87] The term "proper functioning condition" refers to an assessment method developed by the Bureau of Land Management to qualitatively evaluate the condition of riparian areas. See Dickard *et al.* 2015 for a detailed description of the protocol and condition rankings.

06 When drafting or moving water, measures should be taken to prevent movement of invasive and/or non-native aquatic species (e.g., pump intake screens, decontamination, and coordination with state and tribal agencies).

07 Project planning and activities affecting riparian and aquatic ecosystems should consider the desired conditions specified in the current Regional Riparian and Aquatic Ecosystem Strategy (USDA Forest Service 2019).

Management Approaches for Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ-MA)

01 Use protocols such as Proper Functioning Condition, National Riparian Core, Multiple Indicator Monitoring, Groundwater Dependent Ecosystems, and other data sources such as remote sensing and vegetation classification, or other accepted method for riparian assessments and monitoring.

02 Work with partners and volunteers to accomplish annual utilization monitoring in riparian areas and riparian trend monitoring to track changing conditions over time.

03 Incorporate the State of Arizona's narrative Biological Criteria for Wadeable Perennial Streams including Arizona index of biological integrity scores, narrative bottom deposit criteria, or currently adopted water quality standard in stream management (Arizona Administrative Code R18-11-108.01).

04 Assess opportunities to reintroduce beavers to riparian ecosystems as a means of achieving riparian health and providing habitat for at-risk species and other listed species. Riparian and watershed planning could identify areas where beaver were eradicated and prioritize reintroduction in those areas.

05 Explore opportunities to restore natural flow regimes, connect channels and their floodplains where they have been interrupted, and alleviate key stressors to promote natural recovery.

06 Work with partners and stakeholders to inventory, classify, assess, and prioritize springs and recharge areas for restoration, and to implement restoration activities. Include consideration of rare species and endemic species when evaluating springs for restoration.

07 Consider both active and passive restoration techniques[88] to improve riparian conditions and encourage self-sustaining ecosystems.

[88] Active restoration is where management actions (e.g., planting vegetation or bank stabilization or other physical actions) are taken to restore ecological conditions whereas passive restoration focuses on ceasing environmental stressors (e.g., reducing pressure from multiple uses to allow the system to recover on its own.

08 To mitigate any adverse impacts to the spring ecosystem in spring development and maintenance projects, consider conducting a hydrological analysis that includes required flow rate and water table depth to support obligate flora and fauna during the planning and design stages.[89]

[89] See the USDA Forest Service 2020 General Technical Report "Rangeland Water Developments at Springs: Best Practices for Design, Rehabilitation, and Restoration" or other best available science for more information on design considerations, spring management, and restoration approaches.

Wildlife, Fish, and Plants (WFP)

The Tonto National Forest provides important habitat for a 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 Ancha 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 number of species found on the Tonto National Forest.

For some species, 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, disjunct populations, and 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 land. 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 could include the abundance and distribution of aquatic and terrestrial habitats, habitat connectivity, roads and other structural developments, human uses, and invasive species (36 CFR 219.19). While the terms used to describe ecological conditions in this section are often qualitative, some of these conditions can be measured directly through established metrics and monitoring programs (e.g., Ecological Response Unit departure, Proper Functioning and Condition, Fire Regime Condition Classes). The presence of or trend in at-risk or focal species may also be informative in assessing desired conditions.

At-risk species consist of: 1) federally recognized threatened, endangered, proposed, and candidate species, as well as; 2) species of conservation concern (SCC). Federally-listed species are managed by the U.S. Fish and Wildlife Service under the authority of the Endangered Species Act (7 U.S.C. § 136, 16 U.S.C. § 1531 et seq.PL 93-205, as amended) and by the U.S. Forest Service under the authority of the National Forest Management Act (PL 94-588). Section 7(a)(1) of the Endangered Species Act (ESA) of 1973 directs all Federal agencies to "utilize their authorities in furtherance of the purposes of this Act

by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act." Section 7(a) (2) of the ESA requires Federal agencies to ensure that any actions authorized, funded, or carried out by the agency are not likely to jeopardize the continued existence of any threatened, endangered, or proposed species or adversely modify its 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[90]. The 2012 Rule (36 CFR 219.9(b)) requires that plan components provide ecological conditions necessary to maintain "a viable population" of each species of conservation concern and defines a viable population as, "a population of a species that continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments." (36 CFR 219.19).

If the Forest receives new, scientific information that indicates that a species should be added or removed to the list of species of conservation concern, 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 managing the ecological conditions required by at-risk species on the Forest, plan components that maintain or restore ecosystem integrity and ecosystem diversity are found throughout this plan and not solely within this section. Refer to the Vegetation Ecological Response Units, Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones, and Watersheds and Water Resources sections for more applicable plan direction. Additionally, a crosswalk of common-to-scientific names for species used in this section can be found in Appendix C. Species Common Name Crosswalk.

For information on recreational opportunities related to wildlife (e.g., hunting, fishing, and watching wildlife) refer to the Wildlife-Related Recreation section in Chapter 2. Forestwide Plan Direction.

Desired Conditions (WFP-DC)

01 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.

[90] The current list of species of conservation concern can be found on the forest website https://www.fs.usda.gov/detailfull/tonto/landmanagement/planning/?cid=fseprd594555&width=full.

02 Habitats are sufficiently resilient to withstand foreseeable levels of disturbance and redundant enough to maintain species diversity, enabling species to adapt to changing environmental conditions (e.g., climate change).

03 Habitat condition, distribution, and abundance contribute to self-sustaining populations of plant and animal species, including at-risk species, rare, and endemic species.

04 A diversity of habitat features, including biotic and abiotic, are available at the appropriate spatial, temporal, compositional, and structural levels to provide adequate opportunity for critical life history needs (e.g., breeding, feeding, and nesting) of species.

05 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.

06 Locations, status, and life histories (e.g., population trend, threats, and habitat requirements) of at-risk, rare, and endemic species are known and better understood.

07 Human-wildlife conflicts and human disturbances are minimal, as are adverse impacts to vital life history functions (e.g., breeding, feeding, and rearing young) of wildlife, fish, and rare plants.

08 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.

Objectives (WFP-O)

01 Implement at least 20 activities (e.g., habitat improvement projects, collaborative agreements, wildfire management) that contribute to the recovery of at-risk species every ten years.

02 Complete at least 20 products or activities that educate the public about wildlife, fish, and rare plants every two years (e.g., educational signs and brochures, website pages, species checklists, presentations, and field trips).

Guidelines (WFP-G)

01 Activities occurring within federally-listed species habitat should apply habitat management objectives and species protection measures from approved recovery plans.

02 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.

03 The best available science and/or conservation measures should be used to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain viable populations of species of conservation concern and rare endemic species.

04 Projects and activities that may negatively impact at-risk species and rare endemic plant species should consider protections and design elements to address impacts, especially considering the timing and location of vulnerable life history processes (e.g., reproduction, molting, migration, and hibernation). Examples of design elements and protections could include but are not limited to timing restrictions, adaptive percent utilization levels, distance buffers and avoidance (e.g., physical removal/damage of plants).

05 New or reconstructed features (e.g., fences, vent pipes, stock tanks, and culverts) should be designed, constructed, and maintained to minimize wildlife mortality (e.g., capped fence posts and escape ramps).

06 Landscape and vegetation alterations that significantly contribute to uncharacteristic habitat fragmentation should be avoided. Project design should provide for movement and dispersal of species between treated and untreated areas.

07 New infrastructure or constructed features (e.g., fences, roads, recreation sites, facilities, drinkers, crossings, and culverts) should be designed and maintained to minimize negative impacts to the movement and dispersal of wildlife, fish, and rare plants. Infrastructure and constructed features already present that negatively impact movement and dispersal 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.

08 Projects and activities that may negatively impact Sonoran Desert tortoises should apply mitigations from the Arizona Interagency Desert Tortoise Team's Recommended Standard Mitigation Measures (or similar current guidance) when designing projects in desert tortoise habitat.

Management Approaches for Wildlife, Fish, and Plants (WFP-MA)

01 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. Look for opportunities to be involved in working groups, recovery teams, and other groups focused on conserving at-risk species on the Forest.

02 Consider impacts of climate change on at-risk species when designing projects and analyzing the effects of proposed projects.

03 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 Forest.

04 Identify potential opportunities for local universities, State and Federal research branches, and other research groups to assist and initiate projects that address information gaps and advance Forest Service management of vulnerable, at-risk, or economically important species.

05 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).

06 Prioritize areas for plant surveys by focusing on rare soil types, geological features, or biodiversity hotspots.

07 Participate in and support the reintroduction of extirpated (locally extinct) native species into their native range, while considering ecological conditions and social values.

08 Work closely with the Arizona Game and Fish Department to address habitat and other conservation needs of state priority species (e.g., species of greatest conservation need, species of economic and recreational importance).

Invasive Species (INS)

Invasive Species are described as alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. A species that causes, or is likely to cause, harm and that is exotic to the ecosystem it has infested. Invasive species infest both aquatic and terrestrial areas and can be identified within any of the following four taxonomic categories: plants, vertebrates, invertebrates, and pathogens (Executive Order 13112).

Both terrestrial and aquatic invasive species are a growing threat to native species, ecosystem function, and the quantity of forest goods and services. Invasive species threaten native plant communities by competing for resources and altering disturbance regimes (e.g., uncharacteristic fire in the Sonoran Desert). Even though complete eradication of invasive species is not always possible, assessment and control of existing and new populations and integrated pest management (IPM) is important to protect native ecosystem diversity.

Based on projections of future climate change for the region, conditions could favor the spread and establishment of invasive species, which are often more widely adapted to a range of climates and often early colonizers following disturbances.

Desired Conditions (INS-DC)

01 Invasive species do not disrupt ecological functionality, affect the sustainability of native species, cause economic harm, or negatively impact human health.

02 Ground disturbing management activities are not introducing or spreading invasive species.

Objectives (INS-O)

01 Treat and control invasive species on 200 to 1,500 acres annually.

02 Treat and control invasive species on two to ten stream reaches every five years.

Guidelines (INS-G)

01 Equipment and materials should not be stored or staged in areas infested with invasive species.

02 Certified weed-free materials (e.g., seed, forage, mulch, and fill) should be selected for all seeding and mulching projects to restore natural species composition and ecosystem function to the disturbed area, and to ensure that invasive species are not introduced during projects or emergency implementation.

03 Fill and rock material should be inspected to limit and control the spread of invasive species.

04 After initial invasive species treatments, follow up monitoring and treatments should occur to prevent regrowth, establishment, or spread of other invasive species.

05 If chemical application is necessary near human developments (e.g., developed recreation sites) or ecologically sensitive habitat (e.g., at-risk species and riparian areas), techniques should be applied to minimize negative effects (e.g., chemical-free buffers, and spot treatments).

06 When drafting water from streams or other water bodies, measures should be taken to prevent the spread of parasites, pathogens (e.g., fungi, bacteria, protozoa), and invasive species.

07 Efforts to improve disturbed sites should include steps to reduce invasive plant species colonization, protect soils, and improve watershed condition.

Management Approaches for Invasive Species (INS-MA)

01 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 systems.

02 Conduct treatments in a timely manner to reduce or minimize spread.

03 Locations of invasive species are known, recorded, and managed using an integrated pest management (IPM) approach.

04 Invasive species management programs are compatible with and integrated into overall ecosystem resource management.

05 Develop and use action plans to: (1) determine dispersal and transport; (2) determine prediction and forecasting; (3) map and inventory of invasive species; (4) use maps for management and control tactics; and (5) assess the impacts of invasive species or control method.

06 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.

07 Encourage public land users to inspect and clean motorized vehicles and boats prior to recreating on public lands to prevent the spread of invasive species (e.g., quagga mussels and fountain grass).

08 Incorporate new technology (e.g., iNaturalist, EDD maps, and Avenza) and social media (e.g., Instagram) to increase awareness regarding invasive species and to record occurrences on the Tonto National Forest.

09 Explore and incorporate new techniques of treating invasive species (e.g., organic herbicides, herbicide labels, seeding techniques and sources, mapping technologies, and other allowable resources) to strengthen the Tonto National Forest invasive species program.

10 Coordinate with Animal and Plant Health Inspection Service for the release and monitoring of biological controls at invasion sites. Consider only biological controls that do not pose substantial risk to natural resources and to other native species.

11 Participate in scientific weed or invasive species societies, county weed boards, and weed coalitions.

12 Consider developing interpretive signs for placement at portals, treatment sites, and trailheads to alert forest users about invasive species.

13 Strategize approaches to treat and control invasive species. Work with partners and researchers to identify where alternative approaches to invasive species management will help meet forest desired conditions and objectives.

14 Consider using targeted grazing to control invasive species and fuel loading, where appropriate.

Soils (SL)

Functioning ecosystems and all vegetation depend on healthy soils, making soil the foundation for life. Soils on the Tonto National Forest include a wide variety of taxonomic classifications, reflecting the influences several soil forming factors (e.g., parent material, climate, topography, and organisms). 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 valley bottoms. These soil properties greatly affect 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 of healthy ecosystems on the Tonto National Forest.

The Tonto National Forest uses information from the Terrestrial Ecological Unit Inventory, which defines the systematic description, classification (soil, vegetation, climate, geomorphology, and geology), mapping, and interpretation of ecological types (USDA Forest Service 2005).

Refer to the Vegetation Ecological Response Units and Riparian Ecological Response Units sections for additional plan direction.

Desired Conditions (SL-DC)

01 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, resist erosion, and accept, hold, and release nutrients, based on site potential.

02 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.

03 Logs and other woody material are retained and distributed across the soil surface to facilitate soil productivity (e.g., nutrient cycling) and maintain key habitat features, based on site potential.

04 Soil productivity is not inhibited by invasive plant species.

05 Soils are free from contaminants that could alter ecosystem integrity or affect public health.

06 Soils do not exhibit signs of accelerated water or wind erosion (e.g., pedestaling, rills, and gullies).

Guidelines (SL-G)

01 Ground disturbing management activities should be designed to minimize short- and long- term impacts to soil resources (e.g., soil compaction and soil loss). Where disturbance cannot be avoided, project specific soil and water conservation practices should be developed.

02 Where biological soil crusts exist, ground disturbing activities should identify areas for protection and minimize disturbance.

03 Soils with impaired and unsatisfactory condition ratings (as defined by Terrestrial Ecological Unit Inventory) should be managed to maintain or improve their conditions (for activities within the Lakes and Rivers Management Area, reference guideline MA-LRMA-G-03).

04 In areas where soils have a severe erosion hazard rating, are poorly drained or saturated, or have an unsatisfactory soil condition, new activities that encourage concentrated use (e.g., recreation, log landings, stock tanks, and cattle collection areas) should be avoided (for activities within the Lakes and Rivers Management Area, reference guideline MA-LRMA-G-03).

Management Approaches for Soils (SL-MA)

01 Work collaboratively with other agencies and groups that facilitate soil conservation and watershed improvement projects.

02 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!).

03 As conditions change, update the Terrestrial Ecological Unit Inventory data, which provides the basis for planning project activities. Work with partners and stakeholders to share data and improve existing soil information, especially after large-scale soil disturbances.

04 Implement Best Management Practices for ground disturbing activities to ensure long-term soil productivity and satisfactory soil condition (soil health).

05 Consider prioritizing restoration activities (both active and passive) in areas with impaired soil condition where past management has resulted in degraded conditions.

Caves and Karsts (CVK)

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, and insects. Other small and large mammals also use caves opportunistically.

Refer to the Significant Caves section in Chapter 3. Designated Areas and Management Areas Plan Direction for additional applicable plan direction.

Desired Conditions (CVK-DC)

01 The cultural, archaeological, geological, hydrological, paleontological, biological, recreational, and aesthetic resources associated with caves and karst features are conserved, maintained, and not degraded by visitors.

02 Cave formations and karst landscapes continue to develop or erode under natural conditions

03 Cave and karst feature conditions provide habitat for cave fauna (particularly hibernacula and maternity roosts for bats) and facultative use by other wildlife.

Guidelines (CVK-G)

01 Environments in caves should not be altered except where necessary to protect associated natural resources or to protect health and safety.

02 Where necessary to protect human health and safety, gates should be installed to preserve habitats for and mitigate negative impacts to wildlife, including roosting bats. Proposed gates should be designed to allow future access for authorized personnel and include a lock and/or removable bar along with a design to open from the inside without a key.

03 Projects for or near known cave and karst features should consider protections to minimize disruptions to hydrogeology, cave microbiology, and other aspects of cave ecology while also seeking to protect and conserve archaeological, biological, and geological resources.

04 The forest should strive to prevent the spread and minimize the impacts of white-nose syndrome for bat roosts in cave and karst features.

Management Approaches for Caves and Karst (CVK-MA)

01 Consider the development of a response plan for white-nose syndrome through continued collaboration with the U.S. Fish and Wildlife Service, Bat Conservation International, Arizona Game and Fish Department, National Speleological Society, North American Bat Monitoring Program, and others with interests in conservation management for bat species. Support and participate in proactive monitoring for the fungus *Pseudogymnoascus destructans* (Pd), which causes white-nose syndrome.

02 Reference the most current management recommendations and/or decontamination procedures (issued by U.S. Fish and Wildlife Service or U.S. Forest Service) for bat roosts in cave and karst features to prevent the spread and minimize the impacts of white-nose syndrome

03 Consider working with public affairs, recreation, invasive species, minerals staffs; State and other Federal agency partners; and the public to increase awareness internally and externally regarding white-nose syndrome and other significant pathogens at local and regional levels. Include a focus on best management practices for the prevention of outbreaks.

04 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.

05 Foster relationships with caving partners (e.g., Central Arizona Grotto of the National Speleological Society) to engage in cave inventory, survey, mapping, monitoring, management planning, and identification/nomination of significant caves.

06 Collaborate with local and national caving organizations to monitor popular and desirable caving areas and develop best practices and management plans for these areas.

Air Quality (AQ)

The Forest Service recognizes air quality as an important ecosystem service for national forests to protect. The public has come to value the fresh air and sweeping views forests provide. Pollution (e.g., emissions from the burning of fossil fuels, acid deposition, dust, and smoke) generated both on and off the forest affects air quality and resources on the forest. Air quality plays a subtle but critical role in the overall health of the forest ecosystem. Biotic communities, both botanical and zoological, are affected by pollutants in the air which can be directly deleterious to plant respiration and metabolism and indirectly injurious through degradation of water and soil quality. In the case of wildland fires, on the other hand, they are directly beneficial to many plant communities, because the smoke particles deposited on the land surface enhance the germination and growth of some plants (Omasa *et al.* 2005). Furthermore, certain air quality conditions can compromise the respiratory health of forest visitors.

Population centers with the potential to be impacted by management activities on the Tonto National Forest are the Phoenix metropolitan area, Payson, Pine, Strawberry, Globe, Miami, Tonto Basin, Punkin Center, Superior, Roosevelt, Young, and other smaller scattered communities within, or adjacent to, the forest.

Human health standards are defined in the National Ambient Air Quality Standards set by the Environmental Protection Agency (EPA) for six pollutants considered harmful to public health: carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide, and particulate matter (PM_{10} and $PM_{2.5}$). PM_{10} is particulate matter with a diameter of 10 micrometers or less and $PM_{2.5}$ is particulate matter with a diameter of 2.5 micrometers or less. Non-attainment areas are those areas that have not met air standards for one or more of the National Ambient Air Quality Standards as per acceptable levels set in the Clean Air Act. These areas must demonstrate to the public and the EPA how standards will be met in the future via a State Implementation Plan. Some areas on the Tonto National Forest are non-attainment areas as of October 2018. These include areas to the north, west, and south of Globe/Miami (PM_{10} and sulfur dioxide), part of the Superstition Mountains up to and including the west side of the Mazatzal Wilderness and New River Mesa and Bartlett Lake, including the Tonto National Monument and Roosevelt (ozone). Bartlett Lake and areas southwest of it are also non-attainment for PM_{10}. Additionally, pollutants from Phoenix non-attainment area sources and near-by copper mining facilities have been adversely impacting air quality and visibility on the Tonto National Forest.

Within the 1977 Clean Air Act, Congress designated all wilderness areas over 5,000 acres as Class I areas. The intention of this designation is to protect visibility in areas of high scenic value. Class I Federal lands in Arizona include areas such as national parks, national wilderness areas, and national monuments. These areas are granted special air quality protections under Section 162(a) of the Federal Clean Air Act. Arizona has twelve Class I areas, four of them are within the Tonto National

Forest: Pine Mountain, Mazatzal, Sierra Ancha, and Superstition wilderness areas. The visibility at these four Class I Areas is monitored by two IMPROVE[91] sites.

Desired Conditions (AQ-DC)

01 Air quality contributes positively to visibility, human health, quality of life, economic opportunities, quality recreation, and wilderness values.

02 Air quality on the Tonto National Forest meets or surpasses the State of Arizona and Federal ambient air quality standards.

03 Water chemistry and biotic components are not negatively impacted by atmospheric deposition of pollutants.

04 Air quality-related values, including high-quality visibility conditions, are maintained or improved by forest projects over the long term in Class I areas on the forest.

05 Visibility in Class I areas meets the most recent regional haze regulations as mandated by Arizona Department of Environmental Quality and the Environmental Protection Agency.

Standards (AQ-S)

01 Prescribed fire (e.g., pile, broadcast, and jackpot burning) will occur in accordance with Arizona Department of Environmental Quality requirements.

02 When prescribed burns are implemented, strategies for Emissions Reduction Techniques (ERTs) per Arizona Administrative Code R18-2 Article 15 shall be followed when practicable to reduce negative impacts to air quality.

Guidelines (AQ-G)

01 Dust abatement should occur during projects where there are adverse impacts to air quality (e.g., construction and road and motorized trail improvements).

02 During the management of wildland fire, techniques to minimize adverse smoke impacts (e.g., timing of ignitions, mass ignitions, and limiting fire spread) should be used.

03 Coordination with Arizona Department of Environmental Quality should occur before and during prescribed burns to comply with State and Federal requirements for emissions and impacts to Class I areas.

04 During the management of wildland fires, smoke-sensitive receptors should be located and potential adverse impacts to them should be minimized or mitigated.

[91] The IMPROVE program was initiated in 1985, is a multi-agency nation-wide program, provides valuable information for characterizing visibility conditions in wilderness areas. It is a long-term monitoring program to establish the current visibility conditions, track changes in visibility, and determine casual mechanism for the visibility impairment of wilderness areas.

Management Approaches for Air Quality (AQ-MA)

01 Work with agencies, organizations, Tribes, and other entities to actively pursue actions designed to reduce the impacts of air pollutants from sources (e.g., smoke, road maintenance, and mining activities) within and outside the Forest.

02 Consider notifying stakeholders and the public about potential smoke from fire activities through a variety of notification techniques (e.g., media, smoke warning signs along roads).

03 Utilize best management practices to protect visibility and opacity standards on the Tonto National Forest, including Class I areas.

04 Work in cooperation with the Arizona Department of Environmental Quality to monitor smoke during extended periods of burning for levels that may have impacts to human health. Consider deploying smoke monitors when there is potential for significant impacts to the public.

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Chapter 3. Management Areas Plan Direction

The management areas plan direction chapter contains the plan components applicable to specific areas that call for management that is in addition to or different than forestwide management. 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 forestwide guidance by:

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

Forestwide plan components are applied unless there is management direction specific to the management area. All management area plan components are based on applicable authorities and the specific purposes for which the area was created, recommended, or designated.

Designated areas are a specific type of management area that are either statutorily (designated by Congress) or administratively designated (designated by Regional Forester, Forest Service Chief, Secretary of Agriculture, or the President). The current statutorily designated areas on the forest are wilderness, wild and scenic rivers, and national scenic trials. The current administratively designated areas on the forest are inventoried roadless areas, national recreation trails, research natural areas, and significant caves. The Sierra Ancha Experimental Forest is an administratively designated area managed by the Rocky Mountain Research Station and is not included in this plan.

This chapter also includes plan components for management areas created and recommended including: the Lakes and Rivers Management Area, Saguaro Wild Burro Management Area, Salt River Horse Management Area, Apache Leap Special Management Area, proposed research natural areas, recommended botanical areas, eligible wild and scenic rivers, and recommended wilderness areas.

The plan displays plan components in sections with headers shaded in green and accompanied by codes to distinguish them from other sections of the plan. Management approaches, shaded in orange, or text found in sections with headers that are not shaded and without a code are considered optional plan content. Optional content does not constitute management direction, but it may help clarify plan direction and how it may be applied. More information about plan components and other plan content can be found in Chapter 1. Introduction under Plan Framework and Organization.

Maps for the management areas are located in Appendix A. Maps.

Designated Wilderness (DWMA)

Wilderness areas are congressionally designated and defined in the Wilderness Act of 1964 as:

> A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain.

In this Act, Congress acknowledged the immediate and lasting benefits of wild places, by passing landmark legislation that permanently protected some of the most natural and undisturbed places in America. The Wilderness Act established the National Wilderness Preservation System "...to secure for the American people of present and future generations the benefits of an enduring resource of wilderness."

The Wilderness Act prohibits permanent roads and the use of any form of motorized or mechanized transport within wilderness areas, unless for access to inholdings that existed prior to designation. It requires management of human-caused impacts and protection of the area's wilderness character to ensure that it is "unimpaired for the future use and enjoyment as wilderness."

The Wilderness Act describes wilderness using the following qualities:

- untrammeled – free from modern human control or manipulation;
- natural – where the natural condition of the land; its plants, wildlife, water, soil, air, and ecological processes are managed, protected and preserved;
- undeveloped – retaining its primeval character and influence, as is essentially without permanent improvements or human occupation; and
- outstanding opportunities for solitude or primitive and unconfined recreation – opportunities for solitude or primitive and unconfined recreational experiences.
- other features , including ecological, geological, or other features of scientific, educational, scenic, or historical value.

These qualities, as they pertain to a particular wilderness area, define the “wilderness character” of that Wilderness. Wilderness areas are meant to be protected, have their wilderness character preserved, and be administered for the use and enjoyment of the American people now and in the future.

The Tonto National Forest manages eight designated wilderness areas: Four Peaks (60,688 acres), Hellsgate (37,427 acres), Mazatzal (247,995 acres), Pine Mountain (11,498 acres), Salome (18,519 acres), Salt River Canyon (32,096 acres), Sierra Ancha (20,237 acres), and the Superstition Wilderness (160,115 acres). The Pine Mountain Wilderness has shared management with the Prescott National Forest.

Four Peaks Wilderness Area

Four Peaks Wilderness was designated in 1984 and contains 60,688 acres with a major mountain rising up in its center from the desert foothills. The Four Peaks Wilderness is located on the Mesa and Tonto Basin Ranger Districts. The Four Peaks themselves are visible for many miles and are one of the most widely recognized landmarks in central Arizona. The rapid change in elevation produces interesting and unique plant and animal communities. Elevations range from 1,900 feet near Apache Lake to 7,600 feet on Brown's Peak.

Hellsgate Wilderness Area

Hellsgate Wilderness was designated in 1984 and contains 37,427 acres on the Payson and Pleasant Valley Ranger Districts. The Hellsgate Wilderness lies in the central mountain belt of Arizona at the base of the Mogollon Rim. Upper Tonto Creek, a perennial waterway cuts a deep incision through the center of the wilderness, creating topographic relief in the canyon up to 1,000 vertical feet. This creates deep emerald pools sometimes separated by impassable falls. The area also contains Haigler Creek with its impressive rock formations.

