



United States Department of Agriculture

# Tonto National Forest Draft Land Management Plan

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



Forest Service

Tonto National Forest

MB-R3-12-05

November 2019

**Cover Photo:** View of the Salt River from the Apache Trail, credit: Kim Stahl

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotope, and American Sign Language) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at [http://www.ascr.usda.gov/complaint\\_filing\\_cust.html](http://www.ascr.usda.gov/complaint_filing_cust.html) and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: [program.intake@usda.gov](mailto:program.intake@usda.gov).

USDA is an equal opportunity provider, employer and lender.

**Note:** We make every effort to create documents that are accessible to individuals of all abilities; however, limitations with our word processing programs may prevent some parts of this document from being readable by computer-assisted reading devices. If you need assistance with this document, please contact the Tonto National Forest at (602) 225-5200.

# **Tonto National Forest Draft Land Management Plan**

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

For additional information: Kenna Belsky, Forest Planner  
Tonto National Forest  
2324 East McDowell Road  
Phoenix, AZ 85006  
602-225-5200  
[SM.FS.tontoplan@usda.gov](mailto:SM.FS.tontoplan@usda.gov)  
[www.fs.usda.gov/goto/tontoplan](http://www.fs.usda.gov/goto/tontoplan)

*Intentional blank page*

# Table of Contents

<b>Chapter 1. Introduction</b> .....	<b>1</b>
Plan Organization.....	1
Purpose of the Plan.....	1
Description of the Plan Area .....	2
Social and Economic Context .....	2
Key Ecosystem Services.....	6
Adaptive Planning and Monitoring .....	7
Use of Best Available Scientific Information .....	8
Need for Changing the 1985 Forest Plan .....	8
Forest Plan Framework and Organization .....	11
<b>Chapter 2. Forestwide Plan Direction .....</b>	<b>19</b>
Partnerships and Volunteers (PV) .....	20
Recreation (REC).....	21
Special Uses (SU).....	35
Energy Production and Delivery (EG).....	38
Rangelands, Forage, and Grazing (GRZ).....	39
Cultural and Historic Resources (CUH) .....	42
Tribal Relations and Areas of Tribal Importance (TRB).....	45
Forestry and Forest Products (FP) .....	48
Scenery (SC).....	52
Mining, Minerals, and Abandoned Mines (MMAM).....	54
Roads (RD) .....	57
Facilities (FC) .....	59
Lands and Access (LA) .....	61
Salt River Horses (SRH) .....	63
Vegetation and Ecological Response Units (ERU).....	64
Riparian Ecological Response Units (RERU) .....	97
Fire and Fuels (FF) .....	101
Watersheds and Water Resources (WAT).....	105
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ).....	110
Wildlife, Fish, and Plants (WFP) .....	114
Invasive and Noxious Species (INS).....	118
Soils (SL).....	121
Caves and Karsts (CVK).....	123

Air Quality (AQ) .....	125
<b>Chapter 3. Management Areas Plan Direction .....</b>	<b>127</b>
Designated Wilderness (DWMA) .....	128
Recommended Wilderness (RWMA) .....	133
Designated Wild & Scenic Rivers (DWSRMA).....	135
Eligible Wild & Scenic Rivers (EWSRMA) .....	137
Designated and Recommended Research Natural Areas and Botanical Areas (RNBAMA) .....	140
Inventoried Roadless Areas (IRAMA) .....	146
National Trails (NTMA).....	148
Sierra Ancha Experimental Forest (EFMA).....	152
Significant Caves (SCMA).....	154
Lakes & Rivers Management Area (LRMA).....	155
Saguaro Wild Burro Management Area (SWBMA).....	157
Apache Leap Special Management Area (ALSMA).....	158
<b>Chapter 4. Monitoring .....</b>	<b>159</b>
Introduction.....	159
Focal Species.....	160
Monitoring Plan and Strategy.....	161
<b>References .....</b>	<b>169</b>
<b>Appendix A. Maps .....</b>	<b>171</b>
<b>Appendix B. Proposed Probable and Possible Future Actions .....</b>	<b>183</b>
Probable Future Management Actions .....	183
Possible Future Management Actions .....	186
<b>Appendix C. At-Risk Species and Associated Ecological Response Units.....</b>	<b>204</b>

## List of Tables

Table 1. Acronyms used for plan codes.....	14
Table 2. Ecological response units by system type .....	64
Table 3. Fire regimes adapted from (Barrett et al. 2010) and representative ecological response units (ERUs).....	65
Table 4. Desert ecological response units .....	71
Table 5. Mojave Sonoran desert scrub ecological response unit (ERU) desired vegetation conditions ....	73
Table 6. Sonora-Mojave mixed salt desert scrub ecological response unit (ERU) desired vegetation conditions .....	73
Table 7. Semi-desert grassland ecological response unit (ERU) desired vegetation conditions .....	74
Table 8. Interior chaparral ecological response unit (ERU) desired vegetation conditions .....	77
Table 9. Pinyon-juniper woodland ecological response unit (ERU) desired vegetation conditions.....	79

Table 10. Pinyon-juniper grass and juniper grass ecological response units (ERU) desired vegetation conditions.....	80
Table 11. Madrean encinal Woodland ecological response unit (ERU) desired vegetation conditions .....	82
Table 12. Madrean pinyon-oak ecological response unit (ERU) desired vegetation conditions .....	82
Table 13. Pinyon-juniper evergreen shrub ecological response unit (ERU) desired vegetation conditions .....	84
Table 14. Ponderosa pine-evergreen oak (includes perennial grass and shrub subclasses) ecological response unit (ERU) desired vegetation conditions.....	86
Table 15. Ponderosa Pine Forest ecological response unit (ERU) desired vegetation conditions .....	90
Table 16. Mixed conifer–frequent fire ecological response unit (ERU) desired vegetation conditions.....	92
Table 17. Wet mixed conifer–mixed conifer with aspen ecological response unit (ERU) desired vegetation conditions .....	94
Table 18. Eligible wild and scenic rivers with their classifications and outstandingly remarkable values	137
Table 19. Designated and recommended research natural areas and botanical areas on the Tonto National Forest.....	140
Table 20. Inventoried roadless areas on the Tonto National Forest.....	146
Table 21. Monitoring topics, questions, plan components, indicators, and measurement interval for watersheds and riparian areas.....	162
Table 22. Monitoring topics, questions, plan components, indicators, and measurement interval for vegetation, fire, and forest products.....	163
Table 23. Monitoring topics, questions, plan components, indicators, and measurement interval for wildlife, fish, and rare plants.....	165
Table 24. Monitoring topics, questions, plan components, indicators, and measurement interval for recreation .....	166
Table 25. Monitoring topics, questions, plan components, indicators, and measurement interval for cultural resources and sustainability .....	167
Table 26. Monitoring topics, questions, plan components, indicators, and measurement interval for range .....	168
Table 27. Monitoring topics, questions, plan components, indicators, and measurement interval for partnerships and volunteers.....	168
Table 28. At-risk species and associated ecological response units (ERUs).....	204

## List of Figures

Note: Figures located in Appendix A. Maps are preceded by A.

Figure 1. Tonto National Forest vicinity map .....	3
Figure 2. Example of plan component code for inventoried roadless area desired condition .....	15
Figure 3. Example of plan component code for a guideline related to water-based recreation .....	15
Figure 4. Desired conditions for ecological response units at three spatial scales .....	66
Figure A-1. Designated wilderness areas on the Tonto National Forest.....	172
Figure A-2. Recommended wilderness analysis for alternative B .....	173
Figure A-3. Designated wild and scenic rivers on the Tonto National Forest.....	174
Figure A-4. Eligible wild and scenic rivers .....	175
Figure A-5. Proposed botanical areas and existing and proposed research natural management areas	176
Figure A-6. Inventoried roadless areas on the Tonto National Forest.....	177
Figure A-7. National trails on the Tonto National Forest.....	178
Figure A-8. Sierra Ancha Experimental Forest .....	179
Figure A-9. Lakes and Rivers Management Areas on the Tonto National Forest .....	180
Figure A-10. Saguaro Wild Burro Management Area .....	181
Figure A-11. Apache Leap Special Management Area .....	182

*Intentional blank page*



# Chapter 1. Introduction

This land and resource management plan (also referred to as the “forest plan”) guides the Tonto National Forest in fulfilling its stewardship responsibilities to best meet the current and future needs of the American people. 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 content and organization, project consistency with plan components, implementation, and a description of the planning area and its context.

**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 is all combined in this chapter. Additionally, this chapter includes direction for the management of ecosystem services.

**Chapter 3. Management Areas Plan Direction** 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 and management direction is based on applicable authorities and the specific purposes for which the area was created, recommended, or designated.

**Chapter 4. Plan Monitoring** outlines the monitoring and evaluation of plan implementation is used to determine progress toward achieving desired conditions and objectives, and how well management requirements, such as standards and guidelines, are being applied. The monitoring strategy provides a framework for subsequent monitoring and evaluation designed to inform adaptive management.

**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 associated maps referenced in the forest plan or relevant to associated plan direction (e.g., location of management areas).

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

**Appendix C. At-Risk Species and Associated Ecological Response Units** outlines the at-risk species associated with each ecological response unit on the forest, including the common name, scientific name, and taxonomic group for each species.

## 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 to achieve the agency mission is the “Land Management Plan for the Tonto National Forest”.

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 Tonto National Forest Plan was originally approved in 1985 and has since been amended 31 times to accommodate situations in specific projects or to reflect changes in social, economic, or ecological conditions.

A land management 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. Any constraint on the public needs to be imposed by law, regulation, or through the issuance of an order by the responsible official under 36 CFR part 261, Subpart B.

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 (BASI; 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.

## Description of the Plan Area

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 located in central Arizona, with Phoenix to the south, the Mogollon Rim to the north, and the San Carlos and Fort Apache Indian Reservations to the east. 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, 7 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 land management plan covers all of the National Forest System lands within the Tonto National Forest boundary.

## Social and Economic Context

The Tonto National Forest staff manages resources that are important regionally and nationally. One of the primary purposes for establishing the Tonto National Forest in 1905 was to protect its watersheds around reservoirs. The Tonto produces an average of 350,000 acre-feet of water each year. Six major reservoirs on the forest have the combined capacity to store more than 2 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-feet of water is applied to grow an acre of cotton. In 2015, 56% of the water supply for the city of Phoenix came from the Salt and Verde Rivers, which are protected by the Tonto National Forest (ADWR 2019 and Friswold 2016). Management efforts are directed at protecting both water quality and watershed and riparian area conditions.

Communities such as Payson, Globe, Superior, and Young benefit from surrounding National Forest System lands that provide the following: recreation, wood product harvesting, mining, 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 and beyond.

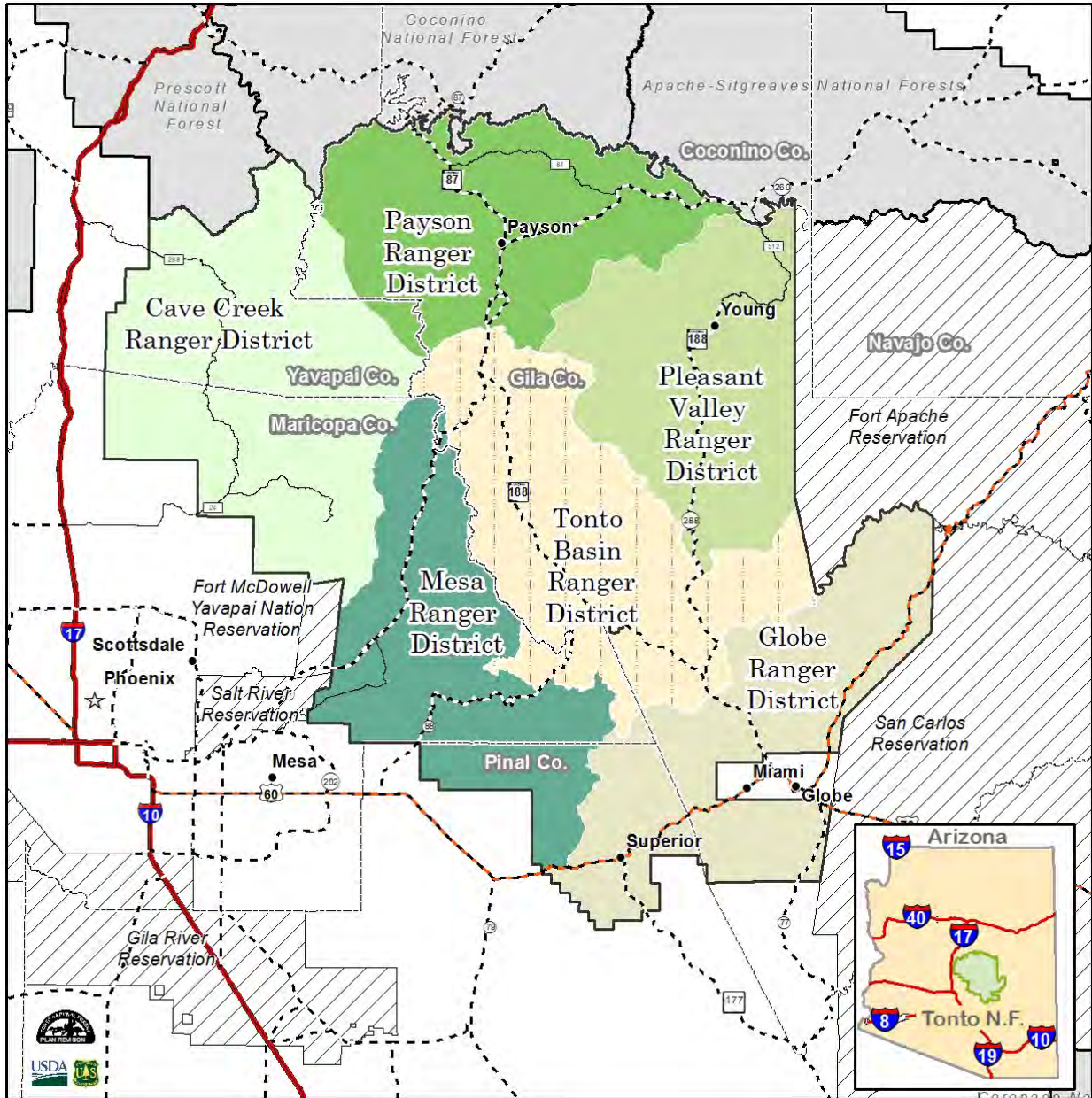


Figure 1. Tonto National Forest vicinity map

### Historical Context

The Tonto has a deep and rich cultural heritage. 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 American Indian 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 for economic, social, and religious purposes.

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 Tonto 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 1500 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 the Tonto 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 Indians 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. 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. A small Mormon colony known as Mesa rapidly 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 expanding population in the Salt River Valley saw these new reservoirs as opportunities for recreation.

## Distinctive Roles and Contributions

Every forest in the National Forest System provides a distinctive role and contribution to the surrounding local area and larger region. The Tonto National Forest is located in central Arizona, with Phoenix to the south, the Mogollon Rim to the north, and the San Carlos and Fort Apache Indian Reservations to the east. 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 (see Figure 1). 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 Tonto 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 a number of rural communities, towns, and cities in central Arizona – including the greater Phoenix area, the 11th largest metropolitan area in the country. The Salt and Verde Rivers are major sources of surface water supplying the Phoenix metropolitan area (see Figure A-4).

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 4 million board feet total 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.

The lands within what is now the Tonto National Forest continue to provide sustenance and spiritual values to Native American Tribes. There are 13 federally recognized Native American Tribes with a potential interest in natural, historical, cultural, and other resources of the Tonto National Forest. These Tribes include the San Carlos Apache Tribe, Tonto Apache Tribe, White Mountain Apache Tribe, Yavapai-Apache Nation, Mescalero Apache Tribe, Salt River Pima-Maricopa Indian Community, Gila River Indian Community, Ak Chin Indian Community, Tohono O'odham Nation, Yavapai-Prescott Tribe, Fort McDowell Yavapai Nation, Hopi, and Pueblo of Zuni. Tribal visitors pursuing traditional uses of the Tonto also clearly form the presence of cultural resources identified as traditional use areas and sacred sites and the protection provided to these properties by the Forest Service management. Cultural resources on the Tonto National Forest contribute to provisioning services primarily for the affiliated tribes: plants and other natural resources for subsistence, medicinal, and ceremonial uses obtained from traditional use areas.

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 3 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 wilderness areas, encompassing more than 589,300 acres, are managed to protect the unique natural character of the land and to ensure that primitive recreational opportunities exists for the public. Designated wilderness areas on the Tonto 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 by Congress as wild and scenic rivers to preserve outstanding natural, cultural, and recreational 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.

Fish and wildlife are a key part of the unique character inherent to the Tonto National Forest, with more than 400 vertebrate species represented. The Tonto National Forest also has 22 Federal and State threatened, endangered, proposed, and candidate species. In addition to this list, the forest also maintains a conservation agreement<sup>1</sup> for one plant species, Arizona bugbane. 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 Tonto 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 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 Tonto 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 Tonto 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 crisscross 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 a number of large reservoirs, numerous ecotonal zones, riparian communities, important rivers, and beautiful geologic features and mountain ranges.

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

---

<sup>1</sup> The Arizona Bugbane Conservation Agreements is a formal agreement between the United States Fish and Wildlife Service and the Forest Service to address the conservation needs of Arizona bugbane with the intent of these protections helping to ensure the species does not become endangered or threatened in the future.

pollination; and cultural, such as spiritual and recreational benefits (MEA 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. These key ecosystem services are important in the broader landscape outside of the forest plan area and are influenced by the forest plan.

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.

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 in order to ensure their availability in the future. See associated sections in Chapter 2. Forestwide Plan Direction.

## 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 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 program 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 best available scientific information has been used to inform the planning process. The planning record documents how best available scientific information was determined to be accurate, reliable, and relevant to issues being considered. The best available scientific information includes relevant ecological, social, and economic scientific information. Use of best available scientific information was documented for the assessment, the forest plan decision, and the monitoring program. The 2012 Planning Rule does not require that planning develop additional scientific information, but that planning should be based on scientific information that is already available. New studies or the development of new information is not required for planning unless required by other laws or regulation. In the context of the best available scientific information, 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.

## Need for Changing the 1985 Forest Plan

Since the release of the Tonto National Forest Land and Resource Management Plan in 1985 (1985 Forest Plan), the Tonto National Forest and surrounding communities have experienced considerable socioeconomic and ecological change and there have been significant improvements in science and technology. As a result of dynamic conditions, the forest plan has to be a flexible and adaptable document. Many of the constraints from the 1985 Forest Plan will be alleviated within this plan. There are also many concepts that are not included in our current management that are needed or required as part of the 2012 Planning Rule.

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 2017) as part of the assessment required by the 2012 Planning Rule (36 CFR 219). These documents are available on the [plan revision website](#) (see Final Assessment Report of Conditions, Trends, and Risks to Sustainability [Volume I](#) and [Volume II](#)). 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 in order to create sustainable resources, goods, and services. These themes were:

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

In order to accurately revise the 1985 forest plan there needed to be a good understanding about which direction to move towards or needs to change. 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 a responsive adaptive management program 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 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 (e.g., springs, wetlands, riparian areas, and perennial waters) and their interconnections in order 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. 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 in order 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 non-motorized 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 common variety mineral materials, such as commercial contracts, personal use (including 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 give consideration to 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 areas at risk of damage or destruction from wildland fires. 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, 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); and
- should not repeat laws, regulations, or program management policies, practices, and procedures that are in the Forest Service directive system.

## 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. Except for desired conditions, other plan components are not necessarily in every resource section. 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.

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

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

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

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

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

**Background and/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 are important in designing projects and activities to achieve desired conditions. Many are posted on the Tonto National Forest website [www.fs.usda.gov/goto/tontoplan](http://www.fs.usda.gov/goto/tontoplan) as a stand-alone document 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.

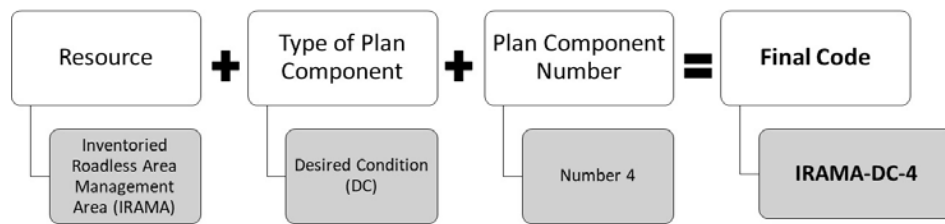
The first series of letters reference a specific resource area (e.g., ERU for ecological response units or REC for recreation), see table 1. The middle two series of letters reference the sub-resource (level 2 and level 3) of the specific resource area, if present. These can include lands of specific 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 (e.g., **DC** for desired condition, **O** for objective, **S** for standard, and **G** for guideline). 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**

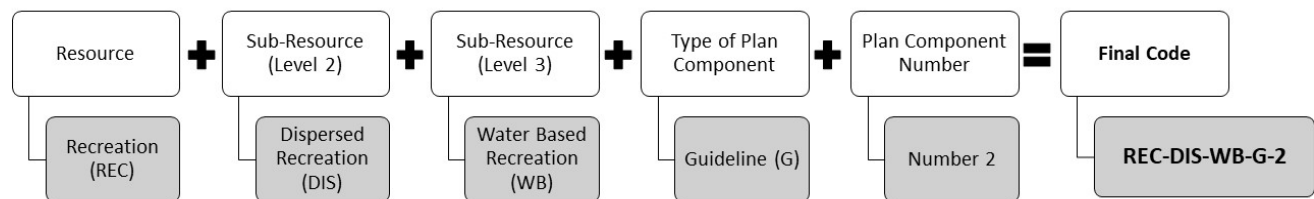
Acronym	Term
ALSMA	Apache Leap Special Management Area
AQ	Air Quality
CUH	Cultural & Historic Resources
CVK	Caves and Karsts
DWMA	Designated Wilderness Management Area
DWSRMA	Designated Wild & Scenic Rivers Management Area
EFMA	Experimental Forest Management Area
EG	Energy Production and Delivery
ERU	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-PG	Perennial Grass Subclass
ERU-SDG	Semi-Desert Grasslands
ERU-SS	Shrub Subclass
EWSRMA	Eligible Wild & Scenic Rivers Management Area
FC	Facilities
FF	Fire and Fuels
FP	Forestry and Forest Products
GRZ	Rangelands, Forage, and Grazing
INS	Invasive and Noxious Species
IRAMA	Inventoried Roadless Areas Management Area

Acronym	Term
LA	Lands and Access
LRMA	Lakes & 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	Non-Motorized 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
SRH	Salt River Horses
SU	Special Uses
SWBMA	Saguaro Wild Burro Territory Management Area
TRB	Tribal Relations & 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 below.



**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**

Plan components are listed by resource with management direction headers that are shaded and accompanied by codes (acronyms). The shading and codes distinguish the plan components from other sections of the plan.

## 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.

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

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

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, objectives, and goals.** A project is consistent with plan desired conditions, objectives, or goals when it:
  - a. Maintains or makes progress toward attaining one or more plan desired conditions, objectives, or goals 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, or goals;
  - 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, objectives, or goals; 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, objectives, or goals.

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,



objective, and goal 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.<sup>2</sup> 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:
  - 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 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, with appropriate analysis as required under the National Environmental Policy Act. Administrative changes 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, glossary, introduction, monitoring questions, other referenced information or guidance, performance history, performance measures, performance risks, program emphasis, program guidance, program

---

<sup>2</sup> 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.”

priorities, possible actions, roles and contributions, management challenges, or strategies, but such other content are not matters to which project consistency is required.

### Transition in the Implementation of the Plan

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

## 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 also 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 traditions, 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 section emphasizes 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. In order 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**, and accompanied by acronyms for codes to distinguish them from other sections of the plan. 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 (e.g., underrepresented communities, youth, and volunteers) 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.

### Management Approaches for 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 and user groups (e.g., Fish and Wildlife Service, Arizona Game and Fish Department, State Historic Preservation Office, State and Tribal Forestry, National Speleological Society, Friends of the Tonto, and Tonto Recreation Alliance).
- 03 Work to implement methods to recruit, train, and coordinate volunteers that are consistent across the Tonto National Forest.

## Recreation (REC)

The Tonto is a recreational oasis for millions of visitors at the edge of the Phoenix Metropolitan area, one of the largest cities and fastest growing places 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.

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 Metro and the forest's approximately 2.5 million visitors annually (National Visitor Use Monitoring, 2013).

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, four-wheeling, motorized and non-motorized 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 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.

The plan components below apply to all recreation (e.g., developed recreation and dispersed recreation). Refer to 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 of our visitors and the communities we serve. Recreation opportunities support healthy lifestyles and local businesses and jobs, create vibrant local economies, and protect water quality, sensitive habitats, landscapes, and cultural resources.
- 02 Recreation and recreation-related projects support the publics 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, resilient, and adapts to the latest science, technology, and management practices when implementing new projects and updating/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 the people we serve and our partnerships with individuals, organizations, and communities.

- 06 Public information is clear and informative about the recreational opportunities on the Forest as well as the rules, regulations, and expectations for visiting them.
- 07 Conflicts among various recreation users and with other multiple uses are infrequent and easily resolved.
- 08 Vandalism, theft, illegal activity, trash dumping, and resource damage at recreation sites or from recreation uses are infrequent.
- 09 Recreation sites are clean, litter and graffiti do not disrupt the recreation experience of the user.
- 10 Recreation serves as a gateway to connect visitors and communities across the forest, create opportunities for local groups and youth programs, and provide accessible opportunities to all regardless of socioeconomic status or individual ability.

### Objectives (REC-O)

- 01 Develop at least one new partnership each year with a local organization or club who will provide quality long-term volunteer services and projects for the Tonto.
- 02 Meet a 75% public satisfaction rating based on the results of recurring National Visitor Monitoring Use Surveys, or similar method, each 5-year period.
- 03 During each 10-year period of the plan, rehabilitate 5 to 7 areas on the Tonto where dispersed recreation sites are causing erosion, sanitation issues, or other adverse effects on natural resources.
- 04 During the 10-year period following plan approval, develop and implement at least 3 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.
- 05 Within 10 years of plan approval, develop or modify 2 to 8 systems of sustainable designated motorized and non-motorized trails (e.g., mountain biking, equestrian, motorcycle, jeep, and all-terrain vehicle trails) to adequately provide for these user groups and reduce user conflicts.
- 06 Every 5 years, decommission 10 miles of motorized and/or non-motorized trails that are deemed unsustainable, low-use, have no remarkable destination value, or are duplicate trails to the same destination.

### Standards (REC-S)

- 01 All project-level decisions, implementation activities, and management activities will ensure consistency with Recreation Opportunity Settings (ROS), or current protocol.
- 02 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.
- 03 Public nudity shall be prohibited at all trailheads and all developed recreation sites including campgrounds, camping areas, picnic areas, day use sites, and boating sites.

### Guidelines (REC-G)

- 01 Roads, bridges, and trails should be marked consistent to Forest Service marking policies.
- 02 Trail markings, kiosks, and interpretive signage should be consistent across all areas of the Forest, and should be designed to suit the scenic and cultural character of the surrounding landscape.

- 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 adverse impacts to landscape character<sup>3</sup>.
- 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 in all recreation settings.
- 08 Trailheads and developed day use sites should not allow for overnight use unless existing developments accommodate such use.
- 09 Recreation facilities and improvements should be designed to minimize human and wildlife conflicts (e.g., bear-proof dumpsters, capped pipe used for fences, survey markers, and sign post, or wildlife egress in plumbing vents).

## Management Approaches for Recreation

- 01 Implement a sustainable recreation approach consistent with the most recent Tonto Sustainable Recreation Strategy, including the completion of the actions and objectives outlined in the action plan (e.g., develop concept plans, scenic byway corridor management plans, interpretive plans, wilderness plans, design narratives, and others).
- 02 Work to 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 Councils, 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 brainstorm solutions that meet the needs of the recreating public while also meeting the needs of the communities we serve.
- 04 Prior to approval, consider life-cycle costs for all new recreation infrastructure. Also consider use levels and trends.
- 05 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.
- 06 Promote shared stewardship by increasing partnerships and volunteers (e.g., creation of a Partnership Council).
- 07 Develop partnerships and collaboration with agencies, groups, communities, volunteers, permit holders, and other individuals to increase forest stewardship, ecological awareness, volunteerism,

---

<sup>3</sup> Information on and desired conditions for landscape character can be found in the scenery section.