Mazatzal Wilderness Area

The Mazatzal Wilderness contains 247,995 acres on both the Tonto and Coconino National Forests. The Tonto National Forest portion of this wilderness area is located in the Cave Creek, Mesa, Payson, and Tonto Basin Ranger Districts. The name Mazatzal translates to "land of the deer." On the western side of the Mazatzal Wilderness, below the steep brush covered foothills, the Verde River flows through the Sonoran Desert. Elevations range from 2,060 feet along the Verde River to 7,903 feet on Mazatzal Peak. There is an extensive system of trails for primitive recreation opportunities.

Pine Mountain Wilderness Area

The 20,061-acre Pine Mountain Wilderness is managed by the Prescott National Forest. An 11,498-acre portion of the Pine Mountain Wilderness is located in the Cave Creek Ranger District on the northern boundary of the Tonto National Forest, west of the Mazatzal Wilderness area. At 6,814 feet, Pine Mountain is the highest point overlooking the Verde River. On the mountain's southeastern side, the unmistakable steep and rocky Skeleton Ridge falls toward the Verde River, which is designated as a wild and scenic river. On the rim there is an "island" of tall ponderosa pine and Douglas-fir surrounded by desert mountains and hot dry mesas covered in pinion and juniper, cut by rugged canyons. Despite scant water, wildlife abounds here on forested slopes and in the canyons, especially game animals.

Salome Wilderness Area

The Salome Wilderness, designated in 1984, contains 18,519 acres on the Pleasant Valley and Tonto Basin Ranger Districts. The area features a rugged canyon with steep slopes, outcroppings of bedrock, and precipitous bluffs. Elevations range from 2,600 feet at the lower end of Salome Creek to 6,500 feet on Hopkins Mountain. Salome Creek and Workman Creek are small, perennial streams snaking through the bottom of these scenic canyons. Spring and fall are ideal times to visit this area; however, with only four trails covering 18.5 miles, access is limited.

Salt River Canyon Wilderness Area

The Salt River Canyon Wilderness, designated in 1984, contains 32,096 acres on the Globe and Tonto Basin Ranger Districts. The Salt River bisect the wilderness for its entire length. Elevations range from 2,200 feet at the canyon's lower end to 4,200 feet on White Ledge Mountain. This area can be visited practically any time; however, there are no maintained trails within the entire wilderness. Travel is basically done by raft or kayak during the short and dangerous river-running season.

Sierra Ancha Wilderness Area

First established in 1933 as a "Primitive Area," this 20,237-acre wilderness is full of surprises. While not large in acres, this wilderness area includes precipitous box canyons, high cliffs, and pine-covered mountains. The extremely rough topography limits (and often prohibits) cross-country travel; however, there is an extensive system of trails (trail condition varies from good to poor). A wide variety of plant and animal species are found here. Species range from those found in the desert to those found at 8,000 feet.

Superstition Wilderness Area

The Superstition Wilderness was established as the Superstition Primitive Area by the Chief of the Forest Service in February 1939. It was then updated to a wilderness classification in 1940 and became a part of the wilderness preservation system with the passage of the Wilderness Act in 1964. The Arizona Wilderness Act of 1984 added 35,000 acres expanding the wilderness area to its present size and shape. The area contains 160,115 acres on the Globe, Mesa, and Tonto Basin Ranger Districts. One nationally known topographic feature within this wilderness is “Weavers Needle” a weathered volcanic plug that rises to a height of 4,553 feet. The Superstition Mountains themselves are a well-known feature that is clearly visible from the Town of Apache Junction and other areas of the East Valley.

Refer to Figure A - 1 in Appendix A. Maps for the designated wilderness areas on the Tonto National Forest.

Desired Conditions (DWMA-DC)

01 Wilderness areas provide opportunities for visitors to experience natural ecological processes with a limited amount of human influence within the untrammeled and natural qualities of wilderness character. Natural ecological processes are fully functioning with limited human intervention. Natural processes such as insect and disease and fires function in their natural ecological role.

02 The availability and use of wilderness as a public lands resource is valued by the public for its contribution to clean air and water, wildlife habitat enhancement, primitive recreation opportunities, and protection of wilderness character.

03 Wilderness areas provide opportunities where social encounters are infrequent and occur only with individuals or small groups so that there are opportunities for solitude.

04 Visitors to wilderness experience opportunities for self-reliance, challenge, and risk while enjoying freedom to pursue nonmotorized or nonmechanized recreation activities that are consistent with wilderness character.

05 The environment within a wilderness is essentially unmodified. Actions and structures that manipulate the biophysical environment are rare or nonexistent. Natural occurring scenery dominates the landscape.

06 Modern, human-made developments are rare, substantially unnoticeable, and use natural or complementary materials.

07 Wilderness areas have minimal to no nonnative invasive species. Native species that are indigenous to the wilderness area are present and supported by properly functioning habitat conditions.

08 Special use permits authorizing activities in wilderness facilitate protection, education, and/or the enjoyment of the wilderness character. These permitted activities maintain the challenging and self-reliant experience of other wilderness visitors and do not cause widespread negative impacts to wilderness character.

09 Well-marked boundaries result in wilderness areas free of motorized and mechanized intrusions.

10 Resource impacts from high use areas outside of designated wilderness are not expanding into designated wilderness.

11 Cultural, historical, and geological features of value that are unique or inherent to qualities for which the wilderness was established are recognized as features of value and part of its wilderness character.

Standards (DWMA-S)

01 Wilderness character, as identified within the Wilderness Act of 1964, and the Arizona Wilderness Act of 1984, shall be maintained or improved by all management decisions and actions in wilderness.

02 Group size limit shall be fifteen persons and fifteen head of pack or saddle animals per group, except as determined under grazing authorization, special use permit, emergency services, formal agreements, and management activities for maintaining wilderness character.

03 Outfitter and guide service opportunities are identified and authorized considering protection of wilderness character and natural resources. Authorized outfitter-guide activities in wilderness shall include appropriate wilderness practices (e.g., Leave No Trace), and incorporate awareness for wilderness values in their interaction with clients and others.

04 Nonconforming structures[92] that are no longer in use, and do not meet the desired conditions, will be removed from designated wilderness.

05 A minimum requirements analysis[93] will be completed when considering new activities and instances that will authorize non-conforming activities, including research, in designated wilderness, and any adverse effects shall be mitigated.

06 Invasive species shall be treated using allowable methods in a manner consistent with wilderness character in order to allow natural processes to predominate in designated wilderness.

Guidelines (DWMA-G)

01 Management of designated wilderness should comply with the most recent version of their respective management or implementation plans.

02 Wilderness boundaries should be clearly identified through signs at official entry points and needed locations (e.g., informal access points), and include features such as trail maps and boundary markers.

03 Unauthorized, user-created structures should be dismantled, rehabilitated, and/or removed from designated wilderness.

04 Whenever practicable, naturally occurring wildfires should be allowed to perform their natural ecological role.

05 Prescribed fire should be used to reduce unnatural buildups of fuels when necessary for the administration of the area as wilderness or where management activities could result in desirable effects of fire as a natural disturbance agent.

06 Intervention in natural processes through management actions should only occur when shown by a minimum requirements analysis that the management action is necessary to be within wilderness and should be the minimum necessary to preserve wilderness character, protect public health and safety and manage the area for the purposes identified within the Wilderness Act of 1964.

07 Areas where human activity has caused degradation to wilderness character and natural conditions should be restored,[94] making use of native vegetation or other natural materials native to the area.

08 New trail construction or existing trail realignment should be considered for purposes of enhancement and protection of wilderness character or resource protection.

[92] Nonconforming structures are facilities and improvements that are not eligible for the National Register and do not protect or enhance the wilderness character of the area.

[93] A minimum requirements analysis (MRA) is required by law whenever land managers are considering a use prohibited by Section 4(c) of the Wilderness Act of 1964.

[94] The term "restore" as defined in Forest Service Handbook 1909.12 Land Management Planning Handbook, Chapter- Zero Code is to renew by the process of restoration.

09 Existing trails or new trails constructed or designated in wilderness should be designed, built, and maintained as minimally to moderately developed (trail classes 1 or 2)[95] except where needed to protect resources.

10 Maintenance and design of trails should be done in a sustainable manner to maintain wilderness character, provide primitive recreation opportunities, protect resources, and minimize impacts on wilderness.

Management Approaches for Designated Wilderness (DWMA-MA)

01 Establish a wilderness character baseline and monitor wilderness character for each wilderness based upon the most recent wilderness character monitoring protocol recognized by agency policy. When monitoring shows degradation of wilderness character, consider management actions to preserve and improve wilderness character (e.g., providing public information about periods of lower visitation, implementing a permitting system, site restoration, public education).

02 Consider assigning a wilderness resource advisor, or wilderness specialist in absence of an available resource advisor, to fires within wilderness areas, fires with the potential to enter wilderness areas, or fires potentially affecting the character of an adjacent wilderness area that are not suppressed during initial attack.

03 Evaluate trails for their need to achieve wilderness management objectives, and for their impact on wilderness character to inform decisions to decommission unused trails or to realign/reconstruct needed trails. Priorities for trail reconstruction are to be based on potential for impacts to wilderness character and recreation opportunities, resource protection, and the trails which receive the greatest use. The Forest will regularly publish up-to-date trail maps for all wildernesses, in a variety of formats, including digital.

04 Consider management of motorized and mechanized transportation intrusions into wilderness areas through methods such as wilderness ranger patrols, placement of bike racks near wilderness boundaries, signs, trail design, and expanded opportunities outside of the wilderness. Where violations of group size or length of stay limits are commonly observed, increasing staffing presence should be considered to enhance education or enforcement efforts to address observed violations.

05 Seek out opportunities and collaborate with stakeholders, local partners, volunteers, Adopt-a-Trail organizations, and other organizations for wilderness stewardship, including trail maintenance and construction. Collaborate with stakeholders to build a volunteer base for wilderness stewardship, including recruiting and training volunteer wilderness rangers. Expand partnerships to increase awareness of wilderness values and etiquette and provide residents who live near wilderness with information to increase awareness and understanding of wilderness. Pursue opportunities to collaborate with neighboring forests and agencies on the management of

[95] Defined in the Forest Service Trail Class Matrix.

adjacent and designated wilderness and similarly managed areas to ensure management is as consistent as possible.

06 Coordinate with the Arizona Game and Fish Department and other partners on management of native species within wilderness to maintain and enhance wilderness character during project implementation.

07 Use an education plan to identify and implement wilderness education and interpretation activities outside of wilderness boundaries.

08 Utilize the most recent version of the individual wilderness implementation plans to protect the wilderness characteristics for which they are designated. The following wilderness implementation plans, as amended, and any future versions are incorporated by reference and are part of the plan:

a. Cedar Bench Wilderness Implementation Plan (USDA Forest Service 1995)
b. Four Peaks Wilderness Implementation Plan (USDA Forest Service 1998a)
c. Hellsgate Wilderness Implementation Plan (USDA Forest Service 1993a)
d. Mazatzal Wilderness Implementation Plan (USDA Forest Service 1985a)
e. Pine Mountain Wilderness Implementation Plan (USDA Forest Service 1993b)
f. Salome Wilderness Implementation Plan (USDA Forest Service 1985b)
g. Salt River Canyon Wilderness Implementation Plan (USDA Forest Service 1985c)
h. Sierra Ancha Wilderness Implementation Plan (USDA Forest Service 1998b)
i. Superstition Wilderness Implementation Plan (USDA Forest Service 1998c)

Recommended Wilderness (RWMA)

Recommended wilderness areas are lands recommended for wilderness designation and are suitable for inclusion in the National Wilderness Preservation System, as defined in the 1964 Wilderness Act. The intent of this management area is to provide direction that would retain or improve the wilderness characteristics of recommended wilderness areas if and until they are considered for designation by Congress. The recommendation is a preliminary administrative recommendation that will receive further review and possible modification by the Chief of the Forest Service, the Secretary of Agriculture, and the President of the United States. The plan direction below will be applied to recommended wilderness areas until such time as the area is designated or rejected as wilderness by Congress.

The Tonto has five recommended wilderness areas totaling 106,204 acres.

Gun Creek Recommended Wilderness Area

Gun Creek Recommended Wilderness Area is located on the Pleasant Valley Ranger District, below the Hellsgate Wilderness. This 23,296-acre area can be characterized by areas of steep ridges and deep canyons, including Coffee Pot Canyon and North Fork Brady Canyon. The elevation in this area ranges from 3,800 to 6,300 feet. The area is remote and unconfined, increasing the opportunities to find solitude and participate in high quality primitive recreation opportunities.

Boulder Recommended Wilderness Area

Located in Maricopa and Gila counties on the Tonto Basin Ranger District, the Boulder Recommended Wilderness Area is a rugged 61,590-acre section of the Basin and Range province of the Upper Sonoran Desert. Topographically, this area is dominated by the crest of the Mazatzal Mountains, which run northwest to southeast within this area. Elevations range in this area from 2,105 to 6,295 feet with the two highest peaks being Pine Mountain and Boulder Mountain. The area provides high quality hiking, hunting and horseback riding opportunities and visitors have the ability to find solitude through most of the area.

Coronado Mesa Recommended Wilderness Area

Located in Maricopa County on the Mesa Ranger District, Coronado Mesa Recommended Wilderness Area is a 6,419-acre area geologically tied to the Superstition Mountain Range at its northern most extension and is located within the superior volcanic field. This area is dominated by two natural features: Horse Mesa and the Fish Creek Canyon. Horse Mesa is a high, very inaccessible bench over 8 miles in length. Sheer cliffs and deep canyons completely surround the Mesa, some forming the northern boundary. Fish Creek Canyon is a spectacular canyon that flows north out of the Superstition Wilderness, characterized by its vertical walls and boulder covered bottom. At its deepest point within this area, it is nearly 2,000 feet deep.

Red Creek Recommended Wilderness Area

Red Creek Recommended Wilderness Area is located approximately 55 miles from downtown phoenix, just west of the Mazatzal Wilderness on the Cave Creek Ranger District. The area has a fair amount of topographic relief across its 11,340 acres, with elevations ranging from 2,315 to 4,820 feet. Within this area there are canyons, river basins, rocky hillsides, grassy ridgetops, and flat volcanic mesas, where it is common for visitors to have a significant feeling of being alone or remote from civilization. Red Creek itself is a Red a scenic perennial stream in the desert which supports riparian habitat and native fish.

Mullen Mesa Recommended Wilderness Area

Mullen Mesa is a long, skinny 3,559-acre area is located approximately 55 miles from downtown Phoenix, just west of the Mazatzal Wilderness on the Cave Creek Ranger District. The area has a fair amount of topographic relief with elevations ranging from 2,120 to 2,735 feet. Within this area there are canyons, river basins, rocky hillsides, grassy ridgetops, and flat volcanic mesas that allow for abundant opportunities to engage in primitive and unconfined recreation.

See Figure A - 2 in Appendix A. Maps for the recommended wilderness areas on the Tonto National Forest.

Desired Conditions (RWMA-DC)

01 The ecological and social characteristics that provide the basis for wilderness recommendation are protected.

02 Recommended wilderness areas are valued by the public and contribute to clean air and water, wildlife habitat enhancement, primitive recreation opportunities, and other cultural ecosystem services.

03 Recommended wilderness areas provide opportunities for visitors to experience natural ecological processes with limited human influence.

04 Improvements are rare and composed of complimentary materials. They are present when needed to provide for public safety, valid existing rights, or resource protection and are not substantially noticeable.

05 Authorized special uses maintain wilderness characteristics of solitude and primitive and unconfined recreation.

06 Recommended wilderness areas provide recreation opportunities, where social encounters are infrequent. Visitors experience self-reliance, challenge, and risk, while participating in recreational activities.

07 Mechanized recreation (e.g., mountain biking, hang gliding) occurs at levels that do not detract from or degrade wilderness characteristics.

Standards (RWMA-S)

01 New permanent or temporary roads, motorized trails, or mechanized trails for public access shall not be constructed or designated in a recommended wilderness area.

02 Management activities shall not permanently degrade the wilderness characteristics of the recommended wilderness area.

03 New energy developments or authorizations shall not be permitted within recommended wilderness areas.

04 Sales or extraction of salablel materials[96] shall not be permitted in recommended wilderness areas.

05 Invasive species shall be treated using allowable methods in a manner consistent with wilderness characteristics in order to allow natural processes to predominate in recommended wilderness.

Guidelines (RWMA-G)

01 Motorized vehicle use should not be authorized in a recommended wilderness area unless specifically authorized for emergency use, resource management, maintenance of authorized improvements, or for the motorized retrieval of legally harvested big game[97].

02 Mechanized uses for management activities (e.g., chainsaws, wheelbarrows) should be allowed in recommended wilderness areas.

03 Interventions in natural processes through management actions (e.g., fire management, active weed management) should move the area towards natural resource desired conditions.

04 Management activities, including transplanting (e.g., removal, reintroduction, or supplemental introduction) fish and wildlife species, should be permitted to use motorized and mechanical means (e.g., helicopter landings) where necessary, to perpetuate or recover a threatened or endangered species, to restore the population of an indigenous species, or to manage fish and wildlife populations.

05 Wildland fire in recommended wilderness areas should be managed in a manner that would reduce the risk of undesirable fire behavior and effects, increase apparent naturalness, or enhance ecosystem function.

06 Existing structures necessary for administration, valid existing rights, and authorized uses within the area should be maintained but not expanded, unless necessary for public health and safety, resource protection, or viability of valid existing rights and authorized uses.

[96]Salable materials/mineral materials/common variety minerals, are synonymous terms for the same class of minerals that can be sold under a mineral material contract, and are common. These minerals are relatively low value per volume, for example: sand, gravel, cinders, common building stone, and flagstone.

[97] Motorized retrieval of legally harvested big game, or motorized big game retrieval, is defined in Travel Management as motor vehicle use solely for retrieving legally harvested elk and bear up to 1 mile on both sides of all designated roads and motorized trails.

07 Maintenance of existing structures within recommended wilderness areas should be carried out in a manner that does not permanently expand evidence of the improvement beyond current condition.

08 New permanent improvements should not be authorized in recommended wilderness areas unless necessary for public health and safety, resource protection, or viability of valid existing rights and authorized uses.

09 Developed recreation facilities (e.g., picnic tables, vault toilets, and fire grills) should not be installed in recommended wilderness areas.

10 Management activities in recommended wilderness areas should meet scenic integrity objectives of high or very high in the long term, as defined in the Scenery Management System or similar protocol.

Management Approaches for Recommended Wilderness Management Areas (RWMA-MA)

01 Work with partners and volunteer groups to manage and maintain wilderness characteristics in recommended wilderness areas and to facilitate user support and reduce user conflicts.

02 Develop educational materials about recommended wilderness areas that encourage widespread and common understanding of the values, philosophy, resources, and benefits of wilderness characteristics.

Designated Wild and Scenic Rivers (DWSRMA)

In 1968, Congress passed the Wild and Scenic Rivers Act[98] to preserve the beauty and free-flowing nature of some of the most precious waterways in America. To be designated, rivers or sections of rivers must be free-flowing and possess at least one outstandingly remarkable value, such as scenic, recreational, geologic, fish, wildlife, historic, cultural, or other features identified under the Act. Wild and scenic rivers are congressionally designated.

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). Both designated Wild and Scenic Rivers are jointly managed with neighboring forests. The Coconino National Forest is the lead manager for Fossil Creek and the Prescott National Forest is the lead manager for the Verde River.

Wild and scenic rivers are meant to preserve outstanding free-flowing rivers to be protected for the benefit and enjoyment of present and future generations. Wild and scenic rivers are congressionally designated.

See Figure A - 3 in Appendix A. Maps for the designated wild and scenic rivers on the Tonto National Forest.

Desired Conditions (DWSRMA-DC)

01 The outstandingly remarkable values, free-flowing condition, and classification of designated wild and scenic river corridors[99] are preserved.

02 The user experience, including the level of development and improvements along the river corridor, is consistent with the river's classification.

03 Designated wild and scenic river segments and their corridors are protected for the benefit and enjoyment of present and future generations.

04 Management activities along the river corridor of designated wild and scenic river segments protect or enhance the river segment's outstandingly remarkable values and are consistent with the river segment's classification.

05 Permitted uses within the river corridor protect and enhance the river segment's outstandingly remarkable values and are consistent with the river segment's classification.

06 Visitors appreciate wild and scenic rivers and understand their role in protecting river values.

[98] For more information about the 1968 Wild and Scenic Rivers Act, go to https://www.rivers.gov/about

[99] The river corridor for management of designated wild and scenic rivers are outlined within the respective comprehensive river management plan.

Standards (DWSRMA-S)

01 The free-flowing condition, classification, and outstandingly remarkable values for wild and scenic river corridors shall be maintained when implementing projects.

02 Sales or extraction of mineral materials shall not be authorized in wild and scenic rivers.

Guidelines (DWSRMA-G)

01 Recreation and other activities in designated river corridors should occur at appropriate locations and capacities to protect or enhance the free-flowing condition and the outstandingly remarkable values, while remaining consistent with the classification.

02 Management activities should be consistent with the recreation opportunity spectrum class of:

a. primitive to semiprimitive nonmotorized in wild rivers

b. semiprimitive nonmotorized to semiprimitive motorized in scenic rivers

c. semiprimitive motorized to roaded natural in recreational rivers.

Management Approaches for Designated Wild and Scenic Rivers (DWSRMA-MA)

01 Utilize the most recent version of the individual comprehensive river management plans to protect outstandingly remarkable values and classification. The following comprehensive river management plans and any future versions are incorporated by reference and are part of the plan:

a. Fossil Creek Wild and Scenic River Comprehensive River Management Plan (USDA Forest Service 2021)

b. Verde Wild and Scenic River Comprehensive River Management Plan (USDA Forest Service 2004)

02 Work cooperatively with the Coconino and Prescott National Forests to administer and track authorized activities within the designated wild and scenic river segments of the Verde River and Fossil Creek.

03 Develop educational materials and interpretation of wild and scenic rivers that encourage widespread and common understanding of the values, philosophy, resources, and benefits of wild and scenic rivers.

04 Work with partners to increase stewardship, ecological awareness, and volunteerism on designated wild and scenic rivers.

05 Encourage multijurisdictional coordination on the management and monitoring of conditions within the stream corridors of designated wild and scenic rivers where management actions upstream or downstream may have impacts.

06 Work with the Arizona Game and Fish Department to address habitat and other conservation needs of state priority species on designated wild and scenic rivers.

Eligible Wild and Scenic Rivers (EWSR MA)

In the Tonto National Forest, all rivers were evaluated to determine their eligibility for inclusion in the National Wild and Scenic Rivers System[100]. Eligible wild and scenic rivers meet the basic criteria for inclusion in the National Wild and Scenic Rivers System. They are free-flowing and possess at least one value that is outstandingly remarkable regionally or nationally. The Tonto has nineteen river segments with outstandingly remarkable values[101] totaling approximately 188 miles (table 18). Each river is assigned a classification of wild, scenic, or recreational, based on the free-flowing condition and current development level in and around the river. There are approximately 66 miles classified as wild, 83 miles classified as scenic, and 40 miles classified as recreational.

Table 18. Eligible wild and scenic rivers with their classifications and outstandingly remarkable values

Stream Name	Ranger District	Segment Length (miles)	Classification	Outstandingly Remarkable Values
Arnett Creek/ Telegraph Canyon	Globe	3.5	Recreational	Scenery, Natural
Canyon Creek	Pleasant Valley	7.2	Recreational	Wildlife
Christopher Creek	Payson	2.3	Recreational	Recreation
Cold Spring Canyon	Pleasant Valley	1.7	Wild	Natural
Devil's Chasm	Pleasant Valley	2.5	Wild	Historic
East Verde River	Payson	32.7	Scenic, Recreational	Scenery
Fish Creek	Mesa	5.7	Wild, Scenic	Natural
Greenback Creek	Pleasant Valley, Tonto Basin	5.1	Scenic	Historic
Lower Tonto Creek	Tonto Basin	3.2	Scenic	Recreation
Pine Creek	Payson	2	Recreational	Geologic
Pueblo Canyon	Pleasant Valley	1.7	Wild	Scenery, Historic
Reno Creek	Tonto Basin	3.6	Scenic	Historic
Salome Creek	Pleasant Valley, Tonto Basin	8.5	Wild	Recreation, Scenery
Ledni Líí Creek	Cave Creek	5.2	Scenic	Historic
Tangle Creek	Cave Creek	9.5	Scenic, Recreational	Natural, Scenery
Upper Salt River	Tonto Basin, Globe	59.4	Wild, Scenic	Geologic, Recreation, Historic, Scenery

[100] For more information about this eligibility study and a list of all segments considered see https://www.fs.usda.gov/detailfull/tonto/landmanagement/planning/?cid=fseprd594556&width=full.

[101] A scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar river-related value that is unique, rare, or exemplary feature and is significant when compared with similar values from other rivers at a regional or national scale.

Stream Name	Ranger District	Segment Length (miles)	Classification	Outstandingly Remarkable Values
Upper Tonto Creek	Payson	21.7	Scenic	Recreation, Scenery, Wildlife, Historic
Verde River	Cave Creek	10	Wild, Scenic	Fisheries, Wildlife, Recreation, Historic
Workman Creek	Pleasant Valley	2.3	Recreational	Natural, Scenery

The Forest is required to manage agency-identified eligible wild and scenic river segments to retain their eligibility status until a suitability determination has been made whether or not to recommend them for inclusion in the National Wild and Scenic Rivers System. The Tonto National Forest may authorize projects and activities in eligible rivers or the surrounding river corridor[102] so long as they preserve the free-flowing[103] condition of the river, protect the outstandingly remarkable values that provide the basis of the river's eligibility for inclusion in the system, and do not affect the classification of the river segment. In some cases, free-flow may be positively affected when instream structures promote more natural levels of river processes (e.g., bank erosion, channel shifting, groundwater infiltration, floodplain development) and bed load or debris movement. In the case a project may negatively impact the free-flow characteristics, a suitability study must analyze the effects of designation to other resource values, identify issues, and explore alternatives for protecting river values.

See Figure A - 4 in Appendix A. Maps for the eligible wild and scenic rivers on the Tonto National Forest.

Desired Conditions (EWSRMA-DC)

01 The existing outstandingly remarkable values, free-flowing condition, and classifications of eligible wild and scenic river corridors are protected or enhanced.

02 The user experience, including the level of development and improvements along the river corridor, is consistent with the river's classification.

03 Eligible river segments and their corridors are protected for the benefit and enjoyment of present and future generations.

04 Management activities along the river corridor of eligible segments protect or enhance the river segment's outstandingly remarkable values and classification that provide the basis of the river's eligibility for inclusion in the system.

[102] The management corridor for eligible wild and scenic rivers includes National Forest System land generally encompassed within one-quarter mile of the river banks ordinary high water mark on either side of a river studied for eligibility or suitability that contains the river and its outstandingly remarkable values (Forest Service Manual 1909.12, chapter 80, section.5).

[103] Flowing in a natural condition without impoundment, diversion, straightening, riprapping, or other modification of the waterway.

05 Visitors appreciate eligible wild and scenic rivers and understand their role in protecting eligible wild and scenic river values.

Standards (EWSRMA-S)

01 The free-flowing condition, classification, and outstandingly remarkable values for eligible wild and scenic river corridors shall be maintained when implementing projects.

02 Activities in an eligible river corridor shall comply with interim protective measures outlined in Forest Service Handbook 1909.12, 84.3, or the most current version.