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

- 08 Develop interpretive facilities 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.
- 09 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).
- 10 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).
- 11 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.

## **Developed Recreation (REC-DEV)**

The developed recreation sites on the Tonto National Forest are generally classified as those sites requiring a fee for use under the Federal Lands Recreation Enhancement Act. Additionally, several developed scenic overlooks are also part of this program and do not require fees. The suite of developed recreation sites on the forest include 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.

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 opportunities provide development and amenities appropriate to the setting. Amenities such as water systems, 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 sites meets demand in high use seasons, including accommodating large groups if appropriate to the setting.
- 04 Developed campsites provide opportunities for both vehicle-based camping and tent camping.
- 05 Vegetation in developed sites complements recreational activities, scenic values, and safety.



## Standards (REC-DEV-S)

- 01 Quiet hours within developed campgrounds are enforced between 10pm and 6am by means of a closure order.
- 02 Adequate amenities (e.g., toilet buildings, trash receptacles) are provided for visitor use at developed campsites.
- 03 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.
- 02 Developed campgrounds and recreation sites that are deemed unsustainable, low-use, and have no remarkable destination value, should be decommissioned.
- 03 80% fee compliance should be achieved in fee sites and on-site payment methods should be available for public convenience where sustainability attainable.

## Management Approaches for 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 and concessionaires<sup>4</sup> to maintain and manage developed facilities, particularly in high use areas.
- 04 Conduct and utilize accessibility assessments for compliance with Forest Service Outdoor Recreation Accessibility Guidelines and the Architectural Barriers Act on all developed recreation sites.

## 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, and mountain biking.

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.

---

<sup>4</sup> An individual, organization, company, corporation, or cooperating State or local agency holding a valid special use permit authorizing the provision of commercial recreation services, facilities, or activities on National Forest System lands.

### **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 non-motorized and motorized recreation activities throughout the Forest including hiking, mountain biking, horseback riding, rock climbing, 4-wheeling, motorcycle riding, and other popular recreational uses.
- 03 Dispersed sites provide an inviting, more primitive, place to camp. Expansion of individual sites and evidence of overuse is infrequent. Resource impacts due to recreation use (e.g., soil compaction or lack of vegetation) are minimized.
- 04 Motorized and non-motorized trail systems provide diverse opportunities (e.g., interconnecting loops and connections to other destinations, varying lengths and challenges).
- 05 Non-designated 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.
- 02 Native vegetation and natural barriers are utilized to mitigate adverse effects in and around dispersed recreation areas.
- 03 Dispersed camping near cultural sites, sensitive species areas, and interpretive sites, and within 200 feet of trailheads is prohibited by closure order.

### **Guidelines (REC-DIS-G)**

- 01 When National Forest System Trails intersect fences, accessible pass-through areas should be provided. When practicable, designs should be consistent with engineering standards and the Architectural Barriers Act.
- 02 Dispersed recreation sites should be closed or effects mitigated when:  
  
Preventative and routine maintenance is unsustainable;  
  
There are persistent user conflicts; and/or  
  
Environmental damage is occurring and there are conflicts with other resource (e.g., riparian areas) desired conditions.
- 06 Design, construction, realignment and maintenance of motorized and non-motorized 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. Fall-line<sup>5</sup> trails should be avoided.
- 07 Newly constructed motorized and non-motorized 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

---

<sup>5</sup>. A "fall line" trail follows the line down a mountain or hill which is most directly downhill. Generally it descends in the most downward direction, rather than traversing in a sideways direction.

areas with high concentrations of significant archeological sites, unless the purpose is to provide for resource protection.

- 08 National Forest System trails should not be used for management activities that negatively impact trail conditions, unless alternatives entail greater resource damage. Adverse impacts to system trails should be mitigated upon project completion.

### **Management Approaches for Dispersed Recreation**

- 01 Consider using educational techniques (e.g., brochures, signs, websites, and social media) to enhance visitor knowledge of proper land etiquette.
- 02 Utilize existing agency protocol, or 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 issues and user conflicts.
- 03 Encourage campers with saddle or pack animals to carry weed-free cubed, pelleted, or rolled feed to limit overuse of the vegetation and discourage establishment or spread of noxious weeds.
- 04 When designing and constructing new trails, consider separating motorized and non-motorized 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 non-motorized trail maintenance.

### **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 provide a relatively dust-free environment and are located in areas convenient for the public.
- 03 Motorized trails and staging areas are sustainable and negative resource impacts related to these recreation areas (e.g., soil erosion, vegetation trampling, and litter accumulation) are minimal.
- 04 Motorized use is consistent with existing state laws.

#### **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 (e.g., avoiding hilltops, ridges, riparian areas, and any route alignments with greater than 10% surface grade) to mitigate erosion and to promote sustainable design.

03 Motorized recreation staging areas shall accommodate vehicles with trailers.

### 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 adapt as 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.

### *Management Approaches for 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.

### **Non-Motorized Recreation (REC-DIS-NMO)**

Non-motorized 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](#), 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-DIS-NMO-DC)

01 Non-motorized trails provide safe, reasonable access 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 local neighborhoods, communities, and other public lands. Trailhead locations are appropriate for current and anticipated use levels.

03 An adequate sign system provides for traveler safety, 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.

- 05 Where equestrian use is an appropriate recreational activity, recreation infrastructure (e.g., hitching posts) provides quality recreation experiences and minimizes conflicts with other recreation groups (e.g., hikers and mountain bikers).

### Guidelines (REC-DIS-NMO-G)

- 01 Trail maintenance and management priorities should be based on the need to provide user safety, prevent erosion, provide appropriate and meaningful recreation opportunities, and a need to accommodate administrative needs.
- 02 Where new and existing designated trails encounter springs, trails should be designed and maintained to mitigate erosion, trampling, compaction, and inadvertent introduction of invasive and undesirable plants, animals, and disease to the spring, while still allowing access by wildlife.
- 03 Non-motorized system trails should be closed or effects mitigated when:
  - a. Trail conditions 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 receives little use and is unsustainable.
- 04 National Forest System non-motorized trails should not be used for timber harvest activities (e.g., landings and skid trails). Impacts to system trails should be avoided, and should be mitigated upon project completion if unavoidable.
- 05 Where rock climbing is an appropriate recreational activity, permanent fixed anchors or bolts for rock climbing and rappelling should be allowed only by prior written authorization, if demonstrated impacts to at-risk species, scenic integrity, cultural resources, or user-conflict concerns have been communicated to the public, and there are no other safe means of descent available and the area is impassable by the use of removable anchors.
- 06 Infrastructure related to equestrian use (e.g., hitching posts, trailer-accessible parking) should be provided in areas with high demand for horseback recreation. User conflicts with other recreation user groups should be considered when determining an appropriate number of features to install.

### *Management Approaches for Non-Motorized Recreation*

- 01 Encourage those participating in non-motorized cross country travel to use only National Forest System trails.
- 02 Develop and implement a strategy for a sustainable, "right-sized, forestwide, non-motorized 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 non-motorized trails.
- 04 Collaborate with established local and national climbing, caving, and canyoneering organizations to monitor popular and desirable climbing routes and develop best practices and management plans for these areas (e.g., cave management plans, climbing zones, vertical trails, individual route applications, and canyoneering routes). Coordinate with local partners and climbing groups to either remove or implement maintenance and replacement of existing fixed anchors and to consider new routes when necessary to improve recreation opportunities and mitigate resource impacts (e.g., cultural or riparian resource damages).

## **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-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 Visitation levels do not result in overcrowding and provide safety for visitors while remaining consistent with other resource desired conditions for the use area.
- 03 Locations for designated water access points and developed sites reflect user demands and water accessibility.
- 04 Sustainable water-based recreation opportunities are provided on the Tonto, while riparian areas remain largely undisturbed from long-term recreational impacts (e.g., camping and access points) with the exception of the Lakes and Rivers Management Area.
- 05 Buoys, boat launches, and/or docks provide safe conditions.

### **Guidelines (REC-DIS-WB-G)**

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

### ***Management Approaches for Water Based Recreation***

- 01 Coordinate with Arizona Game and Fish Department to manage boating opportunities (e.g., boat registration, facilities, and enforcement) on the Forest.
- 02 Work with the State of Arizona, Bureau of Reclamation, and Salt River Project to monitor water quality and ensure water quality standards for direct human contact are not being violated.
- 03 Work with partners and stakeholders to help manage for the safety of water based recreation and ensure ample 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 Safe recreational shooting opportunities are available and address user demand while mitigating risk to public safety, environmental impacts and resource damage, litter, and reduce conflicts with other uses of the National Forest.
- 02 Direction for approved target types and other restrictions is clearly communicated to forest users.

#### Standards (REC-DIS-RS-S)

- 01 Recreational shooting is prohibited in areas where risks to public safety, high environmental condition concerns, and other National Forest uses are not able to be mitigated.
- 02 Management of recreational shooting will be consistent with federal and state laws regarding the use of firearms.
- 03 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) will be prohibited.

#### Guidelines (REC-DIS-RS-G)

- 01 An approved list of target types and target shooting restrictions should be posted online and provided at all areas that are frequently used for shooting by the public.
- 02 Areas restricted from recreational shooting should be clearly identified and communicated through a variety of media and educational materials.
- 03 Recreational shooting should be restricted, or prohibited, in 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 a minimum of one quarter mile from the Lakes and Rivers Special Management Area and the Salt River Horse Management Area;
  - d. Within a minimum of one quarter mile from high use areas (areas that are inherently unsafe to shoot due to the high concentration of people). This does not include areas that are managed for recreational shooting;

- e. Within any designated off highway vehicle area<sup>6</sup>, including “tot lots<sup>7</sup>”;
- f. Within designated or proposed botanical areas and management areas where conflict would occur (e.g., Mesquite Wash). See chapter 3 for additional information.

### ***Management Approaches for Recreational Shooting***

- 01 Work with partners to identify recreational shooting opportunities, additional public needs, and improve recreational shooting opportunities on the Forest.
- 02 Consider the use of designated shooting areas, permitted and developed shooting ranges, special permit zones, and other management tools to meet demands for recreational shooting while meeting public safety and natural resource protection objectives and where compatible with other National Forest uses and objectives.
- 03 Work with partner agencies and groups to expand public education on safe recreational shooting practices and “Leave No Trace” standards. Coordinate enforcement efforts with partner agencies and groups to increase public education and build “self-regulation” within the recreational shooting community.
- 04 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). Work with partner agencies and groups to develop criteria for determining where recreational shooting is appropriate and where it is not appropriate.
- 05 Issue temporary closure orders in the areas of volunteer events to prohibit shooting for the day of the volunteer events such (e.g., area clean-ups).

### **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 & 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

---

<sup>6</sup> Designated off highway vehicle areas are places where enthusiasts can ride on developed routes or drive uninhibited cross-country.

<sup>7</sup> A “tot-lot” is an off highway vehicle area where young riders can learn basic ATV skills.



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 (AWWTA 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 Wildlife related recreation generally does not conflict with other land uses and recreation opportunities.
- 03 Areas providing opportunities for hunting, fishing, and wildlife watching are accessible to a variety of users.
- 04 Residents and visitors have a variety of opportunities to view, experience, appreciate, and learn about the wildlife and fish resources of the Forest.
- 05 Desirable, nonnative species (both fish and wildlife) provide both hunting and fishing opportunities, where they do not pose significant risk to the persistence of native species (including at-risk species<sup>8</sup>).

### **Guidelines (REC-WR-G)**

- 01 Motorized big game retrieval should occur only along the designated system of National Forest System roads, motorized trails, and motorized areas per the motor vehicle use map.
- 02 Mitigation measures (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.

---

<sup>8</sup> At-risk species consist of 1) federally recognized threatened, endangered, proposed, and candidate species, as well as 2) species of conservation concern (SCC). For more information about at-risk species see the [Wildlife, Fish, and Plants](#) section of Chapter 2. Forestwide Plan Direction.

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

### **Management Approaches for Wildlife Related Recreation**

- 01 Work in collaboration with Arizona Game and Fish Department to:
  - a. Maintain and/or enhance habitat for species of economic and recreational importance.
  - 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 new and maintain existing partnerships and programs that promote local recreation through hunting, fishing, and watchable wildlife.
- 03 Identify and enhance watchable wildlife opportunities; 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 such as the State Wildlife Action 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 and opportunities to sustainably fish 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, 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 non-motorized 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 and commercial filming 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.

## Desired Conditions (SU-DC)

- 01 Recreational special uses enhance the outdoor experiences of Forest visitors and provide unique opportunities and services. Authorized activities provide for public health and 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).
- 02 Special use activities support the public's need and demonstrated demands for specific recreation and commercial opportunities or services.
- 03 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.
- 04 Commercial recreation special uses provide an equal opportunity for local businesses to compete for high-demand activities and services.
- 05 User conflicts between outfitting and guiding activities are infrequent.
- 06 The authorization and administration of lands special uses to individuals, companies, groups, other Federal agencies, and State or local governments protects natural resource values and public health and safety.
- 07 Utility corridors and communications sites are sized to fit the intended use and obsolete or unused facilities are not present on the landscape.

## 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 requirements for road construction, reconstructions, reclamation, and maintenance that minimize resource damage (e.g., dust abatement, preventing the spread of invasive weeds).
- 04 Roads, utilities, and communication sites are required to co-locate in existing or small rights-of-way to minimize the footprint on natural resources (e.g., using only existing access roads would reduce soil compaction, utilizing existing communication facilities would decrease visual impacts).
- 05 Authorized boat tours for watercraft in excess of 25 feet long shall be limited to one per reservoir.
- 06 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.
- 07 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 Utility corridors and communications sites should utilize existing facilities, sites, and corridors unless new sites can provide better social, economic, and ecological 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 Non-motorized 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.
- 06 Utility and transmission line corridors should be designed to blend with the existing character of the landscape.

## Management Approaches for Special Uses

- 01 Consider authorizing recreation special use permits for high-demand outfitting and guiding activities based on the results of a capacity study, to be re-evaluated as needed. Utilize available tools to increase administrative efficiencies (e.g., statewide outfitting and guiding authorizations, regional teams, and modernization efforts).
- 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 Utilize special use authorization terms and conditions as a means of protecting water dependent resources 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.

## 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 1900's. 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.

### 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 utility corridors will not be authorized.
- 02 Utility and transmission line corridors will be designed to blend with the existing character of the landscape.

### Guidelines (EG-G)

- 01 Distribution lines and smaller pipelines should occur 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 disturbance to wildlife and vegetation.
- 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 Environmental disturbance should be minimized by co-locating communication and electronic equipment, pipelines, powerlines, fiber optic lines, and associated infrastructure.
- 05 Energy facilities and transmission corridors should avoid locations in areas identified as having a demonstrated high risk to wildlife, cultural resources, and agricultural land uses.
- 06 The Tonto National Forest staff should authorize proposals to use existing utility corridors without alternative-route analysis, subject to site-specific environmental analysis.
- 07 New electrical-utility lines of 33 kilovolts or less, and telephone lines should be buried, unless one or more of the following applies:
  - a. visual quality objectives of the area can be met using an overhead line;
  - b. burial is not feasible due to geologic hazard or unfavorable geologic conditions;
  - c. it would result in greater long-term site disturbance; or
  - d. it is not technically feasible.

## 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 in this plan would not be useful. Over the last decade, the Tonto National Forest has worked with partners and permittees to reduce grazing pressure on sensitive areas (e.g., critical areas, riparian area). Currently, the Tonto National Forest manages the rangeland resources to balance livestock numbers with forage capacity.

Forage for range production 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](#), [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<sup>9</sup>, satisfactory soil conditions, and sustains the quality of wildlife habitat.

---

<sup>9</sup> Desired conditions for plant communities can be found in the Vegetation and Ecological Response Units section.

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

### Objectives (GRZ-O)

- 01 At least 2 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:
- 03 Conversion to forage reserves to improve resource management flexibility.
- 04 Grant to current or new permitted livestock producer.
- 05 Closure to permitted grazing, in whole or in part.

### Guidelines (GRZ-G)

- 01 Range improvements should be maintained to specifications 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, 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. Conversions 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.<sup>10</sup>
- 08 When unauthorized livestock 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.

### Management Approaches for 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.

---

<sup>10</sup> Closed means an area or allotment will no longer be authorized for livestock grazing. Allotments are closed by project level decisions.



- 02 Forest managers work continually with permittees to adjust timing, intensity, and frequency of livestock grazing to respond to changing resource conditions.
- 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 (e.g., Reading the Range and riparian photo points).

## 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, Pima, Yavapai and Zuni have inhabited or utilized forest resources over much of that time. Europeans began to occupy the area over 400 years ago, and many of the historic sites reflect the use and occupation by Apache and Yavapai hunters, gatherers, and farmers, Anglo ranchers, stockmen, miners and prospectors, Basque and other Iberian and Hispanic shepherders, and the current land-managing agency, USDA Forest Service. All of these populations can exist today as traditional and living communities.

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

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](#).

### Desired Conditions (CUH-DC)

- 01 Cultural resources and historic properties are stable and preserves the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. They are not threatened by human disturbances, and are protected from detrimental effects from wildland fire (prescribed and wildfire) or other natural processes.
- 02 Access and use of cultural resources with strong connections to living communities are available to those communities for cultural practices.
- 03 Heritage-based recreation opportunities are available (e.g., exploration and interpretation opportunities) at historic routes and locations and continues 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 traditional and living communities, through the identification, protection, and preservation of cultural resources.

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

### Standards (CUH-S)

- 01 Cultural resources will be managed in coordination with the Arizona State Historic Preservation Officer (SHPO), in accordance with any extant programmatic agreement (PA) between SHPO and the Forest.
- 02 Damage to significant cultural resources, including traditional cultural properties, is not evident.
- 03 Historic properties and landscapes (including traditional cultural properties) 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 and protection during undertakings<sup>11</sup> (e.g., actions, financial support, and authorizations).
- 02 Cultural resources (including artifacts) should be preserved in place, except when endangered. When this is not possible, artifacts and records should be curated following current professional standards.
- 03 Where human and/or natural caused disturbances (e.g., flooding) damage significant cultural resources (including traditional cultural properties), mitigation measures should be implemented as part of adjacent project-specific work or as part of annual Heritage program administration.
- 04 When human remains and objects of cultural patrimony, as defined under the Native American Graves Protection and Repatriation Act are encountered during cultural resource investigations, affiliated communities should be notified and appropriate steps should be taken for repatriation.
- 05 Other Forest activities (e.g., motorized travel, developed recreation, road construction, and range improvements) should be managed to limit 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.
- 06 When adverse effects to cultural resources occur, known affected communities should be involved in the resolution of adverse effects.
- 07 Dispersed recreation (including unauthorized caches) should be prohibited in the vicinity of sensitive archeological sites, and recreation activities should be moved if causing adverse impacts to cultural resources (e.g., disturbance, damage, movement of, alterations, or removal).

---

<sup>11</sup> 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.

## Management Approaches for Cultural and Historic Resources

- 01 Collaborate with American Indian tribes and other traditional communities to manage historic sites and other traditional areas of importance while conserving anonymity of such sites where appropriate, and to identify mitigation measures for historic properties, traditional cultural properties, and cultural landscapes during management activities.
- 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 Consider prioritizing baseline Heritage program work, and focus NHPA Section 110 survey as follows: (1) areas where eligible cultural resources are threatened or on-going impacts are unknown and need to be assessed; (2) areas indicated to have high cultural value or high density of cultural resources; (3) areas of importance to traditional communities; and (4) areas where additional survey will contribute to a greater regional understanding of a specific area.
- 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 priority heritage assets, 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 mitigation measures 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., Cabins 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.

## 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 honored and protected in Tonto National Forest operations on the basis of treaty obligations, trust relationships, and mandates in laws and Executive orders. The Tonto National Forest recognizes that tribes have cultural ties to and knowledge about lands now managed by the Forest Service. The Tonto National Forest provides every Tribe with the opportunity for timely and meaningful government-to-government consultation on project activities which may affect tribes.

The Tonto National Forest consults with the Fort McDowell Yavapai Nation, Gila River Indian Community, Hopi Tribe, Mescalero Apache Tribe, Pueblo of Zuni, Salt River Pima Maricopa Indian Community, San Carlos Apache Tribe, Tonto Apache Tribe, White Mountain Apache Tribe, Yavapai-Apache Nation, and the Yavapai-Prescott Indian Tribe. The Ak Chin Indian Community and Tohono O'odham Nation are represented by Salt River and Gila River Tribes.

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, preserving them, and consulting with appropriate tribes on federal undertakings. To streamline this process during routine land management activities, the Tonto adheres to the Region 3 First Amended Programmatic Agreement with the Arizona State Historic Preservation Office.

### Desired Conditions (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 all 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 Forest Service and Tribal 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. Resources are available upon request to support the economies of local tribes.
- 05 Social, cultural, and economic resources provide a setting for educating tribal youth in culture, history, and land stewardship, and for exchanging information between tribal elders and youth.

### Standards (TRB-S)

- 01 The Forest Service shall maintain the confidentiality of culturally sensitive information provided by tribes with the express expectation of confidentiality, unless permission to share information is given in compliance with 25USC32a.
- 02 Tribal concerns are considered in planning and decisions, especially when activities will affect tribally important places. Consultation with tribes shall occur at the early stages of planning and project design.

- 03 The forest will ensure traditional cultural properties identified by a tribe receive due consideration in project planning as required by section 106 of the National Historic Preservation Act 1992 amendments.
- 04 The responsible official shall work with American Indian tribes to comply with the Cultural and Heritage Cooperation Authority (Public Law 110-234 §8101-8107) under which the tribes may request temporary closures of specific areas for traditional cultural purposes.

### Guidelines (TRB-G)

- 01 Sacred sites and traditional cultural properties should be considered during the project planning process and protected from adverse effects during the implementation of management and permitted activities.
- 02 Tribal traditional use of 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 special use authorizations regarding the approval, location, and maintenance of telecommunication sites, and the facilities within.
- 05 Tribal perspectives, needs, concerns, and traditional knowledge, should be considered during project design, decisions, implementation, and monitoring.
- 06 Requests for reburial on the Forest of American Indian human remains and/or cultural items should be accommodated in coordination with the affiliated tribes.

### Management Approaches for 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 Utilize memoranda of understanding where useful to improve Forest Service relationships with tribal partners.
- 03 Work with American Indian tribes to understand their needs and build respectful, collaborative relationships; to develop ways of accomplishing desired conditions and goals; and to collaborate in ecosystem restoration efforts.
- 04 Actively seek opportunities to hire tribal work crews to assist with land restoration and other projects.
- 05 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.
- 06 Coordinate with American Indian tribes to develop programs focused on getting youth and elders involved in education activities on the Forest.

- 07 Cooperatively develop interpretive and educational exhibits that focus on the history of the lands managed by the Tonto National Forest in collaboration with American Indian tribes to provide the public with a greater understanding and appreciation of our shared history, culture, and traditions.
- 08 Utilize the Tribal Monitor Program to better protect and manage sacred sites, traditional cultural properties, areas of tribal importance, and special forest products.

## 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, a collaborative effort to restore forest ecosystems on portions of four national forests—Coconino, Kaibab, Apache-Sitgreaves, and Tonto, main goal is 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 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 (PTSQ and PWSQ) 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). PTSQ was determined to be 3.4 and 4.2 million cubic feet for the first and second decade, respectively. PWSQ 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, create small and large business and employment opportunities, and provide 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 10 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 stands of trees is limited to stands that generally have reached the culmination of mean annual increment (CMAI) of growth. This requirement would apply only to regeneration harvest of even-aged stands on lands identified as suited for timber production and where timber production is the primary purpose for the harvest.
- 04 When openings are created with the intent of regeneration, efforts shall be made to ensure that lands can be adequately restocked within 5 years of final harvest.
- 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<sup>12</sup>, unless the departure is justified and approved in accordance with direction found in FSH 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.

### Guidelines (FP-G)

- 01 Timber harvests may include uneven-aged 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.<sup>13</sup>
- 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 areas (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 and/or species of conservation concern 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 cutting stalks off of agaves should not be authorized. Exceptions may be made for limited research purposes and traditional tribal uses.

---

<sup>12</sup> A sustained yield is the amount of a timber that can be harvested or obtained without causing depletion of the resource over time.

<sup>13</sup> 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).

- 09 Seed collection and cuttings (rather than whole plant removal) should be the preferred collection methods for rare plants when forest product and research collection permits are issued. An exception would be when whole plant removal is required to meet the needs of the 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<sup>14</sup> of specific species.

### Management Approaches for Forestry and Forest Products

- 01 Consider preparing pest and invasive species control plans with forest health specialists that contain appropriate mitigation measures (e.g., planting resistant tree species, maintaining species diversity, removing damaged trees or invasive species, and using pesticides) and monitoring procedures. Monitoring may include:
- a. Measuring effectiveness of treated areas.
  - b. Determining effects on non-target organisms.
  - c. Determining effects on water quality.
  - d. Determining effects of pesticide that enters the soil or air.
- 02 Discussions with tribes that collect plants for traditional, cultural, and ceremonial purposes are encouraged, to promote the plants' persistence during the planning of forest restoration projects.
- 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.

---

<sup>14</sup> 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. This scenic quality defines the region's character and contributes to the positive experiences people seek on the Forest. In most National Forest settings, managing the scenery is important to protect the naturalness of the existing landscape character. Scenic values and characteristics are important in creating a sense of place for local residents and visitors alike.

### Desired Conditions (SC-DC)

- 01 The forest contains a variety of visually appealing landscapes that contribute 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., major roads and trails, 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.

### Standards (SC-S)

- 01 The Visual Management System (VMS), or other protocol such as the Scenery Management System (SMS), is integrated into the design, planning, and implementation of all resource management decisions.

### 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 visual quality objectives (as defined in the Visual Management System, or similar protocol).
- 02 In areas with visual quality objectives of preservation, the visual character should have only minor, if any, deviations. The areas should appear unaltered and the majority of the area should be dominated by ecological changes. Range facilities are allowed, but mitigation measures should be used to minimize impacts to scenic quality.
- 03 In areas with visual quality objectives of retention, the visual character should appear intact but may include deviations that are not evident (e.g., completely repeat the scenic attributes of size, shape, form, line, color, texture, or patterns common to the scenic character).
- 04 In areas with visual quality objectives of partial retention, the visual character may appear slightly altered. Management activities, manmade structures and facilities should not dominate the scenic character (e.g., repeat the scenic attributes of size, shape, form, line, color, texture, or patterns common to the scenic character).
- 05 In areas with visual quality objectives of modification, the visual character may appear moderately altered. Management activities including manmade structures and facilities may begin to dominate the scenic character but use scenic attributes to blend into the landscape (e.g., repeat the scenic attributes of size, shape, form, line, color, texture, or patterns common to the scenic character).

- 06 Projects should include mitigation measures to address negative impacts to scenic resources.
- 07 Effects to scenery from prescribed fire should be considered during project planning and implementation. In ecosystems where high severity fire could move the resource towards desired conditions, efforts should be made to minimize visible long term impacts of fire management actions, such as dozer lines or hand lines, along areas valued highly by the public for scenery.

### Management Approaches for Scenery

- 01 Consider displaying interpretive or informational signs where management activities have short term negative impacts to scenery.
- 02 Update from the Visual Management System (VMS) to the Scenery Management System (SMS) on the Tonto National Forest.
- 03 Set priorities for rehabilitation of areas where existing scenic integrity is lower than identified in the visual quality objective map (as defined in the Visual Management System, or similar protocol).

## 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. Common varieties of sand, stone, gravel, pumicite, and clay that may be acquired under the Materials Act of 1947 (30 U.S.C. 601–604) are considered salable minerals or mineral materials. Minerals that are not salable or leasable (e.g., gold, silver, copper, tungsten, uranium, et al) are referred to as locatable minerals. Locatable mineral deposits include most metallic mineral deposits and certain nonmetallic and industrial minerals. Locatable minerals are subject to the 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.

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 found on 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.

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 minerals. 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 provides for public safety and the protection of forest resources. They possess a resilient forest ecosystem suitable to permanent post mining landform.

- 03 Mineral materials on National Forest 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 and inactive mines disturbed by past mineral exploration and mine development have been returned to stable conditions and do not pose health, safety, or environmental hazards.

### Objectives (MMAM-O)

- 01 Initiate at least one environmental review for closure of one or more abandoned or inactive mine(s) every three years.

### Standards (MMAM-S)

- 01 Plans of operation shall be required for all mineral operations that will likely cause significant disturbance of surface resources.
- 02 Required reclamation activities shall be designed to establish resilient post-mining ecosystems consistent with the pre-disturbance Ecological Response Unit (ERU), or to an ERU identified as achievable to the post-mining landscape condition.
- 03 All exploration drill holes and water production or monitoring wells reasonably incident to mining operations or required mitigation and monitoring measures shall be abandoned in accordance with current state and federal regulations and attested to by an independent licensed Professional Engineer or Geologist on site during the abandonment.

### Guidelines (MMAM-G)

- 01 Mineral materials (e.g., sand and gravel) should not be removed from the riparian management zone without adequate engineering controls to protect surface waters. Requests for personal and commercial mineral material sales should be considered where consistent with other resource desired conditions.
- 02 Placer mining should avoid damaging riparian vegetation, degrading water quality, and negatively impacting channel stability.
- 03 Reclamation of surface disturbance associated with large-scale mineral activities should be implemented to return sites to other productive uses (e.g., solar energy production) where reclamation to original or other appropriate Ecological Response Unit is impracticable due to impacts of the action. For example, solar energy production on large sites.
- 04 Surface reclamation and revegetation plans for smaller scale mineral activities, such as 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.
- 05 Reclamation should be carried out concurrently with mining operations and in logical succession throughout the operational sequence.
- 06 Abandoned mine features (e.g., adits, shafts, and stopes) should be closed unless they are determined to contain habitat for at-risk species or contain cultural resources. Gating should be considered an alternative to destruction in these instances.

## Management Approaches for Mining, Minerals, and Abandoned Mines

- 01 Consider the use of sites for mineral collection areas during the development of a reclamation plan.
- 02 Use operating and reclamation plans to protect and restore surface resources through the phased introduction and monitoring of pioneer and successor species for vegetative communities. Utilize adaptive management principles to ensure effective reclamation.
- 03 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.
- 04 Seek opportunities to work with proponents to expand knowledge of local natural resources (e.g., proactive data collection and sharing and development of conservation measures).
- 05 Develop general guidelines and informational brochures for public dissemination on rock hounding<sup>15</sup> and mineral collecting on Forest.
- 06 Encourage proponents and/or contractors to utilize local resources for economic benefit of the community.

---

<sup>15</sup> Rock hounding is the recreational study and hobby of collecting rocks and mineral specimens from their natural environment.



## Roads (RD)

There are approximately 4,200 miles of roads on the Tonto National Forest. These roads have various maintenance levels, 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.

Refer to the [Motorized Recreation](#) (REC-DIS-MU) 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 National Forest System roads provide recreation opportunities and access to a variety of recreation settings and places.
- 04 Roads have minimal adverse environmental impacts to soil, riparian areas, watercourses, native vegetation, and at-risk species.
- 05 Unauthorized routes and unnecessary forest system roads or trails are not present on the landscape.
- 06 Forest roads have a water drainage system that minimizes delivering sediment and pollutants to water bodies.

### Objectives (RD-O)

- 01 Decommission at least 10 miles of roads identified for decommissioning and/or unauthorized user created routes every five years.

### Standards (RD-S)

- 01 Motor vehicle use by the public is only authorized as designated by the motor vehicle use map,<sup>16</sup> except as authorized (e.g., by law, permit, right, or order).
- 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.
- 04 Temporary roads shall be constructed, decommissioned, and rehabilitated as part of the same project.

---

<sup>16</sup> The motor vehicle use map identifies roads, trails, and areas where motorized travel is allowed.

## Guidelines (RD-G)

- 01 New motorized routes or areas should not be constructed in areas designated as Primitive in the Recreation Opportunity Spectrum (ROS), or current protocol.
- 02 Construction of temporary roads in areas designated as Semi-Primitive Non-Motorized (ROS) should be avoided unless required by a valid permitted activity or management action. If authorized, roads should be constructed and maintained at the lowest maintenance level needed for the intended use, then rehabilitated.
- 03 Unnecessary roads should be decommissioned and returned to their natural condition.
- 04 Bridges and transportation infrastructure found to serve as important habitat for at-risk species should not be demolished unless necessary for public safety.
- 05 When designing or maintaining bridges, design elements that reduce mortality and are beneficial to wildlife (e.g., habitat connectivity, roost sites) should be incorporated.
- 06 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.
- 07 New or redesigned stream crossings (e.g., bridges and culverts) should be wide enough to pass the bankfull without obstructing or confining the flow.
- 08 Roads, culverts, and other water crossing infrastructure should be designed and located to allow for aquatic species passage and the naturally occurring sediment and debris transported by the stream.
- 09 Roads should be closed or impacts mitigated if geologic hazards (e.g., landslides, rock falls, or flooding) or hazard trees occur.
- 10 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 removed after use.
- 11 Reconstruction and rehabilitation of existing roads should be prioritized over new construction.
- 12 Construction of new and relocated roads should avoid areas with high mass wasting potential, such as high landslide prone areas, and areas where the limitation for unsurfaced roads is severe.

## Management Approaches for 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 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.

## 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, 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 purpose.
- 05 Facilities are in compliance with applicable accessibility guidelines and current building or occupancy standards.
- 06 Recreation and administrative sites complement the forests scenery desired conditions and do not cause damage to ecologically sensitive areas.
- 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 safe, well-organized, and capable of supporting concentrated visitor use. The number and size of constructed facilities are appropriate for the use level and activity types that occur at each site.

### Standards (FC-S)

- 01 Clearing of vegetation around facilities must be limited to that which poses a threat to the facility and its function.
- 02 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 floodplains, wetlands, and other environmentally sensitive areas should be avoided. When this cannot be accomplished in a reasonable manner, the amount and area of disturbance should be as small as practical.
- 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 collusion by birds; accommodate appropriate movement for fish and other aquatic organisms).
- 04 Facilities should be planned, designed, and managed to prevent resource damage, and should not adversely impact the scenic character.

- 05 Facilities no longer used as intended 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.

### Management Approaches for Facilities

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

## Lands and Access (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 to the Tonto.

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

### Desired Conditions (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, and retaining or acquiring key lands for wildlife and fish).
- 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 easements provide access to and/or across National Forest System land are available where needed.
- 07 Rights-of-way easements provide for adequate access to lands within the forest. Owners of private inholdings have adequate and feasible<sup>17</sup> access through the Forest to their property.

### 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.

---

<sup>17</sup> Adequate and feasible access means a route and method of access that is shown to be reasonably necessary and economically practicable.

## 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:
- 02 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);
- 03 The conveyance or acquisition would reduce conflicts between Forest Service and private-landowner objectives, especially when conflicts are adversely impacting National Forest System management;
- 04 Lands with important characteristics would enhance National Forest purposes, including access;
- 05 Lands would improve administration and reduce trespass;
- 06 Lands would add significantly to available National Forest goods and services;
- 07 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
- 08 Lands consist of surface waters that would benefit the economic and social interests of the public.
- 09 The Forest should proactively respond to threats to federally owned property rights (e.g., encroachment, trespass).

## Management Approaches for Lands and Access

- 01 Develop a strategy to address known and suspected trespass and encroachment issues present on the Forest.
- 02 Update the existing landownership adjustment plan, which will identify lands desirable for acquisition, as well as identify parcels as suitable for exchange or sale.
- 03 While addressing access problems on the Forest, seek cooperation of private landowners.
- 04 Consult with local governments to synchronize Forest decisions regarding permits and easements with local planning and zoning ordinances where local and Forest objectives are complementary.

## Salt River Horses (SRH)

The Salt River Horse herd includes the horses that inhabit and that have historically lived in and around the lower Salt River and Saguaro Lake areas in the Tonto National Forest and are absent a brand or other identifiers indicating ownership.

Arizona law<sup>18</sup> 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.

### Desired Conditions (SRH-DC)

- 01 The areas where the Salt River Horse herd is located creates a safe environment for both the horses and other forest users, minimizes user conflicts, and protects natural resources.
- 02 The Salt River Horse herd is healthy and the areas utilized by the Salt River Horses allow for diverse plant communities, satisfactory soil conditions, and maintain or improve wildlife habitat.
- 03 The Salt River Horse herd does not negatively impact other resources.

### Management Approaches for Salt River Horses

- 01 Work with the Arizona Department of Agriculture and the Salt River Horse Collaborative<sup>19</sup> to develop and implement a management plan for the Salt River Horses.

---

<sup>18</sup> Arizona Revised Statute Title 3. § 3-1491

<sup>19</sup> The Salt River Horse Collaborative is comprised of a diverse group of individuals who represent an interest with ties to the Salt River Horses or the area they are located. This includes the Salt River Pima-Maricopa, Fort McDowell, and White Mountain Apache Indian Communities.

## 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.



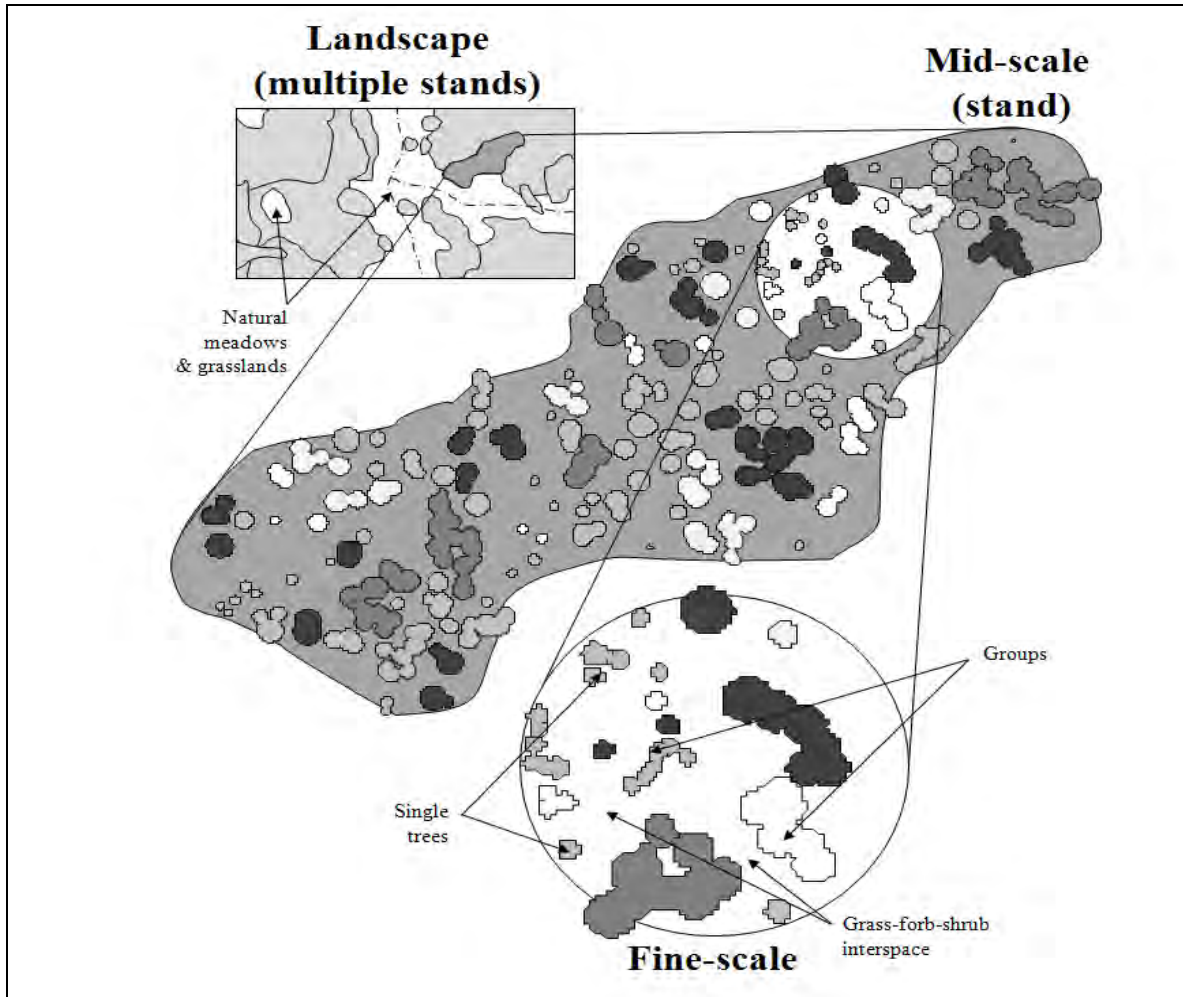
**Table 3. Fire regimes adapted from (Barrett et al. 2010) and representative ecological response units (ERUs)**

Group	Frequency	Severity	Severity Description	Representative ERUs and general descriptions
I	0 – 35 years	Low to mixed	Stand replacement is less than 25% 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 the herbaceous surface vegetation that carries the fire
II	0 – 35 years	High	High severity replaces greater than 75% 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% is topkilled.
III	35 - 100 years	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 years	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+ years	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

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

Each ecological response unit describes a range of conditions (e.g., cacti and grass ranges from 10-25 percent on average) for desired conditions. No one individual project is anticipated to reach these targets (not every acre will be representative of these ranges) but individual projects should be designed in a manner that helps to drive the ecosystem towards the desired conditions. However, the culmination of projects and averaged conditions across the forest, over time, is anticipated to drive the ecosystem/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 12 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 [Forestry and Forest Products](#), [Fire and Fuels](#), and [Invasive and Noxious Species](#) sections in Chapter 2. Forestwide Plan Direction for additional applicable plan direction.

## 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 are 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%, 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<sup>20</sup>, 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 2016), tree basal area is restored or maintained at the low end of the desired range to mitigate water stress.<sup>20</sup> 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.

---

<sup>20</sup> For ranges, see following desired condition descriptions for forest and woodland ecological response units.

- 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<sup>21</sup> are distributed across the soil surface in adequate amounts to limit erosion and contribute to soil deposition and development. Soil cover and herbaceous vegetation protect soil, facilitate moisture infiltration, and contribute to plant and animal diversity and support ecological integrity, 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 surface fires. Firefighters are able to safely and efficiently suppress wildfires in the wildland-urban interface using direct attack.
  - c. In forested vegetation communities, 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 spruce-fir, characteristic ecosystem function is modified to promote low intensity surface fires.
  - d. In shrubland/chaparral vegetation communities, the live and dead fuel loading in the wildland-urban interface is on the lower end of the range given for the vegetation community desired conditions. Enough cover exists to meet the needs of a variety of wildlife species.
  - e. 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 at risk.

---

<sup>21</sup> Litter is the top layer of the biomass and organic material on the ground of a forest, shrubland or grassland floor above the 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 twigs and larger stems.

- f. Ladder fuels are nearly absent.
- g. 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.
- h. Dead and down fuel load is between 1 and 40 tons per acre, depending on ecological response unit, with lower amounts in 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. Higher fuel loading or tree densities may occur in areas where it provides for important fine-scale habitat structure, as long as it meets the overall intent of protecting wildland-urban interface values at risk.
- i. 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 10-year period with both mechanical treatments and fire. About 22% 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 10-year period with only fire (no mechanical treatment). About 22% 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 and juniper grass and Madrean pinyon oak) as follows:
  - a. 400 to 2,000 acres over a 10-year period with both mechanical treatments and fire. About 22% 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 10-year period. About 22% would be treated with prescribed fire, with the expectation that the rest would be treated wildfire.
- 03 Restore at least 500 acres of semi-desert grasslands, over a 10-year period.
- 04 Reduce the impact of invasive species (e.g., buffelgrass, fountain grass, and red brome) by surveying, inventorying, and treating 10,000 to 15,000 acres 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. Wildfire should be actively suppressed when the expected effects do not facilitate progress towards desired conditions or where necessary to protect life, property, and valuable resources.
- 02 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 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 improve herbaceous vegetation growth, watershed condition, soil productivity, and minimize long-term impacts from invasive species. Desired fire behavior and severity, burn severity, firefighter safety, 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.
- 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 large diameter trees, snags, and downed logs in and near stream channels and riparian areas to provide for wildlife habitat and recruitment of large woody material.
- 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 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 kind/s of fire that the ecological response unit evolved with. Fire effects, fire behavior, and emissions in these initial burns may not be within the HRV, and seasonality and timing is less important than for maintenance burns.

### Management Approaches Vegetation and 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, a hazard index, or a 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 2 years as management actions, 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 such as 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.

### 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 3 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 2 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 desert species and ecosystems do not have adaptations that allow them to survive even low-intensity fire. 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 filaree (*Erodium cicutarium*) and prickly lettuce (*Lactuca serriola*), as well as native species, such as globe mallow (*Sphaeralcea* spp.) 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 following wet years where annual exotics reach significant fuel loads. 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 (*Eriogonum fasciculatum*), jojoba (*Simmondsia chinensis*), crucifixion thorn (*Canotia holacantha*) and creosote bush (*Larrea tridentata*).

### **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 (*Carnegiea gigantea*), creosote bush (*Larrea tridentata*), chollas (*Cylindropuntia* sp.), prickly pear cactus (*Opuntia* sp.), bursage (*Ambrosia deltoidea*, *Ambrosia dumosa*), palo verde (*Parkinsonia* sp.) and crucifixion thorn (*Canotia holacantha*), ironwood (*Olneya tesota*) and tall shrubs such as catclaw (*Acacia greggii*), wolfberry (*Lycium* sp.), jojoba and teddy-bear cactus (*Cylindropuntia bigelovii*). Creosote bush is well represented at some areas, but usually eclipsed by brittlebush (*Encelia farinosa*) on warm slopes while some north-exposures are dominated by spikemoss (*Selaginella arizonica*).

### **Sonora-Mojave Mixed Salt Desert Scrub**

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 such as *Atriplex canescens* or *Atriplex polycarpa* along with other species of *Atriplex*. Other halophytic plants (those growing in high saline soils) may also be present. Graminoid species may occasionally include *Sporobolus airoides* or *Distichlis spicata* at varying densities.

For a list of at-risk species associated with desert ecosystems see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

The plan components below apply to all desert ecosystems. Refer to the [All Upland Ecological Response Units](#), [Invasive and Noxious 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. Vegetative ground cover should average about 10%, though it can be less than 1% 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	Structure Class
5		Annual grasses and forbs	10-25%	Open
20		Cacti and perennial grasses	10-25%	Open
75		Cacti and shrubs	>60%	Closed
<1		Exotic annual and perennial grasses	<1%	Absent-sparse

- 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 10%.

**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	Structure Class
15		Perennial grass, sparse shrub	10-25%	Open
85		Shrubs and perennial grasses	10-25%	Open
<1		All exotic vegetation	<1%	Absent-sparse

- 03 Fires are infrequent and localized, with a mean fire return intervals estimated at over 200 years.
- 04 The presence of non-native species does not affect fire behavior or effects, and does not increase the potential for uncharacteristic or undesirable fire.
- 05 The presences of non-native species does not significantly affect native species richness or the habitat of native flora and fauna.
- 06 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).
- 07 Arroyos and gullies with accelerated erosion in desert ecological response units are stabilizing and recovering.
- 08 Saguaros, mesquite trees (*Prosopis* sp.), and other vegetation large enough to sustain cavity nesting birds are present across the landscape (measured from species-specific needs/requirements during project planning).
- 09 Large and old Saguaros are healthy and present on the landscape based on their site potential.

### **Midscale Desired Conditions (ERU-DES-DC)**

- 10 Plants form beneficial relationships with soil microbes and cryptogammic 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).
- 11 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.
- 12 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.

- 13 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

- 01 Support or assist partners in monitoring Sonoran desert ecosystems to better understand post-disturbance (e.g., fire and off-highway vehicle impacts) recovery of desert plant species and plant communities to better guide management.
- 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.

### 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 varies. 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.

For a list of at-risk species associated with semi-desert grasslands see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

The plan components below apply to semi-desert grasslands. Refer to the [All Upland Ecological Response Units](#), [Invasive and Noxious 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	Structure Class
20 – 25	Recently disturbed, grass and forbs, and shrub resprouts	Shrub, Tree <10%	Sparse
70 – 75	Majority of vegetation is late successional herbaceous perennial grasses	Shrub, Tree <10%	Sparse
0 – 5	Shrub and tree encroachment and herb dominance (includes departure states)	Shrub, Tree 10-30%	Open
0	Closed shrub/tree, with herb layer dominated by early seral vegetation, ruderal	Shrub >30%	Closed
0	Herb layer dominated by exotics – namely grasses	Shrub, Tree <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<sup>22</sup>.
- 03 Native herbaceous vegetation and ground cover provides fine fuels that support stand replacement fires, with fire return intervals ranging from 2 to about 30 years, but usually averaging between 2.5 - 10 years (Wahlberg et al. 2017 (in draft), Schussman and Gori 2004, Mau-Crimmins et al. 2005). Vegetative ground cover averages around 28 %, 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).

#### **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 (*Bouteloua eriopoda*), bush muhly (*Muhlenbergia porteri*) and fluffgrass (*Dasyochloa pulchella*).
- 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**

- 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 grass species (e.g., Lehmann lovegrass, Buffelgrass, fountain grass, Boer lovegrass, red brome, and cheatgrass) are abundant.

---

<sup>22</sup> Aridisols 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.

- 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 spp., crucifixion thorn, desert ceanothus, mountain mahogany, little-leaved mountain mahogany (*Cercocarpus intricatus*), Antelope bushes, silktassles, Stansbury cliffrose (*Purshia stansburiana*), shrub live oak (*Quercus turbinella*), and sumacs (*Rhus* spp.).

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

Fire is the primary natural disturbance. Some chaparral species have fire adaptations such as needing 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 13 inches.

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

### Shrub Live Oak-Mixed Shrub

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

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

### Shrub Live Oak-Birchleaf Mountain mahogany

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

### Shrub Live Oak-Datil Yucca-Yellowleaf Silktassel

The shrub live oak-datil yucca-yellowleaf silktassel association tends to occur on wetter north and east exposures at elevation ranges from 3,600 to 5,700 feet at slopes ranging from 2 to 80 percent. Other species associated with this type include Emory and Arizona oak, pointleaf manzanita and Wright buckwheat. Most of this association is found on soils derived from granite.

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

For a list of at-risk species associated with interior chaparral see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

The plan components below apply to all interior chaparral. Refer to the [All Upland Ecological Response Units](#), [Invasive and Noxious 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	Structure Class
2	Recently disturbed, grass and forbs, and shrub resprouts	Shrub <10%	Sparse-Open
5	Dominated by shrub resprouts, grasses and forbs present	Shrub 10-30%	Open
93	Mature shrubland, closed canopy, limited herbaceous vegetation	Shrub > 60%	Closed

- 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.<sup>23</sup> Native fire-adapted species re-sprout vigorously after fire, helping to prevent excessive erosion. The presence of non-native plants

<sup>23</sup> Tonto National Forest Terrestrial Ecological Unit Inventory data

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%, 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 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)<sup>24</sup>.
- 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 (~20 tons/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 (*Rhamnus crocea*), Stansbury cliffrose (*Purshia stansburiana*), desert olive (*Forestiera pubescens* var. *pubescens*), and singleleaf ash (*Fraxinus anomala* var. *lowellii*), 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 (*Eriogonum wrightii*) and desert ceanothus (*Ceanothus greggii*), 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

---

<sup>24</sup> 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.

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, & 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 (*Pinus edulis*), single leaf pinyon (*Pinus monophylla* var. *fallax*), Utah juniper (*Juniperus osteosperma*), oneseed juniper (*J. monosperma*), and alligator juniper (*J. deppeana*). One-seed juniper is most common juniper species; however, there are areas with Utah juniper and Rocky Mountain juniper. In addition, annual and perennial grasses and graminoids, forbs, half-shrubs and shrubs can be found in the understory.

For a list of at-risk species associated with pinyon-juniper woodlands see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

The plan components below apply to all pinyon-juniper woodlands. Refer to the [All Upland Ecological Response Units](#), [Invasive and Noxious 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, & V).
- 03 Snags and older trees (some older than 300 years) with dead limbs and/or tops are scattered across the landscape. Snags 8 inches and above at diameter at root collar average 5 snags per acre, while snags 18 inches and above average 1 snag per acre. Coarse woody debris increases with succession and averages 2 to 5 tons per acre.
- 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	Structure Class
10	Recently disturbed, grass and forbs, and shrub resprouts	Tree < 10%	Sparse-Open
15	Dominated by trees 5.0"- 9.9" diameter	≥ 30%	Closed
5	Dominated by trees 0"- 9.9" diameter	10-29.9%	Open
10	Dominated by trees ≥ 10.0" diameter	10-29.9%	Open
60	Dominated by trees ≥ 10.0" diameter	≥ 30%	Closed

### 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 10s' to 100s' of acres.

- 07 Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about 5 and 15 percent (based on terrestrial ecological unit or other suitable scientific protocol or method).

### 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 (*Juniperus monosperma*), Utah juniper (*Juniperus osteosperma*), Rocky Mountain juniper (*Juniperus scopulorum*), alligator juniper (*Juniperus deppeana*) and two-needle pinyon (*Pinus edulis*). Native understories were made up of perennial grasses, with both annual and perennial forbs, and shrubs that were absent or scattered. Historically, herbaceous understories of native grasses and forbs provided fine 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.

For a list of at-risk species associated with pinyon-juniper grass and juniper grass see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

The plan components below apply to pinyon-juniper grass and juniper grass. Refer to the [All Upland Ecological Response Units](#), [Invasive and Noxious 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	Structure Class
5	Recently disturbed, grass and forbs, and shrub resprouts	Tree < 10%	Sparse-Open
10	Dominated by trees 5.0"- 9.9" diameter	≥ 30%	Closed
25	Dominated by trees 0"- 9.9" diameter	10-29.9%	Open
50	Dominated by trees ≥ 10.0" diameter	10-29.9%	Open
10	Dominated by trees ≥ 10.0" diameter	≥ 30%	Closed

- 02 Fires are typically frequent and low-severity (fire regime I).



### **Midscale Desired Conditions (ERU-PJJUG-DC)**

- 03 Snags are scattered, with snags 8 inches and above at DRC averaging 5 snags per acre, while snags 18 inches and above average 1 snag per acre (Weisz et al. 2011). Coarse woody debris increases with succession and averages 1-3 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 10 and 30% depending on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986, 2006).
- 06 Shrubs average less than 30% 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-DC)**

- 01 In pinyon juniper grass and juniper grass ecological response units, areas with soils classified as Mollisols (soils with relatively thick organic surfaces) should be managed as grasslands.

### **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 (*Quercus arizonica*) and Emory oak (*Quercus emoryi*), with lesser amounts of Toumey oak (*Quercus toumeyii*) depending on the location. Interior chaparral species may be present in some locations but do not co-dominate. A shrub layer is present and often contains species such as beargrass, littleleaf and evergreen sumac, silktassel, birchleaf buckthorn, and ceanothus species. The herb layer is dominated by warm-season grasses such as threeawns, blue grama, sideoats grama, Rothrock grama, Arizona cottontop, curly-mesquite, green sprangletop, muhly grasses, or Texas bluestem.