03 Sales or extraction of mineral materials shall not be authorized in eligible wild and scenic rivers.

Guidelines (EWSRMA-G)

01 Recreation activities in eligible rivers and associated corridors should occur at appropriate locations and capacities to protect or enhance the free-flowing condition and the outstandingly remarkable values, while remaining consistent with the classification.

02 New roads or motorized trails should not be constructed within the river corridor of a river segment with a wild classification.

03 Management activities should be consistent with the recreation opportunity spectrum class of:

a. primitive to semiprimitive nonmotorized in eligible wild rivers
b. semiprimitive nonmotorized to semiprimitive motorized in eligible scenic rivers
c. semiprimitive motorized to roaded natural in eligible recreational rivers.

Management Approaches for Eligible Wild and Scenic Rivers (EWSRMA-MA)

01 Develop educational materials about eligible wild and scenic rivers that encourage widespread and common understanding of the values, philosophy, resources, and benefits of wild and scenic rivers.

02 Work with partners to increase stewardship, ecological awareness, and volunteerism on eligible wild and scenic rivers.

03 Encourage multijurisdictional coordination on the management and monitoring of conditions within the stream corridors of eligible wild and scenic rivers where management actions upstream or downstream may impact eligibility.

04 Opportunities for enhancing outstandingly remarkable values may be considered in project management activities within an eligible wild and scenic river corridor.

05 Work with the Arizona Game and Fish Department to address habitat and other conservation needs of state priority species on eligible wild and scenic rivers.

Designated and Recommended Research Natural Areas and Botanical Areas (RNBAMA)

Management direction for both botanical areas and research natural areas (RNAs) were combined because there is direction applicable to both kinds of special areas (e.g., desired conditions that biological processes are maintained). Some plan components only apply to botanical areas (recommended and designated), research natural areas (recommended and designated), or both – each plan component specifically states the type of special areas the direction applies to.

Designated research natural areas and botanical areas are managed to maintain or enhance the characteristics in which they are designated. Recommended research natural areas and recommended botanical areas are similarly managed to maintain or enhance the unique characteristics they possess for subsequent designation following a separate National Environmental Policy Act process.[104] Research natural areas 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. Research natural areas are principally for non-manipulative research, observation, and study. Any research natural areas within existing wilderness are managed in accordance with agency policy on retaining wilderness character. A botanical area is an area that contains plant specimens, plant groups, or plant communities that are significant because of their form, color, occurrence, habitat, location, life history, arrangement, ecology, rarity, or other features.

There are three designated research natural areas on the Tonto National Forest: Buckhorn Mountain, Bush Highway, and Haufer Wash. There are four recommended research natural areas: Dutchwoman Butte, Picket Post Mountain, Three Bar, and Upper Forks Parker Creek. There are four recommended botanical areas: Mesquite Wash, Horseshoe, Fossil Springs, and Little Green Valley Fen (table 19 and Figure A - 5 in Appendix A. Maps for more information).

Table 19. Designated and recommended research natural areas and botanical areas on the Tonto National Forest

Area Name	Classification	Acres	Ranger District
Buckhorn Mountain	Designated Research National Area	2,801	Tonto Basin
Bush Highway	Designated Research National Area	516	Mesa
Dutchwoman Butte	Recommended Research Natural Area	86	Tonto Basin
Fossil Springs	Recommended Botanical Areas	9	Payson
Haufer Wash	Designated Research National Area	751	Tonto Basin
Horseshoe	Recommended Botanical Areas	3,590	Cave Creek
Little Green Valley Fen	Recommended Botanical Areas	21	Payson
Mesquite Wash	Recommended Botanical Areas	10	Mesa
Picket Post Mountain	Recommended Research National Area	1,261	Globe

[104] All recommended areas are management areas until a separate National Environmental Policy Act process is completed for formal designation.

Area Name	Classification	Acres	Ranger District
Three Bar	Recommended Research National Area	22,920	Tonto Basin
Upper Forks Parker Creek	Recommended Research National Area	1,441	Pleasant Valley

Buckhorn Mountain Designated Research Natural Areas

Buckhorn Mountain Research Natural area lies in the vicinity of Four Peaks in the southern portion of the Mazatzal Mountains in the Tonto Basin Ranger District. Approximately two-thirds of the research area is within Four Peaks Wilderness area (see the "Designated Wilderness" section for additional plan direction). Lands around Buckhorn Mountain in the Four Peaks vicinity of the Mazatzal Mountains are extensively mantled by dense Arizona chaparral vegetation. A variety of chaparral plant associations exists on the steep, rugged topography of the northeasterly trending drainages of Buckhorn Mountain. This research area was established to provide a minimally disturbed example of Arizona chaparral. Two watersheds (Baldy Canyon and upper Buckhorn Creek) are present in the area and in the event of fire, it is improbable that both watersheds would be equally burned, and thus researchers and managers would have a good opportunity to study fire succession and fire physiology of different chaparral species. The area also serves as an unmanipulated baseline to compare against grassland conversion experiments (prescribed fire) conducted just outside the research natural area.

Bush Highway Designated Research Natural Area

The Bush Highway Research Natural Area is located in the Mesa Ranger District, approximately 1.5 miles north of Saguaro Lake on the Salt River. The old Bush Highway traverses the west side of the area. The research natural area is typical of the palo verde-cactus shrub type. The research natural area represents a benchmark example of the Sonoran Desert ecosystem at the warmer end of the climate gradient (hyperthermic) and serves as a baseline reference area. The area also compliments the recommended Picket Post Mountain research natural area that represents the Sonoran Desert ecosystem at different climate regime (thermic; not as warm as hyperthermic).

Dutchwoman Butte Recommended Research Natural Area

The Dutchwoman Butte recommended research natural area is located in the Tonto Basin Ranger District, seven miles north of Roosevelt Arizona. The 86-acre area is an isolated butte that contains a relict semi-desert grassland community that has not been grazed by domestic livestock, largely due to the steep topography. The vegetation has elements of higher elevation woodlands (e.g., the presence of turbinella oak) but is predominately more similar to that of semi-arid grasslands with a climate at the extreme cool/moist end of the semi-arid grassland gradient. The area serves as a valuable reference area in that it represents one of the very few semi-arid grasslands that have not been impacted by domestic livestock grazing and it can be used to assess the impacts that have occurred on managed sites with similar ecosystems.

Fossil Springs Recommended Botanical Area

The recommended Fossil Springs Botanical Area is located in the Payson Ranger District. The area serves as a benchmark example of a rare spring ecosystem in Arizona – one with a highly diverse

riparian deciduous forest, a large and complex spring system, and travertine geology. The springs in Fossil Creek are situated in the bottom of a wide, deep canyon. The springs are responsible for the formation of extensive travertine beds about one mile long and on-half mile wide. The springs issue from Redwall limestone and as a result contain moderate amounts of dissolved solids, primarily calcium, magnesium, and bicarbonate. The springs and these geologic features produce the "fossilized" appearance of debris that collects at the bottom of the stream bed. The floral diversity is high due to the combination of water, elevation and both north and south facing slopes. The vegetation changes markedly from pine forest to more xeric, lower elevation species as one descends into Fossil Creek Canyon. Luxurious, dense growth of riparian plants are found in the immediate area of the springs. A dense understory of annual and perennial plant species is found throughout the area – over two feet tall in some places. The stream, riparian area, and vegetation also support a high diversity of aquatic and wildlife species.

Haufer Wash Designated Research Natural Area

The Haufer Wash Research Natural Area is located 3.5 miles north of Punkin Center and adjacent to SR 188 in the Tonto Basin Ranger District. The area has important benchmark value because it contains semi-desert grassland and desert scrub vegetation following a half-century of recovery after livestock exclusion. The area was originally established as a range exclusion in the 1930s. The vegetation, soil, landform, and climate of the area is representative of thousands of acres with ongoing livestock management within Tonto Basin, as well as adjacent allotments.

Horseshoe Recommended Botanical Area

The recommended Horseshoe Botanical Area is located in the Cave Creek Ranger District. The recommended Horseshoe botanical area includes limestone outcrops within the Larrea tridentata-Canotia holacantha (creosote and crucifixion thorn) association of the Paloverde-Mixed cactus series (Brown 1982). The boundary for the botanical area was delineated to capture the major limestone outcrops and portions of the surrounding creosote-crucifixion association located along Horseshoe Lake in the Cave Creek ranger district. There are two subareas – one located at the southwest side of Horseshoe Lake just west of Horseshoe Recreation area, and the other subarea is located at the north and northeast side of the lake. The differences in soils and soil chemistry in the area produce striking differences in species composition. The limestone outcrops harbor a number of rare, endemic, sensitive, and at-risk plant species including the Arizona cliffrose. The only known occurrences of Ripley's wild buckwheat, and Rusby's milkwort on the forest are located in this area and they both are northern-region species (from the Colorado Plateau) that are disjunct in the Sonoran Desert (that is, uncommon in the Sonoran desert). The horseshoe deer vetch is only found in this area and at the Verde Valley botanical area on the Coconino National Forest. For these reasons, the area has high research value and botanical value. The area and management also provide excellent educational opportunities (e.g., university botany fieldtrips and rare plant citizen science projects) and contributes to the management of viable populations of at-risk species.

Little Green Valley Fen Recommended Botanical Area

The Recommended Little Green Valley Fen Botanical Area is located in the Payson Ranger District. The recommended Little Green Valley Fen botanical area serves as a benchmark example of a rare and sensitive wetland meadow with peat soils that are rare in Arizona. Additionally, the alternating layers of peat and gravel (observed in the headcut) reveal the evolutionary sequence of landform processes which has allowed researchers to reconstruct past climate, vegetation, and disturbances. The boundary was delineated to capture the wetland meadow and portions of Green Valley creek. This area includes the wetland and southern portion of Green Valley Creek where the tributary enters the creek from the southeast. The meadow is about one quarter mile wide but narrows down to a small outlet of less than 100 feet at the southwestern end where Green Valley Creek leaves the meadow. The lower end of the meadow is constantly wet at the lower end and drier at the upper end. The organic layer is about seven meters thick at the outlet end of the fen. The meadow supports a diversity of grasses, sedges, and wetland herbaceous species. The surrounding vegetation is ponderosa pine oak forest with scattered occurrences of pinyon and juniper.

Mesquite Wash Recommended Botanical Area

The recommended Mesquite Wash Botanical area is located along Sycamore Creek in the Mesa Ranger District. The recommended Mesquite Wash botanical area is a unique desert riparian area within Sycamore Creek – rare on the Forest and within the State. The boundary was delineated to capture the riparian area, mesquite stands along the northern side of the creek (bounded by the existing pipe rail), and portions of the southern side of the creek where the riparian area transitions into desert scrub. The western extent ends where the channel becomes intermittent along Sycamore Creek. Arizona Walnut and willows are abundant along the channel with mesquite occupying the terraces and upper banks. The more or less permanent water source and spring at Mesquite Wash produce a striking level of plant diversity and a stark difference to the surrounding vegetation outside the riparian area. There are also many important birds, other wildlife, and aquatic species in the area. There is high public interest in the area for its botanical values and the area is regularly visited by botany students, botanists, researchers, and recreationists.

Picket Post Mountain Recommended Research Natural Area

The recommended Picket Post Mountain Research Natural Area, located in the Globe Ranger District, contains excellent examples of the Sonoran Desert in many of its varied plant community associations on foothill and piedmont topography. The eastern piedmont, bounded by cliffs along Telegraph Canyon and Arnett Creek, represents the Sonoran Desert on gentle upland slopes. Stretches of Arnett Creek are included in the area and have perennial flow that supports a riparian gallery forest (which is rare in the State and on the Forest). The varied topography and soils around Picket Post Mountain display a number of unique plant communities within a small area and also represents the limiting cold temperature boundary of the Saguaro cactus distribution. Arnett Creek and the adjacent uplands serve as excellent benchmark examples for Sonoran Desert plant communities and deciduous riparian forests. The area also serves as an important gene pool for Sonoran flora (especially cacti) and fauna,

and as a control to study the effects of grazing management (at areas excluded from livestock grazing).

Three Bar Recommended Research Natural Area

The Three Bar recommended research natural area is located in the Tonto Basin Ranger District. The 22,920-acre area abuts the Buckhorn Mountain Research Natural Area and the Four Peaks Wilderness area to the west and extends about 5 miles to the east towards Roosevelt Lake. The terrain consists mostly of steep slopes and rocky ravines and the dominant ecological response units (ecosystem types) include Interior Chaparral, Sonoran Paloverde Mixed Cactus Scrub, Semi-desert Grassland, and some inclusions of deciduous riparian woodlands (mainly Arizona Sycamore – Fremont Cottonwood). The area has been ungrazed by livestock since the 1940s. The area has high research value and interest from the public. There have been a number of past and ongoing wildlife studies and research in the area. Additionally, the area serves as a valuable reference area in that it contains a variety of ecosystem types that have been ungrazed and can be used to assess the impacts that have occurred on managed sites with similar ecosystems.

Upper Forks Parker Creek Recommended Research Natural Area

The recommended Upper Forks Parker Creek Research Natural Area is located in the Pleasant Valley Ranger District. The recommended Upper Forks Parker Creek research natural area contains excellent examples of canyon bottom forests consisting of mixed broad-leaf riparian forests – ranging from sycamore-walnut-Arizona alder forests near the headquarters to white fir-big-toothed maple forests at higher elevations. Riparian vegetation is present along both upper and lower forks within chaparral and mixed conifer forests on canyon side slopes and summits. The absence of Arizona cypress from the canyon above the headquarters makes this area unique compared to other mixed broad-leaf canyon bottom riparian forests typically found below the Mogollon rim (such as what is commonly found on the Coronado National Forest). There is a long record of research in and around the area and opportunities for continued study or educational use are available in a wide range of biological and environmental fields.

Refer to Figure A - 5 in Appendix A. Maps for more information of the designated and recommended research natural areas and botanical areas on the Tonto National Forest.

Desired Conditions (RNBAMA-DC)

01 Designated and recommended research natural areas have excellent examples of the ecological features for which they were designated. 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.

02 Genetic diversity of plants and animals and ecological integrity is preserved and maintained in designated and recommended research natural areas and botanical areas.

03 The unique characteristics (e.g., soils, geology, and microhabitat) of designated and recommended research natural areas and botanical areas are protected and maintained. The inherent physical and biological processes are sustained and are not negatively impacted from human activities or authorized uses.

04 Designated and recommended research natural areas function as reference areas to study natural ecological processes and as baseline areas for measuring long-term ecological change.

05 Visitor access and use occurs at levels that maintain the research, education, and biodiversity values of designated and recommended research natural areas and botanical areas.

06 Recreation uses and livestock grazing do not impair or degrade (high departure from reference conditions; measured by site potential, Terrestrial Ecological Unit Inventory data or other suitable dataset) the ecology and unique plant communities within designated and recommended research natural areas and botanical areas.

07 Designated and recommended botanical areas support narrowly restricted species, at-risk species, and important plant communities in the area and provide opportunities for education and research.

Objective (RNBAMA-O)

01 Within one year of plan approval, complete closure of overnight camping and recreation campfire in designated or recommended botanical areas.

Standards (RNBAMA-S)

01 Sales or extraction of mineral materials shall not be authorized in designated or recommended research natural areas and botanical areas.

02 Logging or fuelwood gathering activities are not permitted in designated or recommended research natural areas and botanical areas, unless required for restoration of an area to natural conditions.

03 Livestock grazing will not be authorized in recommended or designated research natural areas or recommended or designated botanical areas.

Guidelines (RNBAMA-G)

01 In designated or recommended research natural areas and botanical areas, fire management activities should be designed and implemented to mimic the natural fire regime, and/or move the burned area towards desired conditions and should be compatible with ongoing research. Multiple entry burns and strategic planning may be required to establish a more natural fire regime.

02 New roads or trails (motorized or nonmotorized) should not be located in designated or recommended research natural areas and botanical areas, except as needed for resource protection.

03 Wildland fire should be managed to protect the resources for which research natural areas and botanical areas are designated or recommended.

04 Special use authorizations should be designed and implemented to retain the values for which the research natural areas and botanical areas are designated or recommended.

Management Approaches for Designated and Recommended Research Natural Areas and Botanical Areas (RNBAMA-MA)

01 Collaborate with appropriate agencies, partners, and universities regarding scientific opportunities in designated or recommended research natural areas and botanical areas and to help educate the public about the purpose and use of special areas.

02 Refer to establishment records for research natural areas for detailed information on physical site description, ecological description, and objectives.

03 Work with partners to develop citizen science programs to conduct rare plant surveys and botanical inventories of areas.

04 Add signs and consider fencing boundaries where needed to educate the public.

05 Assess areas that need additional protection measures, such as fencing or installing pipe rail to reduce resource damage.

06 Work with partners, stakeholders, and interested parties to ensure that overnight camping, recreation campfires, and recreational shooting are not impacting research in designated and proposed research natural areas.

Inventoried Roadless Areas (IRAMA)

The Tonto National Forest manages thirteen inventoried roadless areas (IRAs), totaling about 170,108 acres (table 20 and Figure A - 6 in Appendix A. Maps). Inventoried roadless areas 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.

Table 20, Inventoried roadless areas on the Tonto National Forest

Area Name	Ranger District	Acres
Arnold Mesa	Cave Creek	248
Black Cross	Mesa	5,962
Boulder	Mesa and Tonto Basin	40,328
Cherry Creek	Pleasant Valley	11,362
Goldfield	Mesa	15,245
Hellsgate	Payson	6,166
Horse Mesa	Mesa and Tonto Basin	9,139
Lime Creek	Cave Creek	42,539
Mazatzal	Cave Creek and Payson	16,930
Picacho	Globe	4,965
Pine Mountain Wilderness Contiguous	Cave Creek	6,514
Salome	Tonto Basin	2,929
Sierra Ancha Wilderness Contiguous	Pleasant Valley and Tonto Basin	7,781

Desired Conditions (IRAMA-DC)

01 The roadless characteristics[105] of inventoried roadless areas are sustained and conserved.

02 Inventoried roadless areas serve as safeguards against the spread of invasive species.

03 Inventoried roadless areas provide reference areas for study and research.

[105] Roadless area characteristics are defined in the 2001 Roadless Rule as: (1) High quality or undisturbed soil, water, and air; (2) Sources of public drinking water; (3) Diversity of plant and animal communities; (4) Habitat for threatened, endangered, proposed, candidate, and at-risk species and for those species dependent on large, undisturbed areas of land; (5) Primitive, semiprimitive non-motorized, and semiprimitive motorized classes of dispersed recreation; (6) Reference landscapes; (7) Natural appearing landscapes with high scenic quality; (8) Traditional cultural properties and sacred sites; and (9) Other locally identified unique characteristics (36 CFR 294.11).

04 Inventoried roadless areas appear natural, have high scenic quality, and provide opportunities for dispersed recreation.

Standards (IRAMA-S)

01 Management activities shall maintain or improve the roadless area characteristics of the inventoried roadless area.

02 A road shall not be constructed or reconstructed in an inventoried roadless area, unless the responsible official determines that a road is needed according to the circumstances allowed in the Roadless Rule.

03 Timber shall not be cut, sold, or removed from inventoried roadless areas, unless the responsible official determines that activities meet the circumstances provided in the Roadless Rule.

Guidelines (IRAMA-G)

01 Inventoried roadless areas should be managed for primitive, semiprimitive nonmotorized, and semiprimitive motorized recreation opportunity spectrum or similar protocol.

02 Management activities should be consistent with the scenic integrity objectives, or similar protocol.

Management Approaches for Inventoried Roadless Area (IRAMA-MA)

01 Educate the public on values of inventoried roadless areas for dispersed recreation opportunities to take recreation pressure off of highly visited wilderness areas.

National Trails (NTMA)

In 1968, Congress passed the National Trails System Act (16 U.S.C. 1246), "[in] order to provide for the ever-increasing outdoor recreation needs of an expanding population and…the preservation of…outdoor areas and historic resources of the Nation." The passage of the act created a system of national trails composed of national scenic, historic, and recreation trail intended to provide for a variety of outdoor recreation uses as well as the conservation of nationally significant scenic, historic, natural, or cultural qualities of a landscape. The Tonto National Forest administers three national trails: the Highline and Six Shooter Canyon National Recreation trails, and the Arizona National Scenic Trail (see Figure A - 7 in Appendix A. Maps).

The **Highline National Recreation Trail** (50 miles), established in 1870, was used to travel between homesteads and to attend school in Pine. Famous Arizona historical figures Zane Grey and Babe Haught used the trail while hunting. The trail runs through the northern edge of the Tonto National Forest on the Payson Ranger district. The trail along the Mogollon rim has steep, rocky terrain with spectacular views, canyons, and brushy hills. The portion of the Highline Trail from Washington Park Trailhead to Pine Trailhead is also designated as part of the Arizona National Scenic Trail.

The **Six Shooter Canyon Trail** (6 miles), designated in 1979 in the Pinal Mountains, is a challenging, beautiful trail climbing through several life zones as it rises some 3,000 feet in six miles with views of the Miami/Globe area. Access to this trail is approximately six miles south of Globe from the Icehouse Civilian Conservation Corps trailhead, or the Ferndell Trailhead. Six Shooter Canyon National Recreation Trail is home to the national champion Canyon Maple tree. These two national recreation trails offer spectacular views and high-quality recreation opportunities.

The **Arizona National Scenic Trail** 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 nonmotorized 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 Arizona National Scenic Trail corridor is defined as approximately one-half mile from the centerline of the trail. The Tonto National Forest manages about 200 miles of the Arizona National Scenic Trail on the Globe, Mesa, Tonto Basin, and Payson Ranger Districts.

A map of the national trails on the Tonto National Forest can be found in Appendix A. Maps, Figure A - 7.

Desired Conditions (NTMA-DC)

Applicable to all National Trails

01 Recreation opportunities on national trails support the needs of the diverse populations we serve by providing a variety of opportunities for recreation with different levels of solitude, challenge, and development.

02 Use conflicts among national trail users are infrequent.

03 Visitor access, use, and management activities are consistent with the recreational, scenic, ecological, cultural, traditional, wildlife resources, and the nature and purpose for which the trail is designated.

04 National trails are signed, passable, and conform to National Forest Trail System Standards.

05 Unauthorized construction on or modification of national trails is minimized.

Applicable to the Arizona National Scenic Trail

06 The Arizona National Scenic Trail and corridor are well-defined and provide high-quality, primitive hiking, mountain biking, equestrian opportunities, and other compatible nonmotorized trail activities. The significant scenic, natural, historic, and cultural resources within the trail's corridor are conserved. The trail provides visitors with expansive views of the natural-appearing landscapes.

07 Scenery viewed from the Arizona National Scenic Trail is consistent with high or very high scenic integrity objectives. The foreground of the trail is natural-appearing.

08 The potential to view wildlife and natural ecological processes exist along the Arizona National Scenic Trail.

09 Connectivity of the Arizona National Scenic Trail is maintained.

10 The Arizona National Scenic Trail has appropriate trailheads and access points that provide various opportunities to select the type of terrain, scenery, and trail length (ranging from long distance to day use) that best provide for compatible outdoor recreation experiences.

Standards (NTMA-S)

Applicable to all National Trails

01 Designated national trails conform to their Trail Management Objectives (TMO) and shall be maintained to National Forest Service standards.

Applicable to the Arizona National Scenic Trail

02 Motorized use shall not be allowed on newly constructed segments of the Arizona National Scenic Trail.

03 Sales or extraction of mineral materials (e.g., limestone and gravel) shall not be authorized within the Arizona National Scenic Trail corridor.

Guidelines (NTMA-G)

Applicable to all National Trails

01 National trails should be consistent with management direction in the trail establishment reports as well as the maintenance standards for trail class and use.

02 To retain or enhance the purposes for which the national trail was designated, new or relocated trail segments should be located within the recreation opportunity spectrum and scenic integrity objectives consistent with or complementing the pre-existing condition.

03 Construction of new motorized routes should not intersect national trails located within primitive or semiprimitive nonmotorized recreation opportunity spectrum classes. Management activities should maintain public access to designated national trails.

04 If national trails are to be used as firelines, management actions should be reviewed and approved prior to use, and adverse effects should be mitigated.

05 Landings created for timber harvest or mechanical treatments should not be visible from national trails.

06 Fences crossing national trails should be designed with gates and pass-throughs that accommodate multiple modes of nonmotorized traffic. Fences should be compatible with the scenic objectives of the area.[106]

07 Special use authorizations that affect national trails should include measures to avoid impacts to visual resources.

Applicable to the Arizona National Scenic Trail

08 If management activities result in short-term impacts to the scenic character of the Arizona National Scenic Trail, design elements should be included (e.g., screening, feathering, and other scenery management techniques) at the project level.

09 The minimum trail facilities necessary to accommodate the amount and types of use anticipated on any given segment along the Arizona National Scenic Trail should be provided to protect resource values and for health and safety (not for the purpose of promoting user comfort) to preserve or promote a natural-appearing setting.

10 Linear utilities and rights-of-way should not be constructed over national trails. Where unavoidable, these should be limited to a single Arizona National Scenic Trail crossing per special use authorization to maintain the integrity of the trail corridor and values for which the Arizona National Scenic Trail was designated.

11 Wildland fire in the foreground of the Arizona National Scenic Trail should be managed using tactics appropriate to protect and incorporate the values of the Arizona National Scenic Trail. Firelines created with heavy equipment (e.g., dozer lines) should not be used within the Arizona National Scenic Trail corridor unless necessary for emergency protection of life and property.

12 To protect scenic integrity, special use authorizations for new communication sites, utility corridors, and renewable energy sites should be avoided. Where unavoidable, design elements

[106] As defined in the Scenery Management System.

should be implemented to maintain scenic integrity in the trail corridor and the values for which the Arizona National Scenic Trail was designated.

13 E-bikes should not be allowed on the Arizona National Scenic Trail, unless a regulatory exception authorized by the National Trails System Act is met or there is an exception in the enabling legislation for the trail.

Management Approaches for National Trails (NTMA-MA)

Applicable to all National Trails

01 Work with volunteer groups, private and non-profit partners, local governments, and adjacent landowners to manage and maintain national trails for the purposes for which they were established.

02 Maintain open and frequent communication with partners and address conflicts (user or management) as soon as possible.

03 Ensure that local wildland fire managers, incident management teams, and others assigned to active incidents are aware that national trails are identified as values at risk during wildland fire management activities.

04 Prioritize wildfire-related rehabilitation along national trails and any associated corridors.

05 Work with partners and volunteers to remove unauthorized structures and restore the trail to established trail management objectives.

06 Work with partners and volunteers to discourage unauthorized trail construction and reconstruction.

Applicable to the Arizona National Scenic Trail

07 Use the most recent version of the Arizona National Scenic Trail Comprehensive Plan when considering projects in the Arizona National Scenic Trail corridor.

08 Work with volunteer groups, partners, local governments, and adjacent landowners to manage the Arizona National Scenic Trail corridor, maintain the condition and character of the surrounding landscape, and to facilitate user support and reduce user conflicts on the trail.

09 Identify opportunities to acquire lands or rights-of way within or adjacent to the Arizona National Scenic Trail as they become available.

10 Consider identifying alternate routes when natural events or forest management activities result in temporary closures along the trail.

Significant Caves (SCMA)

The Tonto National Forest contains many significant caves and karst resources. The Federal Cave Resources Protection Act (FCRPA) of 1988 (16 U.S.C. 4301-4309; 102 Stat. 4546) 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 the Federal Cave Resources Protection Act 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.

Refer to the Caves and Karsts section in Chapter 2. Forestwide Plan Direction for additional applicable plan direction.

Desired Conditions (SCMA-DC)

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

02 The resources and significant features of caves designated under the Federal Cave Resources Protection Act are protected and maintained.

Standards (SCMA-S)

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

Management Approaches for Significant Caves (SCMA-MA)

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

02 Consider using volunteers and cost-share agreements to complete projects when applicable.

Lakes and Rivers Management Area (LRMA)

The purpose of the Lakes and Rivers Management Area is to prioritize and manage high-use developed and dispersed recreational opportunities in and around the lakes and major rivers of the Tonto National Forest. The management area consists of the areas one quarter mile around Roosevelt Lake, Apache Lake, Canyon Lake, Saguaro Lake, Horseshoe Lake, Bartlett Lake, the Verde River, and the Lower Salt River. Four Peaks Wilderness and Three Bar Research Natural Area are not included in this management area (Figure A - 8 in appendix A). This management area is removed from designated wilderness and proposed research natural areas. It provides additional guidance to sustain and promote the high-use and enhanced recreation in the area.

The lakes provide recreation opportunities such as boating, fishing, picnicking, swimming, and camping. The Lower Salt River provides opportunities for tubing, fishing, picnicking, rafting, kayaking and can attract 7,000 recreationists on a busy day (USDA Forest Service 2016). The Verde River provides swimming, picnicking, and kayaking opportunities. Most access and facilities in these areas are 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 visitors.

Much of the land around the lakes and rivers within this management area is withdrawn from “entry” for irrigation purposes. These “reclamation withdrawals” restrict the ability to occupy, or use the land (e.g., mining and homesteading) in a way that would conflict with the construction, operation, or maintenance of current or future reclamation projects. Reclamation Withdrawals on National Forests Section 3, Part 33 of the Reclamation Act of 1902 (Chap. 1093, 32 STAT. 388) states “Reclamation withdrawals within the national forests are dominant, but until needed by the Reclamation Service, the lands will remain for administrative and protection purposes under control and direction of the Forest Service.”

Refer to the Recreation, Developed Recreation, Dispersed Recreation, Water-Based Recreation, Wildlife-Related Recreation, Special Uses, Watersheds and Water Resources, Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones, and Wildlife, Fish, and Plants sections in Chapter 2. Forestwide Plan Direction and other sections in Chapter 3. Management Areas Plan Direction for additional applicable plan direction.

Refer to Figure A - 8 in Appendix A. Maps for a map of the lakes and rivers management area.

Desired Conditions (LRMA-DC)

01 This area provides diverse recreation opportunities that are enhanced by facilities, access, and unique services.

02 The area attracts diverse user groups and is a highly desirable recreation destination for day use and camping throughout the year.

03 User conflicts and public health and safety issues are infrequent.

04 Recreation opportunities adapt to changing trends and technologies.

05 Natural resources enhance the recreational experience in the Lakes and Rivers Management Area and are adaptable to disturbances.

Standards (LRMA-S)

01 Management decisions in this area shall be consistent with the latest approved Tonto Fee Program and Tonto Sustainable Recreation Plan, or other applicable protocols.

02 Within special recreation permit areas along shorelines, as identified in the motor vehicle use map (MVUM), vehicle use off designated roads and routes is only for accessing water and campsites.

03 Authorize only one privately owned marina each at Bartlett, Saguaro, Canyon, and Apache Lakes to be operated under special use permit.

Guidelines (LRMA-G)

01 Permitted marinas, restaurants, and resorts should maintain natural settings.

02 Vendors and commercial services should not be authorized if the need is already met by existing vendors. Any authorized vendors or commercial services should maintain a natural setting.

03 Vegetation should be managed to compliment or enhance recreation opportunities in this management area (e.g., remove non-native reeds at river access points, utilize native trees and brush for bank stabilization in developed areas).

04 Native riparian vegetation, natural streambank stability, floodplain and wetland function, and soil heath and stability should be maintained, or impacts mitigated from high-use recreation opportunities in the Lakes and Rivers Management Area.

05 Permitted livestock grazing should not be authorized in the Lakes and Rivers Management Area except where existing infrastructure or natural boundaries prevent livestock from accessing the rivers and lakes or where grazing can be used to manage hazardous fuels created by fluctuating water levels around Theodore Roosevelt Lake and Apache Lake.

06 Permitted livestock should not be authorized to cross the Verde River except where necessary and authorized in allotment management plans.

Management Approaches for Lakes and Rivers Management Area (LRMA-MA)

01 Develop and maintain strong working relationships with county sheriffs, the Arizona Game and Fish Department, Salt River Project, and other partners as they are identified to provide quality recreation experiences for the public and to promote the Lakes and Rivers Management Area as a high-quality recreation destination on the Tonto National Forest.

02 Encourage forest visitors to use all of the different lakes and rivers in this management area to disperse recreation and improve experiences. Make information available about recreation opportunities at recreation sites, on social media, and through other media channels and partners.

03 Work with law enforcement, partners, and volunteers to reduce the number of public safety incidents (e.g., substance abuse, physical altercations, drownings, and injuries) and to identify needs for special orders (e.g., closures) when necessary to protect public health and safety.

04 Work with partners, local interest groups, and other applicable affected parties (e.g., the local county sheriff's office, Salt River Project, and permit holders) to remove debris in water bodies that pose a risk to public health and safety or inhibit recreation opportunities.

05 Work to educate forest users about the impacts of trash and litter in riparian areas and encourage "pack it in, pack it out" and Leave No Trace ethics.

06 Work collaboratively with partners to identify management tools to address capacity issues, changes in recreational trends and demands, and improve the overall recreation experience.

07 Notify the public of major changes to management practices utilizing a variety of outreach methods (e.g., press releases, social media posts).

08 Encourage and incentivize permit holders, partners, and volunteers to develop a system of litter clean up and trash disposal.

09 Consider a closure for possession or storage of glass containers within the lakes and rivers management area.

Saguaro Wild Burro Management Area (SWBMA)

The Tonto National Forest contains one wild burro territory established under the Wild Free-Roaming Horses and Burros Act of 1971. The Saguaro Wild Burro Management Area covers 27,092 acres, which includes 4,180 acres of the designated Saguaro Wild Burro Territory. The Saguaro Wild Burro Management Area is located within the Sunflower grazing allotment, with the majority located in the Four Peaks Wilderness (Figure A - 9 in appendix A). Burros have not been known to be present in the territory since the early 1990s. The territory is not currently occupied.

Desired Conditions (SWBMA-DC)

01 The Saguaro Burro Territory is unoccupied by burros.

02 Vegetation and soil conditions are similar to other areas on the Forest of similar ecological response units.

Standards (SWBMA-S)

01 The Saguaro Wild Burro Management Area and Saguaro Wild Burro Territory shall be managed for zero burros.

02 Wild burros shall not be reintroduced to the territory.

Salt River Horse Management Area (SRHMA)

The purpose of the Salt River Horse Management Area is to identify an area the Salt River Horse herd may use. It is in the Mesa Ranger District and is roughly 19,665 acres in size. The Salt River Horse herd includes the horses that live in and around the lower Salt River in the Tonto National Forest and are absent a brand or other identifiers indicating ownership.

Arizona law[107] protects the Salt River Horse herd from being harassed, shot, injured, killed, or slaughtered. It requires written authorization from the Arizona Department of Agriculture or Maricopa County Sheriff's Office before interacting with a horse from the herd, clarifies that horses from the Salt River Horse herd are not considered stray under Arizona law, and directs the Arizona Department of Agriculture to enter into an agreement with the Forest Service to implement this article or address any issues relating to the Salt River Horse herd.

The area encompasses the Goldfield and Bulldog zones on both sides of lower Salt River in the Mesa Ranger District. Refer to Figure A – 10 in Appendix A. Maps for a map of the Salt River Horse Management Area.

Desired Conditions (SRHMA-DC)

01 Other uses are not negatively impacted by the Salt River horse herd.

02 User conflicts and public health and safety issues are infrequent.

03 Natural resources in the Salt River Horse Management Area are resilient to disturbances, fluctuations, and extremes in the natural environment (e.g., fire, flooding, drought, climate variability) and allow for healthy, diverse plant communities, satisfactory soil conditions, and sustain the quality of wildlife habitat.

Standards (SRHMA-S)

01 The Salt River horse herd shall only be located within the Salt River Horse Management Area.

02 Horses outside of the Salt River Horse Management Area shall be managed as unauthorized livestock.

03 Permitted livestock grazing shall not be authorized within the Salt River Horse Management Area.

Guideline (SRHMA-G)

01 To minimize human-horse interactions, the Salt River horses should be prevented from being in developed recreation sites or other areas where negative impacts to recreation could occur.

02 The Salt River horses should only be located within the Salt River Horse Management Area where infrastructure or natural features are in place to keep them from crossing the highway.

[107] Arizona Revised Statute Title 3. § 3-1491

03 If supplemental forage is provided within the Salt River Horse Management Area, certified weed-free materials including hay, cubes, pellets, or rolled feed should be required.

Management Approaches for Salt River Horse Management Area (SRHMA-MA)

01 Work closely with the Arizona Department of Agriculture to reduce impacts to other uses and natural resources by the Salt River Horse herd.

02 Work with partners to reduce the number of public safety incidents as a result of the Salt River horse herd.

Apache Leap Special Management Area (ALSMA)

The Apache Leap Special Management Area consists of extremely rugged terrain located east of the Town of Superior in the Globe Ranger District. The management area, designated by Congress in December 2014, is named after its prominent feature, a western-facing escarpment of sheer cliff faces, hoodoos, and buttresses known as “Apache Leap.” Other features of the special management area include eastern slopes containing canyons and drainages leading to Oak Flat, relatively undisturbed landscape, open space, and dominant backdrop to the Town of Superior and the adjacent U.S. Route 60 (a designated State Scenic Highway). The Apache Leap Special Management Area 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 Special Management Area will include only Federal lands.

See Figure A - 11 in Appendix A. Maps for a map of the Apache Leap Special Management Area.

Desired Conditions (ALSMA-DC)

01 The Apache Leap Special Management Area persists as a special place with emphasis given to preserving the area’s natural character, allowing traditional uses by Indian tribes, and protecting and conserving the cultural and archeological resources of the area.

Guidelines (ALSMA-G)

01 Management activities should protect the cultural, archaeological, or historical resources of Apache Leap, which may include permanent or seasonal closures of all or a portion of Apache Leap.

02 Access should be provided for recreation opportunities.

Management Approaches for Apache Leap Special Management Area (ALSMA-MA)

01 Utilize direction from the Apache Leap Special Management Area management plan (USDA 2017d) when conducting projects or activities in the Apache Leap Special Management Area.

Chapter 4. Monitoring

Introduction

Under the 2012 Planning Rule (36 CFR 219.12(a)(5)), monitoring consists of two elements: the plan monitoring program and broader-scale monitoring strategies (FSH 1909.12-2015-1). Together, these should enable the responsible official to determine if a change in plan components or other plan content that guide management of resources on the plan area may be needed. The Regional Forester develops broader-scale monitoring strategies; however, at this time those strategies have not yet been completed.

The monitoring plan is to be developed collaboratively with other agencies, organizations, and individuals, in consultation with Tribes, while coordinating with Forest Service Research and State and Private Forestry. Monitoring is continuous and provides feedback for the planning cycle by testing relevant assumptions, tracking relevant conditions over time, and measuring management effectiveness. It should also use the best available scientific information and be within the financial and technical capabilities of the agency. The monitoring plan is informed by the assessment phase; developed during plan development; and implemented after plan decision. Biennial monitoring evaluation reports document whether a change to the plan or change to the monitoring plan is warranted based on new information, whether a new assessment may be needed, or whether there is no need for change at that time. The monitoring plan provides a framework for subsequent monitoring and evaluation designed to inform adaptive management.

In addition to the requirements above, a monitoring plan must contain at least one monitoring question and associated indicator to address each of the eight following elements. These are the minimum monitoring requirements as specified in the 2012 Planning Rule (36 CFR 219.12(a) (5).

1. The status of select watershed conditions;
2. The status of select ecological conditions, including key characteristics of terrestrial and aquatic ecosystems;
3. The status of focal species to assess ecological conditions required under 36 CFR 219.9;
4. The status of a select set of ecological conditions required under 36 CFR 219.9 to contribute to recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern;
5. The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives;
6. Measurable changes within the plan area related to climate change and other stressors that may be affecting the plan area;
7. Progress toward meeting desired conditions and objectives in the forest plan, including providing multiple use opportunities; and

8. The effects of each management system, to determine they do not substantially and permanently impair the productivity of the land.

Social, economic, and cultural sustainability will also be addressed in the monitoring plan because sustainability is an inherent part of several required monitoring items listed above. The purpose for monitoring social, cultural, and economic sustainability is to; inform managers and the public of changes in social, cultural, and economic conditions that are influenced by the plan; monitor contributions of the management of the plan area toward meeting social, cultural, and economic attributes of desired conditions; and provide feedback for adaptive management toward expected and potential contributions to social, cultural, and economic sustainability. This is captured as monitoring topic 9 in table 21 through table 27 below: plan contributions to social, cultural, and economic sustainability.

Focal Species

Focal species are not selected to make inferences about other species. Focal species are selected because they are believed to be responsive to ecological conditions in a way that can inform future plan decisions. Forest Service handbook direction (FSH 1909.12 chapter 30, section 32.13c) for focal species further specifies that every forest plan monitoring plan must identify one or more focal species and one or more monitoring questions and associated indicators[108] addressing the status of the focal species. The purpose for monitoring the status of focal species over time is to provide insight into the following:

1. Integrity of ecological systems on which focal species depend,
2. Effects of management on those ecological conditions,
3. Effectiveness of the plan components to provide for ecological integrity and maintain or restore ecological conditions, and
4. Progress towards achieving desired conditions and objectives for the plan area. It is not expected that a focal species be selected for every element of ecological conditions.

Monitoring methods for evaluating the status of focal species may include measures of abundance, distribution, reproduction, presence or absence, area occupied, survival rates, or others. The objective is not to choose the monitoring technique(s) that will provide the most information about the focal species, but to choose a monitoring technique(s) for the focal species that will provide useful information with regard to the purpose for which the species is being monitored. The expectation is that monitoring ecosystem and watershed conditions along with monitoring the status of a set of well-chosen focal species will provide timely information regarding the effectiveness of plan components related to plant and animal diversity.

[108] Indicators are quantitative or qualitative variables that can be measured or described and, when observed periodically, show trends in conditions that are relevant to the associated monitoring questions.

The following section describes the recommended focal species and how they provide information regarding ecological integrity and ecosystem diversity. This species was selected because they will inform management about the status of ecological conditions, diversity, and integrity. Detected population changes are most likely to indicate the effects of management for the selected species.

Mexican spotted owl (*Strix occidentalis lucida*)

As a federally listed species under the Endangered Species Act, a great deal of information has been acquired regarding effects of forest conditions and management activities on these owls, thus the species' relationship to ecological conditions on the ground are relatively well understood. Plan components for forested ecological response units in the revised forest plan were developed with Mexican spotted owls in mind specifically, incorporating the habitat conditions the species needs for survival and recovery into the desired conditions for the ERUs where the species occurs. The assumption is that the presence or absence of the species in these ERUs is responsive to those desired conditions working as intended. Examples of these desired conditions include: 1) desired conditions that old growth occurs throughout the landscape and includes snags, coarse woody debris, and structural diversity (ERU-DC-03, ERU-DC-05, ERU-DC-14); 2) desired conditions that forests, woodlands, shrublands, and grasslands are functioning properly and resilient to disturbance (ERU-DC-03, ERU-DC-05, ERU-DC-09); and 3) a desired condition that fire management activities improve and maintain public safety, improve ecosystem function, wildlife habitat, and other socio-economic values (FF-DC-04).

As vegetation and fuels treatments are implemented under the plan, stable or increasing trends in the detection and reproductive success of the owl serve as an indicator for whether the treatments are promoting healthy and sustainable habitats used by the owls.

While somewhat rare and cryptic, surveying for spotted owls on the forest is largely successful and widely accepted protocols are available. Resources are generally available to monitor owls, and the forest participates in regional programs to work with partners to monitor to protocol. As such, a continued focus on spotted owls is useful to assess the overall conditions of many forested ecological response units on the Tonto National Forest while contributing to larger scale assessments of Mexican spotted owls throughout the region.

Monitoring Plan

The monitoring plan is made up of monitoring questions and indictors that may address one or more of the required monitoring topics. Monitoring questions are evaluative in design and address two topics:

- Status and trends related to desired social, cultural, economic, and ecological conditions identified in the forests plan and,
- Effectiveness of management actions in contributing to the sustainability of affected social, cultural, economic, and ecological systems in the plan area. Indicators are selected for each

monitoring question that are responsive to activities and that when monitored, would enable answering the monitoring questions. Table 21 through table 27 display monitoring questions, the required monitoring topics addressed, associated plan components, indicators, and measurement frequency or interval[109] required to answer the monitoring questions by resource area.

Monitoring elements also address key ecosystems services for the Tonto National Forest. Key ecosystem services on the Tonto National Forest include water for consumption; water for recreation; habitat for hunting, fishing, and watchable wildlife; sustainable and productive rangelands; and cultural heritage. These key ecosystem services are important in the broader landscape outside of the plan area and are influenced by the forest plan. The monitoring questions that address key ecosystem services are notated in table 21 through table 27.

A plan monitoring implementation guide may be developed after the revised plan goes into effect to describe the "how" in terms of specific approaches or strategies for measuring and analyzing plan monitoring indicator variables, models to be used, and appropriate target thresholds/benchmarks to be met to address the plan monitoring questions. The monitoring plan implementation guide would help in the development of the biennial monitoring report, the first report being due two years after the revised plan goes into effect.

[109] The measurement interval is the estimate for when data would be obtained or collected. This is the point at which a meaningful report on the monitoring status would be achievable documented in biennial reports and may include a description on how the data is being collected, the established protocols, and or preliminary data. It does not necessarily mean a trend analysis would be conducted at this interval – in some instances it may take several years to collect sufficient data to produce results (reported in later biennial reports).

Watersheds and Riparian Areas

Table 21. Monitoring topics, questions, plan components, indicators, and measurement interval for watersheds and riparian areas

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
1: Status of select watersheds **4**: Status of ecological conditions for at-risk species **6**: Ecosystem resiliency and climate change **7**: Progress towards meeting desired conditions and objectives Key ecosystem service: water for consumption	M-01: What are the trends in watershed condition among sentinel[110] watersheds?	Desired conditions for proper functioning and resilient watershed conditions capable of buffering climate change impacts (WAT-DC-03, WAT-DC-04). Desired conditions that at-risk species have good habitat conditions and are resilient to maintain viable populations (WFP-DC-01, WFP-DC-02, WFP-DC-03).	Watershed condition indicators related to water quality, water quantity, aquatic habitat, aquatic biota, riparian/wetland vegetation, roads and trails, soils, fire regime, forest cover, rangeland vegetation, terrestrial invasive species, and forest health and where qualitative or quantitative monitoring data are collected for these indicators how they are changing over time. Percent of streams classified as stable or functioning properly (e.g., Proper Functioning Condition or similar metric) and how this percent is changing over time. Changes in hydrographs, tree and shrub encroachment rates, and changes in water temperature and how these are changing over time.	2-15

[110] Sentinel watersheds are a subset of forest watersheds chosen based on the management influence, ecosystem type, and distribution that can be used as indicators of forest-wide watershed health. These watersheds are a subset of watersheds more intensely monitored that can, but does not have to, include priority watersheds.

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
1: Status of select watersheds **2**: Status of terrestrial and aquatic ecosystems **4**: Status of ecological conditions for at-risk species **7**: Progress towards meeting desired conditions and objectives Key ecosystem service: water for consumption	M-02: Are management actions effective in maintaining or improving watershed integrity in priority watersheds?	Desired conditions for the heath and productivity of watersheds (WAT-DC-01, WAT-DC-03, WAT-DC-06). Objectives to improve the conditions of priority watersheds (WAT-O-01, WAT-O-02). Desired conditions that ecological conditions support at-risk species and conditions support good habitat conditions to maintain viable populations (WFP-DC-01, WFP-DC-02, WFP-DC-03).	Watershed condition indicators related to water quality, water quantity, aquatic habitat, aquatic biota, riparian/wetland vegetation, roads and trails, soils, fire regime, forest cover, rangeland vegetation, terrestrial invasive species, and forest health, and where qualitative or quantitative baseline (pre-restoration) monitoring data are collected for these indicators, how they improve over time. Essential projects implemented.	2

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
1: Status of select watersheds **2**: Status of terrestrial and aquatic ecosystems **4**: Status of ecological conditions for at-risk species **7**: Progress towards meeting desired conditions and objectives Key ecosystem service: water for consumption, water for recreation, and habitat for hunting, fishing, and watchable wildlife	M-03: How are stream conditions trending on the forest?	Desired conditions for water quality conditions to meet or exceed State standards to support multiple uses and wildlife and plants (WAT-DC-02, WAT-DC-04). Desired conditions for resilient riparian areas within their natural range of variability (RMZ-DC-01, RMZ-DC-06). Objective to improve stream conditions (RMZ-O-01).	Percentage of surveyed streams in non-impaired condition and how this percent is changing over time. Watershed condition indicators related to water quality, water quantity, aquatic habitat, aquatic biota, riparian/wetland vegetation, roads and trails, soils, fire regime, forest cover, rangeland vegetation, terrestrial invasive species, and forest health and, where qualitative or quantitative monitoring data are collected for these indicators, how they are changing over time.	4

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
2: Status of terrestrial and aquatic ecosystems **4**: Status of ecological conditions for at-risk species **6**: Ecosystem resiliency and climate change **7**: Progress towards meeting desired conditions and objectives Key ecosystem service: water for consumption, water for recreation, and habitat for hunting, fishing, and watchable wildlife	M-04: Are management activities effective in maintaining or improving riparian and or spring ecosystems?	Desired conditions that riparian areas, springs, and wetlands are properly functioning and resilient (RMZ-DC-01, RMZ-DC-02, RMZ-DC-03). Objectives to improve riparian and spring ecosystems (RMZ-O-01, RMZ-O-02).	Miles of riparian areas improved or maintained, and number of springs restored. Abundance and diversity of native riparian obligate species in treatment areas compared to pre-project levels and/or untreated areas. Age class diversity (multiple cohorts/age groups) in treatment areas compared to pre-project levels and/or untreated areas. Watershed condition attributes including water quality, flow characteristics, large woody pieces, channel shape and function, native versus exotic and/or invasive aquatic species, and riparian vegetation condition and, where qualitative or quantitative monitoring data are collected for these indicators, how they are changing over time.	2-5

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
2: Status of terrestrial and aquatic ecosystems **6**: Ecosystem resiliency and climate change **7**: Progress towards meeting desired conditions and objectives Key ecosystem service: sustainable and productive rangelands	M-05: Do grazing schedules allow sufficient time for riparian vegetation development and recovery following grazing?	Plan components to allow sufficient time for plant development and recovery following grazing and that livestock grazing allows for healthy rangeland conditions (RERU-G-02, RMZ-DC-04, GRZ-DC-03).	Length of use and length of time between grazing in select riparian areas. Streambank herbaceous ground cover and species diversity (e.g., frequency) in select riparian areas and how ground cover and species diversity compare to reference reaches and onsite pre-grazing conditions. Long term indicators including age class and structural diversity and channel morphology in select riparian areas and how these indicators compare to reference reaches and onsite pre-grazing conditions.	4-10

Vegetation, Fire and Forest Products

Table 22. Monitoring topics, questions, plan components, indicators, and measurement interval for vegetation, fire, and forest products

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
2: Status of terrestrial and aquatic ecosystems **6**: Ecosystem resiliency and climate change **8**: Management system impacts to productivity of the land **7**: Progress towards meeting desired conditions and objectives Key ecosystem service: sustainable and productive rangelands Focal Species: Mexican Spotted Owl	M-06: Are management actions moving forest, woodland, shrubland, and grassland ecological response units towards desired conditions?	Desired conditions that forests, woodlands, shrublands, and grasslands are functioning properly and resilient to disturbance (ERU-DC-03, ERU-DC-05, ERU-DC-09). Treatment objectives for forest, woodland, and grassland ecological response units (ERU-O-01, ERU-O-02, ERU-O-03).	Vegetation departure using sources such as: Midscale, or other remote sensing products. Key sites monitored where treatments have been completed (e.g., diversity of herbaceous cover and composition, coarse woody debris, and vegetation structure). Ground cover and soil condition assessments at key sites where mechanical operations and wildland fire have occurred. Acres treated of mechanical and fire Percent of acres in desirable seral state distributions Presence/absence of Mexican spotted owls in associated habitats.	5-10

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
2: Status of terrestrial and aquatic ecosystems **4**: Status of ecological conditions for at-risk species **7**: Progress towards meeting desired conditions and objectives	M-07: To what extent is wildland fire used to achieve desired ecological, social, or economic conditions?	Desired conditions that wildfire effects pose minimal threats to public safety, property, infrastructure, habitat conditions for species, watersheds, and other values (FF-DC-05, ERU-DC-06, ERU-DC-07). Desired condition that fire management activities improve maintain and improve public safety, improve ecosystem function, wildlife habitat, and other socio-economic values (FF-DC-04). Treatment objectives for forest and woodland ecological response units (ERU-O-01, ERU-O-02).	Number and acres of unplanned ignitions managed with the primary strategy of suppression. Number and acres of planned and unplanned ignitions managed for ecological, social, or economic reasons. Evaluation and classification of areas by wildfire strategic response (e.g., proportion in "maintain" category using PODS). Acres of undesirable fire effects and effects from fire management activities (e.g., dozer lines). Severity, patch size, and frequency of wildfires (RAVG data or other suitable data).	2
2: Status of terrestrial and aquatic ecosystems **3**: Status of focal species and ecological conditions **7**: Progress towards meeting desired conditions and objectives Focal species: Mexican spotted owl	M-08: Are snags, downed logs, and large old trees at desired conditions at the midscale (100-1000-acre average) level?	Desired conditions that old growth occurs throughout the landscape and includes snags, coarse woody debris, and structural diversity (ERU-DC-03, ERU-DC-05, ERU-DC-14).	Number of snags, downed logs, and large old trees left per acre as indicated in treatment prescriptions. Presence/absence of Mexican spotted owls in associated habitats (e.g., pre- and post-project surveys, regional occupancy modeling).	1-5

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
2: Status of terrestrial and aquatic ecosystems **7**: Progress towards meeting desired conditions and objectives Key ecosystem service: Sustainable and productive rangelands	M-09: What is the status/condition of semi-desert grasslands?	Desired conditions that grasslands are diverse, productive, and resilient; and objectives to improve conditions (ERU-SDG-DC-01, ERU-SDG-DC-03, ERU-SDG-DC-05, ERU-O-03).	Acres of grasslands treated. Acres of grasslands evaluated as restorable. Acres of grasslands evaluated as highly departed (e.g., highly encroached). Key sites monitored for treatment effectiveness.	2
2: Status of terrestrial and aquatic ecosystems **7**: Progress towards meeting desired conditions and objectives	M-10: What is the status/condition of the Sonoran Desert?	Desired conditions that invasive species do not increase undesirable fire effects in deserts and impair ecological conditions (ERU-DC-10, ERU-DES-DC-04). Desired conditions that large vegetation (e.g., saguaros) in desert ecosystems is present and healthy, based on site potential (ERU-DES-DC-07, ERU-DES-DC-08, ERU-DES-DC-10).	Acres of areas surveyed of desert ecological response units occupied by invasive grasses (e.g., red brome, buffelgrass, and fountain grass). Assessment of the extent and distribution of invasive grasses on the forest. Desert condition layer that informs management on the restorability of areas and prioritizes areas for surveys and treatment. Acres of Sonoran Desert habitat improved; native vegetation planted. Acres of fire in Sonoran Desert ecosystems.	2-4