For a list of at-risk species associated with Madrean encinal woodland and Madrean pinyon-oak see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

The plan components below apply to all Madrean encinal woodland and Madrean pinyon-oak. Refer to the [All Upland Ecological Response Units](#), [Invasive and Noxious 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	Structure Class
20	Recently disturbed, sparsely vegetated, grass, forbs, and shrub resprouts	Shrub <10% Tree <10%	Sparse-Open
40	Dominated by trees 5.0"- 9.9" diameter	≥ 30%	Closed
25	Dominated by trees 0"- 9.9" diameter	10-29.9%	Open
15	Dominated by trees ≥ 10.0" diameter	10-29.9%	Open
0	Dominated by trees ≥ 10.0" diameter	≥ 30%	Closed

- 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	Structure Class
4	Recently disturbed, grass and forbs, and shrub resprouts	Tree < 10%	Sparse-Open
5	Seedling/sapling; resprouter dominated	Varies	Open-Closed
13	Young with grass understory	Varies	Open
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 8 inches or greater at DBH average 4 snags per acre, while snags 18 inches or greater average 1 snag per acre. Large oak snags (>10 inches) are a well-distributed component. Coarse woody debris increases with forest succession and averages 2-3 tons per acre.
- 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, moisture 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 10 and 40% depending on site productivity and past disturbance, with tree cover in canyons and drainage bottoms nearer the upper end of this range. A lesser amount is in closed canopy condition characteristic of the reference condition. Patch sizes range from less than 1 acre to 10s of acres, 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 8 inches or greater at DBH average 4 snags per acre, while snags 18 inches or greater average 1 snag per acre (Weisz et al. 2011). Large oak snags (>10 inches) are a well-distributed component. Coarse woody debris increases with forest succession and averages 2-3 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 1 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 1 acre to 10s 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 1 acre or less. Groups at the mid- to old-age stages consist of 2 to approximately 40 trees. Interspaces between tree groups are variably-

shaped and comprised of a grass/forb/shrub mix. Some natural openings contain individual trees, including large open-grown oaks.

### 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 (*Pinus edulis*), single leaf pinyon (*Pinus monophylla* var. *fallax*), Utah juniper (*Juniperus osteosperma*), oneseed juniper (*J. monosperma*), alligator juniper (*J. deppeana*), Manzanita spp. (*Arctostaphylos* spp.), mountain mahogany (*Cercocarpus montanus*), Antelope bushes (*Purshia* spp.), silktassles (*Garrya* spp.), Stansbury cliffrose (*Purshia stansburiana*), turbinella oak (*Quercus turbinella*), and sumacs (*Rhus* spp.). Pinyon may be absent at some areas, however juniper is always present. Oaks (Arizona white oak, grey oak, Emory oak) become more common among mild climate zones in central Arizona. The understory is dominated by low to moderate density shrubs, with herbaceous plants in the interspaces. This ecological response unit is found on well-drained soils, frequently with coarse-textured or gravelly (stony) soil characteristics. Aside from disparities in structure and composition, Pinyon-juniper evergreen shrub can also be differentiated from interior chaparral by longer fire intervals and less severe fire events.

For a list of at-risk species associated with pinyon-juniper evergreen shrub see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

The plan components below apply to all pinyon-juniper evergreen shrub. Refer to the [All Upland Ecological Response Units](#), [Invasive and Noxious 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	Structure Class
5	Recently disturbed, grass and forbs, and shrub resprouts	Tree < 10%	Sparse-Open
0	Dominated by trees 5.0"- 9.9" diameter	≥ 30%	Closed
55	Dominated by trees 0"- 9.9" diameter	10-29.9%	Open
40	Dominated by trees ≥ 10.0" diameter	10-29.9%	Open
0	Dominated by trees ≥ 10.0" diameter	≥ 30%	Closed

- 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 8 inches and above at DRC averaging 3 snags per acre, while snags 18 inches and above average 1 snag per acre (Weisz et al. 2011). Large dead wood is present, and coarse woody debris averages 2-4 tons per acre.
- 05 The understory is dominated by low to moderate density shrubs depending on successional stage, overall averaging greater than 30% 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 5 and 15% depending on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986, 2000a).

### **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 1 to 10s 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**

- 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 5,500-7,200 feet, on sites slightly cooler-moister than the Madrean pinyon-oak ecological response unit, and with a much greater plurality of ponderosa pine. This system is dominated by ponderosa pine (*Pinus ponderosa* var. *scopulorum*) and can be distinguished from the ponderosa pine forest ecological response unit by well-represented evergreen oaks (for example, Emory oak, (*Quercus emoryi*), Arizona white oak (*Quercus arizonica*), alligator juniper, and pinyon pine (for example, *Pinus edulis*). In some areas, ponderosa pine-evergreen oak communities can alternatively be dominated or codominated by Apache pine (*Pinus englemannii*) and Chihuahuan pine (*P. leiophylla*), both site potential indicators. In terms of disturbance, the ponderosa pine-evergreen oak 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 (*Arctostaphylos* sp.), turbinella oak (*Quercus turbinella*), skunkbush sumac (*Rhus trilobata*), and mountain mahogany (*Cercocarpus montanus*). Depending on site conditions, shrubs and perennial grasses have varying importance in vegetation response to disturbance. 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.

For a list of at-risk species associated with ponderosa pine-evergreen oak see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

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 and Noxious 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**

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

- 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 (>3 inch diameter), all well-distributed throughout the landscape.

- 06 Dwarf-mistletoe occurs in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures.
- 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, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.
- 09 Shrubs average less than 30% 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 1 acre to 10s of acres.
- 13 Ponderosa pine snags are typically 18 inches or greater at DBH and average 1 to 2 snags per acre, while snags greater than 8 inches average 5 snags per acre (Weisz et al. 2011). Large oak snags (>10 inches) are a well-distributed component. Downed logs (>12 inch diameter at mid-point, >8 feet long) average 3 logs per acre. Coarse woody debris, including downed logs, ranges from 3 to 10 tons per acre.
- 14 Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about 5 and 15% 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 10 to 20 percent higher basal area in the mid- to old-age tree groups than goshawk foraging areas and the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the ponderosa pine-evergreen oak type.

### 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 1 acre. Groups at the mid-to old-age stages consist of 2 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 (>3 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 15 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, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Shrubs average greater than 30% 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 1 acre to 10s 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 18 inches or greater at DBH and average 1 to 2 snags per acre, while snags greater than 8 inches average 5 snags per acre (Weisz et al. 2011); large oak snags (>10 inches) are a well-distributed component. Downed logs (>12 inch diameter at mid-point, >8 feet long) average 3 logs per acre. Coarse woody debris, including downed logs, ranges from 3 to 10 tons per acre.
- 09 Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about 5 and 15% 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 10 to 20 percent higher basal area in the mid- to old-age tree groups than goshawk foraging areas and the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the ponderosa pine-evergreen shrub type.

#### 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 0.5 acre.

#### Guidelines for both subclasses of Ponderosa Pine-Evergreen Oak (ERU-PPE-G)

- 01 Multiple species of large oak trees and snags should be sustained to promote old-growth attributes.
- 02 Management activities should leave an average of 1 to 2 snags greater than 18 inches per acre, when these components exist on the landscape prior to treatment.

#### 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.

For a list of at-risk species associated with ponderosa pine forest see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

The plan components below apply to the ponderosa pine forest vegetation community. Refer to the [All Upland Ecological Response Units](#), [Invasive and Noxious 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 trees, and coarse woody debris (>3 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	Structure Class
2	Recently disturbed, grass and forbs, and shrub resprouts	Tree < 10%	sparse-open
2	Dominated by trees 5.0"- 9.9" diameter	10-29.9%	open
80	Dominated by trees 10.0"- 20.0"+ diameter	10-29.9%	open, multi-storied
2	Dominated by trees 0"- 4.9" diameter	10-30+%	open and closed
2	Dominated by trees 5.0"- 9.9" diameter	≥ 30%	closed
12	Dominated by trees 10.0"- 20.0"+ diameter	≥ 30%	closed, multi-storied

- 05 Dwarf-mistletoe occurs in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures. Grasses, forbs, shrubs, and needle cast (fine fuels), and small trees maintain the natural fire regime. Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. The amount of shrub cover depends on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986, 2006).

### 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%. 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 5 and 20% depending on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986, 2006).

- 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 18 inches or greater at DBH and average 1 to 2 snags per acre. In the Gambel oak subtype, large oak snags (>10 inches) are a well-distributed component. Downed logs (>12 inch diameter at mid-point, >8 feet long) average 3 logs per acre. Coarse woody debris, including downed logs, ranges from 3 to 10 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 10 to 20 percent higher basal area in mid- to old-age tree groups than in goshawk foraging areas and the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the ponderosa pine type.

#### **Fine-scale Desired Conditions (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 1 acre, but averages 0.5 acres. Groups at the mid- to old-age stages consist of 2 to approximately 40 trees per group.

#### **Guidelines for Ponderosa Pine Forest (ERU-PPF-G)**

- 01 Management activities should leave an average of 1 to 2 snags greater than 18 inches per acre, when these components exist on the landscape prior to treatment.

#### **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 (*Pinus ponderosa* var. *scopulorum*) in an open forest structure (less than 30 percent tree cover), with minor occurrence of aspen (*Populus tremuloides*), Douglas-fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), and Southwestern white pine (*Pinus strobiformis*). Aspen may occur as small groups in north-facing slopes, drainages, and other microsites where cooler, moister conditions prevail, but does not occur as a seral stage in the mixed conifer–frequent fire ecological response unit. More shade tolerant conifers, such as Douglas-fir, 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.

For a list of at-risk species associated with mixed conifer-frequent fire see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

The plan components below apply to the mixed conifer-frequent fire vegetation community. Refer to the [All Upland Ecological Response Units](#), [Invasive and Noxious 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 (>3 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	Structure Class
9	Early development, all structures from Recently disturbed, grass and forbs to 0-4.9" trees	Tree < 10%	Sparse-Open
3	Dominated by trees 5.0"- 9.9" diameter	≥ 30%	Closed
3	Dominated by trees 5.0"- 9.9" diameter	10-29.9%	Open, Multi-Storied
60	Dominated by trees 10.0"- 20.0"+ diameter	10-29.9%	Open, Multi-Storied
25	Dominated by trees 10.0"- 20.0"+ diameter	≥ 30%	Closed
0	Historically rare, Dominated by trees 10.0"- 20.0"+ diameter	10-29.9%	Open, 1-2 Storied

- 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 15 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, moisture 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, 2006).
- 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 18 inches or greater at DBH and average 3 per acre. Smaller snags, 8 inches and above at DBH, average 8 snags per acre. Downed logs (>12 inch diameter at mid-point, >8 feet long) average 3 per acre within forested areas. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre.
- 10 Ground cover consists primarily of perennial grasses and forbs capable of carrying surface fire, with basal vegetation values ranging between about 5 and 20% depending on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986, 2006). 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 10 to 20 percent higher basal area in mid- to old-age tree groups than in goshawk foraging areas and in the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the dry mixed conifer type.

### **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 1 acre. Groups at the mid- to old-age stages consist of 2 to approximately 50 trees per group.

### **Guidelines (ERU-MCD-G)**

- 13 Management activities should leave an average of 1 to 2 snags greater than 18 inches per acre, when these components exist on the landscape prior to treatment.

### **Wet Mixed Conifer–Mixed Conifer with Aspen (ERU-MCW)**

The wet mixed conifer-mixed conifer with aspen vegetation community 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.

For a list of at-risk species associated with wet mixed conifer–mixed conifer with aspen see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

The plan components below apply to all wet mixed conifer–mixed conifer with aspen. Refer to the [All Upland Ecological Response Units](#), [Invasive and Noxious 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	Structure Class
7	Early development, all structures from Recently disturbed, grass and forbs to 0-4.9" trees	Tree < 10%	Sparse-Open
21	All Aspen and deciduous tree mix, all size classes	Varies	All storiedness
18	Dominated by trees 0.0"- 9.0" diameter	10-30.0%+	All storiedness
14	Dominated by trees 10.0"- 20.0" diameter	≥ 30%	Closed
40	Dominated by trees 20.0"+ diameter	> 30%	Closed, 3+ 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 1 to 5 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 (>8 inches DBH) averages 20 per acre. Coarse woody debris, including downed logs, vary by seral stage, with averages ranging from 5 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 (>12 inch diameter at mid-point, >8 feet long) and coarse woody debris (>3 inch diameter) vary by seral stage.
- 06 Organic ground cover and herbaceous vegetation provide protection of soil, moisture 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 & 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 10 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 MCW 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<sup>25</sup>. Other smaller disturbances occur more frequently.
- 11 Ground cover consists of shrubs, perennial grasses, and forbs with basal vegetation values ranging between about 5 and 20% depending on the Terrestrial Ecological Unit Inventory unit (USDA Forest Service 1986, 2006).
- 12 Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests typically contain 10 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 moisture 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.

---

<sup>25</sup> 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.

## **Guidelines (ERU-MCW-G)**

- 01 Management activities should leave an average of 1 to 5 snags greater than 18 inches per acre, when these components exist on the landscape prior to treatment.



## Riparian Ecological Response Units (RERU)

Riparian ecological response units are mapped riparian areas that describe dominant riparian plant communities. This section provides management direction for riparian plant communities present on the Forest and the riparian ecological response unit framework is simply a system of mapping, delineating, and describing riparian plant communities. 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.

The following riparian ecological response units are present on the Forest: 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 (2013) for a detailed description of each riparian ecological response unit. 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. 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<sup>26</sup> can indicate changes in local site conditions and ecological status (e.g., high departure). For example, drying conditions may be evident by the under-representation of wetland-obligate (only found at wetlands) species and increases in facultative-upland or upland species (mostly occur at uplands). A number of riparian species are groundwater dependent (generally requiring shallow groundwater levels), so dominance by upland plants at the riparian zone may indicate a declining water table and or drought conditions.

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 (6<sup>th</sup>-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 – these indicators should be considered for the riparian guidelines listed below (RERU-G-1, RERU-G-2, RERU-G-3, and RERU-G-4). This is not an exhausted list as the BASI should inform the consideration of additional indicators. See the Regional Desired Conditions for Riparian and Aquatic Systems guide<sup>27</sup> for other applicable indicators and measures. PFC assessments or other similar protocols should be used to evaluate current riparian

---

<sup>26</sup> 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.

<sup>27</sup> This guide supplements the Riparian and Aquatic Ecosystem Strategy (RAES) of the Southwestern Region by establishing desired conditions, particularly for resources involving vegetation, fire, stream hydrology, and groundwater-fed systems.

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.

For a list of at-risk species associated with riparian ecological response units see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

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 and Noxious 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% 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 are present and approach desired seral state distributions by Riparian Ecological Response Unit. Seral state proportions, per the R3 Seral State Proportions Supplement<sup>28</sup>, 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<sup>29</sup>, 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.

---

<sup>28</sup> The R3 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.

<sup>29</sup> 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.

- 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<sup>30</sup> 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.
- 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 and wildlife 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 cottonwood and 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.

---

<sup>30</sup> 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.

## Management Approaches for all Riparian Ecological Response Units

- 01 Use best available scientific information and adaptive management strategies 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 USDOJ 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 (NWCG 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 affects the health, resilience, sustainability of highly valued resources, including natural resources and “built” resources

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 adjoining governmental jurisdictions.

Daily management objectives may 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.

Some 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. Refer to the [Vegetation and Ecological Response Units \(ERU\)](#) sections for additional applicable plan direction.

### Desired Conditions (FF-DC)

- 01 Firefighter and public safety is 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 low intensity surface fires as ladder fuels are nearly absent. Firefighters are able to safely and efficiently suppress wildfires in the wildland-urban interface.
- 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 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 valued natural or built resources.
- 05 Where the natural fire regime is high severity fire, prescribed fire planning will include consideration of first and second order fire effects outside of a Wilderness area.
- 06 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.

## 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 avoids disturbance to at-risk species, cultural resources, and other highly valued or at-risk resources, while keeping safety and risk management as a priority.
- 04 Aerial retardant drops should avoid at-risk species habitat, waterways, riparian areas, and wetlands per the Nationwide Aerial Application for Fire Retardant on National Forest System Lands.
- 05 In designated and recommended wilderness areas, prescribed fire should be used to reduce the potential for undesirable fire behavior and effects and to meet forest plan objectives. Naturally occurring fires should be allowed to burn where the effects are beneficial, or where management actions would produce desirable effects.

- 06 Temporary fire facilities (e.g., incident bases, camps, staging areas, helispots, and retardant batch plants) should be placed to avoid negative impacts in potentially sensitive species areas (e.g., designated critical habitat, owl packs, at-risk plant sites, and riparian areas).
- 07 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.
- 08 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.
- 09 Wildland fire operations within riparian management zones should use minimum impact suppression tactics to protect terrestrial and aquatic resources associated with these zones.
- 10 Prescribed fire ignitions should be located outside riparian management zones, unless local conditions suggest otherwise. Prescribed fires should be allowed to spread naturally into these zones, unless local conditions suggest better management by ignitions within the riparian management zones.
- 11 Wildfire management activities should be consistent in meeting incident management objectives to minimize evidence of management activities in wilderness, this includes:
  - Minimum Impact Suppression Tactics (MIST) should be used for suppression activities that occur within a Wilderness area. This includes any and all actions that may be advisable to minimize the potential for uncharacteristically large or severe fires.
  - Control lines and suppression action should be taken outside of wilderness, unless approved by a qualified Agency Administrator.

## Management Approaches for 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 such as the Wildfire Strategic Response Zones 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. Five strategic zones were developed for the Tonto National Forest: 1) maintain, 2) restore, 3) protect, 4) exclusion, 5) high complexity. These zones are dynamic over time and space and will change as conditions change, affecting management opportunities. For example an area currently identified as a “restore” zone could become a “maintain” zone post-treatment (mechanical and/or fire). Conversely, a “restore” zone could become a “protect” zone if changing fuel conditions change expected fire behavior and effects such that fire would not meet forest plan objectives.
- 05 Wildland fire may be coordinated across jurisdictional boundaries when resource 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 land owners 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.



## 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. Among other benefits, these facilities and the river channels below (particularly the Salt River) provide for a substantial portion of the recreation use on the Forest and provide habitat for migrating water fowl.

Priority watersheds for the Tonto National Forest have been identified using the Forest Service National Watershed Condition Framework as areas where plan objectives for restoration focus on maintaining or improving watershed condition. These 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. To view the current Tonto National Forest priority watersheds visit <https://apps.fs.usda.gov/wcatt/>.

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. A portion (approximately 390,000 acres based on GIS analysis) 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 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 stockpounds, 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. They can also harbor invasive aquatic species such as American bullfrogs and crayfish that prey on or compete with native wildlife. Poorly designed constructed waters can entrap native wildlife or be inaccessible. These water resources are at increased risk from projections of future climate change and competing demands from multiple uses.

Water for consumption is one of the key ecosystem services provided by the Tonto National Forest. Surface water runoff from within the Forest is estimated at approximately 350,000 acre feet per year. Groundwater beneath the Forest provides an additional source of water for various uses within and around the Forest boundary. 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.

For a list of at-risk species associated with watersheds and water resources see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

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) 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 Water quality, including groundwater, 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 Watershed vegetation exhibits low departure from reference condition of vegetation characteristics (e.g., fuel composition, fire regime, and associated disturbances).
- 08 Groundwater discharge maintains water table elevation, supports base flows and water temperature in streams, seeps, fens, springs, and other wetland resources and that sustains the function of surface and subsurface aquatic ecosystems exhibit low departure from reference

condition. Groundwater discharge maintains site productivity and soil moisture characteristics for riparian vegetation.

- 09 Surface waters provide habitat for aquatic species and riparian species, contribute to connectivity for wildlife across the landscape, provide for local and urban potable<sup>31</sup> water supplies, agricultural uses (e.g., livestock watering and irrigation), and recreation.
- 10 Water rights to support water dependent resources and uses on the Forest have been acquired.

### Objectives (WAT-O)

- 01 Ensure that at least two priority watersheds are identified at all times.
- 02 Implement at least one project identified in the Watershed Restoration Action Plan<sup>32</sup> for each priority watershed every year.
- 03 Improve or maintain watershed condition class (as defined in the Watershed Condition Framework or other acceptable method) of at least one 6<sup>th</sup> code (HUC12) watershed every 5 years.
- 04 Improve soil and water condition of 10,000 – 20,000 acres annually.
- 05 Complete at least four aquatic habitat restoration projects (e.g., increase pool quantity, provide stream cover, and bank stabilization) every 10 years.
- 06 Acquire 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) 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) 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 wells on National Forest System lands and pipelines across National Forest System lands shall only be authorized 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 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.

### Guidelines (WAT-G)

- 01 When existing groundwater wells are proposed for improvement, 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.

---

<sup>31</sup> Potable (drinkable) water is one of the key ecosystem services provided by water resources from the Tonto National Forest.

<sup>32</sup> Watershed Restoration Action Plans for priority watersheds are used to maintain or improve watershed condition and implement essential projects.

- 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 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.
- 05 Activities that could impact groundwater or surface water quality should be located outside Source Water Protection Areas<sup>33</sup> 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 aquatic life, riparian and aquatic desired conditions, and other water dependent resources.
- 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. 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 as an 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

---

<sup>33</sup> Source Water Protection Areas are areas that contribute water to wells or surface water intakes that are used for public water supply.

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.

## Management Approaches for Watersheds and Water Resources

- 01 Work with partners to leverage resources and 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<sup>34</sup> 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 (US 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 Manage groundwater and surface water on National Forest System lands as a hydraulically connected system.
- 09 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.
- 10 Identify and map Source Water Protection Areas on the Forest.
- 11 Use the watershed condition framework, or other acceptable method, to assess and prioritize watersheds for restoration or maintenance activities.
- 12 Prepare Watershed Restoration Action Plans to improve or maintain watershed condition, which can include management activities or projects to maintain or improve riparian areas, seeps, springs, wetlands, and riparian management zones where these resources have been identified as impaired or functioning at risk.

---

<sup>34</sup> Necessary water flows to sustain water resources and the goods and services they provide to people.

## Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)

### Riparian areas

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.

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. Fire is an infrequent disturbance and is related to the fire regimes of adjacent vegetation communities. Fire effects in adjacent and/or upslope communities do not negatively impact riparian communities. Key disturbances in these systems include surface water withdrawals and impoundments, groundwater pumping, domestic livestock, nonnative wildlife, and feral horse and 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 storm events. Intermittent streams flow seasonally, usually in response to winter precipitation but typically maintain shallow water tables throughout the year, and may contain perennial pools. Perennial streams flow year-round, though in some locations their flows may be below the surface (near-perennial streams). 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 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

All plan components in this section apply to all riparian management zones (RMZ) and associated riparian vegetation (refer to [Riparian Ecological Response Units](#)). The forest plan establishes riparian management zones around all lakes, stream ecosystems (perennial and intermittent), springs, seeps, and wetlands. Riparian management zones will be identified for land and vegetation within approximately 100 feet from the edges of these features. Other areas of identified riparian vegetation will also be included within riparian management zones. Riparian management zone width may vary based on ecological or geomorphic factors or by type of water body. Riparian management zone widths may be replaced by site-specific delineations during project planning and implementation.

For a list of at-risk species associated with riparian areas and riparian plant communities/riparian ecological response units see [Appendix C. At-Risk Species and Associated Ecological Response Units](#).

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 Response Units](#), 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 type and capability, 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 Herbivory 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 a ¼ mile) in warm water streams for aquatic species.

#### Objectives (RMZ-O)

- 01 Complete restoration projects on 200 – 500 acres of riparian areas rated as nonfunctioning and functioning-at-risk (Proper Functioning Condition or similar protocol) during each 10-year period, with emphasis on priority 6th code watersheds.
- 02 Improve or maintain 10-15 individual springs during each 10-year period.

#### Standards (RMZ-S)

- 01 All projects in riparian areas shall identify and delineate the riparian management zone.
- 02 Refueling, maintaining equipment, and storing fuels or other toxicants shall not occur in riparian management zones, except in the Lakes and Rivers Management Area.

#### Guidelines (RMZ-G)

- 01 New spring developments and redeveloped springs (not including maintenance<sup>35</sup>) should leave some water behind to support riparian obligate vegetation and wildlife species.
- 02 Motorized vehicle use should be limited to designated routes and/or areas, except when short-term uses are required for restoration activities or maintain infrastructure.
- 03 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.
- 04 In riparian areas (RMZ), 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](#)).

---

<sup>35</sup> The term “maintenance” refers to reoccurring work required to keep spring development functioning.



- 05 Annual operating instructions should schedule pasture use to achieve 50 percent utilization of current year's growth on riparian woody/browse species and 50 percent utilization of herbaceous vegetation within the riparian management zone.
- 06 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).
- 07 Activities that modify stream channels currently in proper functioning condition (evaluated using Proper Functioning Condition<sup>36</sup> Assessment or similar protocol) that would result in a non-functioning system should not be authorized.
- 08 When drafting water from streams, pumps should be screened to prevent capture of fish and aquatic organisms.

### Management Approaches for Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones

- 01 Use Tonto Stream Assessment Method, Proper Functioning Condition protocol, National Riparian Core Protocol, MIM (Multiple Indicator Monitoring), mapping efforts, or other accepted method for riparian assessments and monitoring.
- 02 Work with partners 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.
- 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 Focus restoration efforts where the potential to restore self-sustaining ecosystems is high versus those that require repeated management actions (e.g., continual planting of vegetation, treating invasive species, or maintaining exclosures).

---

<sup>36</sup> 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.

## Wildlife, Fish, and Plants (WFP)

The Tonto National Forest provides important habitat for an exceedingly diverse array of wildlife, fish, and rare plants. This level of biodiversity is due largely to the forest's position across three distinct ecological sections; the Sonoran Desert, Tonto Transition, and White Mountain-San Francisco Peak-Mogollon Rim. The Mazatzal Mountains and Sierra 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 or disjunct populations, or high levels of endemism. Forest management and multiple-use activities may also pose risks to some species. In the arid southwest, aquatic and riparian communities are some of the most diverse systems even though they represent only a small fraction forest lands. However, the species associated with these areas are at particularly high risk due to many pressures on water resources.

Under the 2012 planning rule, the forest is instructed to provide for ecological conditions necessary to maintain the persistence or contribute to the recovery of native species within the plan area, including at-risk species (FSH 1909.12, Chapter 20, section 21.13). Ecological conditions consist of the biological and physical environment that can affect the diversity of plant and animal communities, the persistence of native species, and the productive capacity of ecological systems. Ecological conditions include habitat and other influences on species and the environment. Examples of ecological conditions include the abundance and distribution of aquatic and terrestrial habitats, connectivity, roads and other structural developments, human uses, and invasive species (36 CFR 219.19). While the terms used to describe ecological conditions in this section are often qualitative, many 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). Federal listing under the Endangered Species Act of 1973 falls under the purview of the U.S. Fish and Wildlife Service. Section 7 of the act requires Federal agencies to use their authorities to carry out programs for the conservation of endangered and threatened species and to insure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat. Species of conservation concern are species native to, and known to occur in, the plan area; and for which there is substantial concern about the species ability to persist in the plan area.

At present, a total of 70 at-risk species have been identified, 19 federally recognized and 51 SCC; however, if any employee receives new, scientific information that indicates that a species should be added or removed to the list of SCC, the information should be sent to the Forest Supervisor to be evaluated and documented, and any subsequent recommendation for change should be sent to the Regional Forester for consideration (FSH 1909.12, Chapter 20, section 21.22b).

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

Due to the integrated nature of 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. For a crosswalk of these ecological conditions and their related plan components, and associated ecological response units see [appendix C](#).

For information on recreational opportunities related to wildlife (e.g., hunting, fishing, and watching wildlife) refer to the [Wildlife-Based Recreation](#) (REC-DIS-WB) 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.
- 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.
- 04 A diversity of habitat components, including biotic and abiotic features, are available at the appropriate spatial, temporal, compositional, and structural levels to provide adequate opportunity for 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 understood.
- 07 Human-wildlife conflicts and human disturbances are minimal, as are 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 that contribute to the recovery of federally listed species every 10 years.
- 02 Complete at least 20 products or activities that educate the public about wildlife, fish, and rare plants every 2 years (e.g., educational signs and brochures, website pages, species checklists, presentations, volunteer projects that restore TES habitats, 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, maintain viable populations of species of conservation concern.
- 04 Projects and activities that may negatively impact at-risk species should consider protections and mitigation measures, especially considering the timing and location of vulnerable life history processes (e.g., reproduction, molting, migration, and hibernation). Examples of mitigations and protections could include but are not limited to: timing restrictions, adaptive percent utilization levels, distance buffers.
- 05 Projects and activities that may negatively impact or impair the viability of at-risk plant populations should be avoided where these species are known or likely to occur.
- 06 Manmade structures (e.g., fences, steel posts, vent pipes, stock tanks, and drinkers) should be designed, constructed, and maintained to minimize wildlife mortality (e.g., capped fence posts and escape ramps).
- 07 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.
- 08 New infrastructure or constructed features (e.g., fences, roads, recreation sites, facilities, drinkers, 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 do 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.
- 09 Earthen stock tanks identified as important for at risk species should be managed to maintain water and habitat needed for species survival and reproduction, consistent with existing water rights.
- 10 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

- 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 floristic 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.