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
7: Progress towards meeting desired conditions and objectives **8**: Management system impacts to productivity of the land **9**: Plan contributions to social, cultural, and economic sustainability	M-11: Is the national forest providing a sustainable, predictable level of forest products to communities?	Desired conditions that timber harvest contributes to health of ecosystems (FP-DC-01, FP-DC-02). Desired condition that a sustainable supply of commodities are available to businesses and individuals (FP-DC-03).	Number and volume of forest products permits issued. Annual timber volume offered, and annual timber volume sold.	2
2: Status of terrestrial and aquatic ecosystems **7**: Progress towards meeting desired conditions and objectives	M-12: To what extent are management activities controlling the spread of invasive species?	Desired conditions that invasive species do not disrupt ecosystem function or disrupt natural diversity (INS-DC-01, ERU- DC-10). Objectives for invasive species management in terrestrial and aquatic ecosystems (INS-O-01, INS-O-02, ERU-O-04).	Frequency and abundance of invasive species at disturbed sites (e.g., landing sites, slash piles). Frequency and abundance of invasive species at recreation sites (developed and dispersed). Education activities around the spread of invasive species.	2

Wildlife, Fish and Rare Plants

Table 23. Monitoring topics, questions, plan components, indicators, and measurement interval for wildlife, fish, and rare plants

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
4: Status of ecological conditions for at-risk species **5**: Visitor use, satisfaction, and recreation **7**: Progress towards meeting desired conditions and objectives Key ecosystem service: habitat for hunting, fishing, and watchable wildlife	M-13: To what extent are management activities maintaining or improving habitats necessary for wildlife, fish, and rare plants (including at-risk species, unique plant communities, and species important for hunting, fishing, and watchable wildlife activities)?	Desired conditions for resilient species habitats that support sustainable species populations (WFP-DC-02, WFP-DC-03). Objectives to complete products or activities that educate the public about wildlife, fish, and rare plants, and activities that contribute to the recovery of listed species (WFP-O-01, WFP-O-02). Desired condition that ecological conditions support wildlife and the associated socio-economic opportunities, such as watchable wildlife and hunting (REC-WR-DC-01).	Acres of terrestrial habitat enhanced or improved. Miles of stream ecosystem enhanced or improved. Acres of lake ecosystem enhanced or improved. Environmental education events (e.g., Nature Watch) or materials produced, as well as volunteer and other public engagement projects. Surveys for and new occurrences of at-risk and rare species. Conservation measures and assessments initiated or completed. Number of outfitter guide permits administered per year related to wildlife-based recreation.	2

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
4: Status of ecological conditions for at-risk species **7**: Progress towards meeting desired conditions and objectives	M-14: What is the status/condition of rare and at-risk plants and unique plant communities?	Desired conditions that the location and status of at-risk, rare, and endemic plant species are known, and necessary landscape features are present (WFP-DC-06, WFP-DC-08).	Progress and status of special area designation for recommended botanical areas. Site inventories (e.g., vegetation, soils, geology, and climate) completed for recommended botanical and research natural areas. Baseline data (e.g., surveys and research) for rare plants that inform management. Information on status of populations, ecological conditions, and threats.	4

Recreation

Table 24. Monitoring topics, questions, plan components, indicators, and measurement interval for recreation

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
5: Visitor use, satisfaction, and recreation **7**: Progress towards meeting desired conditions and objectives **9**: Plan contributions to social, cultural, and economic sustainability	M-15: What is the status and trend of visitor use, visitor satisfaction, and progress toward meeting recreation objectives in the plan?	Desired conditions for recreation opportunities that enhance quality of life and reflect desires of the communities we serve, adapting to latest science and management (REC-DC-01, REC-DC-02, REC-DC-03, REC-DC-04). Objectives to maintain and rehabilitate recreation sites to enhance recreation opportunities (REC-O-01, REC-O-02).	Data collected in the USDA national visitor use monitoring survey results, including use, satisfaction, and demographics. Rehabilitation work accomplished in recreation areas. Education conducted about discouraged practices. System trails developed or modified. Trails decommissioned.	2-5
5: Visitor use, satisfaction, and recreation **7**: Progress towards meeting desired conditions and objectives **9**: Plan contributions to social, cultural, and economic sustainability	M-16: Is recreation infrastructure (e.g., trails and developed sites) sustainable?	Desired conditions for sustainable, maintained, recreation infrastructure (REC-DC-03, REC-DC-08, REC-DIS-WB-DC-04, RD-DC-01, FC-DC-07, FC-DC-08). Objectives to maintain sustainable recreation infrastructure that provides a range of visitor needs (REC-O-03, REC-O-04, REC-O-05).	Revenue at developed recreation sites Property condition assessment Return on investment of recreation infrastructure. Ratio of special use permits administered to standard Recreation sites maintained to standard Trails maintained to standard Sites or trails decommissioned	2

Cultural Resources and Sustainability

Table 25. Monitoring topics, questions, plan components, indicators, and measurement interval for cultural resources and sustainability

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
7: Progress towards meeting desired conditions and objectives **9**: Plan contributions to social, cultural, and economic sustainability Key ecosystem service: cultural heritage	M-17: Are we preserving and protecting cultural resources?	Desired conditions that cultural resources are stable and preserve the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (CUH-DC-01, CUH-DC-02, CUH-DC-06). Desired conditions that heritage-based recreation opportunities are available allowing the public to learn about, appreciate, and understand cultural resources. (CUH-DC-04, CUH-DC-05) Desired conditions that cultural resources have been inventoried and are preserved in place (CUH-DC-07, CUH-DC-08).	Number of recorded sites on the forest. Acres surveyed per current professional standards. Number of sites evaluated for national historic register. Number of condition assessments on Priority Heritage Assets completed.	2

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
5: Visitor use, satisfaction, and recreation **7**: Progress towards meeting desired conditions and objectives **9**: Plan contributions to social, cultural, and economic sustainability Key ecosystem service: cultural heritage	M-18: Is management successful at providing educational and recreational opportunities for cultural resources?	Desired conditions that heritage-based recreation opportunities are available allowing the public to learn about, appreciate, and understand cultural resources. (CUH-DC-04, CUH-DC-05).	Number of outreach activities accomplished per fiscal year (e.g., Passport in Time). Volunteer hours tied to heritage activities. Number of sites revisited by site stewards. Number of outfitter guides or trips to heritage sites. Data collected in the USDA national visitor use monitoring survey results, including use.	2-5

Range

Table 26. Monitoring topics, questions, plan components, indicators, and measurement interval for range

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
7: Progress towards meeting desired conditions and objectives **9**: plan contributions to social, cultural, and economic sustainability Key ecosystem service: Sustainable and productive rangelands	M-19: Are rangelands providing adequate forage for livestock to sustain traditional lifestyles, socioeconomic diversity, and cultural identity of local communities?	Desired conditions that sustainable livestock grazing and associated management activities support healthy range conditions that then support long-term socioeconomic diversity and stability of local communities (GRZ-DC-01, GRZ-DC-02). Objective to evaluate vacant allotments for sustainable use (GRZ-O-02).	Number of active allotments. Number of permitted and authorized livestock (e.g., AUMs, head months). Number of annual operating instructions modified for changed conditions.	2-4
2: Status of terrestrial and aquatic ecosystems **7**: Progress towards meeting desired conditions and objectives Key ecosystem service: Sustainable and productive rangelands	M-20: Is native herbaceous cover and diversity, based on site potential, maintained and/or increased?	Desired condition that livestock grazing allows for healthy, diverse plant communities, satisfactory soil conditions, and minimizes impacts to wildlife habitat (GRZ-DC-03).	Select range condition assessments (e.g., reading the range, Parker three steps, and photo points) relative to site potential at specific allotments (e.g., TEUI).	5-10
2: Status of terrestrial and aquatic ecosystems **7**: Progress towards meeting desired conditions and objectives	M-21: Are improvements for riparian areas being maintained to standard?	Desired conditions that range management and improvements sustains or improves ecological resources (GRZ-DC-04, RMZ-DC-04).	Riparian improvement projects maintained in select riparian areas. Condition of riparian improvements in select riparian areas.	2-4

Partnerships and Volunteers

Table 27. Monitoring topics, questions, plan components, indicators, and measurement interval for partnerships and volunteers

Monitoring Topics and Key Ecosystem Services Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
7: Progress towards meeting desired conditions and objectives	M-22: How has the general public gained knowledge on Forest Service management and opportunities to be involved?	Desired conditions that partners and volunteers provide a collaborative network to increase capacity for managing forest resources, staff and leadership work effectively, and there is open communication between parties (PV-DC-02, PV-DC-03, PV-DC-04).	Number of outreach events at public schools, public meetings, stakeholder meetings, and other events. Educational materials developed.	2
7: Progress towards meeting desired conditions and objectives **9:** plan contributions to social, cultural, and economic sustainability	M-23: What is the contribution of volunteer and partnership work towards meeting plan objectives and moving towards desired conditions?	Desired conditions that responsibility and stewardship between the Tonto National Forest and our partners leads to greater outcomes and benefits to forest users and the communities we serve (PV-DC-01, PV-DC-02, PV-DC-05).	Total number of volunteer agreements. Total number of partnership agreements. Estimated monetary value of partnership and volunteer efforts on the forest. Total number of volunteer hours. Total number of projects accomplished through partnerships and volunteers.	2

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Appendix A. Maps

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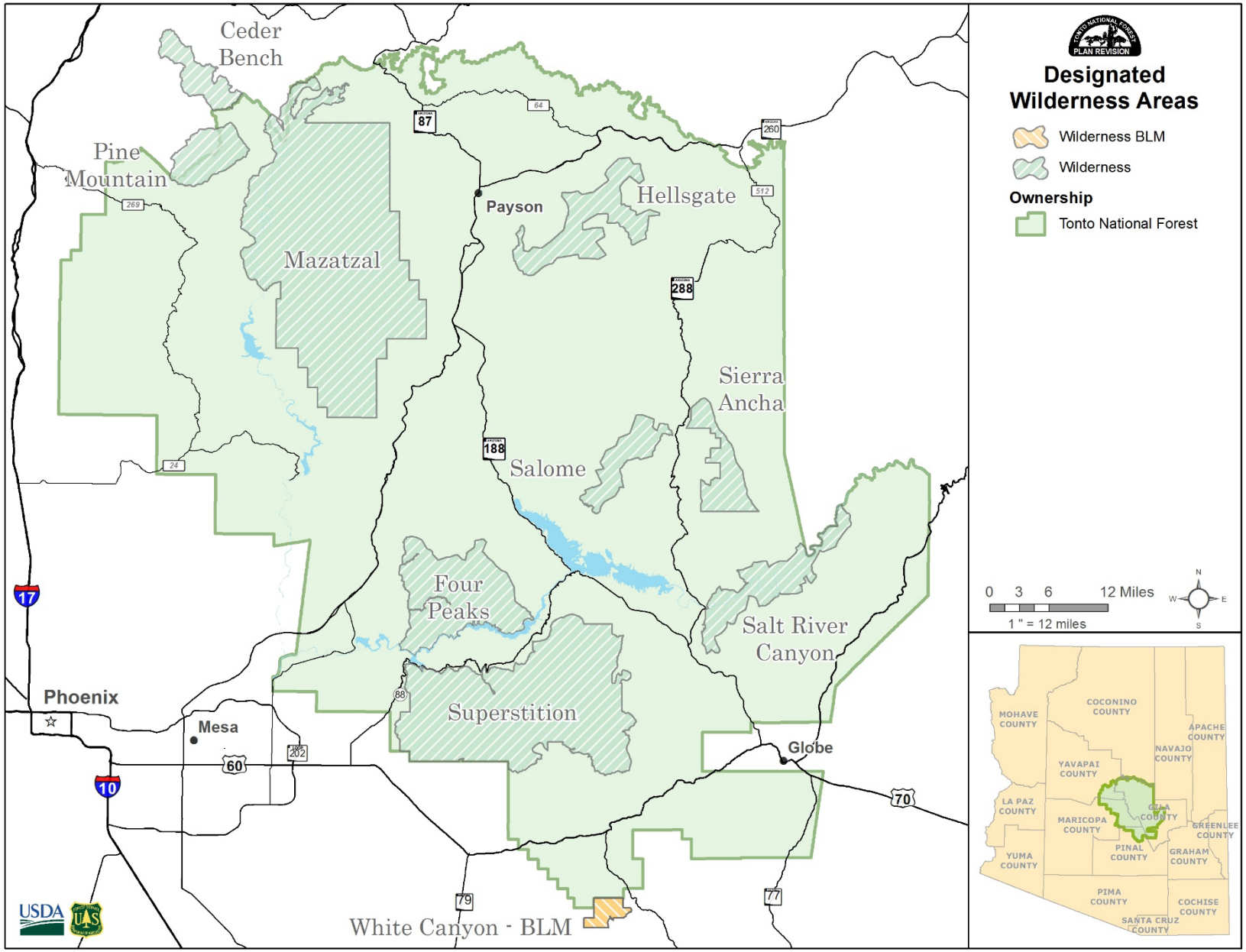

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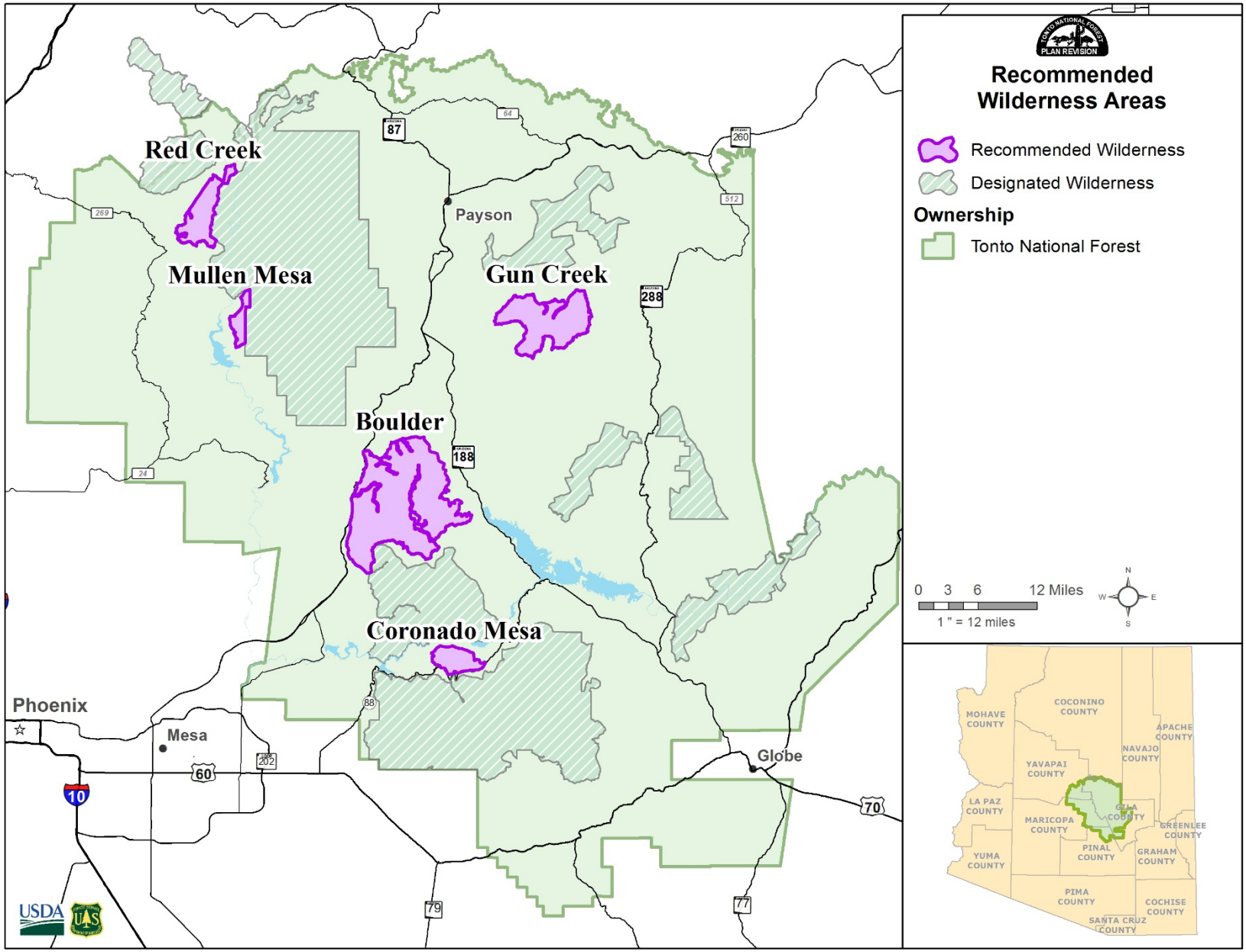

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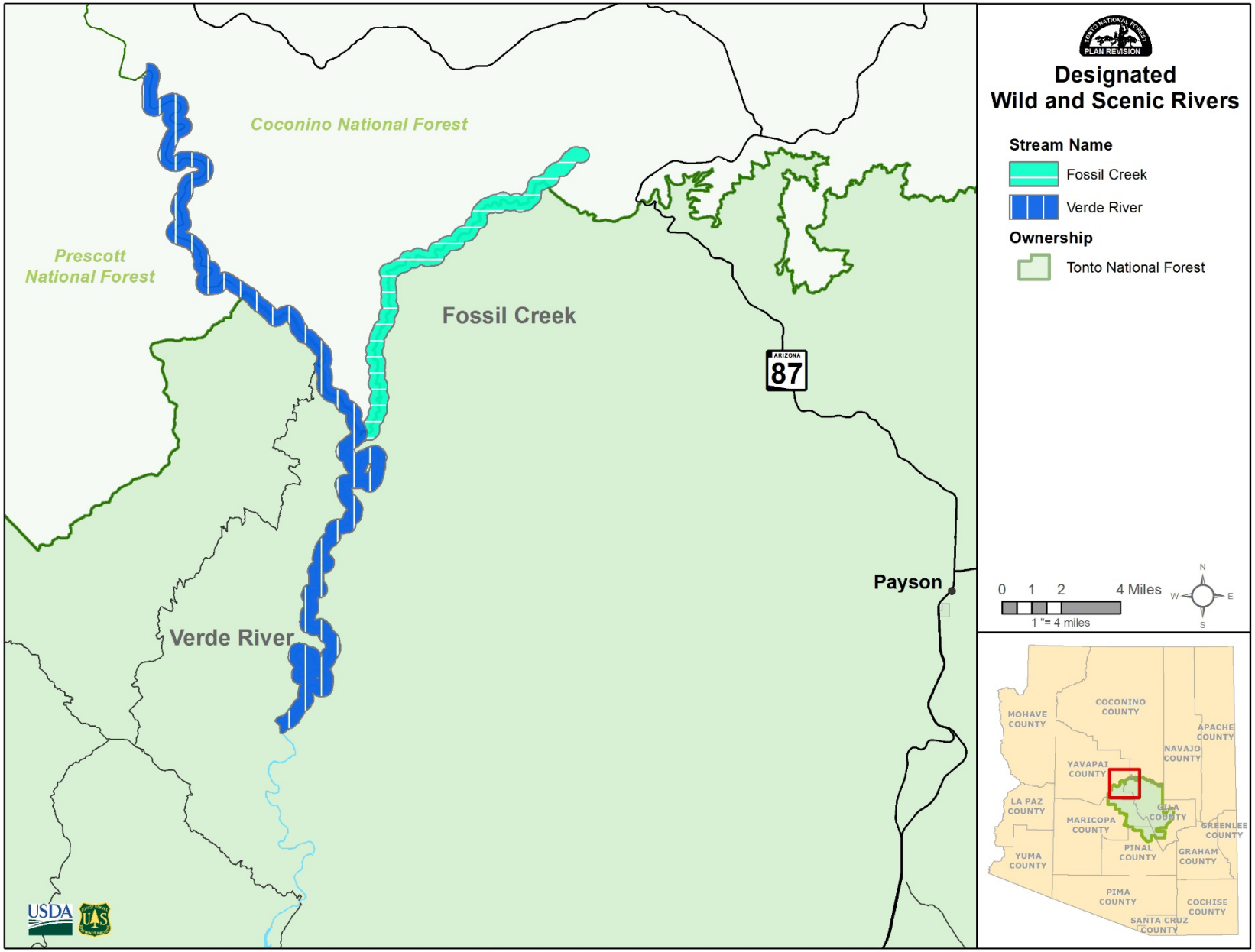

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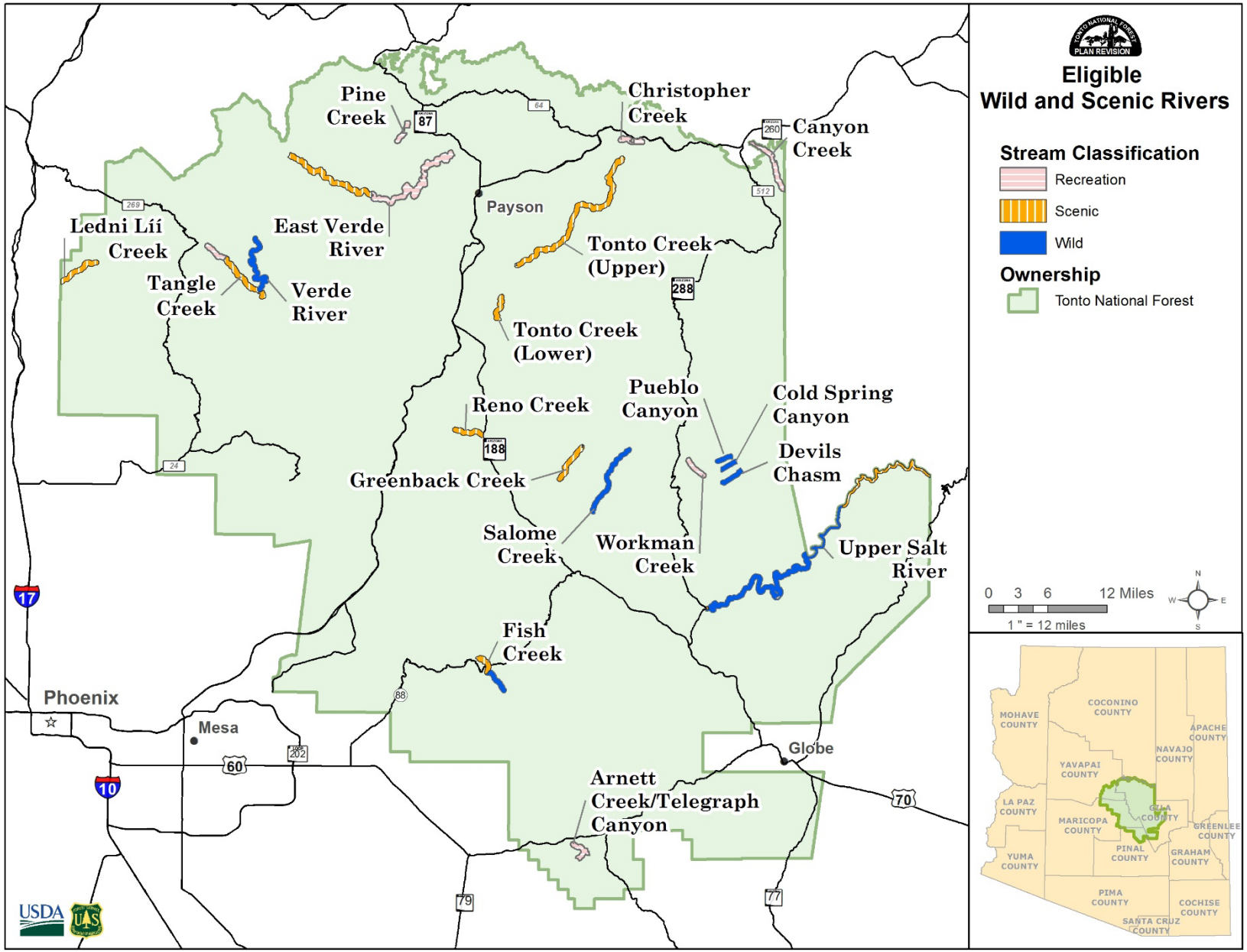

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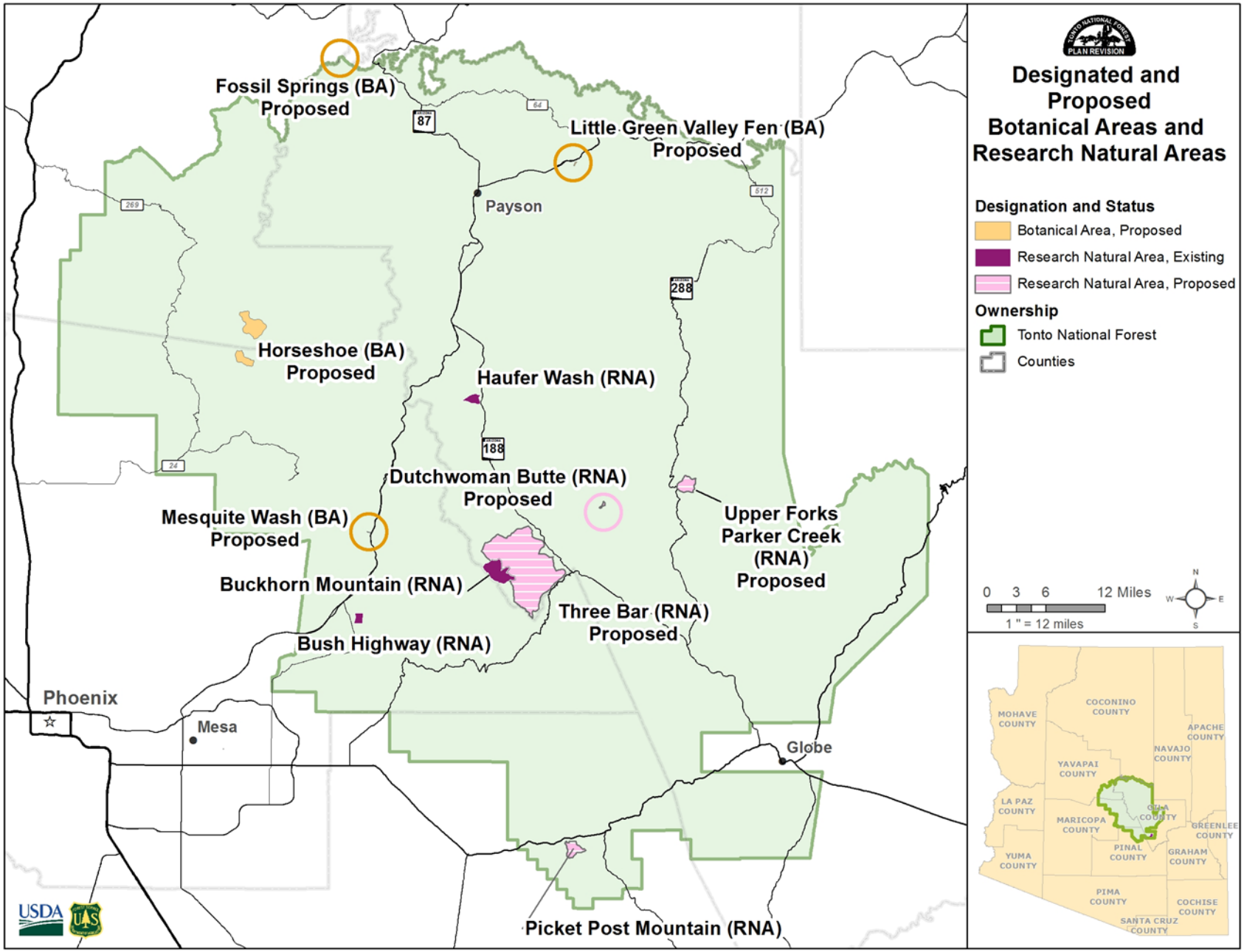

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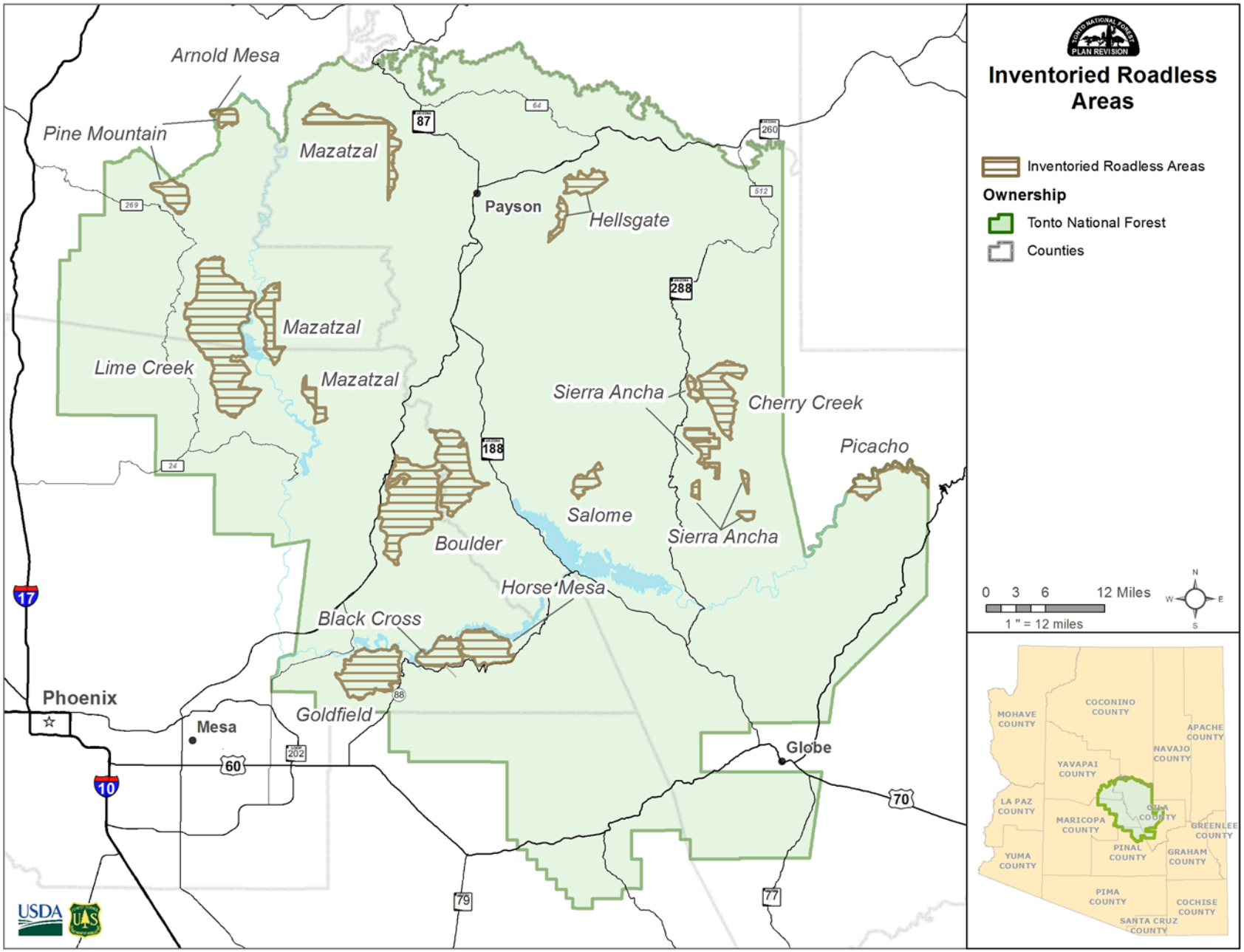

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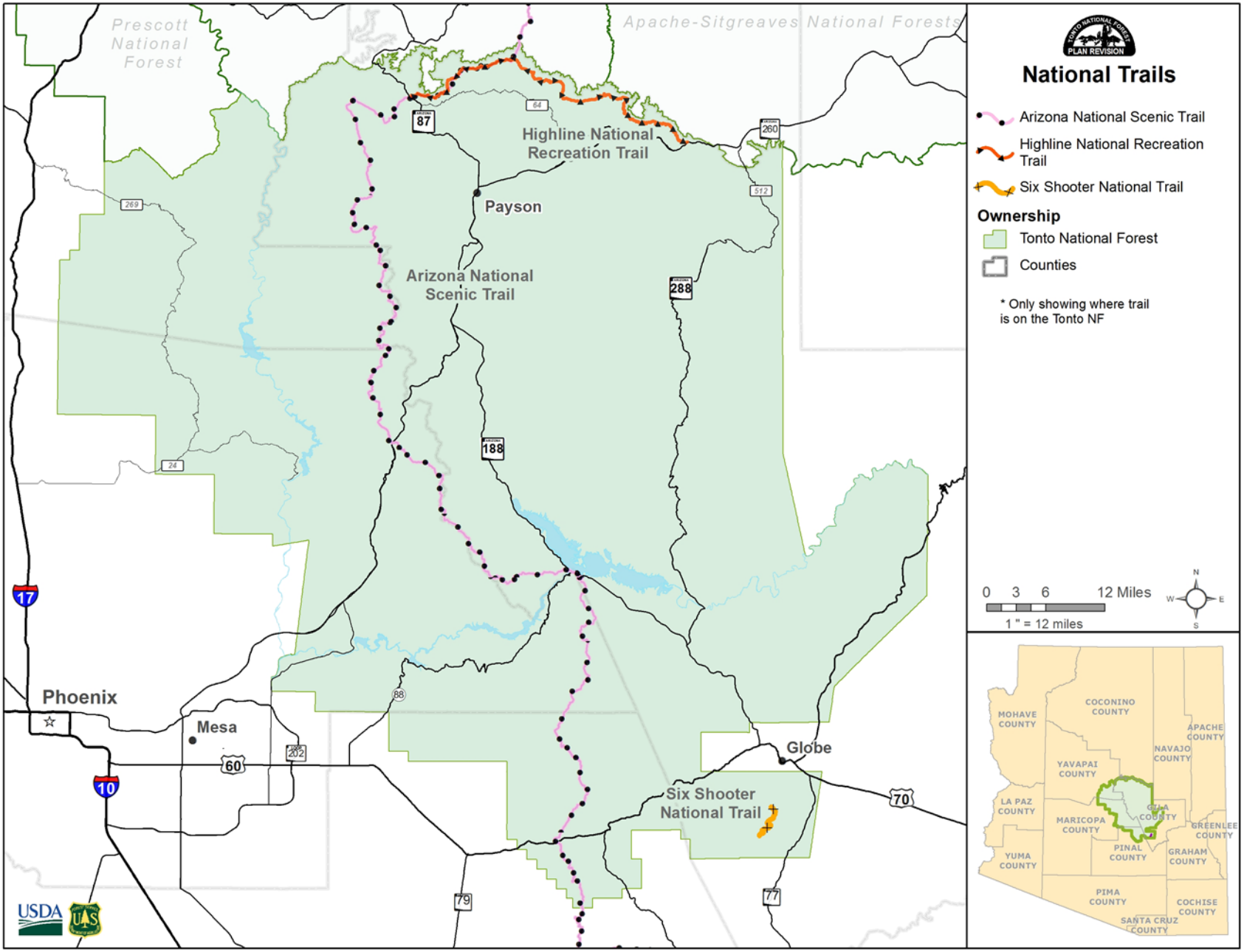

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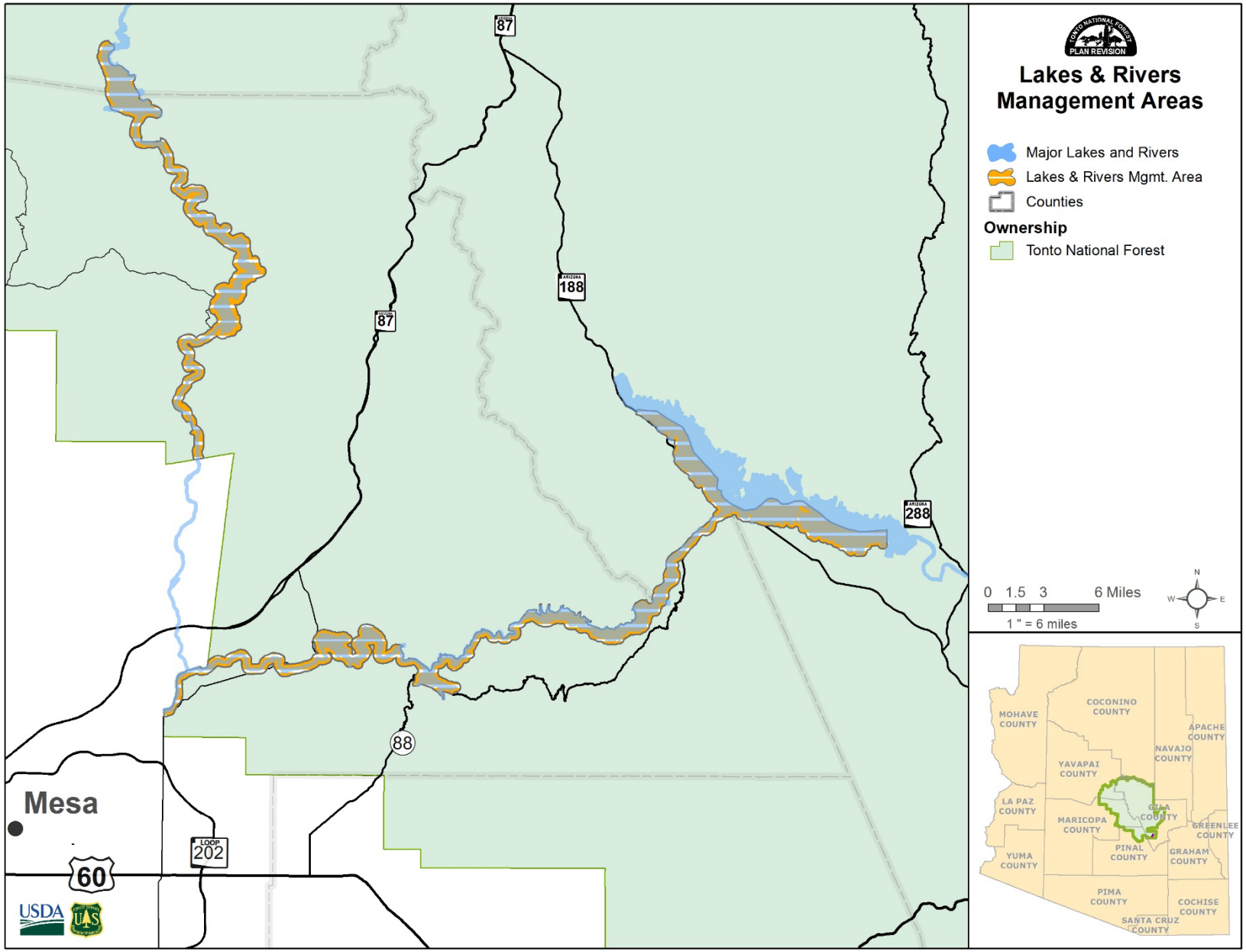

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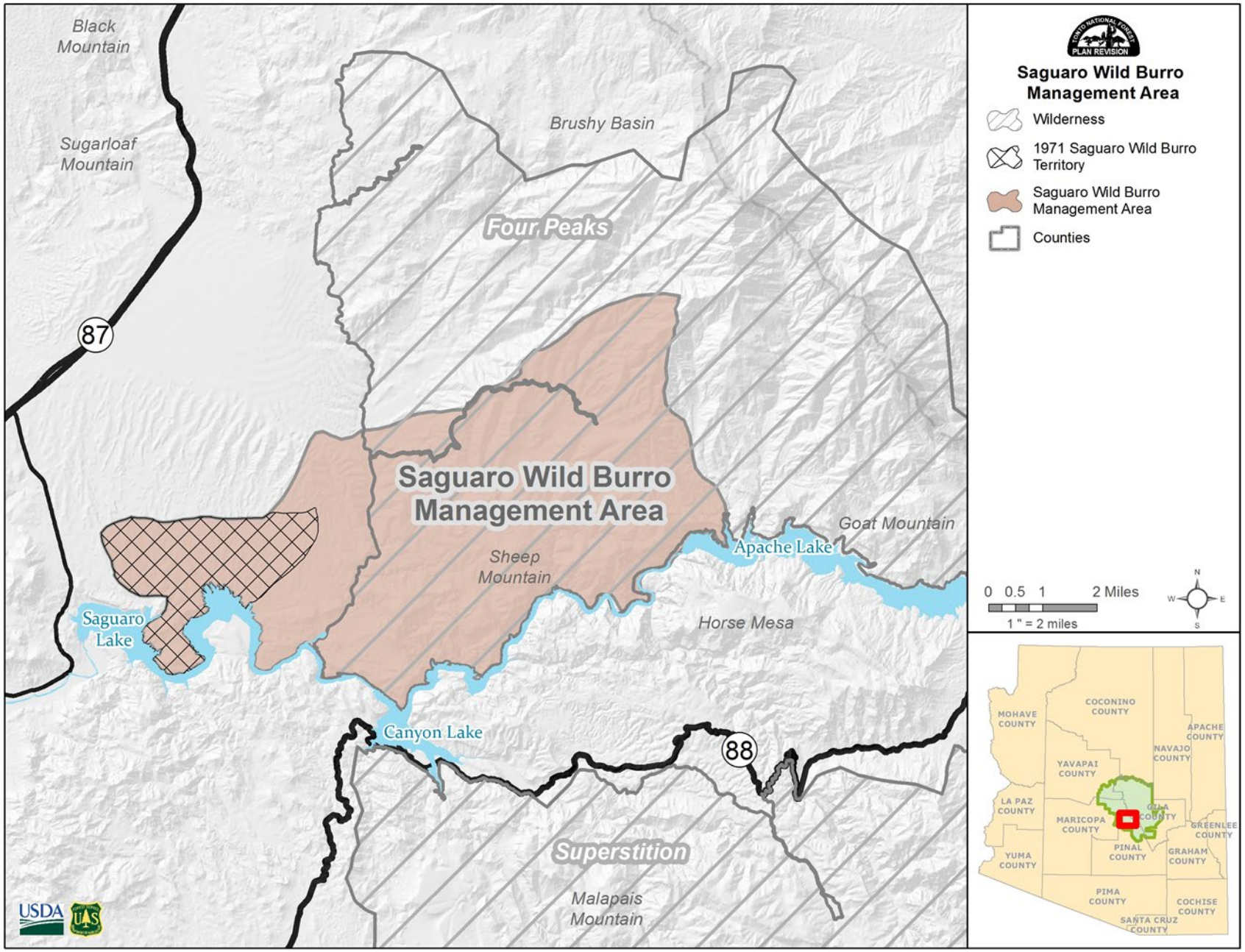

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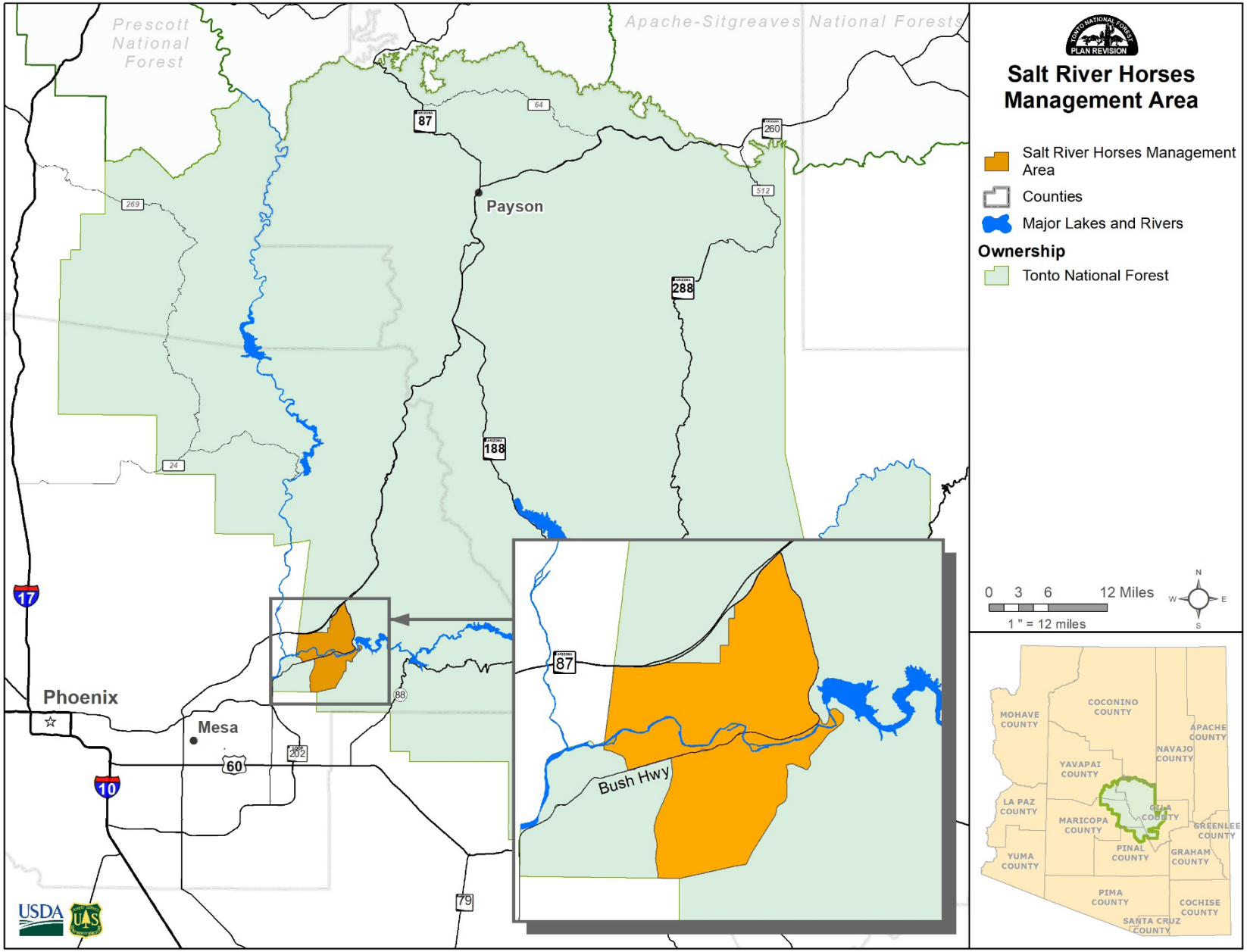

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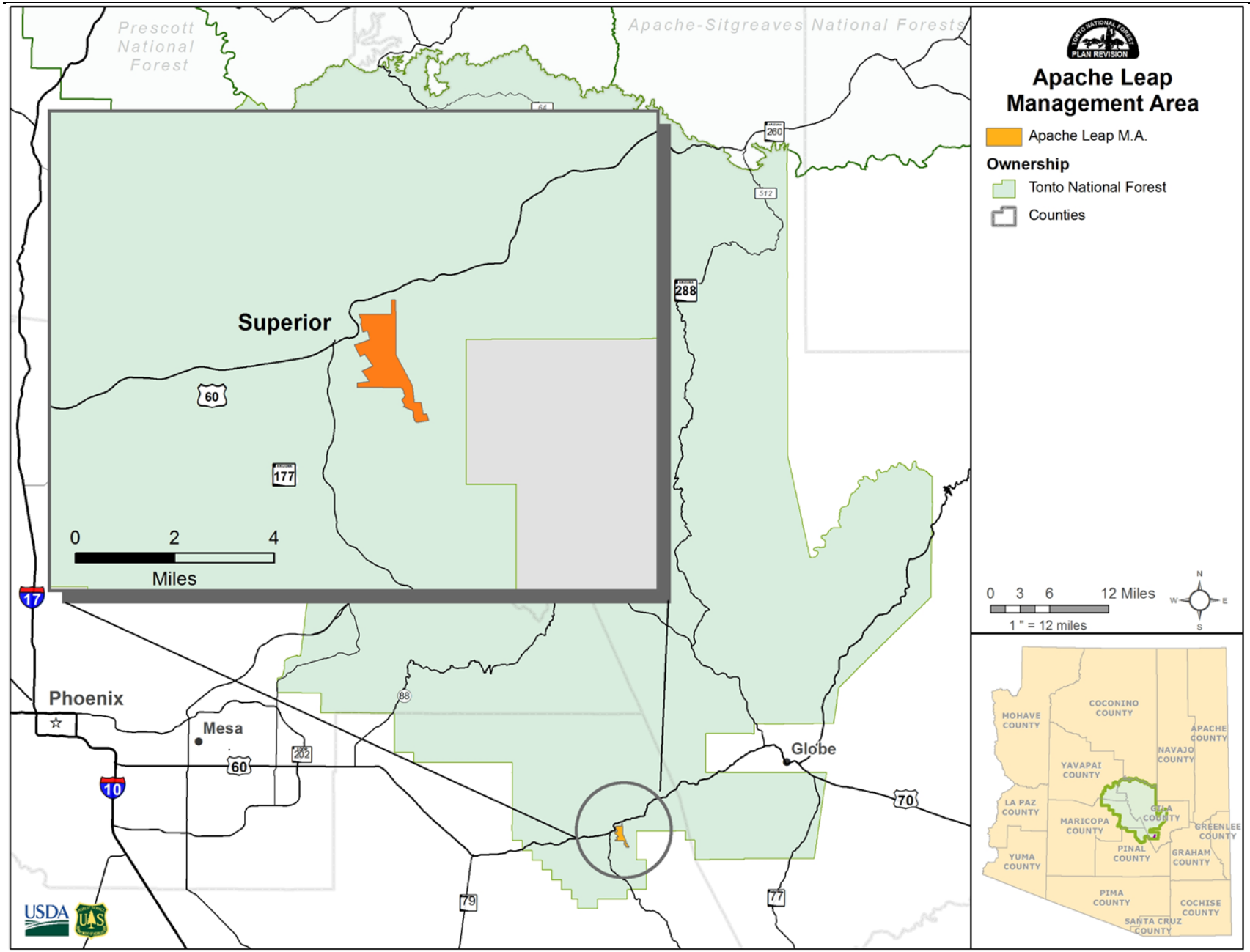

Figure A - 11. Apache Leap Special Management Area

Appendix B. Proposed Probable and Possible Future Actions

Proposed and possible actions include a list of possible actions and potential management approaches. Possible actions are the types of projects that the forest may use in the next three to five 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.

This appendix describes some of the possible actions and potential management approaches and strategies the Tonto National Forest might undertake to maintain or make progress towards achieving the desired conditions described in the forest plan. It is also intended to help clarify how the planned outcomes (e.g., objectives and desired conditions) in the plan might be achieved. The potential management approaches included here may be used to inform future proposed and possible actions. It does not serve as a "to do list" of projects; it does not suggest expected locations or dates of implementation; and it is not an all-inclusive list.

This appendix provides information by individual resource areas that is intended to clarify the intent and provide suggested means to achieve specific forest plan direction and components related to each resource area. Management approaches and strategies presented in this section may include suggestions for on-the-ground implementation, analysis, assessment, inventory, or monitoring, as well as partnership and coordination opportunities the Forest is suggesting might be helpful in achieving its desired conditions.

The potential approaches and strategies are not intended to be all-inclusive, nor are they commitments to perform particular actions. The types of actions that are exemplified in this appendix do not commit the Tonto National Forest to perform or permit these actions but are provided as actions that would likely be consistent with plan components and that might be undertaken to maintain or move towards the desired conditions and objectives. Although the purpose and need developed for a specific project may address one or more desired conditions identified in the forest plan, each individual desired condition would not need to be met on every project nor in every treatment area within a project.

The plan of the Tonto National Forest employs adaptive management in its decision making and achievement of the plan's desired conditions and objectives. Adaptive management emphasizes the learning process. It involves using the best current knowledge to design and implement management actions, then monitoring and evaluating results and adjusting future actions on the basis of what has been learned. This is a reasonable and proactive approach to decision-making considering the degree of uncertainty in future ecological, social, and economic factors.

Other than the following section, which is a required element of forest plans developed under the 2012 planning rule, this appendix describing potential management approaches and possible actions

is optional content in the Tonto National Forest plan. Forest plans may include optional content such as potential management approaches, strategies and partnership opportunities, or coordination activities (36 CFR § 219.7(f) (2)).

Probable Future Management Actions

Objectives as outlined within chapter 2 and 3 of this land management plan represent projects or activities intended to be accomplished during the planning period. These are listed below by resource area.

Partnerships

01 Develop at least one new partnership each year with an organization or club who will provide quality long-term volunteer services and projects for the Tonto.

Recreation

01 During each ten-year period of the plan, rehabilitate[111] five to seven areas on the Tonto where dispersed recreation is causing erosion, sanitation issues, or other adverse effects on natural resources.

02 During the ten-year period following plan approval, implement at least three strategies to raise awareness of discouraged practices (e.g., illegal dumping, unsafe shooting practices, driving on closed roads) to promote visitor safety and natural resource protection.

03 Within ten years of plan approval, develop or modify one to four systems[112] of sustainable, designated motorized trails (e.g., motorcycle, jeep, and off-highway vehicle trails) to adequately provide for these user groups and reduce user conflicts.

04 Within ten years of plan approval, develop or modify one to four systems[113] of sustainable, designated nonmotorized trails (e.g., mountain biking, equestrian, hiking) to adequately provide for these user groups and reduce user conflicts.

05 Every five years take appropriate action (e.g., close, decommission, or convert) on at least ten miles of motorized and/or nonmotorized trails[114] that may not offer recreational value (e.g., unsustainable, low-use, or have no remarkable destination value) or are not needed for administrative use.

[111] Rehabilitate can be defined as to reestablish the natural landscape, ecosystem, or artificial improvements through sustainable ecological, social, or economic management practices based off the activity and use in the area. Examples include planting seed and small vegetation in an area that has experienced soil compaction and vegetation trampling from vehicles where there are no designated roads or motorized trails.

[112] A System (of trails) is a group or collection of trails or roads that are interconnected, defined access points, similar recreation destination values.

[113] A System (of trails) is a group or collection of trails or roads that are interconnected, defined access points, similar recreation destination values.

[114] Designated trails / routes

06 Within five years of plan approval, conduct forest closure for public nudity at all trailheads and developed recreation sites (e.g., campgrounds, camping areas, picnic areas, day use sites, and boating sites).