## Invasive and Noxious Species (INS)

A species is considered invasive if it is (1) non-native to the ecosystem under consideration and (2) its introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112). Noxious species are species that are detrimental, destructive, or difficult to control or eradicate. Invasive and noxious species include, but are not limited to, plants, animals, fungi, bacteria, and viruses.

Across the nation invasive species have caused massive disruptions in ecosystem function, reducing biodiversity, and degrading ecosystem health in National Forests. Invasive species are frequently adapted to a wide range of climates and tend to thrive as early colonizers after disturbances. Changing conditions due climate change and increased human impacts on many systems may favor the spread and establishment of invasive species.

Historically, the Tonto National Forest has suffered from introduced, non-native invasive species that have threatened native communities through direct competition and predation, or by altering the frequency, severity, or other characteristics of fire regimes and other ecosystem functions. Riparian and aquatic communities have been especially impacted over time, and many other ecosystems and native species remain at risk of further invasion of harmful invasive species.

Invasive aquatic and wetland organisms are organisms that have moved into an area through purposeful or inadvertent human means and reproduced so aggressively that native aquatic and wetland species and ecosystems are being negatively affected. Invasive aquatic and wetland species are infiltrators that enter ecosystems beyond their historic range. In some cases, these organisms may even harm the health of humans.

Throughout the Tonto National Forest, noxious weeds infest native plant communities in increasing numbers. Five categories can be used interchangeably to describe noxious weeds: (1) exotic, (2) invasive, (3) competitive, (4) persistent, and (5) aggressive. While eradicating noxious weeds is not always possible, control of existing populations is important to ensure that native ecosystems are protected.

Plant invasions (such as invasive grasses) have two inter-related components; the first being biological and the second being environmental. Biological-invasiveness is the capacity of a plant species to spread beyond the site of introduction and become established new sites; and environmental- invasiveness is the susceptibility of a habitat to the colonization and establishment of individuals from species not currently apart of the local community. In the case of invasive and exotic grasses on the Tonto National Forest, within the Sonoran desert many species (e.g., fountain grass, red brome, and buffelgrass) are highly aggressive, fire adapted, and readily-out compete native plants. Additionally, after burning, these invasive grasses rapidly reestablish.

### Desired Conditions (INS-DC)

- 01 Invasive and noxious species are present at population levels that do not disrupt ecological functionality, affect the sustainability of native species, cause economic harm, or negatively impact human health.

### Objectives (INS-O)

- 01 Treat and control invasive and noxious species on 200-1,500 acres annually.
- 02 Treat and control invasive species on 2 – 10 stream reaches every five years.

### Standards (INS-S)

- 01 Activities in and around surface waters will use decontamination procedures that prevent the spread of non-desirable fungi, disease, and invasive species.

- 02 Non-native, 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 or recommended wilderness.

### Guidelines (INS-G)

- 01 Equipment and materials should not be stored or staged in areas infested with invasive weeds or other non-native 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 weed species are not introduced during projects or emergency implementation.
- 03 Fill and rock material should be inspected for nonnative invasive plants prior to using for a project, to control the spread on nonnative invasive plants.
- 04 After initial treatments, follow up treatments should occur to prevent regrowth, establishment, or spread of treated and 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 Ground disturbing management activities should not introduce or spread non-desirable fungi, disease, and invasive and undesirable species.
- 07 When drafting water from streams or other water bodies, measures should be taken to prevent the spread of parasites or disease (e.g., chytrid fungus, Didiymo, and whirling disease).
- 08 Efforts to improve severely disturbed sites should include steps to reduce non-native invasive plant species colonization, protect soils, and improve watershed condition.
- 09 Management activities in and around streams and water bodies should use decontamination procedures to prevent the spread of non-desirable fungus, disease, and nonnative and/or invasive biota.

### Management Approaches for Invasive and Noxious 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 Consider conducting treatments in a timely manner to reduce or minimize spread
- 03 Locations of invasive and undesirable species are known, recorded, and managed using an integrated pest management (IPM) approach.
- 04 Noxious, invasive, and undesirable 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 current infestations, (4) use maps for management and control tactics, and (5) assess the impacts of the 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 and undesirable species. Work to develop educational materials for the public.
- 07 Encourage public land users to inspect and clean motorized vehicles prior to recreating on public lands to prevent the spread of invasive and undesirable species (e.g., quagga mussels and fountain grass).
- 08 Incorporate new technology and social media (e.g., Instagram, iNaturalist, EDDmaps, Avenza) to increase awareness regarding invasive and undesirable 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 TNF invasive and undesirable program. Attend trainings specifically geared toward the use of herbicide treatments for noxious weed control.
- 10 Coordinate with Animal and Plant Health Inspection Service to provide invasion sites on the forest, where appropriate, for the release and monitoring of biological controls. Ensure that biological control agents do not pose substantial risk to other native plants.
- 11 Encourage forest service employees to participate in scientific weed 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 and noxious weeds.



## 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, 1996).

### 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.
- 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.
- 04 Soil productivity is not inhibited by non-native invasive plant species.
- 05 Soils are free from contaminants that could alter ecosystem integrity or affect public health.
- 06 Soils do not exhibit accelerated or unnatural signs of water or wind erosion (e.g., pedestaling, rills, and gullies).

### Standards (SL-S)

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

### 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 to allow soil crusts to repopulate after project activities are completed.
- 03 Soils with impaired and unsatisfactory condition ratings (as defined by Terrestrial Ecological Unit Inventory) should be managed to improve their conditions, prioritizing areas where past management has resulted in degraded conditions (for activities within the Lakes & Rivers Management Area, reference guideline [MA-LRMA-G-03](#)).

- 04 In areas where soils have a severe erosion hazard rating<sup>37</sup>, 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 & Rivers Management Area, reference guideline [MA-LRMA-G-03](#)).

### Management Approaches for 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.

---

<sup>37</sup> Soil erosion hazard is the probability of soil loss resulting from complete removal of vegetation and litter. Slope, soil texture, and vegetation type greatly influence soil erosion hazard rating. It is an interpretation based on the relationship between the maximum soil loss and the tolerable (threshold) soil loss of a site. Soils are given a slight, moderate, or severe erosion hazard rating.

## 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, 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 specialists (particularly hibernacula and maternity roosts for bats) and facultative use by other wildlife.

### Guidelines (CVK-DC)

- 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, closures should be designed to preserve habitats for and mitigate negative impacts to wildlife, including roosting bats. Gates should include a lock and/or removable bar should be installed to allow future access for authorized personnel.
- 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

- 01 Consider the development of a response plan for white-nose syndrome through continued collaboration with the US Fish and Wildlife Service (USFWS), Bat Conservation International, AZ Department of Game and Fish, the National Speleological Society, and others with interests in conservation management for bat species.

- 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 internally and externally increase awareness 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.

## 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., fertilization, 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 (AirGO2, 2019). 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 plants (Omasa, 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 seven pollutants considered harmful to public health: carbon monoxide, lead, nitrogen dioxide, particulate matter 10 microns in size or smaller (PM10), particulate matter 2.5 microns in size or smaller (PM2.5), ozone, and sulfur dioxide. 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 (PM10 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 PM10. Additionally, pollutants from Phoenix non-attainment area sources and near-by copper mining facilities have been adversely impacting air quality and visibility on Tonto National Forest.

Class 1 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. Altogether, Arizona has twelve Class I areas – four of them – all wilderness areas are near or within the TNF: Pine Mountain, Mazatzal, Sierra Ancha, and Superstition. In addition to the Class I areas already discussed, the TNF includes four other wilderness areas designated after 1977: Hellsgate, Salome, Four Peaks, and Salt River Canyon. Even though these lack Class I status, they are managed as if they had this status; moreover, their visibility characteristics are adequately monitored by the three IMPROVE sites.

### Desired Conditions (AQ-DC)

- 01 Air quality on the Tonto National Forest meets or surpasses the State of Arizona and Federal ambient air quality standards.
- 02 Good air quality contributes to visibility, human health, quality of life, economic opportunities, quality recreation, and wilderness values.
- 03 Water chemistry and biotic components are not negatively impacted by atmospheric deposition of pollutants.
- 04 Smoke impacts on air quality related values are minimal.
- 05 Visibility in designated wilderness areas (Class I and sensitive Class II areas) is free of anthropogenic (human-caused) impacts.

- 06 Visibility in Class I areas meets the most recent regional haze regulations as mandated by Arizona Department of Environmental Quality and the Environmental Protection Act.

### Standards (AQ-S)

- 01 Prescribed fire (e.g., pile, broadcast, and jackpot burning) will occur in accordance with Arizona Department of Environmental Quality (ADEQ) requirements.
- 02 Prescribed burns and strategies for Emissions Reduction Techniques (ERTs) per Arizona Administrative Code R18-2 Article 15 shall be followed to reduce negative impacts to air quality.
- 03 Best management practices shall be used to protect visibility and opacity standards on the Tonto National Forest including Class I air sheds and wilderness areas that have more stringent requirements than other areas on the forest.

### Guidelines (AQ-G)

- 01 Dust abatement should occur during projects where dust is a potential effect (e.g., construction and road and motorized trail improvements).
- 02 During wildfire incidents, techniques to minimize smoke impacts (e.g., public notification, timing of ignitions, mass ignitions, and limiting fire spread) should be considered, including the identification of smoke management objectives in the wildfire decision document.
- 03 Coordination with ADEQ should occur before and during prescribed burns to comply with State and Federal regulatory requirements for emissions and impacts to Class I areas.
- 04 Wildfire decision documents should identify smoke-sensitive receptors, and include objectives and courses of action to minimize and mitigate impacts to those receptors.
- 05 During extended periods of burning, smoke should be monitored, in cooperation with the Arizona Department of Environmental Quality, for levels that may have impacts to human health from fine particulates.

### Management Approaches for Air Quality

- 01 Work with agencies, organizations, Tribes, and other entities to actively pursue actions designed to reduce the impacts of pollutants from sources within and outside the Forest.
- 02 Consider deploying smoke monitors when there is potential for significant impacts to the public.
- 03 To promote public awareness and protection of human health and safety, consider notifying stakeholders and the public about potential smoke from fire activities through methods of advanced notification through the media and smoke warning signs along roads when visibility may be reduced due to wildland fire.
- 04 Work with partners to develop strategies for managing wildfires to incorporate as many emission reduction techniques as feasible, subject to economic, technical, and safety criteria, and land management objectives.
- 05 Utilize Emission Reduction Techniques to minimize impacts to sensitive receptors of burn unit(s).

## Chapter 3. Management Areas Plan Direction

Management areas plan direction 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 trails. The current administratively designated areas on the forest are: critical habitat, experimental forest, inventoried roadless areas, national recreation trails, research natural areas, and significant caves.

This chapter also includes plan components for management areas created and recommended including: the Lakes and Rivers Management Area, Apache Leap Special Management Area, proposed research natural areas, recommended botanical areas, eligible wild & scenic rivers, and recommended wilderness areas.

The plan displays plan components in sections with **shaded** headers accompanied by codes to distinguish them from other sections of the plan. Text found in sections with headers that not shaded and without a code are considered optional plan content. 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. 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 untrammelled by man, where man himself is a visitor who does not remain.”*

In the 1964 law, 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. The Wilderness Act requires management of human-caused impacts and protection of the area's wilderness character to insure that it is "unimpaired for the future use and enjoyment as wilderness."

The Wilderness Act describes wilderness using the following qualities of “wilderness character”:

- untrammelled – free from modern human control or manipulation;
- natural – where the natural condition of the land, its plants, wildlife, water, soil, air and the 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 of value, which are ecological, geological or other features of scientific, educational, scenic, or historical value, are truly unique and essential to the character of a particular wilderness, but this may not be applicable to all wilderness areas.

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 (60,740 acres), Hellsgate (37,440 acres), Mazatzal (252,500 acres), Pine Mountain (20,061), Salome (18,530 acres), Salt River Canyon (32,100 acres), Sierra Ancha (20,850 acres), and the Superstition Wilderness (160,200 acres). 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 60,740 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 37,440 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 252,500 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: their condition varies from very good to very poor.

### **Pine Mountain Wilderness Area**

The 20,061-acre Pine Mountain Wilderness is managed by the Prescott National Forest. An 11,301-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 18,530 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 32,100 acres on the Globe and Tonto Basin Ranger Districts. This Wilderness contains approximately 32,100 very rugged acres and was established in 1984. 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 20,850 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 160,200 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 for a map of 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 untrammelled 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 other wilderness characteristics.
- 03 Wilderness areas provide recreation opportunities where social encounters are infrequent and occur only with individuals or small groups so that there are opportunities for solitude. Visitors experience self-reliance, challenge, and risk while enjoying freedom to pursue non-motorized or non-mechanized primitive recreation activities in keeping with wilderness character.
- 04 The environment within a wilderness is essentially unmodified. Natural occurring scenery dominates the landscape.
- 05 Modern, human-made developments are rare, substantially unnoticeable, and use natural or complementary materials. They are present only when needed to provide for public safety, resource protection, or to reflect the historic and cultural landscape.
- 06 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, keeping with the natural quality of wilderness character.
- 07 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.
- 08 Well-marked boundaries result in wilderness areas free of motorized and mechanized intrusions.
- 09 Resource impacts from high use areas outside of designated wilderness are not expanding into designated wilderness.

### Standards (DWMA-S)

- 01 Management of designated wilderness shall comply with the most recent version of their respective management or implementation plans. 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 15 persons and 15 livestock per group, except as determined under special use permit, emergency services, formal agreements, and management activities for maintaining wilderness character.
- 03 Outfitter and guide service opportunities are identified and authorized by public needs and health of 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<sup>38</sup> that are no longer in use and do not meet the desired conditions will be removed from wilderness.
- 05 Any research conducted in wilderness shall be subjected to analysis by a minimum requirements analysis, and shall not have adverse effects to wilderness character. Any proposed research that is not dependent upon occurring within wilderness shall be conducted elsewhere in the Forest.
- 06 A minimum requirements analysis<sup>39</sup> will be utilized when considering new activities and instances authorizing non-conforming uses in designated wilderness.

## Guidelines (DWMA-G)

- 01 Wilderness boundaries should be clearly identified through signage at official entry points and needed locations (e.g., informal access points), and include features such as trail maps and boundary markers.
- 02 Limited use of non-colored blazes may be used where it is difficult to navigate the trail. Painted blazes should be removed.
- 03 Unauthorized, user-created structures should be dismantled, rehabilitated, and/or removed from designated wilderness.
- 04 Naturally occurring wildfires should be allowed to perform their natural ecological role.
- 05 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.
- 06 Areas that are negatively impacted by human activity that has caused degradation to natural conditions and wilderness character should be rehabilitated to a natural condition making use of native vegetation or other natural materials native to the area.
- 07 New trail construction or existing trail realignment should be considered for health and safety concerns, resource protection, or for purposes of enhancement and protection of wilderness character.
- 08 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 240) except where needed to protect resources.
- 09 Maintenance and design of trails should be done in a sustainable manner to maintain wilderness character, reflect a primitive setting, protect resources, and minimize impacts on wilderness.

## Management Approaches for Designated Wilderness

- 01 Establish a wilderness character baseline and implement and maintain a wilderness character monitoring program for each wilderness based upon the most recent wilderness character monitoring protocol recognized by agency policy. Complete a map of threats to wilderness character. Wilderness management decision making process will be informed by the results of

---

<sup>38</sup> Nonconforming structures are facilities and improvements that do not protect or enhance the wilderness character of the area.

<sup>39</sup> 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.

<sup>40</sup> Defined in the Forest Service [Trail Class Matrix](#)

threats to wilderness character mapping and by results of the monitoring trends in the condition of wilderness character by the wilderness character monitoring program. Forest staff will complete and implement wilderness use capacity studies, non-native invasive species inventories, and comprehensive vegetation inventories for each designated wilderness.

- 02 Where trends in monitoring indicate that opportunities for solitude are being degraded, consider implementing management actions that improve opportunities for solitude (e.g., promoting non-wilderness destinations, providing public information about periods of lower visitation, or evaluating the possible need for a permit system).
- 03 Where impacts from an increasing number of recreation sites or increasing impacts at individual sites are observed, management actions (e.g., public education, site restoration, and site or area closures) can be implemented to reduce cumulative impacts to wilderness character.
- 04 Consider assigning a wilderness resource advisor, or in absence of an available resource advisor a wilderness specialist, to all 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.
- 05 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.
- 06 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.
- 07 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.
- 08 Coordinate with the Arizona Department of Game and Fish on management of native species within wilderness to maintain and enhance wilderness character during project implementation.
- 09 Use interpretation and education to encourage visitors to adopt techniques, equipment, and ethics specific to wilderness, including Leave No Trace Outdoor Ethics. Consider the use of news releases, postings, permit issuance, and individual visitor contacts to inform visitors of areas of concentrated resource damage and use restrictions. Develop educational materials and interpretation that encourage widespread and common understanding of and support for wilderness values, philosophy, resources, and benefits.

## Recommended Wilderness (RWMA)

Recommended wilderness areas are lands recommended for wilderness designation as a result of a 4-step wilderness recommendation process: (1) inventory; (2) evaluation; (3) analysis; and (4) recommendation. The purpose of the recommendation process was to identify all areas within the Tonto National Forest that 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 these 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 stated below will be applied to recommended wilderness areas until such time as the area is designated as wilderness by Congress.

See Figure A-2 in appendix A for a map of 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 and disturbances with a limited amount of human influence.
- 04 Natural processes (e.g., insects, disease, blowdown, and fire) function in their ecological role.
- 05 Recommended wilderness areas have minimal to no nonnative invasive species that are noticeable to the average forest visitor.
- 06 Manmade features are rare and composed of complimentary materials. They are present when needed, to provide for public safety or resource protection.
- 07 Improvements necessary for valid existing rights and uses are not substantially noticeable and do not detract from the wilderness characteristics of the area.
- 08 Authorized special uses maintain wilderness characteristics of solitude and primitive and unconfined recreation.
- 09 Recommended wilderness areas provide recreation opportunities, where social encounters are infrequent and occur only with individuals or small groups so that there are opportunities for solitude. Visitors experience self-reliance, challenge, and risk, while participating in recreational activities.
- 10 Mechanized recreation (e.g., mountain biking) occurs at levels that do not detract from 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, unless there are valid existing rights.

- 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 common variety minerals<sup>41</sup> shall not be permitted in recommended wilderness areas.

### Guidelines (RWMA-G)

- 01 Motorized vehicle access should not occur in a RWA unless specifically authorized for emergency use, resource protection, or maintenance of authorized improvements.
- 02 Mechanized uses for management activities (e.g., chainsaws, wheelbarrows) should be authorized in an RWA if they do not permanently degrade wilderness characteristics.
- 03 Intervention in natural processes through management actions (e.g., fire management, active weed management) should only be authorized where they move an area towards resource desired conditions and the project design does not permanently degrade the wilderness characteristics.
- 04 Management activities, including transplants (e.g., removal, reintroduction, or supplemental introduction) of wildlife species, should be permitted to use motorized and mechanical means (e.g., helicopter landings) if necessary to perpetuate or recover a threatened or endangered species, to restore the population of an indigenous species, or to manage wildlife populations.
- 05 When conditions permit, wildland fire in RWAs 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.
- 07 Maintenance of existing structures should be carried out in a manner that does not permanently expand the evidence of motor vehicle and mechanized equipment use beyond current conditions within the recommended wilderness area.
- 08 New permanent improvements should not be authorized unless necessary for public health and safety, resource protection, or viability of valid existing rights and authorized uses.
- 09 Developed recreation facilities with provisions for user comfort (e.g., picnic tables and fire grills) should not be installed in RWAs.
- 10 Management activities in RWAs should meet visual quality objectives of High or Very High in the long term, as defined in the Visual Management System or similar protocol.

---

<sup>41</sup> Salable/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.

## Designated Wild & Scenic Rivers (DWSRMA)

In 1968, Congress passed the Wild and Scenic Rivers Act 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 & 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 for a map of 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 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 Authorized projects along the river corridor of designated Wild and Scenic river segments protect or enhance the river segment's outstandingly remarkable values and classification.
- 05 Domestic livestock grazing and constructed range improvements within the river corridor do not impact the river segment's outstandingly remarkable values, and are consistent with the river segment's classification.

### 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 common variety minerals shall not be authorized in wild and scenic rivers.

### Guidelines (DWSRMA-G)

- 01 Recreation and other activities in designated rivers and associated corridors should be managed to occur at appropriate locations and intensities to protect and 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 ¼ mile of a wild river segment.
- 03 Management activities should be consistent with the recreation opportunity spectrum class of:
  - a. "primitive" to "semi-primitive non-motorized" in eligible wild rivers
  - b. "semi-primitive non-motorized" to "semi-primitive motorized" in eligible scenic rivers

- c. “semi-primitive non-motorized” to “roaded natural” in eligible recreational rivers.

## Management Approaches for Designated Wild & 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 shall be incorporated by reference and are part of the plan:
  - a. Fossil Creek Wild and Scenic River Comprehensive River Management Plan <sup>42</sup>
  - b. Verde Wild and Scenic River Comprehensive River Management Plan
- 02 Collaborate with neighboring forests and agencies on the management of wild and scenic rivers.
- 03 Work cooperatively with the Coconino and Prescott National Forests to administer and track authorized activities within the designated wild and scenic segments of the Verde River and Fossil Creek.
- 04 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. Consequently, residents and visitors not only appreciate and learn about wild and scenic rivers, but understand their role in protecting wild and scenic river values. This can result in increased stewardship, ecological awareness, partnerships, and volunteerism.

---

<sup>42</sup> The Draft Fossil Creek Comprehensive River Management Plan (CRMP) and Draft Environmental Impact Statement was released for public comment December 1, 2018 through February 28, 2019. The Coconino and Tonto National Forests are working together on the CRMP and information is available on the forest [webpage](#).



## Eligible Wild & Scenic Rivers (EWSRMA)

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.

In the Tonto National Forest, all rivers were evaluated to determine their eligibility for inclusion in the National Wild and Scenic Rivers System. This evaluation resulted in 20 possible river segments with outstandingly remarkable values<sup>43</sup> on the Forest (table 18). Each river is assigned a classification of Wild, Scenic, or Recreational, based on the free flowing condition and development level in and around the river at the time it is deemed eligible. There are approximately 46 miles classified as wild, 50 miles classified as scenic, and 32 miles classified as recreational.

See Figure A-4 in appendix A for a map of the eligible wild and scenic rivers on the Tonto National Forest.

**Table 18. Eligible wild and scenic rivers with their classifications and outstandingly remarkable values**

Stream Name	Ranger District	Classification	Outstandingly Remarkable Values
Arnett Creek / Telegraph Canyon	Globe	Recreational	Scenery, Fisheries
Cold Spring Canyon	Pleasant Valley	Wild	Natural
Devil's Chasm	Pleasant Valley	Wild	Historic
Dude Creek	Payson	Recreational	Fisheries
Fish Creek	Mesa	Wild, Scenic	Natural
Greenback Creek	Pleasant Valley, Tonto Basin	Scenic	Historic
Lime Creek	Cave Creek	Scenic	Fisheries
Canyon Creek	Pleasant Valley	Recreational	Wildlife
Lower Salt River	Mesa	Recreational	Wildlife, Recreation, Historic
Lower Tonto Creek	Tonto Basin	Scenic	Recreation
Pine Creek	Payson	Recreational	Geologic
Pueblo Canyon	Pleasant Valley	Wild	Scenery, Historic
Reno Creek	Tonto Basin	Scenic	Historic
Salome Creek	Pleasant Valley, Tonto Basin	Wild	Recreation, Scenery
Squaw Creek	Cave Creek	Scenic	Historic
Tangle Creek	Cave Creek	Scenic, Recreational	Natural, Scenery
Upper Salt River	Tonto Basin, Globe	Wild, Scenic	Geologic, Recreation, Historic, Scenery
Upper Tonto Creek	Payson	Scenic	Recreation, Scenery, Wildlife, Historic
Verde River	Cave Creek	Wild, Scenic	Fisheries, Wildlife, Recreation, Historic
Workman Creek	Pleasant Valley	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

<sup>43</sup> 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.

projects and activities in eligible rivers or the surrounding river corridor<sup>44</sup> so long as they preserve the free-flowing<sup>45</sup> 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.

### Desired Conditions (EWSRMA-DC)

- 01 The existing outstandingly remarkable values, free-flowing condition, and classifications of eligible wild and scenic river corridors (¼ mile of each river banks ordinary high water mark along the river segment) 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 Authorized projects 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.

### 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 eligible wild and scenic river corridors shall comply with interim protective measures outlined in Forest Service Handbook 1909.12, 84.3, or the most current version.
- 03 When management activities are proposed that may compromise the outstandingly remarkable values, classification, or free-flowing condition of an eligible wild and scenic river segment, a suitability study shall be completed for that eligible river segment prior to initiating activities.<sup>46</sup>
- 04 Sales or extraction of common variety minerals shall not be authorized in eligible wild and scenic rivers.

### Guidelines (EWSRMA-G)

- 01 Recreation and other activities in eligible rivers and associated corridors should be managed to occur at appropriate locations and intensities to protect and 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 ¼ mile of a wild river segment.

---

<sup>44</sup> The geographic area generally encompassed within one-quarter mile on either side of a river studied for eligibility or suitability that contains the river and its outstandingly remarkable values.

<sup>45</sup> Flowing in a natural condition without impoundment, diversion, straightening, riprapping, or other modification of the waterway.

<sup>46</sup> Rivers found unsuitable for inclusion in the National Wild and Scenic River System shall be released from further consideration and restrictions of this section.

- 03 Management activities should be consistent with the recreation opportunity spectrum class of:
- a. "primitive" to "semi-primitive non-motorized" in eligible wild rivers
  - b. "semi-primitive non-motorized" to "semi-primitive motorized" in eligible scenic rivers
  - c. "semi-primitive non-motorized" to "roaded natural" in eligible recreational rivers.

### Management Approaches for Eligible Wild & Scenic Rivers

- 01 Develop educational materials and interpretation of eligible wild and scenic rivers that encourage widespread and common understanding of the values, philosophy, resources, and benefits of wild and scenic rivers. Consequently, residents and visitors not only appreciate and learn about wild and scenic rivers, but understand their role in protecting wild and scenic river values. This can result in increased stewardship, ecological awareness, partnerships, and volunteerism.
- 02 Collaborate with neighboring forests and agencies on the management and monitoring of conditions within the stream corridors of eligible wild and scenic rivers.
- 03 Opportunities for enhancing outstandingly remarkable values may be considered in all project management activities within an eligible wild and scenic river corridor.

## Designated and Recommended Research Natural Areas and Botanical Areas (RNBAMA)

Management direction for both botanical areas and research natural areas 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 NEPA process<sup>47</sup>. 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. See table 19 and Figure A-5 in appendix A 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
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.

<sup>47</sup> All recommended areas are management areas until a separate National Environmental Policy Act process is completed for formal designation.

This research areas 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 RNA.

#### **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 RNA is typical of the palo verde-cactus shrub type. The RNA 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; *Quercus turbinella*) 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 1 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 & Lowe 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 (*Purshia subintegra*). The only known occurrences of Ripley's wild buckwheat (*Eriogonum ripleyi*) and Rusby's milkwort (*Polygala rusbyi*) 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 (*Lotus mearnsii* var. *equisolensis*) 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 provides 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 ¼ 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 7 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 RNA 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 ecosystems 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 for a map 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.