Developed Recreation

01 Within one year of plan approval, complete an occupancy and use order to establish quiet hours within developed campgrounds between 10pm and 6am[115].

Dispersed Recreation - Recreational Shooting

01 Within two years of plan approval, complete recreational shooting closure on behalf of public safety and in compliance with the Dingell Act[116], in the following areas:

a. Within a minimum of one quarter mile from developed recreation sites;

b. Within a minimum of one quarter mile from occupied private property, residences, or administrative sites;

c. Within the Lakes and Rivers Management Area; and

d. Within any designated off highway vehicle areas, including “tot lots,” and special recreation permit areas along shorelines as identified in the motor vehicle use map (MVUM).

Rangelands, Forage, and Grazing

01 At least two water troughs or open storage tanks per ranger district will be fitted with wildlife escape ramps each year until all troughs and tanks have ramps.

02 At least one vacant allotment will be evaluated for one of the following options every two years, until there are no vacant allotments. If additional allotments become vacant (waived without preference) they will be evaluated for one or a combination of the following options within two years:

a. Convert to forage reserves to improve resource management flexibility;

b. Grant to current or new permitted livestock producer; or

c. Close to permitted grazing, in whole or in part.

Forestry and Forest Products

01 Provide at least 34,000 CCF (hundred cubic feet) or 15,400 MBF (thousand board feet) of timber every ten years to contribute to forest product industry.

Mining, Minerals, and Abandoned Mines

01 Implement closures of at least ten abandoned mines every five years.

[115] Quiet Hours enforceable under 36 CFR § 261.4 (Disorderly Conduct), 36 CFR § 261.10i & ii (Occupancy and Use)

[116] Dingell Act is an omnibus land act that protected public lands and modified management provisions. See also the Forest Service handbook (Forest Service Handbook 5309.11, section 34) for the directives related to recreational shooting.

Roads

01 Decommission[117] 100 to 600 miles of a combination of unauthorized routes and national forest system roads identified through the travel management process every ten years.

02 Grade surfaces and clean culverts and ditches on at least 500 miles of open National Forest System roads annually.

Vegetation Ecological Response Units

01 In frequent-fire forested ecological response units (ponderosa pine forest, ponderosa pine-evergreen oak, and mixed conifer-frequent fire), emphasize treatments within the ponderosa pine-evergreen oak ecological response unit by treating:

a. 50,000 to 122,000 acres over a ten-year period with both mechanical treatments and fire. About 22 percent would be treated with prescribed fire, with the expectation that the rest would be treated with wildfire.

b. 105,000 to 325,000 acres over a ten-year period with only fire (no mechanical treatment). About 22 percent of these acres would be treated with prescribed fire, with the expectation that the rest would be treated with wildfire.

02 In woodland ecological response units, emphasize treatments within the frequent fire woodlands (pinyon-juniper grass, juniper grass, and Madrean pinyon oak) as follows:

a. 400 to 2,000 acres over a ten-year period with both mechanical treatments and fire. About 22 percent would be treated with prescribed fire, with the expectation that the rest would be treated wildfire.

b. 20,000 to 200,000 acres with only fire (no mechanical treatments) over a ten year period. About 22 percent would be treated with prescribed fire, with the expectation that the rest would be treated by wildfire.

03 Restore[118] at least 500 acres of semi-desert grasslands, over a ten-year period.

04 Survey, inventory, or treat 10,000 to 15,000 acres of invasive species[119] (e.g., buffelgrass, fountain grass, and red brome) in desert ecological response units (Sonoran Desert plant communities and Sonora-Mojave mixed-salt desert scrub) over a ten-year period.

[117] Decommission includes activities that result in restoration of unneeded roads to a more natural state using one or more of the options found per FSM 7734.

[118] The term "restore" as defined in Forest Service Handbook 1909.12 Land Management Planning Handbook, Chapter- Zero Code is to renew by the process of restoration. Ecological Restoration, as defined in Forest Service Handbook 1909.12 Land Management Planning Handbook, Chapter- Zero Code.

[119] See the Invasive Species section in Chapter 2: Forestwide Plan Direction for more information.

Watersheds and Water Resources

01 Implement at least one essential project identified in the Watershed Restoration Action Plan[120] for each priority watershed every year.

02 Improve or maintain[121] watershed condition class of at least one 6th code (HUC12) watershed every five years, as defined in the Watershed Condition Framework.

03 Improve soil and water condition of at least 10,000 acres annually.

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

05 Apply for state-based water rights for instream flow use for at least two streams threatened with dewatering, supporting highly valued resources (e.g., threatened or endangered species, species of conservation concern, river-based recreation) or containing unique qualities (e.g., a perennial stream in the Sonoran Desert) within each ten-year period.

Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones

01 Complete active and passive restoration projects on at least 125 miles of streams every ten years to improve the ecological integrity of perennial and intermittent riparian ecosystems rated as nonfunctioning and functioning-at-risk.[122]

02 Improve[123] ten to fifteen individual springs during each ten-year period.

Wildlife, Fish, and Plants

01 Implement at least 20 activities (e.g., habitat improvement projects, collaborative agreements, wildfire management) that contribute to the recovery of at-risk species every ten years.

[120] Watershed Restoration Action Plans for priority watersheds are used to maintain or improve watershed condition and implement essential projects.

[121] Improving a watershed means the completion of essential projects within a Watershed Restoration Action Plan that result in a better condition class (i.e. from “impaired” to “functioning at risk” or “functioning at risk” to “functioning properly”). Maintaining a watershed means the completion of essential projects within a Watershed Restoration Action Plan that result in no change of condition class of a watershed (i.e. keep it as “functioning at risk” or “functioning properly”).”

[122] Both nonfunctioning and functioning-at-risk are synonyms from the Proper Functioning Condition assessment framework and terms “Nonfunctional” and “Functional-at-risk.” Nonfunctioning riparian areas are highly degraded, and do not provide adequate vegetation, landform, or woody material to dissipate stream energy associated with moderately high flows, and thus are not reducing erosion or providing ecosystem services such as improving water quality. Functional-at-risk riparian areas are limited in functioning condition, however existing hydrological, vegetative, or geomorphic attributes make them susceptible to impairment.

[123] Spring improvement refers to work that improves the ecological integrity of a spring. See the 2020 Forest Service General Technical Report “Rangeland Water Developments at Springs: Best Practices for Design, Rehabilitation, and Restoration.”

02 Complete at least 20 products or activities that educate the public about wildlife, fish, and rare plants every two years (e.g., educational signs and brochures, website pages, species checklists, presentations, and field trips).

Invasive and Noxious Species

01 Treat and control invasive species on 200 to 1,500 acres annually.

02 Treat and control invasive species on two to ten stream reaches every five years.

Designated and Recommended Research Natural Areas and Botanical Areas

01 Within one year of plan approval, complete closure of overnight camping and recreation campfire in designated or recommended botanical areas.

Possible Future Management Actions

Management approaches as outlined within chapter 2 and 3 of this land management plan describe some of the possible management actions for achieving desired conditions and objectives. These are listed below by resource area.

Partnerships and Volunteers

01 Work collaboratively with partners and volunteers on forest issues and enable them to take action to move projects forward when they can provide funding, volunteers, and other resources for environmental analysis or project implementation.

02 Use a collaborative approach when developing and implementing projects by forming partnerships with other Federal and State agencies, local professional organizations, for-profit and not-for-profit organizations, and strategic partners and volunteers.

03 Work to implement methods to recruit, train, and coordinate volunteers that are consistent across the Tonto National Forest.

04 Consider ways to engage underrepresented communities in forest projects and activities.

Recreation

01 Utilize a sustainable recreation approach consistent with the most recent Tonto Sustainable Recreation Action Plan, or similar strategy, including the completion of the actions and objectives outlined in the action plan.

02 Increase public awareness and compliance in rehabilitation or restoration areas by posting information to redirect use away from sites.

03 Develop and utilize Local Sustainable Recreation Collaboratives, or other similar working groups, comprised of municipal, county and state governments, special interest recreation groups, interested organizations and individuals, and the forest to address recreation opportunities and challenges and identify solutions that meet the needs of the recreating public and of the communities we serve.

04 Encourage marketing and tourism organizations (such as chambers of commerce, boards of tourism) to promote tourism and recreational opportunities on the forest through websites, brochures, conferences, and other educational/informative outlets.

05 Promote shared stewardship by continuing to develop partnerships and volunteer opportunities, and by taking advantage of opportunities to engage with the public.

06 Collaborate with Federal, State, and local governments, for-profit and non-profit organizations, permit holders, communities, clubs, and individuals on topics that relate to sustainable recreation (e.g., forest stewardship, conservation education and volunteerism, visitor satisfaction, recreation opportunities, and recreation impacts). Develop interpretive materials and conservation education programs in conjunction with our partners and communities to help visitors understand their relationship with the natural environment. Use current technology and media sources to connect to forest users.

07 Promote established programs (e.g., Leave No Trace, Kids in the Woods, Passport in Time, Discovery Agents, and Bear Aware) and develop new conservation education programs that help connect people to nature and encourage responsible use at various locations (e.g., schools, youth activities, fairs, and volunteer events).

08 Consider the use of permit and reservation systems to preserve the integrity of the Tonto National Forest'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 off-highway vehicle areas).

09 Evaluate whether new recreation infrastructure developments qualify for recreation fees or can be managed through formal partnership agreements, permits, or other contractual instruments. Periodically evaluate whether existing recreation infrastructure may also qualify to change to these types of management.

10 Utilize shared interests and ideas of forest users to connect people to recreation management and facilitate conversations related to sustainable recreation and conservation (e.g., place-based collaboratives and cross-boundary planning).

11 Utilize National Visitor Use Monitoring Surveys, or similar user satisfaction surveys, to adapt management where deficiencies are identified and increase user satisfaction.

Developed Recreation

01 When evaluating to operate or close a site, consider the volume of use and public demands, resource protection needs, opportunities for public-private partnerships, equitable geographic distribution, and operating costs.

02 Consider incorporating sustainable operations (e.g., solar panels, electric maintenance vehicles, recycling receptacles, and trash can compaction models) at developed recreation sites.

03 Consider additional fee areas to maintain and manage developed facilities, particularly in high use areas.

04 Utilize accessibility guidelines and Architectural Barriers Act criteria when building or modifying recreation infrastructure.

05 Aspire to achieve 80 percent fee compliance in fee sites and provide on-site payment methods for public convenience, where practicable.

06 Consider decommissioning developed campgrounds and recreation sites that are deemed unsustainable, low-use, or have no remarkable destination value.

Dispersed Recreation

01 Consider using educational techniques (e.g., brochures, signs, websites, and social media) to enhance visitor knowledge of proper recreation etiquette.

02 Utilize existing agency protocol, or work with partners to develop and utilize a forestwide protocol, to assess the sustainability, objectives, and use of National Forest System trails and dispersed campsites, and prioritize work needed to address resource damage and user conflicts.

03 Encourage campers with saddle or pack animals to carry certified weed-free cubed, pelleted, or rolled feed to limit overuse of the vegetation and discourage establishment or spread of invasive species.

04 When designing and constructing new trails, consider separating motorized and nonmotorized opportunities.

05 Consider additional facilities at high-use areas such as toilets and other recreational infrastructure when fees are supported or when the user community is willing to pay the cost of installation and maintenance through a formal partnership agreement, permit, or other contractual tool.

06 Utilize collaborative partnerships where volunteers plan, lead, and execute a majority of motorized and nonmotorized trail and airstrip maintenance.

07 Utilize closure orders where dispersed recreation activities have caused resource damage.

08 Work with partners to identify recreation opportunities along the Great Western Millennium Trail.[124]

09 Consider using natural barriers to mitigate adverse effects in and around dispersed recreation areas.

[124] The Great Western Trail was designated as a National Millennium Trail under Executive Order 13072. The trail system traverses 4,455 miles through Arizona, Utah, Idaho, Wyoming, and Montana with a portion of it on the Cave Creek and Mesa Ranger Districts.

Motorized Recreation

01 Consider proposals for improving motorized recreation opportunities including new loop trails, connector trails that create loops, staging areas, and trailheads.

02 Consider public involvement when new motorized recreation infrastructure is proposed in proximity to residential areas.

03 Consider implementing off-highway vehicle permit zones to increase public awareness and improve compliance in areas with high user conflicts or resource damage.

04 Consider investing in the resources necessary for motorized recreation management to address user demands and resource impacts associated with motorized recreation.

05 Consider incorporating dust abatement in design elements for new projects (e.g., trailheads, staging areas).

06 Work with other Federal and State agencies, stakeholders, and organizations to inform the demands and trends for motorized recreation and help with signage and enforcement.

Nonmotorized Recreation

01 Promote educational programs (e.g., “don’t bust the crust”) to encourage those participating in nonmotorized recreation to use only National Forest System trails.

02 Develop and implement a strategy for a sustainable, “right-sized, forestwide, nonmotorized trail system.”

03 The Forest works with partners, user groups, and volunteers to maintain trails, including the Adopt-A-Trail Program. To facilitate trail maintenance, partnerships are in place prior to construction of new nonmotorized trails.

04 Collaborate with established local and national climbing, caving, and canyoneering organizations to monitor popular and desirable climbing areas and develop best practices and management plans for these areas (e.g., cave management plans, climbing management plans, vertical trails, individual route applications, and canyoneering routes).

05 Coordinate with local partners and climbing groups to either remove or implement maintenance and replacement of existing fixed anchors and bolts and to consider new areas when necessary to meet demands for rock climbing and rappelling while meeting public safety and natural resource desired conditions and where compatible with other National Forest uses.

06 Work with partner organizations and user groups to expand public education on safe recreational climbing practices and the use of permanent fixed anchors and bolts. Coordinate enforcement efforts with partner agencies, user groups, clubs, and local organizations to increase public education and build “self-regulation” within the recreational climbing community.

Water-based Recreation

01 Coordinate with Arizona Game and Fish Department to manage boating opportunities (e.g., boat registration, facilities, and enforcement) and invasive species management on the Forest.

02 Work with partners, Federal and State agencies, and local governments to monitor water quality and ensure water quality standards for direct human contact are not being violated.

03 Work with partners and stakeholders to promote safe water-based recreation and provide opportunities for the future.

Recreational Shooting

01 Work with partners to identify and improve recreational shooting opportunities based on public needs. Collaborate with partners to develop criteria for determining where recreational shooting is appropriate and where it is not appropriate.

02 Consider permitted and developed shooting ranges and other management tools to meet demands for recreational shooting while also meeting public safety and natural resource protection objectives.

03 Work with partners to expand public education on safe recreational shooting practices and “Leave No Trace” standards.

04 Coordinate enforcement efforts with law enforcement agencies to increase public education and build “self-regulation” within the recreational shooting community.

05 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).

06 Work with partners to identify areas in need of signage, increased enforcement, and a list of appropriate target types.

Wildlife Related Recreation

01 Work in collaboration with Arizona Game and Fish Department to:

a. Maintain and/or enhance habitat for economically import species.

b. Reintroduce species of interest into historical home ranges.

c. Coordinate fish and wildlife management activities (e.g., reintroductions, introductions, or transplants; control or eradication of nonnative species; habitat enhancement; and the management of sport and native fishes).

d. Plan and prioritize projects that achieve desired conditions for hunting, fishing, and watchable wildlife species and habitats on the Forest.

e. Establish short and long-term goals consistent with agency missions to foster healthy and productive populations of native and non-native sportfish and game species.

02 Develop and maintain partnerships and programs that promote local recreation through hunting, fishing, and watchable wildlife.

03 Identify and enhance watchable wildlife opportunities on the forest and work with partners to provide information on watchable wildlife programs and opportunities.

04 Consider current user demands and future trends for wildlife related recreation using economic studies and other best available science.

05 Consider recommendations of wildlife planning efforts (e.g., Arizona Game and Fish's State Wildlife Action Plan and Cold Water Fisheries Plan, the North American Waterfowl Management Plan), and other range-wide management plans for big game, upland game, and aquatics species.

06 Encourage public interest in fishing for native sport fish species.

Special Uses

01 Recreation special use proposals that request outfitting and guiding activities in high-demand or heavily impacted areas will be reviewed and handled to the most current management plans, or practices, for that area or activity and will be re-evaluated as needed.

02 Work cooperatively with the Arizona Game and Fish Department to manage fishing and hunting outfitting and guiding operations, recreation events, and tournaments.

03 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.

04 Consider using special use authorization terms and conditions as a means of protecting water dependent resources (refer to the Watersheds and Water Resources section) on the forest.

05 When applicant objectives can be met outside of designated wilderness, consider authorizing activities in locations outside of wilderness before authorizing locations within wilderness areas.

06 Consider managing existing outfitting and guiding authorizations to standard[125] before issuing new proposals.

Energy Production and Delivery

01 Work with partners to identify new transmission line corridors that will minimize impacts to the landscape and also offer mitigation measures.

Rangelands, Forage, and Grazing

01 Coordinate permittees' grazing schedules with planned prescribed fire treatments to ensure there will be sufficient fuel to allow burn objectives to be met and forage available for permittee.

[125] As defined in FSM 2716.5 and NRM Special Uses Data System - User Guide Chapter 5 Pg. 91-95

02 Forest managers continually work with permittees to adjust timing, intensity, and frequency of livestock grazing to respond to changing resource conditions (e.g., fire, flooding, drought, high fuel loading).

03 Consider allowing structural range improvements to be added or removed to meet desired conditions in conformance with applicable laws and regulations in the Allotment Management Plan.

04 Range managers use a cooperative approach working with permittees, local, county, State, and Federal government entities, and non-government organizations and develop partnerships to facilitate flexible and balanced permitted use.

05 Encourage the development of water sources in uplands (including wells) where possible to improve or restore riparian areas.

06 Work with partners (e.g., University of Arizona and Friends of the Tonto) to complete rangeland monitoring using currently accepted protocols (e.g., Reading the Range and riparian photo points).

07 Utilize post-fire resource assessments (e.g., burned area emergency response assessments) to determine timing for the restocking of livestock in the burned area post-fire. Consider the post-fire condition of ecological resources (e.g., vegetation, soil, riparian, and watershed conditions) and the functionality of range improvements before restocking.

08 Coordinate with partners, permittees, and other stakeholders to monitor and/or address unauthorized livestock use across all allotments, including closed and vacant.

09 Production, utilization, and other monitoring and assessment techniques are considered when developing stocking rates. Where current stocking rates are not available (e.g., vacant or rested allotments and pastures) production and other inventories may be used more broadly.

10 Work with agencies and partners to identify, maintain, and implement projects that increase water availability across the landscape for livestock and wildlife.

11 Consider targeted grazing to reduce high fuel loading.

Cultural and Historic Resources

01 Collaborate with American Indian tribes and other traditional[126] communities (e.g., descendants of Basque sheepherders, Chinese immigrant laborers, Latin American miners) to manage cultural and historic resources while conserving anonymity of such sites where appropriate, and to identify design elements for such properties.

[126] "Traditional" is used here in the manner described in National Register Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties, which states: "'Traditional' in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice."

02 Work with partners and volunteers (e.g., American Indian tribes, Arizona Site Steward Program, Arizona Preservation Foundation, Arizona Archaeological Council, National Trust for Historic Preservation, National Park Service, Bureau of Indian Affairs, Bureau of Land Management, U.S. Fish and Wildlife, and local museums) to identify, study, protect, and monitor archaeological sites and artifact collections.

03 Prioritize baseline Heritage program work, and focus National Historic Preservation Act Section 110 survey considering the following:

a. areas where eligible cultural resources are threatened or on-going impacts are unknown and need to be assessed;

b. areas indicated to have high cultural value or high density of cultural resources;

c. areas of importance to traditional communities; and

d. areas where additional survey will contribute to a greater regional understanding of a specific area.

04 Find teaching opportunities, both internally and externally, to educate employees, permittees, contractors, and public groups on the identification, management, impacts to, and protection of significant cultural resources.

05 Work with stakeholders to determine heritage tourism opportunities, educational needs, and other benefits to the public. Work with state and local governments, historic preservation groups, historical societies, and other interested stakeholders to identify best management practices and design elements to minimize adverse effects to historic properties, promote cultural awareness, and strengthen local economies.

06 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.

07 Consider restoration of select significant historic structures for appropriate recreation or interpretive use (e.g., Rooms with a View cabin rental program).

08 Consider maintaining and updating existing interpretive sites (e.g., Sears-Kay Ruin, Shoofly Ruin, Rye Creek Ruin) to enhance visitor experiences and educational opportunities.

09 Consider incorporating repair or restoration actions as part of adjacent project-specific work or as part of annual Heritage program administration where human and/or natural caused disturbances (e.g., flooding) have damaged historic properties.

10 Consult with the Arizona State Historic Preservation Officer in the management of historic properties, utilizing any applicable programmatic agreements.

Tribal Relations and Areas of Tribal Importance

01 Work cooperatively with tribes to develop management protocols to address the restoration and sustainability of traditionally important plants and ensure that healthy sustainable plant

populations are available for traditional uses. Work with tribes to identify and locate species of interest (e.g., citizen science iNaturalist project).

02 Consider developing and maintaining memoranda of understanding or other agreements to formalize work with American Indian tribes and to identify community needs and build respectful, collaborative relationships to achieve mutually desired conditions.

03 Provide training opportunities for Forest Service employees to gain a broader understanding of the unique legal relationship between the Federal Government and federally recognized tribes and tribal customs, traditions, and values.

04 Work with American Indian tribes to build respectful, collaborative relationships; to develop ways of accomplishing desired conditions and goals; and to collaborate in ecosystem restoration efforts.

05 Actively seek opportunities to employ tribal work crews to assist with land restoration and other projects.

06 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.

07 Develop, coordinate, and/or support programs focused on getting tribal members, including youth, involved in education activities on the Forest.

08 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 history, culture, and traditions.

09 Leverage opportunities for developing and/or supporting tribal monitoring programs to better identify, protect, and manage historic properties, sacred sites, areas of tribal importance, and culturally significant forest products.

10 Consider traditional ecological knowledge during project design, decisions, implementation, and monitoring.

11 Consult with tribes early and throughout the process of project planning and design.

Forestry and Forest Products

01 Consider preparing pest and invasive species control plans in coordination with forest health and pest management specialists that contain appropriate design elements to mitigate any pest or invasive species concerns. (e.g., planting resistant tree species, maintaining species diversity, removing damaged trees or invasive species, and using pesticides). Utilize monitoring of procedures and results to inform future pest and invasive species control plans.

02 Coordinate with tribes during the planning of forest restoration projects to promote the persistence of plants used for traditional, cultural, and ceremonial purposes.

03 Consider designing small timber contracts to accommodate small operations based in local communities.

04 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

01 Where management activities have short-term negative impacts to scenery, consider displaying interpretive or informational signs.

02 Consider setting priorities for rehabilitation of areas where existing scenic integrity is below the scenic integrity objective (as defined in the Scenery Management System, or similar protocol).

03 Work with partners, Federal and State agencies, local governments, and Tribes to protect and enhance scenic character on the Tonto National Forest.

04 Make the scenery management inventory and scenic integrity objective maps available to neighboring land management agencies, State agencies, communities, other partners, and the public for consideration in their projects and plans.

05 Use the Forest Service Built Environment Image Guide, or similar guide, as a reference in construction or reconstruction of Forest Service facilities to ensure consistency with the scenic character of the Southwestern Region.

Mining, Minerals, and Abandoned Mines

01 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 to ensure effective reclamation.

02 Work with proponents to list the Tonto National Forest as “Landowner” on all Arizona Department of Water Resources form (e.g., Notice of Intent to Drill and Abandon an Exploration/Specialty Well) and provide copies of submitted forms to minerals administrator.

03 Seek opportunities to work with proponents to expand and share knowledge of local natural resources (e.g., proactive data collection and sharing and development of conservation measures).

04 Develop general guidelines and informational brochures for public dissemination on rock hounding[127] and mineral collecting on Forest.

05 Encourage proponents and/or contractors to utilize local resources for economic benefit of the community.

[127] Rock hounding is the recreational study and hobby of collecting rocks and mineral specimens from their natural environment.

06 Encourage large-scale mine sites to convert to other productive uses (e.g., renewable energy production, agricultural, or recreational types of uses) where reclamation to the original Ecological Response Unit is impracticable.

Roads

01 Develop partnerships with various interest and user groups to participate in evaluation, planning, and maintenance programs for roads.

02 Prioritize decommissioning of roads or user created routes that impact flow regimes, are redundant routes, cause mass movement of soils and sediment, are built within the riparian management zone, or have substantial negative impacts to at-risk species.

03 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.

04 Utilize the Arizona Department of Transportation Guidelines for Highways on Bureau of Land Management and National Forest System lands, or similar document, when designing, constructing, or maintaining highways that traverse forest land.

Facilities

01 Consider developing a comprehensive preventative maintenance program for buildings and infrastructure to minimize major unplanned repairs or replacements.

02 Consider prioritizing infrastructure investments for current needs and long-term planning goals as identified in the facilities master plan, sustainable recreation plan, other resource documentation, and health and safety requirements.

Lands and Access

01 Develop a strategy to address known and suspected trespass and encroachment issues present on the Forest.

02 While addressing access problems on the Forest, seek cooperation of private landowners through acquiring easements.

03 Consult with interested state and local governments on Forest decisions regarding permits and easements with planning and zoning ordinances where local and Forest objectives are complementary.

Vegetation Ecological Response Units

01 Work with partners on collaborative plant conservation programs and projects aimed at restoring native plant communities and ecosystem resiliency.

02 Support new and existing partnerships 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).

03 Use a risk assessment, hazard index, or similar methodology to identify areas with the greatest need for treatment to mitigate the potential for detrimental fire effects. It should be updated at least every two years as management activities, natural disturbances, or other changes in condition change the need for treatment.

04 Work closely with the U.S. Fish and Wildlife Service to address the habitat needs of the Mexican spotted owl by minimizing unnatural disturbance and providing nest/roost habitat, which includes managing for areas of closed canopy and desired levels of key structural elements (e.g., large old trees, snags, and downed woody material) in forested ecological response units. Forested ecological response units provide Mexican spotted owl habitat as discussed under the most recent, approved recovery plan for the Mexican spotted owl.

05 Work with partners and other experts in the field to proactively promote research and monitoring that will assist in the adaptive management related to climate change.

Desert Ecosystems

01 Document and track current and ongoing research studies of Sonoran Desert ecosystems to better inform management of the response of desert plant species, plant communities, and ecological processes to unnatural disturbances (e.g., fire, livestock grazing, climate change, invasive species, and off-highway vehicle impacts).

02 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.

03 Work with partners and researchers to accomplish mapping, inventorying, and surveying invasive species to meet forest plan objectives. Develop data products such as invasive species cover and extent for the forest using remote sensing or other similar technologies.

04 Use an index, or other quantitative measure, to evaluate the condition of the Sonoran Desert (areas of high vs. of low ecological integrity) that can be shared with partners to facilitate adaptive management. The index uses metrics and data that can be updated and managed by the forest every year or two to inform management activities and priorities in the Sonoran Desert.

Semi-Desert Grasslands

01 Collaborate with partners and stakeholders on grassland restoration, grassland connectivity, and education.

02 Work with partners and research institutions to develop effective management approaches for restoring native perennial grasslands and ecological integrity in areas where non-native plant species (e.g., Lehmann lovegrass, buffelgrass, and fountain grass) are abundant.

03 Develop and refining state-and-transition models to incorporate restoration pathways that would inform management and potential treatment regimes.

04 Identify priority areas for restoration; such as areas with high restoration potential (native perennial grasslands) versus areas with low restoration potential (very high woody encroachment).

05 Consider treating areas through a combination of treatments based on site specific conditions; may include, but are not limited to fire, mechanical, re-seeding native grasses, invasive species treatments, and grazing management.

Pinyon-Juniper Evergreen Shrub

01 Emphasize coordination with local partners and stakeholders to reduce the risk of uncharacteristic or undesirable fires that are hazardous to values in the wildland-urban interface on the Tonto National Forest and adjacent lands of other ownerships.

Riparian Ecological Response Units

01 Use best available scientific information and adaptive management to better understand the effects of treatments in upper levels of watersheds on riparian areas lower down in the watershed.

02 Collect quantitative or qualitative data (e.g., photos of before-and-after-treatment conditions) on riparian fuels whenever possible.

Fire and Fuels

01 Fire and other resource managers take advantage of opportunities as they arise, and/or create opportunities to inform and educate the public about the benefits of wildland fire.

02 Coordinate and work with specialists (forest and/or fisheries biologist, riparian ecologist, soil scientist, hydrologist, or ecologist) to assess appropriate project design or mitigation related to slash piles and their placement near perennial and intermittent streams.

03 Wildland fire risk assessments may be used as a means to assess the potential risk posed by wildfire to specific highly valued resources and assets across large landscapes.

04 Use a risk-based support process (e.g., Potential Operational Delineations (PODS)) to facilitate informed and transparent decision making that will allow beneficial fires to burn under the right conditions, and informs aggressive strategies when fires need to be suppressed.

05 Wildland fire may be coordinated across jurisdictional boundaries when resource and protection objectives can be met for all jurisdictions.

06 Community wildfire protection plans, or similar assessments and management plans, are regularly integrated with plans in other Federal, State, county, local, and Tribal governments, and private landowners within the Tonto's boundary in order to mitigate the potential for negative impacts from wildfire. These plans identify and prioritize areas for treatment based on input from communities and multiple stakeholders and encourage communication between agency and partners.

07 Provide the public with information and/or educational opportunities on fire prevention, smoke management, and both the dangers and beneficial effects of wildland fire is an integral part of the Tonto National Forest fire management program. Incorporate strategies to inform the public about ongoing wildfires, and ongoing or upcoming prescribed fires.

08 Coordinate with Arizona Department of Environmental Quality during prescribed burns to comply with State and Federal regulatory requirements for emissions and impacts to class I areas.

09 Coordinate with Arizona Department of Environmental Quality during wildland fires to ensure awareness of potential smoke impacts to receptors.

10 Integrate wildland fire management with other programs to increase the effectiveness and efficiency of using fire as a tool to improve or maintain resource conditions, restore fire-adapted ecosystems to a resilient condition, and to protect values at risk.

Watersheds and Water Resources

01 Work with forest leadership and partners to identify priority watersheds, develop watershed restoration action plans as well as other restoration activities to leverage resources, and to implement and monitor projects that improve vegetative composition, reduce erosion, and/or otherwise improve watershed function.

02 Complete an inventory of water sources where water rights exist or are needed and file water right applications for water sources needed for National Forest management purposes.

03 Select streams to ensure sufficient flow is provided for protection of riparian and aquatic species and their habitat, and for recreation. Streams prioritized for protection through instream flow water rights would be based on resource values supported by the streams and potential threats to dewatering.

04 Coordinate with Federal, State, and County agencies and with interested stakeholders with respect to water rights and ground and surface water issues (e.g., preservation, water quantity, and timing of flows).

05 Work with partners on developing appropriate environmental flows[128] for sensitive and/or high-risk areas using available tools and best available scientific information[129].

06 Identify aquifers, including important recharge areas, within the forest boundary and consider these areas during project planning and implementation.

07 Manage groundwater quantity and quality on National Forest System lands in cooperation with appropriate State agencies.

[128] Necessary water flows to sustain water resources and the goods and services they provide to people.

[129] An example of this would be e.g., Desert Flows Assessment: Environmental Water Needs of Riparian and Aquatic Ecosystems (U.S. and Mexico) (https://www.sciencebase.gov/catalog/item/599f6ae0e4b0e5eb065f98dc).

08 Identify and inventory groundwater-dependent resources. Collaborate with external groups (e.g., U.S. Geological Survey, State, Tribal and local governments, State geological surveys, and universities) when locating, investigating, or assessing the hydrogeology and groundwater resources of National Forest System lands.

09 Identify and map Source Water Protection Areas on the Forest.

10 Use the Watershed Condition Framework, or other acceptable method, to assess and prioritize watersheds for restoration or maintenance activities.

Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones

01 Use protocols such as Proper Functioning Condition, National Riparian Core, Multiple Indicator Monitoring, Groundwater Dependent Ecosystems, and other data sources such as remote sensing and vegetation classification, or other accepted method for riparian assessments and monitoring.

02 Work with partners and volunteers to accomplish annual utilization monitoring in riparian areas and riparian trend monitoring to track changing conditions over time.

03 Incorporate the State of Arizona's narrative *Biological Criteria for Wadeable Perennial Streams* including Arizona index of biological integrity scores, narrative bottom deposit criteria, or currently adopted water quality standard in stream management (Arizona Administrative Code R18-11-108.01).

04 Assess opportunities to reintroduce beavers to riparian ecosystems as a means of achieving riparian health and providing habitat for at-risk species and other listed species. Riparian and watershed planning could identify areas where beaver were eradicated and prioritize reintroduction in those areas.

05 Explore opportunities to restore natural flow regimes, connect channels and their floodplains where they have been interrupted, and alleviate key stressors to promote natural recovery.

06 Work with partners and stakeholders to inventory, classify, assess, and prioritize springs and recharge areas for restoration, and to implement restoration activities. Include consideration of rare species and endemic species when evaluating springs for restoration.

07 Consider both active and passive restoration techniques[130] to improve riparian conditions and encourage self-sustaining ecosystems.

[130] Active restoration is where management actions (e.g., planting vegetation or bank stabilization or other physical actions) are taken to restore ecological conditions whereas passive restoration focuses on ceasing environmental stressors (e.g., reducing pressure from multiple uses to allow the system to recover on its own.

08 To mitigate any adverse impacts to the spring ecosystem in spring development and maintenance projects, consider conducting a hydrological analysis that includes required flow rate and water table depth to support obligate flora and fauna during the planning and design stages.[131]

Wildlife, Fish, and Plants

01 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. Look for opportunities to be involved in working groups, recovery teams, and other groups focused on conserving at-risk species on the Forest.

02 Consider impacts of climate change on at-risk species when designing projects and analyzing the effects of proposed projects.

03 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 Forest.

04 Identify potential opportunities for local universities, State and Federal research branches, and other research groups to assist and initiate projects that address information gaps and advance Forest Service management of vulnerable, at-risk, or economically important species.

05 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).

06 Prioritize areas for plant surveys by focusing on rare soil types, geological features, or biodiversity hotspots.

07 Participate in and support the reintroduction of extirpated (locally extinct) native species into their native range, while considering ecological conditions and social values.

08 Work closely with the Arizona Game and Fish Department to address habitat and other conservation needs of state priority species (e.g., species of greatest conservation need, species of economic and recreational importance).

[131] See the USDA Forest Service 2020 General Technical Report “Rangeland Water Developments at Springs: Best Practices for Design, Rehabilitation, and Restoration” or other best available science for more information on design considerations, spring management, and restoration approaches.

Invasive Species

01 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 systems.

02 Conduct treatments in a timely manner to reduce or minimize spread.

03 Locations of invasive species are known, recorded, and managed using an integrated pest management (IPM) approach.

04 Invasive species management programs are compatible with and integrated into overall ecosystem resource management.

05 Develop and use action plans to: (1) determine dispersal and transport, (2) determine prediction and forecasting, (3) map and inventory of invasive species, (4) use maps for management and control tactics, and (5) assess the impacts of invasive species or control method.

06 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.

07 Encourage public land users to inspect and clean motorized vehicles and boats prior to recreating on public lands to prevent the spread of invasive species (e.g., quagga mussels and fountain grass).

08 Incorporate new technology (e.g., iNaturalist, EDD maps, and Avenza) and social media (e.g., Instagram) to increase awareness regarding invasive species and to record occurrences on the Tonto National Forest.

09 Explore and incorporate new techniques of treating invasive species (e.g., organic herbicides, herbicide labels, seeding techniques and sources, mapping technologies, and other allowable resources) to strengthen the Tonto National Forest invasive species program.

10 Coordinate with Animal and Plant Health Inspection Service for the release and monitoring of biological controls at invasion sites. Consider only biological controls that do not pose substantial risk to natural resources and to other native species.

11 Participate in scientific weed or invasive species societies, county weed boards, and weed coalitions.

12 Consider developing interpretive signs for placement at portals, treatment sites, and trailheads to alert forest users about invasive species.

13 Strategize approaches to treat and control invasive species. Work with partners and researchers to identify where alternative approaches to invasive species management will help meet forest desired conditions and objectives.

14 Consider using targeted grazing to control invasive species and fuel loading, where appropriate.

Soils

01 Work collaboratively with other agencies and groups that facilitate soil conservation and watershed improvement projects.

02 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!).

03 As conditions change, update the Terrestrial Ecological Unit Inventory data, which provides the basis for planning project activities. Work with partners and stakeholders to share data and improve existing soil information, especially after large-scale soil disturbances.

04 Implement Best Management Practices for ground disturbing activities to ensure long-term soil productivity and satisfactory soil condition (soil health).

05 Consider prioritizing restoration activities (both active and passive) in areas with impaired soil condition where past management has resulted in degraded conditions.

Caves and Karsts

01 Consider the development of a response plan for white-nose syndrome through continued collaboration with the U.S. Fish and Wildlife Service (USFWS), Bat Conservation International, Arizona Game and Fish Department, National Speleological Society, North American Bat Monitoring Program, and others with interests in conservation management for bat species. Support and participate in proactive monitoring for the fungus *Pseudogymnoascus destructans* (Pd), which causes white-nose syndrome.

02 Reference the most current management recommendations and/or decontamination procedures (issued by U.S. Fish and Wildlife Service or U.S. Forest Service) for bat roosts in cave and karst features to prevent the spread and minimize the impacts of white-nose syndrome

03 Consider working with public affairs, recreation, invasive species, minerals staffs; State and other Federal agency partners; and the public to increase awareness internally and externally regarding white-nose syndrome and other significant pathogens at local and regional levels. Include a focus on best management practices for the prevention of outbreaks.

04 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.

05 Foster relationships with caving partners (e.g., Central Arizona Grotto of the National Speleological Society) to engage in cave inventory, survey, mapping, monitoring, management planning, and identification/nomination of significant caves.

06 Collaborate with local and national caving organizations to monitor popular and desirable caving areas and develop best practices and management plans for these areas.

Air Quality

01 Work with agencies, organizations, Tribes, and other entities to actively pursue actions designed to reduce the impacts of air pollutants from sources (e.g., smoke, road maintenance, and mining activities) within and outside the Forest.

02 Consider notifying stakeholders and the public about potential smoke from fire activities through a variety of notification techniques (e.g., media, smoke warning signs along roads).

03 Utilize best management practices to protect visibility and opacity standards on the Tonto National Forest, including Class I areas.

04 Work in cooperation with the Arizona Department of Environmental Quality to monitor smoke during extended periods of burning for levels that may have impacts to human health. Consider deploying smoke monitors when there is potential for significant impacts to the public.

Designated Wilderness

01 Establish a wilderness character baseline and monitor wilderness character for each wilderness based upon the most recent wilderness character monitoring protocol recognized by agency policy. When monitoring shows degradation of wilderness character, consider management actions to preserve and improve wilderness character (e.g., providing public information about periods of lower visitation, implementing a permitting system, site restoration, public education).

02 Consider assigning a wilderness resource advisor, or wilderness specialist in absence of an available resource advisor, to fires within wilderness areas, fires with the potential to enter wilderness areas, or fires potentially affecting the character of an adjacent wilderness area that are not suppressed during initial attack.

03 Evaluate trails for their need to achieve wilderness management objectives, and for their impact on wilderness character to inform decisions to decommission unused trails or to realign/reconstruct needed trails. Priorities for trail reconstruction are to be based on potential for impacts to wilderness character and recreation opportunities, resource protection, and the trails which receive the greatest use. The Forest will regularly publish up-to-date trail maps for all wildernesses, in a variety of formats, including digital.

04 Consider management of motorized and mechanized transportation intrusions into wilderness areas through methods such as wilderness ranger patrols, placement of bike racks near wilderness boundaries, signs, trail design, and expanded opportunities outside of the wilderness. Where violations of group size or length of stay limits are commonly observed, increasing staffing presence should be considered to enhance education or enforcement efforts to address observed violations.

05 Seek out opportunities and collaborate with stakeholders, local partners, volunteers, Adopt-a-Trail organizations, and other organizations for wilderness stewardship, including trail maintenance and construction. Collaborate with stakeholders to build a volunteer base for wilderness stewardship, including recruiting and training volunteer wilderness rangers. Expand

partnerships to increase awareness of wilderness values and etiquette and provide residents who live near wilderness with information to increase awareness and understanding of wilderness. Pursue opportunities to collaborate with neighboring forests and agencies on the management of adjacent and designated wilderness and similarly managed areas to ensure management is as consistent as possible.

06 Coordinate with the Arizona Game and Fish Department and other partners on management of native species within wilderness to maintain and enhance wilderness character during project implementation.

07 Use an education plan to identify and implement wilderness education and interpretation activities outside of wilderness boundaries.

08 Utilize the most recent version of the individual wilderness implementation plans to protect the wilderness characteristics for which they are designated. The following wilderness implementation plans, as amended, and any future versions are incorporated by reference and are part of the plan:

a. Cedar Bench Wilderness Implementation Plan (USDA Forest Service 1995)
b. Four Peaks Wilderness Implementation Plan (USDA Forest Service 1998a)
c. Hellsgate Wilderness Implementation Plan (USDA Forest Service 1993a)
d. Mazatzal Wilderness Implementation Plan (USDA Forest Service 1985a)
e. Pine Mountain Wilderness Implementation Plan (USDA Forest Service 1993b)
f. Salome Wilderness Implementation Plan (USDA Forest Service 1985b)
g. Salt River Canyon Wilderness Implementation Plan (USDA Forest Service 1985c) Sierra Ancha Wilderness Implementation Plan (USDA Forest Service 1998b)
a. Superstition Wilderness Implementation Plan (USDA Forest Service 1998c)

Recommended Wilderness

01 Work with partners and volunteer groups to manage and maintain wilderness characteristics in recommended wilderness areas and to facilitate user support and reduce user conflicts.

02 Develop educational materials about recommended wilderness areas that encourage widespread and common understanding of the values, philosophy, resources, and benefits of wilderness characteristics.

Designated Wild and Scenic Rivers

01 Utilize the most recent version of the individual comprehensive river management plans to protect outstandingly remarkable values and classification. The following comprehensive river management plans and any future versions are incorporated by reference and are part of the plan:

a. Fossil Creek Wild and Scenic River Comprehensive River Management Plan (USDA Forest Service 2021)

b. Verde Wild and Scenic River Comprehensive River Management Plan (USDA Forest Service 2004)

02 Work cooperatively with the Coconino and Prescott National Forests to administer and track authorized activities within the designated wild and scenic river segments of the Verde River and Fossil Creek.

03 Develop educational materials and interpretation of wild and scenic rivers that encourage widespread and common understanding of the values, philosophy, resources, and benefits of wild and scenic rivers.

04 Work with partners to increase stewardship, ecological awareness, and volunteerism on designated wild and scenic rivers.

05 Encourage multijurisdictional coordination on the management and monitoring of conditions within the stream corridors of designated wild and scenic rivers where management actions upstream or downstream may have impacts.

06 Work with the Arizona Game and Fish Department to address habitat and other conservation needs of state priority species on designated wild and scenic rivers.

Eligible Wild and Scenic Rivers

01 Develop educational materials about eligible wild and scenic rivers that encourage widespread and common understanding of the values, philosophy, resources, and benefits of wild and scenic rivers.

02 Work with partners to increase stewardship, ecological awareness, and volunteerism on eligible wild and scenic rivers.

03 Encourage multijurisdictional coordination on the management and monitoring of conditions within the stream corridors of eligible wild and scenic rivers where management actions upstream or downstream may impact eligibility.

04 Opportunities for enhancing outstandingly remarkable values may be considered in project management activities within an eligible wild and scenic river corridor.

05 Work with the Arizona Game and Fish Department to address habitat and other conservation needs of state priority species on eligible wild and scenic rivers.

Designated and Recommended Research Natural Areas and Botanical Areas

01 Collaborate with appropriate agencies, partners, and universities regarding scientific opportunities in designated or recommended research natural areas and botanical areas and to help educate the public about the purpose and use of special areas.

02 Refer to establishment records for research natural areas for detailed information on physical site description, ecological description, and objectives.

03 Work with partners to develop citizen science programs to conduct rare plant surveys and botanical inventories of areas.

04 Add signs and consider fencing boundaries where needed to educate the public.

05 Assess areas that need additional protection measures, such as fencing or installing pipe rail to reduce resource damage.

06 Work with partners, stakeholders, and interested parties to ensure that overnight camping, recreation campfires, and recreational shooting are not impacting research in designated and proposed research natural areas.

Inventoried Roadless Areas

01 Educate the public on values of inventoried roadless areas for dispersed recreation opportunities to take recreation pressure off of highly visited wilderness areas.

National Trails

Applicable to all National Trails

01 Work with volunteer groups, private and non-profit partners, local governments, and adjacent landowners to manage and maintain national trails for the purposes for which they were established.

02 Maintain open and frequent communication with partners and address conflicts (user or management) as soon as possible.

03 Ensure that local wildland fire managers, incident management teams, and others assigned to active incidents are aware that national trails are identified as values at risk during wildland fire management activities.

04 Prioritize wildfire-related rehabilitation along national trails and any associated corridors.

05 Work with partners and volunteers to remove unauthorized structures and restore the trail to established trail management objectives.

06 Work with partners and volunteers to discourage unauthorized trail construction and reconstruction.

Applicable to the Arizona National Scenic Trail

07 Use the most recent version of the Arizona National Scenic Trail Comprehensive Plan when considering projects in the Arizona National Scenic Trail corridor.

08 Work with volunteer groups, partners, local governments, and adjacent landowners to manage the Arizona National Scenic Trail corridor, maintain the condition and character of the surrounding landscape, and to facilitate user support and reduce user conflicts on the trail.

09 Identify opportunities to acquire lands or rights-of way within or adjacent to the Arizona National Scenic Trail as they become available.

10 Consider identifying alternate routes when natural events or forest management activities result in temporary closures along the trail.

Significant Caves

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

02 Consider using volunteers and cost-share agreements to complete projects when applicable.

Lakes and Rivers Management Area

01 Develop and maintain strong working relationships with county sheriffs, the Arizona Game and Fish Department, Salt River Project, and other partners as they are identified to provide quality recreation experiences for the public and to promote the Lakes and Rivers Management Area as a high-quality recreation destination on the Tonto National Forest.

02 Encourage forest visitors to use all of the different lakes and rivers in this management area to disperse recreation and improve experiences. Make information available about recreation opportunities at recreation sites, on social media, and through other media channels and partners.

03 Work with law enforcement, partners, and volunteers to reduce the number of public safety incidents (e.g., substance abuse, physical altercations, drownings, and injuries) and to identify needs for special orders (e.g., closures) when necessary to protect public health and safety.

04 Work with partners, local interest groups, and other applicable affected parties (e.g., the local county sheriff's office, Salt River Project, and permit holders) to remove debris in water bodies that pose a risk to public health and safety or inhibit recreation opportunities.

05 Work to educate forest users about the impacts of trash and litter in riparian areas and encourage "pack it in, pack it out" and Leave No Trace ethics.

06 Work collaboratively with partners to identify management tools to address capacity issues, changes in recreational trends and demands, and improve the overall recreation experience.

07 Notify the public of major changes to management practices utilizing a variety of outreach methods (e.g., press releases, social media posts).

08 Encourage and incentivize permit holders, partners, and volunteers to develop a system of litter clean up and trash disposal.

09 Consider a closure for possession or storage of glass containers within the lakes and rivers management area.

Salt River Horse Management Area

01 Work closely with the Arizona Department of Agriculture to reduce impacts to other uses and natural resources by the Salt River Horse herd.

02 Work with partners to reduce the number of public safety incidents as a result of the Salt River horse herd.

Apache Leap Special Management Area

01 Utilize direction from the Apache Leap Special Management Area management plan (USDA 2017d) when conducting projects or activities in the Apache Leap Special Management Area.

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Appendix C. Species Common Name Crosswalk

The following list of species cross references the common names of species used throughout the forest plan and their associated scientific names.

Table C - 1. Species scientific and common names

Scientific Name	Common Name
Abies concolor	white fir
Acacia greggii	catclaw acacia
Acacia sp.	Catclaw
Agave murpheyi	Murphey's century plant
Agave phillipsiana	Grand Canyon century plant
Agave spp.	agave
Ambrosia sp.	bursage
Arctostaphylos pringelei	Pringle manzanita
Arctostaphylos pungens	Point leaf manzanita
Arctostaphylos sp.	manzanita
Arenaria aberrans (syn. Eremogone aberrans)	Mt. Dellenbaugh sandwort
Aristida spp.	threeawns
Asclepias tuberosa	butterfly milkweed
Atriplex canescens	fourwing saltbush
Atriplex polycarpa	cattle saltbush
Atriplex sp.	Saltbrush
Bothriochloa barbinodis	cane bluestem
Bouteloua barbata var. rothrockii	Rothrock's grama
Bouteloua curtipendula	sideoats grama
Bouteloua eripoda	black grama
Bouteloua gracilis	blue grama
Bouteloua hirsuta	hairy grama
Brassica tournefortii	Sahara mustard, Asian mustard

Scientific Name	Common Name
Bromus rubens	red brome
Bromus tectorum	cheatgrass, downy brome
Calliandrea eriophylla	fairyduster
Canotia holancantha	crucifixion thorn
Carnegia gigantea	saguaro cactus
Ceanothus greggii	desert ceanothus
Ceanothus spp.	ceanothus
Cercocarpus intricatus	littleleaf mountain mahogany
Cercocarpus montanus	mountain mahogany
Cercocarpus montanus var. paucidentatus	hair mountain mahogany
Cimicifuga arizonica (syn. Actea arizonica)	Arizona bugbane
Cylindropuntia bigelovii	teddy-bear cactus
Cylindropuntia sp.	chollas
Dalea albiflora	white prairie clover
Dasyochloa pulchella	desert fluffgrass
Datura wrightii	sacred thorn-apple
Desmodium metcalfei	Metcalfe's tick-trefoil
Digitaria californica	Arizona cottontop
Distichlis spicata	saltgrass
Echinocereus triglochidiatus var. arizonicus	Arizona hedghog cactus
Encelia farinosa	brittlebush
Eragrostis curvula	weeping lovegrass
Eragrostis intermedia	plains lovegrass
Eragrostis lehammaniana	Lehman's lovegrass
Ericameria laricifolia	Turpentine bush
Erigeron anchana	Sierra Ancha fleabane
Eriodictyon angustifolium	narrowleaf yerba santa

Scientific Name	Common Name
Eriogonum fasciculatum	eastern Mojave buckwheat
Eriogonum ripleyi	Fraziers Well buckwheat
Eriogonum spp	buckwheat
Eriogonum wrightii	bastardsage
Erodium cicutarium	redstem stork's bill, filaree
Festuca arizonica	Arizona fescue
Forestiera pubescens var. pubescens	stretchberry
Fraxinus anomala var. lowellii	little singleleaf ash
Garrya flavescens	ashy silktassel
Garrya spp.	silktassles
Garrya wrightii	Wright's silktassle
Gutierrezia sarothrae	broom snakeweed
Hesperocyparis arizonica	Arizona cyprus
Hilaria belangeri	curly mesquite
Hymenoxys ambigens var. ambigens	Pinaleno Mountain rubberweed
Ipomoea coccinea	redstar
Juniperus deppeana	Alligator juniper
Juniperus monosperma	oneseed juniper
Juniperus osteosperma	Utah juniper
Juniperus scopulorum	Rocky Mountain juniper
Lactuca serriola	prickly lettuce
Larrea tridentata	creosote bush
Leptochloa dubia	green sprangletop
Linum lewisii	blue flax
Lotus mearnsii var. equisolensis	Mearns' bird's-foot trefoil
Lycium. sp.	desert thorn
Mabrya acerifolia	brittlestem

Scientific Name	Common Name
Marrubium vulgare	horehound
Mimosa biuncifera	catclaw mimosa
Muhlenbergia montana	mountain muhly
Muhlenbergia porteri	bush muhly
Muhlenbergia spp.	Muhly grasses
Nolina microcarpa	sacahuista
Olneya tesota	desert ironwood
Opuntia sp.	prickly pear cactus
Pakera neomexicana var. toumeyi	Toumey's groundsel
Parkinsonia microphylla	yellow palo verde, foothill palo verde
Pediomelum verdiense	Verde Formation breadroot
Pennisetum ciliare	buffelgrass
Pennisetum setaceum	crimson fountaingrass, or fountaingrass
Penstemon barbatus	beardlip penstemon
Penstemon eatoni	firecracker penstemon
Penstemon linariodes	toadflax penstemon
Penstemon nudiflorus	Flagstaff penstemon
Penstemon palmeri	Palmer's penstemon
Perityle gilensis var. salensis	Salt River rock daisy
Perityle saxicola	Roosevelt Dam rockdaisy
Pinus edulis	twoneedle pinyon
Pinus leiophylla	Chihuahuan pine
Pinus monophylla	singleleaf pinyon
Pinus ponderosa	ponderosa pine
Pinus strobiformis	southwestern white pine
Plantago ovata	Blond plantain
Platanus wrightii	Arizona sycamore

Scientific Name	Common Name
Plantago patagonica	wooly plantain
Polygala rusbyi	Rusby's milkwort
Populus fremontii	Fremont Cottonwood
Populus tremuloides	quaking aspen
Populus angustifolia	narrowleaf cottonwood
Prosopis velutina	Velvet mesquite
Pseudotsuga menziesii	Douglas-fir
Psoralidium tenuiflorum	slimflower scurfpea
Purshia spp.	bitterbrush
Purshia stansburiana	Stansbury cliffrose
Purshia subintegra	Arizona cliff rose
Quercus arizonica	Arizona White Oak
Quercus emoryi	Emory Oak
Quercus gambelii	Gambel oak
Quercus grisea	grey Oak
Quercus turbinella	Sonoran scrub oak, shrub live oak
Rhamnus crocea	redberry buckthorn, hollyleaf buckthorn
Rhus ovata	sugar sumac
Rhus spp.	sumac
Rhus trilobata	skunkbush sumac
Robinia neomexicana	New Mexico locust
Rumex orthoneurus	Chiricahua Mountain dock
Salvia amissa	Santa Catalina Mountain sage
Salvia davidsonii	Davidson's sage
Schizachyrium scoparium	little bluestem
Selaginella arizonica	Arizona spikemoss
Simmondsia chinensis	jojoba

Scientific Name	Common Name
Solanum xanti	chaparral nightshade
Solidago	golden rod
Sphaeralcea. spp.	Globemallow
Sporobolus airoides	alkali sacaton
Verbena wrightii	Davis Mountain mock vervain
Yucca baccata	banana yucca
Qutierresia sarothrae	snake weed
Cupressus arizonica	Arizona cypress