### Standards (RNBAMA-S)

- 01 Sales or extraction of common variety minerals 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 Overnight camping, recreation campfires, and recreational shooting are prohibited in designated or recommended botanical areas.
- 04 Livestock grazing will not be authorized in recommended or designated research natural areas or recommended or designated botanical areas.
- 05 Allotment management plans shall have the necessary provisions to protect the uniqueness, ecological condition, and biological diversity of designated or recommended research natural areas and botanical areas that occur within an active grazing allotment.

### 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 trails (motorized or non-motorized) should not be in designated or recommended research natural areas and botanical areas, except as needed for resource protection.
- 03 Wildland fire should be managed using Minimal Impact Suppression Tactics (MIST) or other appropriate tactics 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.
- 05 Overnight camping and campfires should be prohibited in designated or recommended research natural areas when it interferes with current and/or ongoing research.
- 06 When granting access to designated or recommended botanical areas, prioritize non-motorized forms of transportation to protect the ecology, sensitive soils, and plant communities of these areas.



## Management Approaches for 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 signing 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.

## Inventoried Roadless Areas (IRAMA)

The Tonto National Forest manages thirteen inventoried roadless areas (IRAs), totaling about 264,876 acres (Table 20 and Figure A-6 in appendix A). 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	1,809
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 character of inventoried roadless areas is protected and conserved.
- 02 Inventoried roadless areas serve as safeguards against the spread of invasive plant species
- 03 Inventoried roadless areas provide reference areas for study and research.
- 04 IRAs appear natural, have high scenic quality, and provide opportunities for dispersed recreation.

### Standards (IRAMA-DC)

- 01 Management activities shall maintain or improve the roadless area characteristics<sup>48</sup> of the inventoried roadless area.

<sup>48</sup> 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, Semi-primitive Non-motorized, and Semi-primitive Motorized classes of dispersed recreation; (6) Reference landscapes; (7) Natural appearing landscapes with high scenic quality; (8) Traditional cultural properties and sacred sites; and (9) Other locally identified unique characteristics (36 CFR §294.11).

- 02 A road shall not be constructed or reconstructed in an IRA, unless the responsible official determines that a road is needed according to the circumstances allowed in the 2001 Roadless Rule (36 CFR § 294.12) and the road construction has been approved by the appropriate review.
- 03 Timber shall not be cut, sold, or removed from IRAs, unless the responsible official determines that activities meet the circumstances provided in the Roadless Rule (36 CFR § 294.12) and the activities have been approved through the appropriate review.

#### Guidelines (IRAMA-DC)

- 01 IRAs should be managed for Primitive, Semi-Primitive Non-Motorized, and Semi-primitive Motorized recreation opportunity settings (ROS) or similar protocol.
- 02 Management activities should be consistent with the visual quality objectives (VQO) settings, or similar protocol.

## National Trails (NTMA)

Congress passed the National Trails System Act in 1968. The Act authorized creation of a national trail system comprised of national scenic trails, national historic trails, and national recreation trails. The Tonto National Forest administers four national trails: Highline Trail, Six Shooter Canyon Trail, Great Western Trail, and the Arizona National Scenic Trail (see Figure A-7 in appendix A).

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 6 miles south of Globe from the Ice house Civilian Conservation Corps trailhead, or the Ferndell Trailhead. Six Shooter Canyon National Recreation Trail is home to the national champion Canyon Maple tree. These 2 national recreation trails offer spectacular views and high quality recreation opportunities.

The **Great Western Trail** was designated a National Millennium trail under Executive Order 13072. This unique corridor of braided and paralleling trails for both motorized and non-motorized user provides “something somewhere for everyone”. The trail system traverses 4,455 miles through Arizona, Utah, Idaho, Wyoming, and Montana. It incorporates stunning desert and canyon landscapes, plateaus, woodlands, dense forests, and alpine meadows. A portion of the Great Western Trail passes through the western side of the Tonto National Forest, from north to south, roughly through the center of the Cave Creek Ranger District.

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 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 ½ 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, Figure A-7.

## Desired Conditions (NTMA-DC)

### Applicable to all National Trails

- 01 National trails provide 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, and wildlife resource values for which the trail is designated.
- 04 Recreation opportunities on national trails support the needs and expectations of the diverse population in the surrounding area.

- 05 Visitors are aware of the nature and purpose of the national trail designation.
- 06 National trails are well maintained, signed, and passable. Alternate routes are available in the case of temporary closures (e.g., natural events including fire or flooding) or land management activities.

#### **Applicable to the Arizona National Scenic Trail**

- 07 The Arizona National Scenic Trail is a well-defined trail that provides for high-quality, primitive hiking and equestrian opportunities, and other compatible non-motorized trail activities, in a highly scenic setting traversing the State of Arizona. The significant scenic, natural, historic, and cultural resources along the trail's corridor are conserved. The trail provides visitors with expansive views of the natural landscapes.
- 08 Viewsheds from the Arizona National Scenic Trail have high visual qualities. The foreground of the trail (up to 0.5 miles on either side) is natural-appearing. The potential to view wildlife is high and evidence of ecological processes such as fire, insects, and diseases exist.
- 09 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.
  - a. Wild and remote backcountry segments of the Arizona National Scenic Trail provide opportunities for solitude, immersion in natural landscapes, and primitive outdoor recreation.
  - b. Front-country and easily accessible trail segments complement local community interests and needs and help contribute to their sense of place.

### **Standards (NTMA-S)**

#### **Applicable to all National Trails**

- 01 Designated national trails shall be maintained to National Forest Service standards.
- 02 National trails shall not be used as high speed downhill mountain bike or mechanized bike runs. Constructing ramps and jumps are prohibited. User built ramps and jumps shall be removed and the trail restored to Forest Service standards.

#### **Applicable to the Arizona National Scenic Trail**

- 03 Motorized use shall not be allowed on newly constructed segments of the Arizona National Scenic Trail.
- 04 Motorized events and activities shall not be authorized under special use permit on any section of the Arizona National Scenic Trail or anywhere crossing the trail.
- 05 Sales or extraction of common variety minerals (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 Trail corridor protection strategies should closely follow the authorities of the National Trails System Act (16 USC 1246).
- 03 To retain or promote the character for which the national trail was designated, new or relocated trail segments should be located within settings consistent with or complementing primitive or semi-primitive non-motorized recreation opportunity spectrum classes (e.g., a segment of semi-primitive trail to be relocated should be constructed and relocated in area of comparable semi-primitive qualities). Primitive and semi-primitive national trails should not intersect motorized trails, roads, or approach other signs of modern development.
- 04 Management activities should maintain safe public access to designated national trails.
- 05 National trails should not be used for firelines or for timber pile landings.
- 06 Fences that cross national trails should be designed to ensure continued user access (e.g., via acceptable gates, and pass-throughs) and should use fence design that meet desired conditions of scenic resources adjacent to the trail corridor.
- 07 Special use authorizations that affect national trails should include restrictions and/or mitigative measures for impacts to visual resources (e.g., no large banners or tents).
- 08 To protect visual quality, special use authorizations for new communication sites, utility corridors, and renewable energy sites should not be allowed within visible foreground (up to 0.5 miles) and middle ground viewshed (up to four miles) of national trails.
- 09 New temporary and/or permanent roads and motorized trails should not be constructed across or adjacent to national trails unless necessary for resource protection, access to private lands, or to protect public health and safety.

#### **Applicable to the Arizona National Scenic Trail**

- 10 If management activities result in short-term impacts to the visual quality along the Arizona National Scenic Trail, mitigation measures should be included (e.g., screening, feathering, and other scenery management techniques) at key locations (e.g., vistas) within and adjacent to the trail corridor.
- 11 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.
- 12 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.
- 13 In order to promote a naturally appearing and non-motorized setting, the Arizona National Scenic Trail should not be permanently relocated onto routes open to motor vehicle use.
- 14 Wildland fire in the foreground (if visible, up to 0.5 miles) of the Arizona National Scenic Trail should be managed using Minimum Impact Suppression Tactics (MIST) or other tactics appropriate to protect and incorporate the values of the Arizona National Scenic Trail. Heavy equipment fire line constructions (e.g., dozer lines) should not be used within the Arizona National Scenic Trail corridor unless necessary for emergency protection of life and property.

- 15 Best available science should be used in lieu of the comprehensive plan if the plan is out of date with science.
- 16 To protect or enhance the scenic qualities of the Arizona National Scenic Trail, management activities should be consistent with Visual Quality Objectives of Preservation or Retention within the foreground of the trail (up to 0.5 miles either side).
- 17 In order to promote a naturally appearing setting and avoid visual, aural, and resource
- 18 Applicable to all National Recreation Trails
- 19 National recreation trails should be managed for their designated uses (e.g., non-motorized versus mechanized travel) to enhance visitor experience, except where portions of a trail are currently co-located (e.g., a segment of a non-motorized national trail coincides with a designated road) at which time multiple uses should be managed until relocation of either the trail or road is achieved.

## Management Approaches for National Trails

### **Applicable to all National Trails**

- 01 Consider expansion of connector trails to accommodate user access when near towns and developed recreation facilities.
- 02 Work with volunteer groups, partners, local governments, and adjacent landowners to maintain national trail corridors, the condition and character of the surrounding landscape, and to facilitate support by trail users that promote Leave No Trace principles and reduces user conflict.
- 03 Ensure that Incident Management teams are aware of all national trails as a resource to be protected during wildland fire management activities. Clearly identify fire-related rehabilitation and long-term recovery of the national trail corridor(s) as high priorities for fire managers, Incident Management Teams, burned area emergency response (BAER) teams, and post-fire rehabilitation interdisciplinary teams.

### **Applicable to the Arizona National Scenic Trail**

- 04 Utilize the most recent version of the Arizona National Scenic Trail Comprehensive Plan when considering projects in the Arizona National Scenic Trail corridor.
- 05 Work with volunteer groups, partners, local governments, and adjacent landowners to maintain the Arizona National Scenic Trail corridor, the condition and character of the surrounding landscape, and to facilitate user support and reduce user conflicts on the trail.
- 06 Establish appropriate visitor use levels for specific segments of the Arizona National Scenic Trail and take appropriate actions if there is a trend away from the desired condition.
- 07 Identify and pursue opportunities to acquire lands or rights-of way within or adjacent to the Arizona National Scenic Trail as they become available.
- 08 Work with other land managers to provide consistent signage along the Arizona National Scenic Trail corridor at road crossings to adequately identify the Arizona National Scenic Trail and include interpretation at trailheads.
- 09 Encouraging trail partners and volunteers to assist in the planning, development, maintenance, and management of the trail, where appropriate and as consistent with the Arizona National Scenic Trail Comprehensive Plan.

## Sierra Ancha Experimental Forest (EFMA)

The Sierra Ancha Experimental Forest is a research area focused on studying watershed management. The Experimental Forest lies roughly 30 miles (48 km) northeast of Globe, Arizona. Experimental forests provide lands for conducting research and development that serves as a basis for the management of forests and rangelands.

The climate, soil, and landforms of the 13,255 acres (5,364 ha) Sierra Ancha Experimental Forest are representative of much of the southwestern region of the United States, particularly Arizona, and are representative of the Verde, Salt, and Upper Gila watersheds. Vegetation communities within the area range from semi-desert shrub and grassland to pine-fir forests at higher elevations. It lies along the crest of the Sierra Ancha Mountain range and includes areas between 3,550 to 7,723 feet (1,082 to 2,354 m) in elevation.

The USDA Forest Service first established research plots in Sierra Ancha in 1925. The research area was named the Parker Creek Experimental Forest in 1932, with a research focus on watershed management. This experimental forest was expanded and renamed the Sierra Ancha Experimental Forest in 1938.

The initial research mission on the newly formed experimental forest was to study the effects of grazed and ungrazed vegetation, water yields, and to learn more about water cycle relationships with the varying vegetation zones of the Sierra Ancha. Research was conducted at Parker Creek, Natural Drainages, and Workman Creek.

Hydrologic records began after the Civilian Conservation Corps installed weirs and equipment in the 1930s. The Workman Creek watersheds (North Fork, Middle Fork and South Fork) are located at intermediate elevations (4,800 to 6,000 ft.) and fall within the high-elevation mixed conifer vegetation type. The four Natural Drainages watersheds are located in the chaparral vegetation zone of the experimental forest and range from 9 to 19 acres in size, and hydrologic records began here in 1934.

Refer to Figure A-8 in appendix A for a map of the Sierra Ancha Experimental Forest.

### Desired Conditions (EFMA-DC)

- 01 The area is a valuable resource for research and for forest and range influence investigations pertaining to erosion-stream flow, erosion-ecological, grazed and ungrazed vegetation-water yield, and water cycle relationships.
- 02 The area is a valuable reference area in that it contains a variety of ecosystems types that have been ungrazed and can be used to assess the impacts that have occurred on managed sites with similar ecosystems.
- 03 The area has excellent examples of the characteristic vegetation of the area (and the Southwest), including the Mohave Sonoran Desert Scrub, semi-desert grassland, interior chaparral, juniper grass, Madrean pinyon-oak woodland, pinyon juniper evergreen shrub, ponderosa pine evergreen oak, ponderosa pine forest, and mixed conifer forest (both dry and wet types) ecological response units.
- 04 Watershed conditions in the area show little impairment and are trending towards low departure from desired conditions.



## Standards (EFMA-S)

- 01 Management is consistent with the objectives outlined in the Sierra Ancha Experimental Forest establishment record<sup>49</sup>.
- 02 Fuelwood gathering and cutting shall not be permitted as it could interfere with ongoing research (e.g., within experimental plots). A limited quantity of firewood may be cut, but only under permit for use at Parker Creek only.
- 03 Livestock grazing is not authorized in the Sierra Ancha Experimental forest or in experimental plots, except at locations currently associated with existing Term Grazing Permits (in conjunction with existing fence lines and natural boundaries in order to maintain neighboring allotment boundary divisions)<sup>50</sup>.
- 04 Fire management activities shall be coordinated with and approved by the Sierra Ancha Experimental Forest, Rocky Mountain Station, and scientist-in charge

## Management Approaches for the Sierra Ancha Experimental Forest

- 01 Coordinate all permitted uses and improvements (e.g., roads, trails, and fences) with the Sierra Ancha Experimental Forest manager and station director.
- 02 Work with the Rocky Mountain Research Station, Sierra Ancha Experimental forest managers to obtain information on historic and current research plots and other important features. Ensure data is maintained in FS GIS database.
- 03 Work with the Rocky Mountain Research Station Experimental Forest managers, local universities (Arizona State University, University of Arizona, Northern Arizona University), and colleges to explore opportunities for research and student involvement (e.g., outdoor classroom at Parker Creek camp).

---

<sup>49</sup> An approved establishment record is required for every experimental area and includes information on the location, purpose of establishment, description of vegetation and other physical attributes, management, administration, and use.

<sup>50</sup> Introduction of animals for experimental grazing and possibly some use by animals maintained in connection with the field station may also occur but has to be approved by the station director.

## Significant Caves (SCMA)

The Tonto National Forest contains many significant caves and karst resources. The National Caves Resources Management and Protection Act (P.L. 110-691) defines a significant cave as a cave located on National Forest System lands that has been evaluated and shown to possess features, characteristics, values, or opportunities in one or more of the following resource areas: biota; cultural; geologic-mineralogic-paleontologic; hydrologic; recreational; or educational-scientific for scientific, educational or recreational purposes; and which has been designated “significant” by the forest supervisor. The Forest Service implementation regulations for 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 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

- 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 & Rivers Management Area (LRMA)

The purpose of the Lakes & 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 portions of Roosevelt Lake, Apache Lake, Canyon Lake, Saguaro Lake, Horseshoe Lake, Bartlett Lake, the Verde River, and the Lower Salt River (Figure A-9 in appendix A). It provides additional guidance in order 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. 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 vendor 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](#), [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-9 in appendix A for a map of the lakes and rivers management areas.

### Desired Conditions (LRMA-DC)

- 01 This area provides diverse recreation opportunities that are enhanced by facilities, access, and unique services.
- 02 The area is a highly desirable recreation destination to both day users and overnight visitors throughout the year and attracts diverse user groups.
- 03 User conflicts and public health and safety issues are infrequent.
- 04 Recreation opportunities adapt to changing trends in local recreation activities and demands.
- 05 Natural resources in the Lakes & Rivers Management Area are resilient 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 Target shooting and possession or storage of glass containers shall be prohibited.

- 03 Off-highway vehicle recreation shall be prohibited unless authorized in a designated off-highway vehicle area, designated permit zone, or where the primary use of vehicles is for transportation to and from dispersed camping areas or for water access.
- 04 Permitted livestock shall not be authorized.
- 05 Authorize only one privately owned marina at each lake (Bartlett, Saguaro, Canyon, Apache, and Roosevelt) to be operated under special use permit.

### Guidelines (LRMA-G)

- 01 Authorized commercial services and vendors (e.g., marinas, restaurants, and resorts) should maintain natural settings that do not detract from the landscape.
- 02 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).
- 03 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 & Rivers Management Area.

### Management Approaches for 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 by making information available at recreation sites, on social media, and through other media channels and partners.
- 03 Work with partners and volunteers to reduce the number of public safety incidents on the Lower Salt River.
- 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/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 Work with law enforcement and partners to identify needs for special orders such as restriction and closures when necessary to protect public health and safety.
- 08 Notify the public of major changes to management practices that are intended to improve the recreation experience or reduce public health and safety issues.
- 09 Encourage/incentivize permit holders and partners to develop a system of litter clean up and trash disposal and identify areas to implement a ban on disposable containers to reduce litter.

## 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, of which 4,180 acres are within the official boundary of the 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-10 in appendix A). Burros have not been known to be present in the territory since the early 1990's. 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 Burro Territory shall be managed for zero burros.
- 02 Wild burros shall not be reintroduced to the territory.

### Management Approaches for the Saguaro Wild Burro Territory

- 01 Consider annual monitoring of the territory to prevent the introduction of a new unprotected burro 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 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.

### Management Approaches for Apache Leap Special Management Area

- 01 Utilize direction from the with the Apache Leap Special Management Area management plan 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 plan monitoring program is to be developed collaboratively with other agencies, organizations, and individuals, in consultation with Tribes, while coordinating with Forest Service Research and State and Private Forestry. Monitoring is continuous and provides feedback for the planning cycle by testing relevant assumptions, tracking relevant conditions over time, and measuring management effectiveness. It should also use the best available scientific information and be within the financial and technical capabilities of the agency. The plan monitoring program is informed by the assessment phase; developed during plan development; and implemented after plan decision. Biennial monitoring evaluation reports document whether a change to the plan or change to the monitoring program is warranted based on new information, whether a new assessment may be needed, or whether there is no need for change at that time. The monitoring strategy provides a framework for subsequent monitoring and evaluation designed to inform adaptive management.

In addition to the requirements above, a plan monitoring program must contain at least one monitoring question and associated indicator to address each of the eight following elements. 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 for multiple-use opportunities; and
8. The effects of each timber management system, to determine they do not substantially and permanently impair the productivity (soils) of the land.
9. Address the plan contributions to communities, social and economic sustainability of communities, multiple use management in the plan area, or progress toward meeting the desired conditions and objectives related to social and economic sustainability (FSH 1909.12, Chapter 30, section 32.13f).

Social, economic, and cultural sustainability will also be addressed in the monitoring program because sustainability is an inherent part of several required monitoring items listed above. The purpose for monitoring social, cultural, and economic indicators 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.

## 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 plan monitoring program must identify one or more focal species and one or more monitoring questions and associated indicators addressing the status of the focal species. The purpose for monitoring the status of focal species over time is to provide insight into the following:

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.

The following section describes the recommended focal species and how they provide information regarding ecological integrity and ecosystem diversity. These species were selected because they will 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.

### **Red brome (*Bromus rubens*)**

Red brome is an invasive species that has substantial influences on fire regimes and behavior. It is particularly problematic in low desert, non-fire-adapted systems found in the Sonoran desert where decreasing fire return intervals and greater intensity burns may result in mortality of native species. Because it is a major stressor on a significant portion of the Tonto National Forest, the presence or absence of red brome is a powerful indicator of ecological health.

Uncharacteristic fire, especially in low desert systems, is a chief management concern and focus of vegetative and fire management in these systems. Other activities that may result in the introduction of invasive, non-native grasses are also managed. As the species itself is a management priority, its response to management in the desert southwest has been studied and is relatively understood. USDA provides a management guide.

Under active management, we would expect to see lower infestation rates and a reduction in red brome, and ultimately fewer and lower intensity fires in desert systems with a return towards reference conditions for fire return intervals.

Precipitation patterns and prior burns may play a large role in the efficacy of weeds treatments. However, the interaction between weather, fire, and active weed management is still useful in providing information regarding the overall condition of the systems in question.



This species is not particularly difficult to observe or identify, neither is it rare on the landscape. The forest has a number of established monitoring programs in which monitoring for this species does or may occur. Specifically, the forest has an active weeds program that monitors and tracks red brome, with both internal and external funding. Additionally, there are a number of local volunteer organizations actively engaged in monitoring for invasive species, of which red brome is consistently a high priority target.

### **Mexican spotted owl (*Strix occidentalis lucida*)**

As 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. Many plan components for forested ecological response units in the revised forest plan were specifically designed with Mexican spotted owls in mind. While a number of activities may threaten these owls, uncharacteristic fire is considered the most important factor, and this aligns with many of the priority vegetation and fire management goals on the Tonto National Forest.

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.

These focal species are indicators of species diversity and ecological integrity of desert ecosystems.

### **Monitoring Plan and Strategy**

The monitoring plan is made up of monitoring questions and indicators that may address more than one of the required monitoring topics. Monitoring questions are evaluative in design and address two topics:

- Status and trends related to desired social, economic, and ecological conditions identified in the forests plan and,
- Effectiveness of management actions in contributing to the sustainability of affected social, 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. Tables 1 through 7 display monitoring questions, the required monitoring topics addressed, associated plan components, indicators, and measurement frequency or interval required to answer the monitoring questions by resource area.

Monitoring elements also address key ecosystem 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 will be developed after the revised plan goes into effect. It will, separate from the revised plan, 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, as identified in the tables on the following pages. The Plan Monitoring implementation guide will help in the development of the biennial monitoring report, the first report being due two years after the revised plan goes into effect.

**Table 21. Monitoring topics, questions, plan components, indicators, and measurement interval for watersheds and riparian areas.**

<b>Monitoring Topics and Key Ecosystem Services Addressed</b>	<b>Monitoring Question</b>	<b>Selected Plan Components (plan component code)</b>	<b>Associated Indicators</b>	<b>Measurement Interval (years)</b>
<p>1: Status of select watersheds</p> <p>4: Status of ecological conditions for at-risk species</p> <p>6: Ecosystem resiliency and climate change</p>	<p>What are the trends in watershed condition among sentinel<sup>51</sup> watersheds?</p>	<p>Desired conditions for proper functioning and resilient watershed conditions capable of buffering climate change impacts (WW-DC-3, WAT-DC-5)</p> <p>Desired conditions that at-risk species have good habitat conditions and are resilient to maintain viable populations (WFP-DC-1, WFP-DC-2)</p>	<p>Assessments on water quality (e.g., macroinvertebrate surveys), ground cover, stream flow, streambank stability, and groundwater levels</p> <p>Watershed condition classification</p> <p>Percent of streams classified as stable or functioning properly (e.g., Proper Functioning Condition or similar metric)</p> <p>Changes in hydrographs, tree and shrub encroachment rates, and changes in water temperature in sentinel wilderness watersheds relative and other sentinel watersheds to assess climate change impacts</p>	<p>2-15</p>
<p>1: Status of select watersheds</p> <p>2: Status of terrestrial and aquatic ecosystems</p> <p>4: Status of ecological conditions for at-risk species</p> <p><i>Key ecosystem service: water for recreation</i></p>	<p>Are management actions effective in maintaining or improving watershed integrity in priority watersheds?</p>	<p>Objectives to improve the conditions of priority watersheds (WAT-O-1 and WAT-O-2)</p> <p>Desired conditions that ecological conditions support at-risk species and conditions support good habitat conditions to maintain viable populations (WFP-DC-1)</p>	<p>Assessments for example, water quality (e.g., macroinvertebrate surveys), ground cover, stream flow, streambank stability, and groundwater levels.</p> <p>Watershed condition classification</p> <p>Essential projects implemented</p>	<p>2</p>
<p>1: Status of select watersheds</p> <p>2: Status of terrestrial and aquatic ecosystems</p> <p><i>Key ecosystem service: water for consumption</i></p>	<p>How are stream conditions trending on the forest?</p>	<p>Desired conditions for water quality conditions to meet or exceed State standards to support multiple uses and wildlife and plants (WAT-DC-2)</p>	<p>Percentage of surveyed streams in non-impaired condition</p>	<p>4</p>

<sup>51</sup> 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.

<b>Monitoring Topics and Key Ecosystem Services Addressed</b>	<b>Monitoring Question</b>	<b>Selected Plan Components (plan component code)</b>	<b>Associated Indicators</b>	<b>Measurement Interval (years)</b>
2: Status of terrestrial and aquatic ecosystems	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-1, RMZ-DC-2, RMZ-DC-3)	Acres of riparian areas improved or maintained and number of springs maintained or improved. Abundance and diversity of riparian obligate species in treatment areas Age class diversity (multiple cohorts/age groups) in treatment areas	2
2: Status of terrestrial and aquatic ecosystems	Do grazing schedules allow for adequate rest for riparian vegetation recovery following grazing?	Guideline to allow sufficient time for plant development and recovery following grazing and that livestock grazing allows for healthy rangeland conditions (RERU-G-2, GRZ-DC-3).	Length of use and length of time between grazing Range utilization monitoring in riparian areas	2

**Table 22. Monitoring topics, questions, plan components, indicators, and measurement interval for vegetation, fire, and forest products.**

<b>Monitoring Topics and Key Ecosystem Services Addressed</b>	<b>Monitoring Question</b>	<b>Selected Plan Components (plan component code)</b>	<b>Associated Indicators</b>	<b>Measurement Interval (years)</b>
2: Status of terrestrial and aquatic ecosystems 6: Ecosystem resiliency and climate change 8: Timber management and impacts to productivity (soils) <i>Key ecosystem service: sustainable and productive rangelands</i>	How are key characteristics of vegetation structure, function, soil productivity, and vegetation composition changing over time in relation to desired conditions and reference conditions at the ecosystem and landscape scale?	Desired conditions that forests, woodlands, shrublands, and grasslands are functioning properly and resilient to disturbance (ERU-DC-2, ERU-DC-5, ERU-DC-9).	Vegetation departure using sources such as: Midscale, or other remote sensing products. Key sites monitored where treatments have been completed. Soil condition assessments at key sites where timber harvest operations have occurred.	5-10
2: Status of terrestrial and aquatic ecosystems 4: Status of ecological conditions for at-risk species	Is there an increase in the acres of undesirable effects from wildfires?	Desired conditions that wildfire behavior and effects are within the natural range of variability and pose minimal threats to public safety, property, infrastructure, habitat conditions for species, watersheds and other values (FF-DC-5, ERU-DC-1, ERU-DC-13).	Acres of undesirable fire effects and effects from fire management activities (e.g., dozer lines). Severity of wildfires (RAVG data or other suitable data). Patch size of wildfires (RAVG data or other suitable data). Frequency of wildfires (RAVG data or other suitable data).	2

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	To what extent is fire (both planned and unplanned) used to achieve desired ecological, social, or economic conditions?	Desired conditions that fire management activities improve maintain and improve public safety, improve ecosystem function, wildlife habitat, and other socio-economic values (FF-DC-4).	Number and acres of unplanned natural fire ignitions managed for ecological, social, or economic reasons. Number and acres of unplanned fire ignitions managed with the primary strategy of suppression. Number and acres of planned fire 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).	2
2: Status of terrestrial and aquatic ecosystems 4: Status of ecological conditions for at-risk species	Are treatment objectives for forest, woodland, and shrubland ecological response units making progress towards desired conditions?	Mechanical and fire treatment objectives to improve conditions for ecological response units (ERU-O-1, ERU-O-2) Desired conditions that habitat conditions support viable populations of at-risk species and habitats are resilient (WFP-DC-1, WFP-DC-2)	Acres treated	4
2: Status of terrestrial and aquatic ecosystems 3: Status of focal species and ecological conditions <i>Focal species: Mexican spotted owl</i>	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-1, ERU-DC-2, ERU-DC-3, ERU-DC-14)	Number of snags, downed logs, and large old trees per acre Presence/absence of Mexican spotted owls in associated habitats.	1-5
2: Status of terrestrial and aquatic ecosystems	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-3, ERU-SDG-DC-4, ERU-SDG-DC-5, ERU-O-3)	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	What is the status/condition of invasive grasses in the desert	Desired conditions that invasive species do not increase undesirable fire effects in	Acres of areas surveyed of desert ecological response units occupied by focal species, red brome ( <i>Bromus rubens</i> )	2

<b>Monitoring Topics and Key Ecosystem Services Addressed</b>	<b>Monitoring Question</b>	<b>Selected Plan Components (plan component code)</b>	<b>Associated Indicators</b>	<b>Measurement Interval (years)</b>
<p><b>3:</b> Status of focal species and ecological conditions</p> <p><i>Focal species: red brome</i></p>	capable of disrupting ecological processes?	deserts and impair ecological conditions (ERU-DES-DC-4)	Assessment of the extent and distribution of invasive grasses on the forest.	
<p><b>7:</b> Progress towards desired conditions, objectives, and providing multiple-use opportunities</p> <p><b>9:</b> Address the plan contributions to social and economic sustainability</p>	Is the national forest providing a sustainable, predictable level of forest products to communities?	Desired conditions that a sustainable supply of commodities are available to businesses and individuals (FP-DC-3)	<p>Number and volume of forest products permits issued</p> <p>Annual timber volume offered and annual timber volume sold.</p>	2

**Table 23. Monitoring topics, questions, plan components, indicators, and measurement interval for wildlife, fish, and rare plants**

<b>Monitoring Topics and Key Ecosystem Services Addressed</b>	<b>Monitoring Question</b>	<b>Selected Plan Components (plan component code)</b>	<b>Associated Indicators</b>	<b>Measurement Interval (years)</b>
<p><b>4:</b> Status of ecological conditions for at-risk species</p> <p><b>5:</b> Visitor use, satisfaction, and recreation</p> <p><b>7:</b> Progress towards desired conditions, objectives, and providing multiple-use opportunities</p> <p><i>Key ecosystem service: habitat for hunting, fishing, and watchable wildlife</i></p>	To what extent are management activities maintaining or improving habitats necessary for wildlife (including at-risk species and species important for hunting, fishing, and watchable wildlife activities)?	Desired conditions that ecological conditions support wildlife and the associated socio-economic opportunities, such as watchable wildlife and hunting (REC-WR-DC-1)*	<p>Acres of wildlife habitat enhanced or improved.</p> <p>State economic impact reports on angling, hunting, and watchable wildlife.</p> <p>Number of outfitter guide permits administered per year related to wildlife based recreation.</p>	2
<p><b>4:</b> Status of ecological conditions for at-risk species</p> <p><b>5:</b> Visitor use, satisfaction, and recreation</p> <p><b>7:</b> Progress towards desired conditions, objectives, and providing multiple-use opportunities</p>	What is the status/condition of rare and at-risk plants and unique plant communities and how is management providing opportunities for public involvement?	<p>Desired conditions that the location and status of at-risk, rare, and endemic plant species are known (WFP-DC-6)</p> <p>Objectives to complete products or activities that educate the public about wildlife, fish, and rare plants,</p>	<p>Progress and status of special area designation for recommended botanical areas</p> <p>Site inventories completed for recommended botanical and research natural areas</p>	4

<b>Monitoring Topics and Key Ecosystem Services Addressed</b>	<b>Monitoring Question</b>	<b>Selected Plan Components (plan component code)</b>	<b>Associated Indicators</b>	<b>Measurement Interval (years)</b>
<i>Key ecosystem service: habitat for hunting, fishing, and watchable wildlife</i>		and activities that contribute to the recovery of listed species (WFP-O-1, WFP-O-2)	Public engagement activities; volunteer opportunities for rare plant surveys and inventories Baseline data (e.g., surveys and research) for rare plants that inform management Species surveyed and new occurrences of at-risk species that provide information on ecological conditions and threats Conservation measures in conservation agreements initiated or completed	

**Table 24. Monitoring topics, questions, plan components, indicators, and measurement interval for recreation**

<b>Monitoring Topics and Key Ecosystem Services Addressed</b>	<b>Monitoring Question</b>	<b>Selected Plan Components (plan component code)</b>	<b>Associated Indicators</b>	<b>Measurement Interval (years)</b>
<p><b>5:</b> Visitor use, satisfaction, and recreation</p> <p><b>7:</b> Progress towards desired conditions, objectives, and providing multiple-use opportunities</p> <p><b>9:</b> Address the plan contributions to social and economic sustainability</p>	What is the trend in visitor use and satisfaction?	Desired conditions for sustainable recreation, adapting to latest science and management and objectives to meet public satisfaction based on national monitoring use surveys, and objectives to maintain recreation sites (REC-DC-3, REC-O-4, REC-O-5, REC-O-6, REC-O-7)	Satisfaction levels from USDA national visitor use monitoring survey results.	5
<p><b>5:</b> Visitor use, satisfaction, and recreation</p> <p><b>7:</b> Progress towards desired conditions, objectives, and providing multiple-use opportunities</p>	Is unsustainable recreation infrastructure being identified and addressed?	Desired condition for sustainable recreation, adapting to latest science and management (REC-DC-3, REC-DIS-WB-DC-4, RD-DC-1)	Revenue at developed recreation sites Property condition assessment Return on investment of recreation infrastructure. Ratio of special use permits administered to standard	2

**Table 25. Monitoring topics, questions, plan components, indicators, and measurement interval for cultural resources and sustainability**

Monitoring Topics Addressed	Monitoring Question	Selected Plan Components (plan component code)	Associated Indicators	Measurement Interval (years)
<p>5: Visitor use, satisfaction, and recreation</p> <p>7: Progress towards desired conditions, objectives, and providing multiple-use opportunities</p>	<p>Is management successful at providing recreational opportunities for cultural resources?</p>	<p>Desired condition that heritage-based recreation opportunities are available allowing the public to learn about, appreciate, and understand cultural resources. (CUH-DC-3)</p> <p>Desired condition that 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. (CUH-DC-5)</p>	<p>Number of recorded sites on the forest.</p> <p>Acres surveyed per current professional standards.</p> <p>Trends in the number of recorded cultural sites.</p>	<p>10</p>
<p>5: Visitor use, satisfaction, and recreation</p> <p>7: Progress towards desired conditions, objectives, and providing multiple-use opportunities</p>	<p>Are sites being evaluated for eligibility, are new sites being categorized as PHAs, and are condition assessments being done on current PHAs?</p>	<p>Desired condition that cultural resources and historic properties are stable and preserve the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (CUH-DC-1)</p> <p>Desired condition that heritage-based recreation opportunities are available allowing the public to learn about, appreciate, and understand cultural resources. (CUH-DC-3)</p>	<p>Number of sites evaluated for national historic register.</p> <p>Verification of legacy sites as eligible for national historic register.</p> <p>Number of new sites categorized as PHAs</p> <p>Number of condition assessments on Priority Heritage Assets completed.</p>	<p>2</p>
<p>5: Visitor use, satisfaction, and recreation</p> <p>7: Progress towards desired conditions, objectives, and providing multiple-use opportunities</p> <p><i>Key ecosystem service: cultural heritage</i></p>	<p>Are the trends in visitation levels sustainable at key heritage locations?</p>	<p>Desired condition that cultural resources and historic properties are stable and not damaged and preserve the integrity of the property's location, design, setting, materials, workmanship, feeling, or association, (CUH-DC-1, REC-DIS-MO-DC-3)</p>	<p>Number of people visiting heritage resources (as determined by the heritage program) on the forest.</p> <p>Assessment of damage to heritage sites.</p>	<p>2</p>
<p>5: Visitor use, satisfaction, and recreation</p> <p>7: Progress towards desired conditions, objectives, and providing multiple-use opportunities</p> <p><i>Key ecosystem service: cultural heritage</i></p>	<p>How is the forest providing opportunities for experiencing heritage resources (e.g., passport in time)?</p>	<p>Desired conditions that access and use of cultural resources are available for cultural practices, heritage-based recreation opportunities are available, and historic properties and landscapes are considered when working with other resources. (CUH-DC-2, CUH-DC-3, CUH-DC-7)</p>	<p>Number of outreach activities accomplished per fiscal year.</p> <p>Volunteer hours tied to heritage activities</p>	<p>2</p>

**Table 26. Monitoring topics, questions, plan components, indicators, and measurement interval for range**

<b>Monitoring Topics and Key Ecosystem Services Addressed</b>	<b>Monitoring Question</b>	<b>Selected Plan Components (plan component code)</b>	<b>Associated Indicators</b>	<b>Measurement Interval (years)</b>
<p>7: Progress towards desired conditions, objectives, and providing multiple-use opportunities</p> <p>9: Address the plan contributions to social and economic sustainability</p>	Are rangelands providing adequate forage resources 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-1, GRZ-DC-3)*	Number of livestock (e.g., AUMs) Number of active allotments	2-4
<p>2: Status of terrestrial and aquatic ecosystems</p> <p>7: Progress towards desired conditions, objectives, and providing multiple-use opportunities</p>	Is herbaceous cover and diversity 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 3)	Range condition assessments (e.g., reading the range, Parker three steps)	2-4

**Table 27. Monitoring topics, questions, plan components, indicators, and measurement interval for partnerships and volunteers**

<b>Monitoring Topics and Key Ecosystem Services Addressed</b>	<b>Monitoring Question</b>	<b>Selected Plan Components (plan component code)</b>	<b>Associated Indicators</b>	<b>Measurement Interval (years)</b>
7: Progress towards desired conditions, objectives, and providing multiple-use opportunities	How has the general public gained knowledge on FS management and opportunities for the public to be involved?	Desired condition 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 (FW-PV-DC-1, FW-PV-DC-2, FW-PV-DC-3)	Outreach events at public schools, public meetings, stakeholder meetings, and other events	2
<p>7: Progress towards desired conditions, objectives, and providing multiple-use opportunities</p> <p>9: Address the plan contributions to social and economic sustainability</p>	How are partnerships and volunteers helping the forest to achieve desired conditions?	Desired condition 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.(FW-PV-DC-5, FW-PV-DC-5)	Total number of volunteer agreements. Total number of partnership agreements. Monetary value of partnership and volunteer efforts on the forest.	2



## References

- Abella, S. R. (2010) Disturbance and plant succession in the Mojave and Sonoran Deserts of the American Southwest. *International Journal of Environmental Research and Public Health*, 7, 1248-1284.
- Arizona Department of Water Resources. 2019. Water Conservation Overview. Accessed 06/14/2019 at <https://new.azwater.gov/conservation>.
- Arizona Watchable Wildlife Tourism Association (AWWTA). 2015. Where to Watch Wildlife and Birding in Phoenix and Central Arizona. Available at: <http://www.azwatchablewildlife.org/index.php/viewing-regions/phoenix-and-centralarizona> [2015, April 3]
- Barrett, S., D. Havlina, J. Johes, W. Hann, C. Frame, d. Hamilton, K. Schon, T. Demeo, L. Hutter & J. Menakis. 2010. Interagency Fire Regime Condition Class Guidebook. Version 3.0, [Online]. U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior;
- Brooks, M. L. & d. A. Pyke. 2001. Invasive Plants And Fire In The Deserts Of North America. In In: Pages 1-14, Proceedings Of The Invasive Species Workshop: The Role Of Fire In The Control And Spread Of Invasive Species, Workshop November 27-December 1, 2000, San Diego, Tall Timbers Research Station, Publication No. 11.
- Friswold, George. 2016. Trends and Patterns of Water Use in Cotton in the U.S. Proceedings from the Beltwide Cotton Conference, New Orleans, LA., and City of Phoenix. 2015 Update to City of Phoenix Drought Contingency Plan
- LANDFIRE 2010. Vegetation dynamics model descriptions (LF 1.2.0). U.S.D.A Forest Service and U.S.D.I. [http://www.landfire.gov/national\\_veg\\_models\\_op2.php](http://www.landfire.gov/national_veg_models_op2.php).
- Marcus, Lisa N.; 1983. The spatial and temporal evolution of Tonto National Forest. M.S. thesis. Tempe, AZ: Arizona State University. 109 p.
- Mau-Crimmins, T. A., T. Hubbard, D. Angell, C. Filippone & N. Kline. 2005. Sonoran desert network vital signs monitoring plan. Technical Report NPS/IMR/SODN-003. Denver, Colorado: National Park Service.
- Merritt, D; Carlson, E; Coles-Ritchie, M; Dwire, K; Manning, M; Hough-Snee, N; Polvi, L; Riegel, G; Weixelman, D. 2017. The national riparian core protocol: A riparian vegetation monitoring protocol for wadeable stream of the conterminous United States. Forest Service Rocky Mountain Research Station, Fort Collins, CO. Online: [https://www.fs.fed.us/rm/pubs\\_series/rmrs/gtr/rmrs\\_gtr367.pdf](https://www.fs.fed.us/rm/pubs_series/rmrs/gtr/rmrs_gtr367.pdf)
- Omosa, K; De Kok, D; Luit, J. 2005. Plant Responses to Air Pollution and Global Change. Springer Japan, Tokyo, Japan.
- Paysen, T. E., R. J. Ansley, j. K. Brown, G. J. Gotffried, S. M. Hasse, M. G. Harrington, M. G. Narog, S. S. Sackett & R. C. Wildon. 2000. Wildland fire in ecosystems: effects of fire on flora. Chapter 6 - Fire in Western Shrubland, Woodland, and Grassland Ecosystems. In *Wildland fire In Ecosystems*, eds. J. Brown & J. Kaplar-Smith, 121 - 159.
- Reynolds, R; Sánchez Meador, A; Youtz, J; Nicolet, T; Matonis, M; Jackson, P; DeLorenzo, D; Graves, A. 2013. Restoring Composition and Structure in Southwestern Frequent-Fire Forests: A science-based framework for improving ecosystem resiliency United States. Forest Service Rocky

- Mountain Research Station, Fort Collins, CO. Online:  
[https://www.fs.fed.us/rm/pubs/rmrs\\_gtr310.pdf](https://www.fs.fed.us/rm/pubs/rmrs_gtr310.pdf)
- Salt River Project. 2011. 100 years of power from the Roosevelt dam.  
<https://www.srpnnet.com/water/dams/rooseveltenergy.aspx>
- Schussman, Heather. 2006. Historical Range of Variation for Madrean Encinal of the Southwestern U.S. Prepared for the U.S.D.A. Forest Service, Southwestern Region by The Nature Conservancy, Tucson, AZ. 16 pp.
- Schussman, H. & D. Gori. 2004. An Ecological Assessment of the Bureau of Land Management's Current Fire Management Plans : Materials and Recommendations for Future Fire Planning. The Nature Conservancy.
- Smith, N., R. Deal, J. Kline, D. Blahna, T. Patterson, T. Spies, and K. Bennett. 2011. Ecosystem Services as a Framework for Forest Stewardship: Deschutes National Forest Overview. General Technical Report PNW-GTR-852, Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture, Portland, OR
- Triepke, Francis J.; Esteban H. Muldavin; Maximillian M. Wahlberg; Timothy K. Lowrey; Donald A. Falk; Megan M. Friggens; and Karen E. Bagne. 2016. Assessing the Climate Change Vulnerability of Ecosystem Types of the Southwestern U.S. Albuquerque, NM: University of New Mexico  
[https://digitalrepository.unm.edu/biol\\_etds/200](https://digitalrepository.unm.edu/biol_etds/200)
- United States Department of Agriculture, Forest Service. 1986. Terrestrial ecosystem survey handbook. USDA Forest Service, Southwestern Region, Albuquerque, NM.
- United States Department of Agriculture, Forest Service. 2017a. Final Assessment Report of Social and Economic Conditions, Trends, and Risks to Sustainability, Tonto National Forest, Volume II.
- United States Department of Agriculture, Forest Service. 2017b. Final Assessment Report of Ecological Conditions, Trends, and Risks to Sustainability, Tonto National Forest, Volume I.
- United States Department of Agriculture, Forest Service. 2017c. Tonto National Forest's Needs to Change Management Direction of Its Existing 1985 Forest Plan, Tonto National Forest.
- United States Department of Agriculture; Natural Resource Manager. 2016. USDA Forest Service national visitor use monitoring. <https://apps.fs.usda.gov/nvum/results/A03012.aspx/FY2016>
- Wahlberg, M., F. J. Triepke, W. Robbie, S. H. Stringer, D. Vandendriesche, E. Muldavin & J. Malusa. 2017 (in draft). Ecological Response Units of the Southwestern United States.
- Weisz, R.; Vandendriesche, D. 2011. Use of the Forest Vegetation Simulator to Quantify Disturbance Activities in State and Transition Models. Proceedings of the First Landscape State-and-Transition Simulation Modeling Conference, June 14–16, 2011. Forest Service Southwestern Region, Albuquerque, NM, U.S. Department of Agriculture Online:  
[https://www.fs.fed.us/pnw/pubs/pnw\\_gtr869/pnw\\_gtr869\\_011.pdf](https://www.fs.fed.us/pnw/pubs/pnw_gtr869/pnw_gtr869_011.pdf)
- Wood, J. Scott, Martin E. McAllister, and Michael A. Sullivan. 1989. 11,000 Years on the Tonto National Forest. Southwest Natural and Cultural Heritage Association, Albuquerque, New Mexico. On file at the Tonto National Forest, Supervisor's Office.

# Appendix A. Maps

## List of Figures

Figure A-1. Designated wilderness areas on the Tonto National Forest .....	172
Figure A-2. Recommended wilderness analysis for alternative B .....	173
Figure A-3. Designated wild and scenic rivers on the Tonto National Forest.....	174
Figure A-4. Eligible wild and scenic rivers .....	175
Figure A-5. Proposed botanical areas and existing and proposed research natural management areas	176
Figure A-6. Inventoried roadless areas on the Tonto National Forest.....	177
Figure A-7. National trails on the Tonto National Forest.....	178
Figure A-8. Sierra Ancha Experimental Forest .....	179
Figure A-9. Lakes and Rivers Management Areas on the Tonto National Forest .....	180
Figure A-10. Saguaro Wild Burro Management Area .....	181
Figure A-11. Apache Leap Special Management Area .....	182

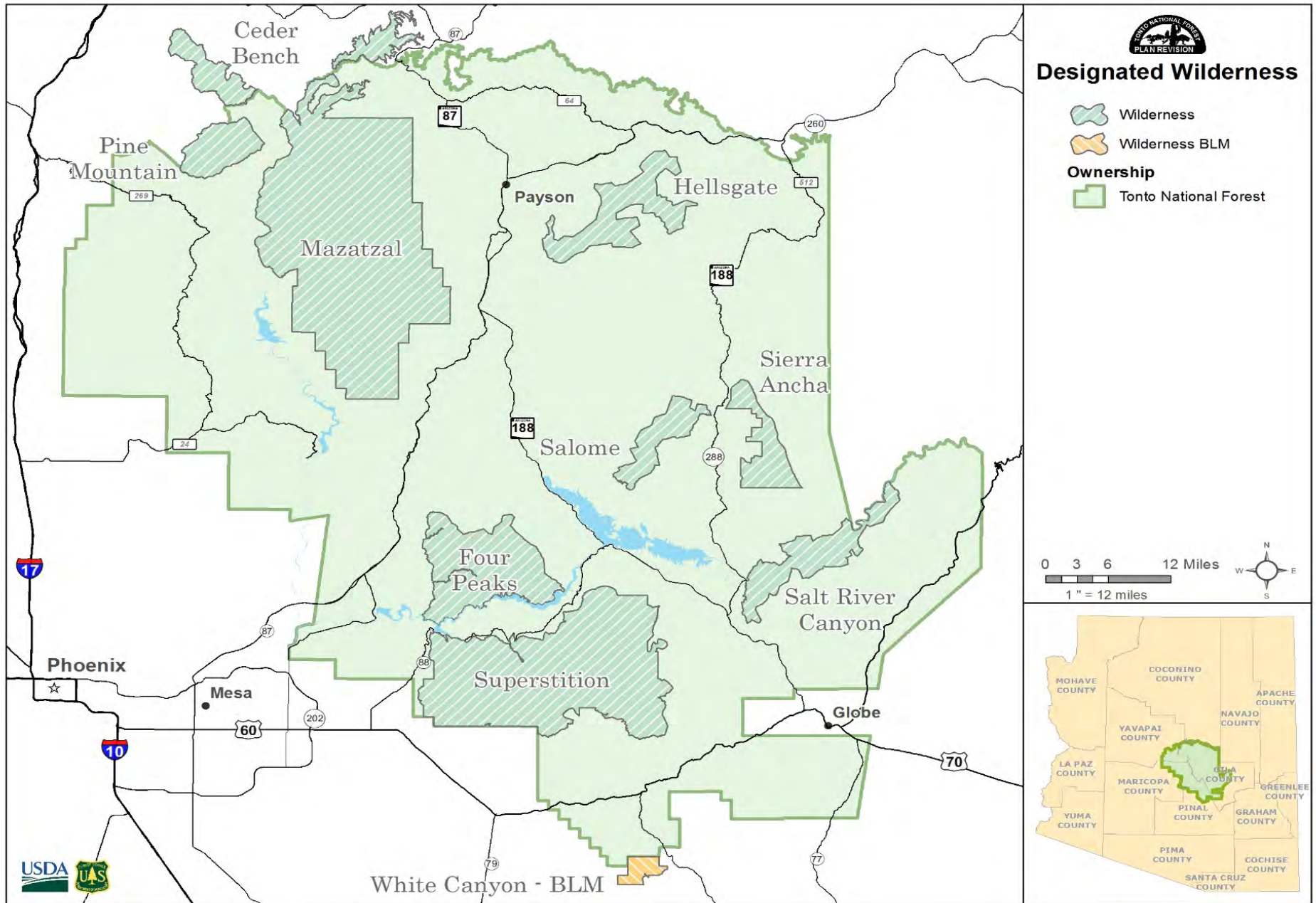


Figure A-1. Designated wilderness areas on the Tonto National Forest

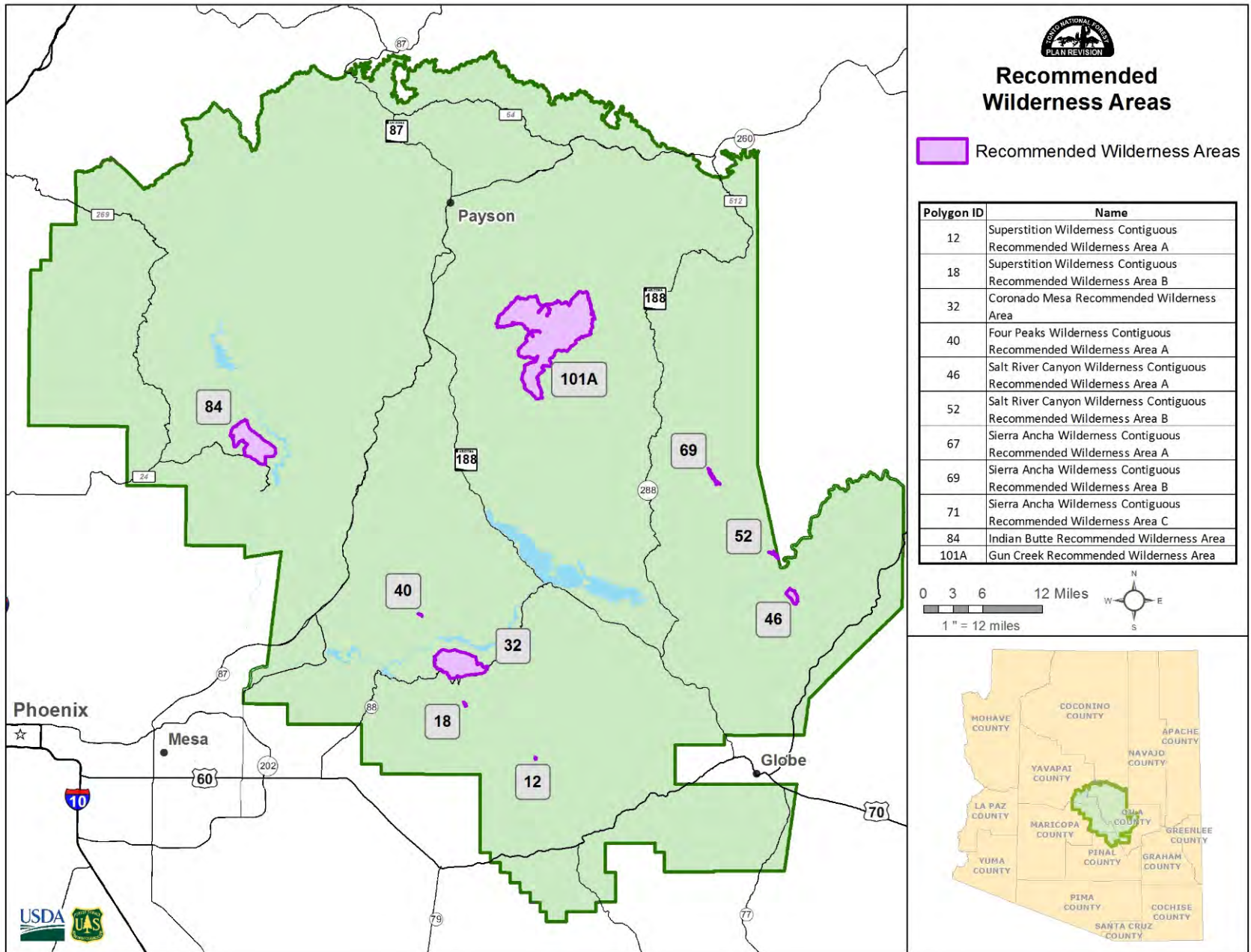


Figure A-2. Recommended wilderness analysis for alternative B

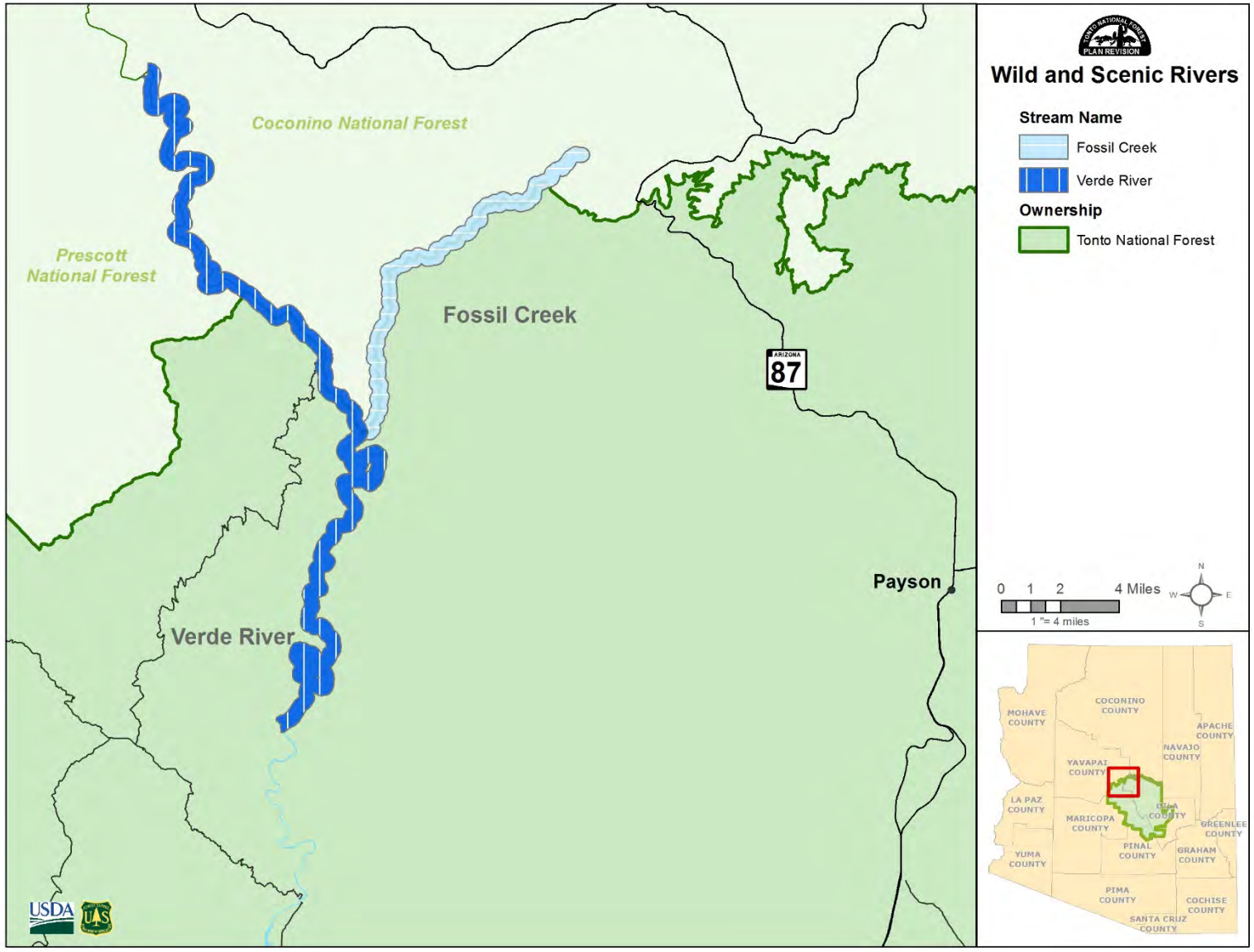


Figure A-3. Designated wild and scenic rivers on the Tonto National Forest

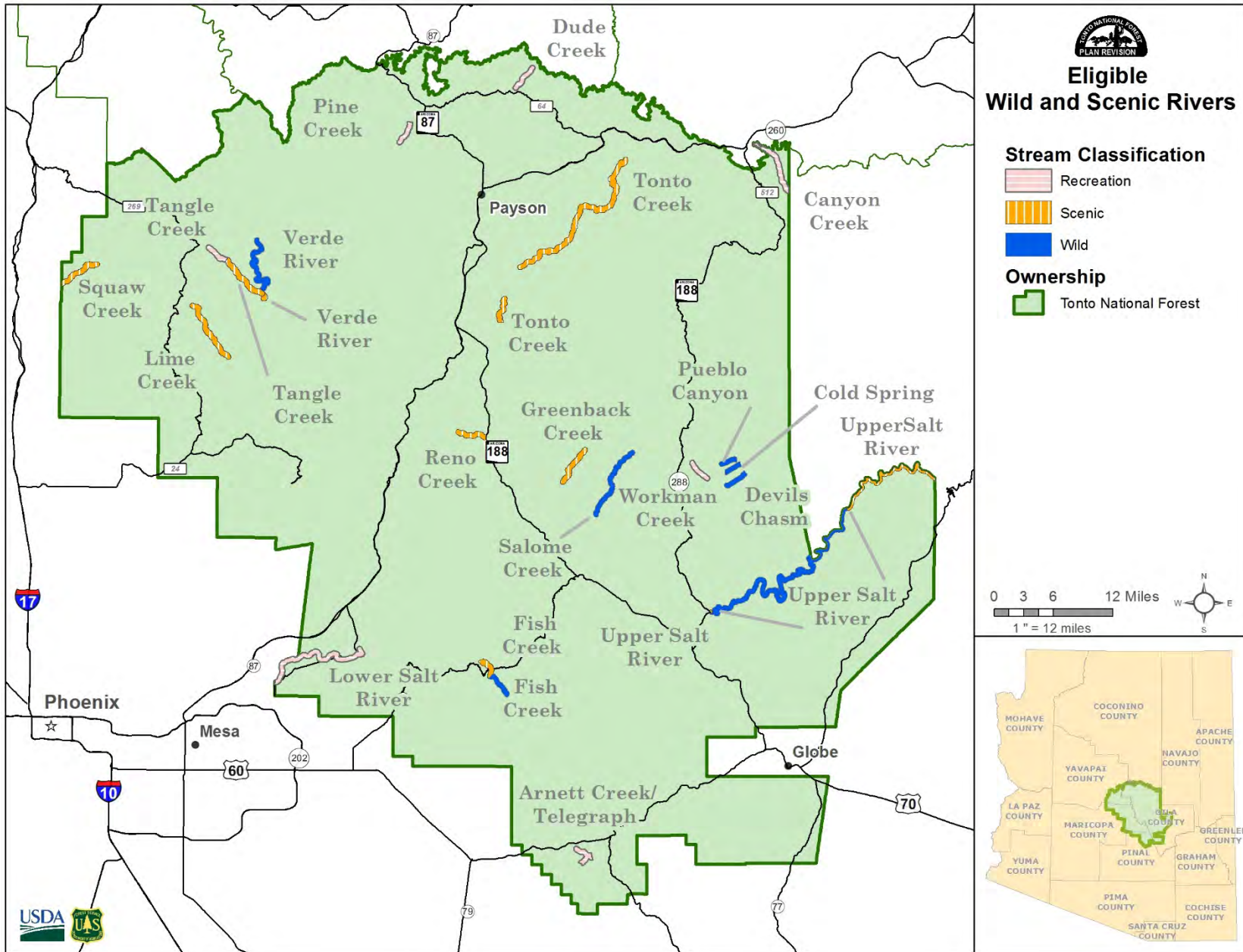


Figure A-4. Eligible wild and scenic rivers

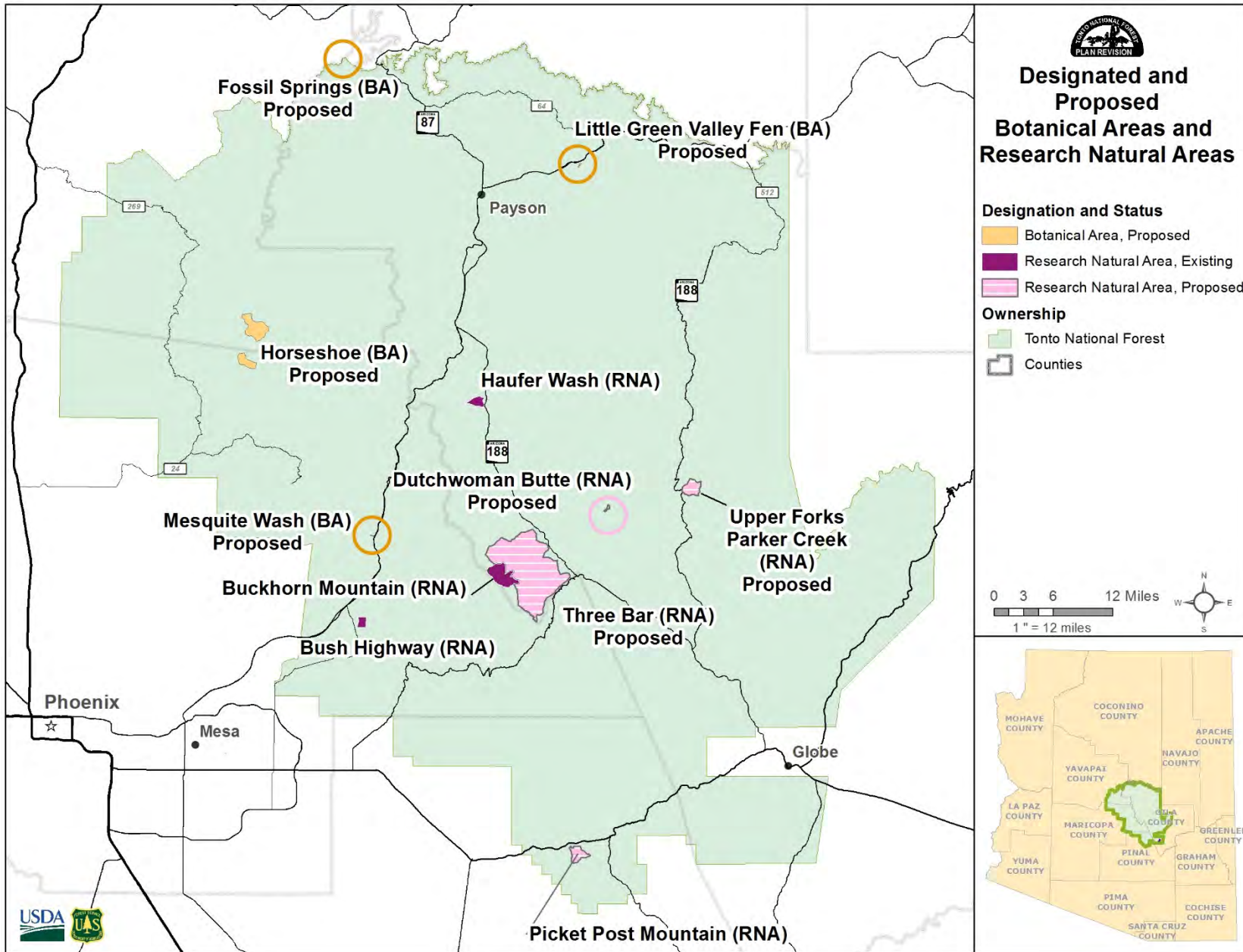


Figure A-5. Proposed botanical areas and existing and proposed research natural management areas



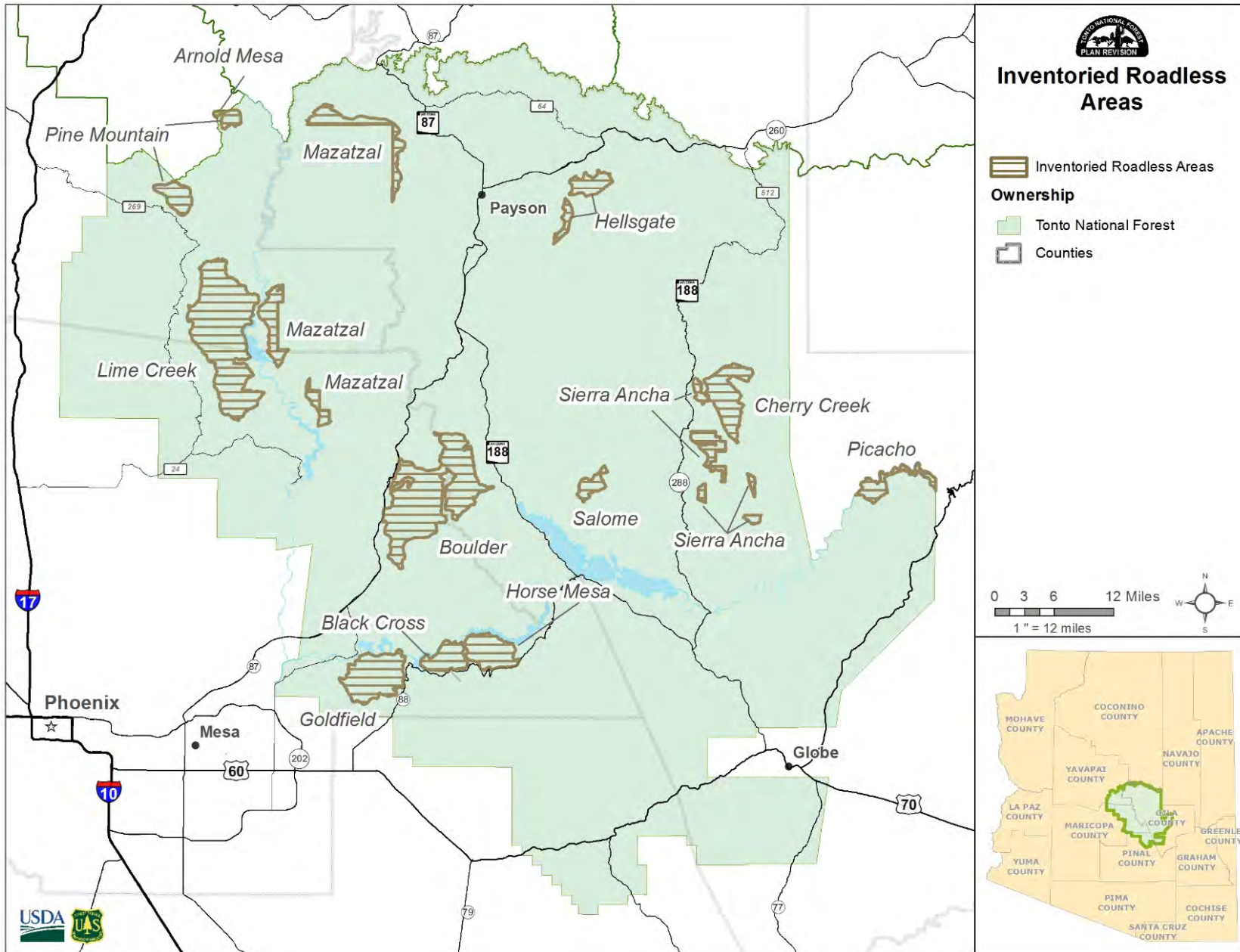


Figure A-6. Inventoried roadless areas on the Tonto National Forest

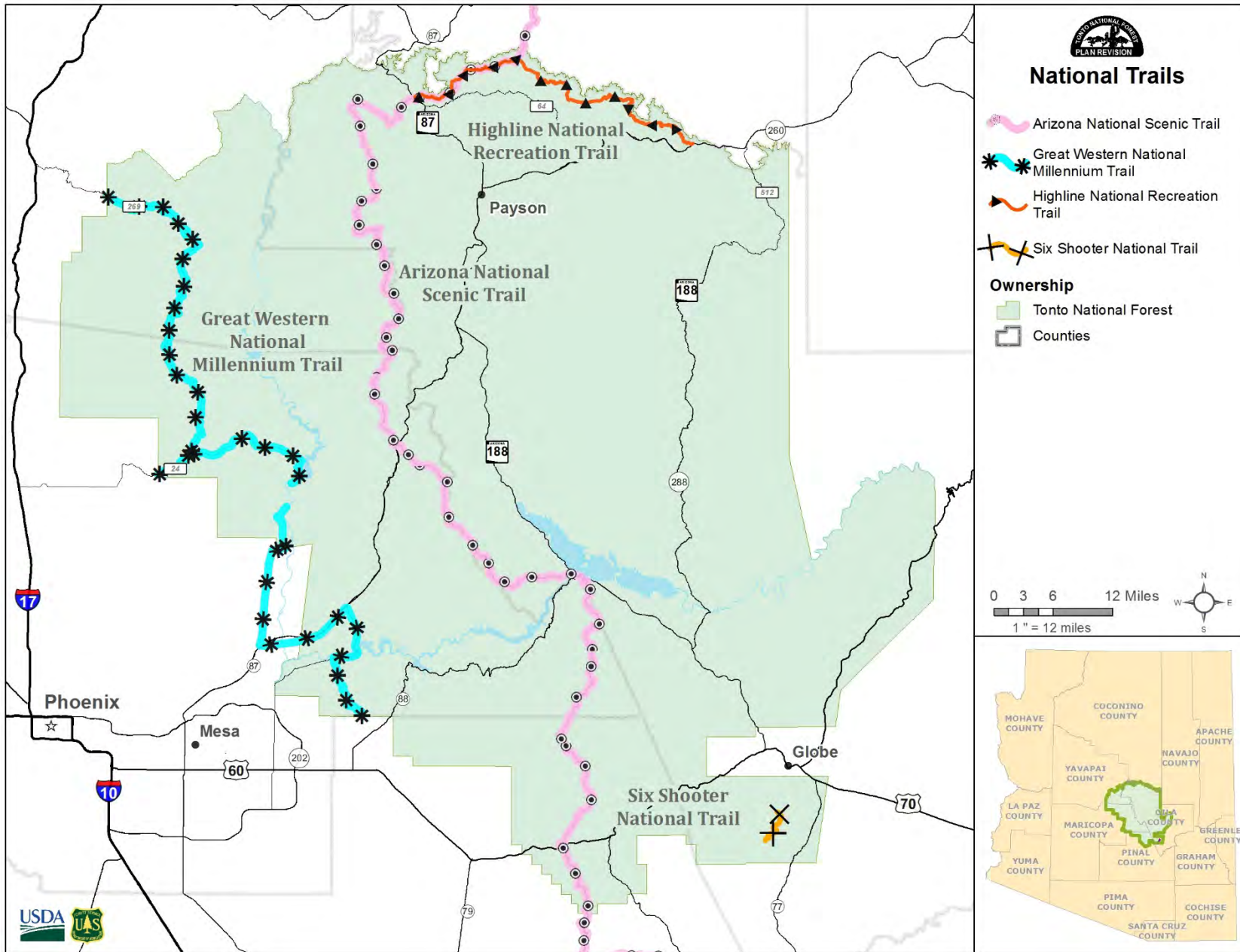


Figure A-7. National trails on the Tonto National Forest

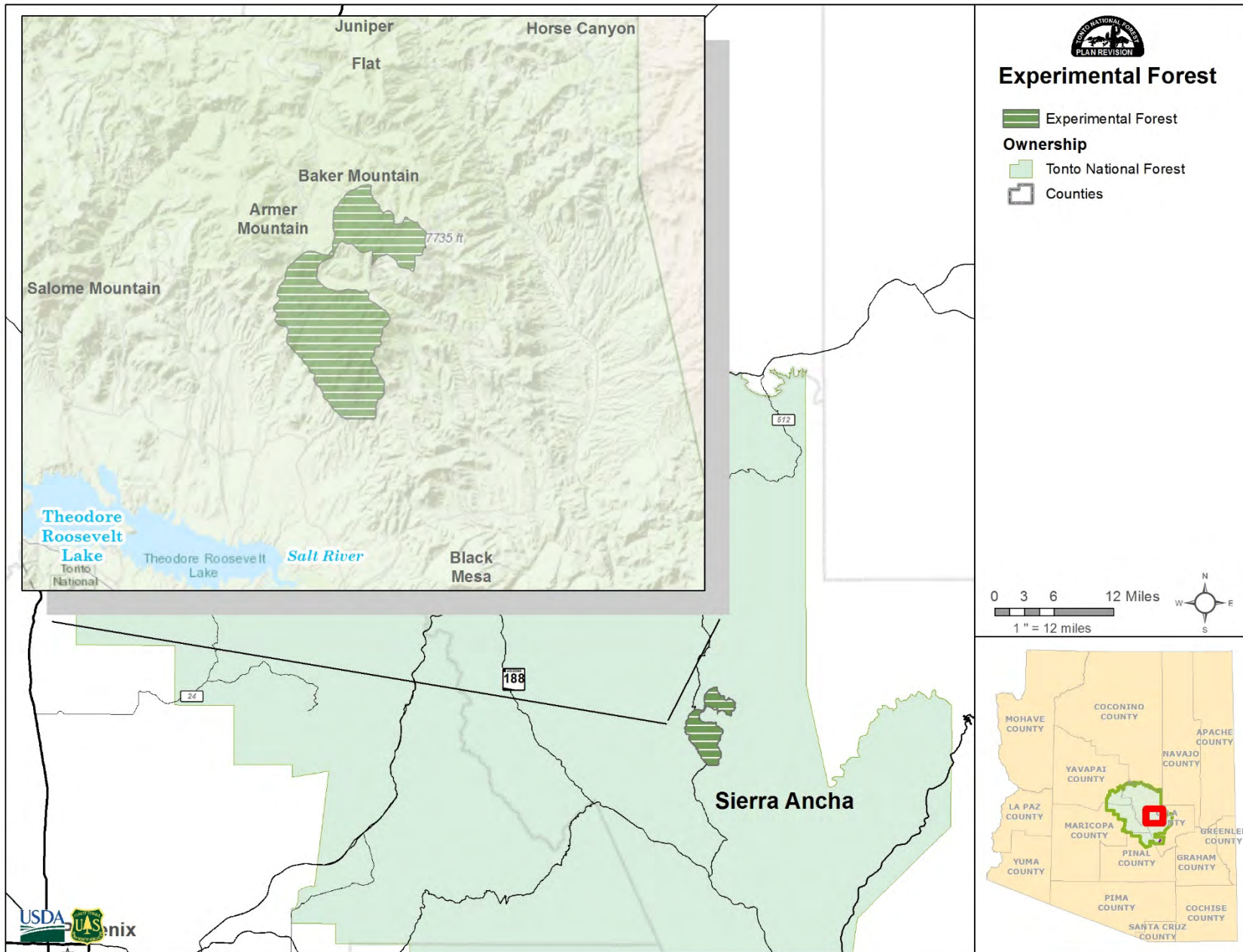


Figure A-8. Sierra Ancha Experimental Forest

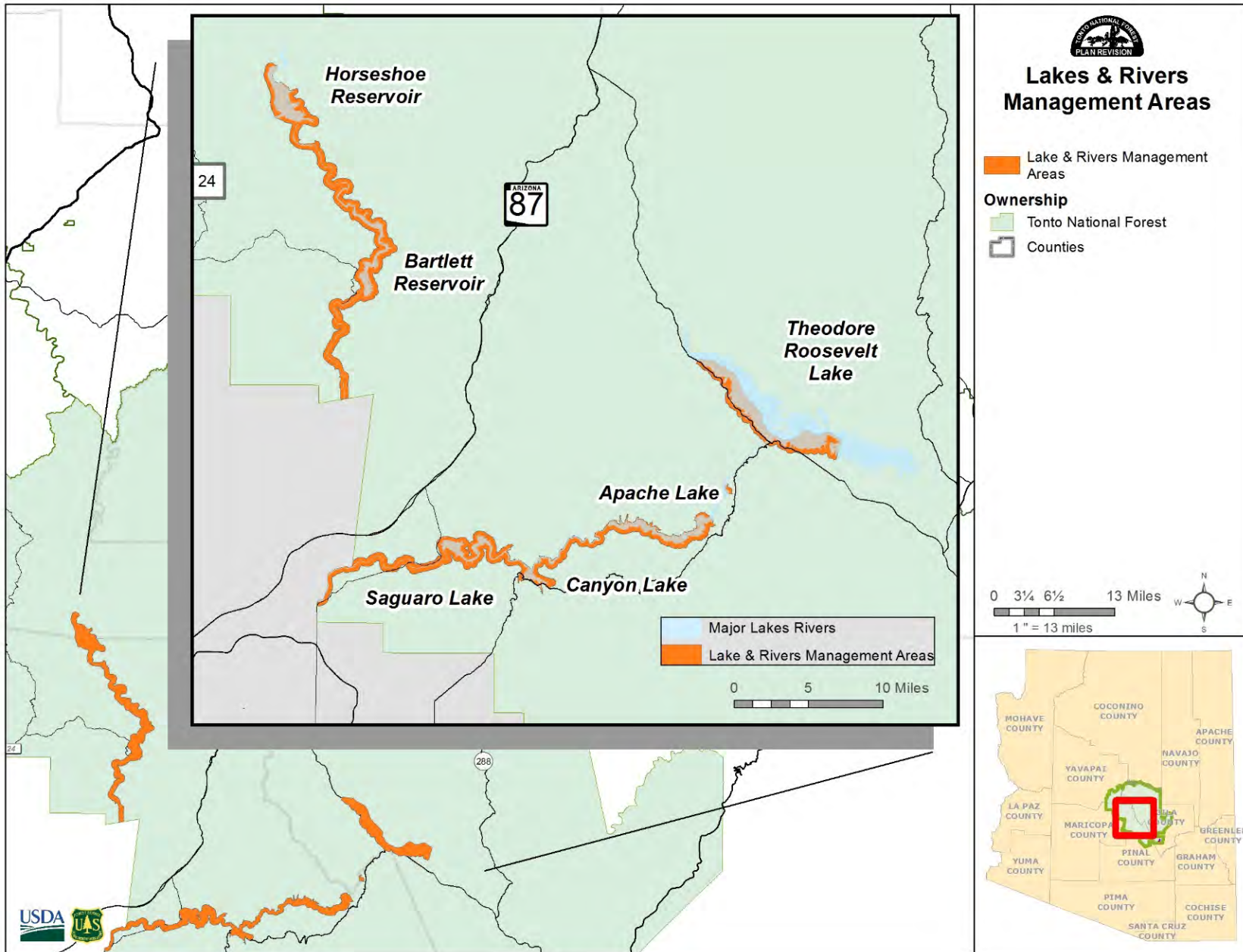


Figure A-9. Lakes and Rivers Management Areas on the Tonto National Forest

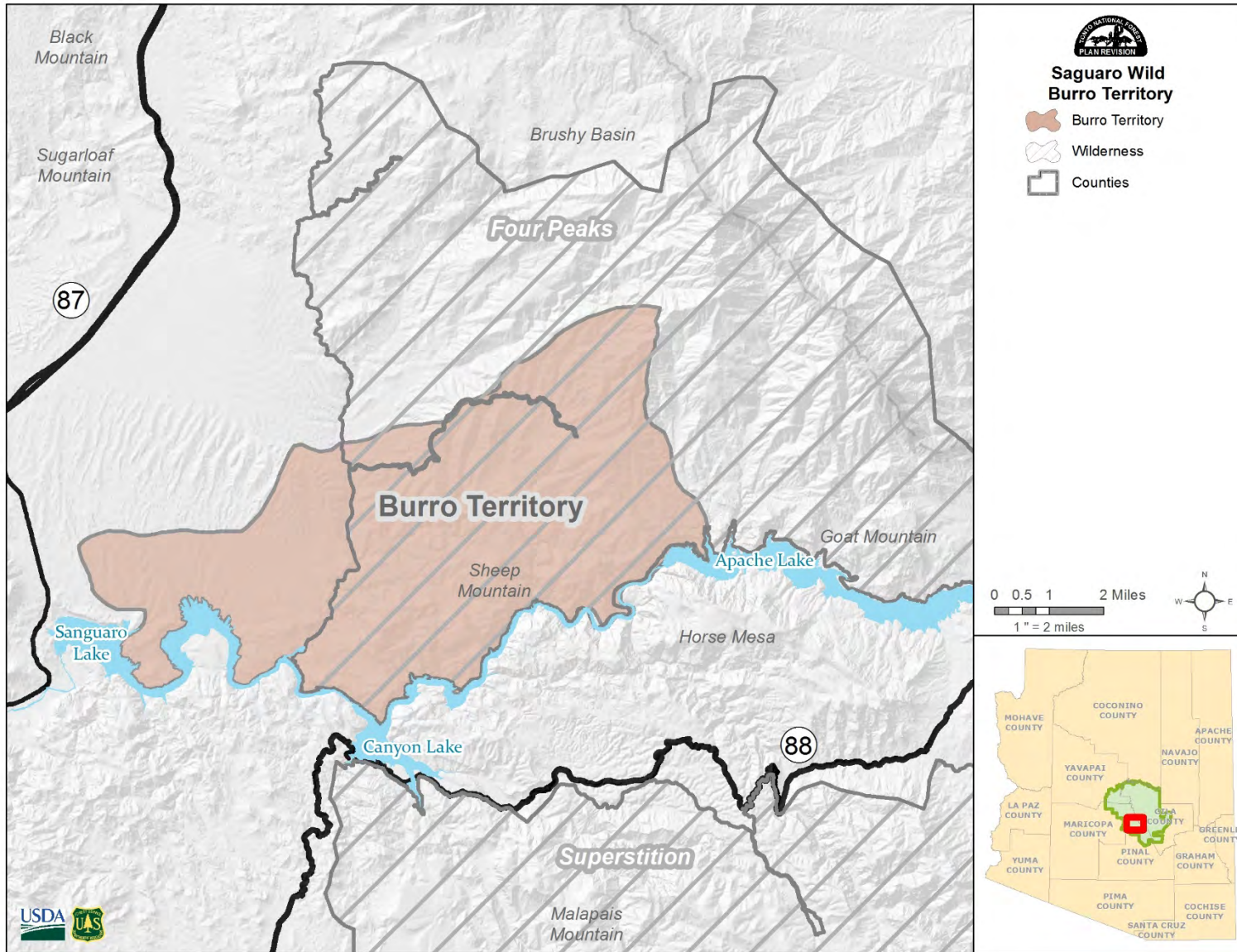


Figure A-10. Saguaro Wild Burro Management Area

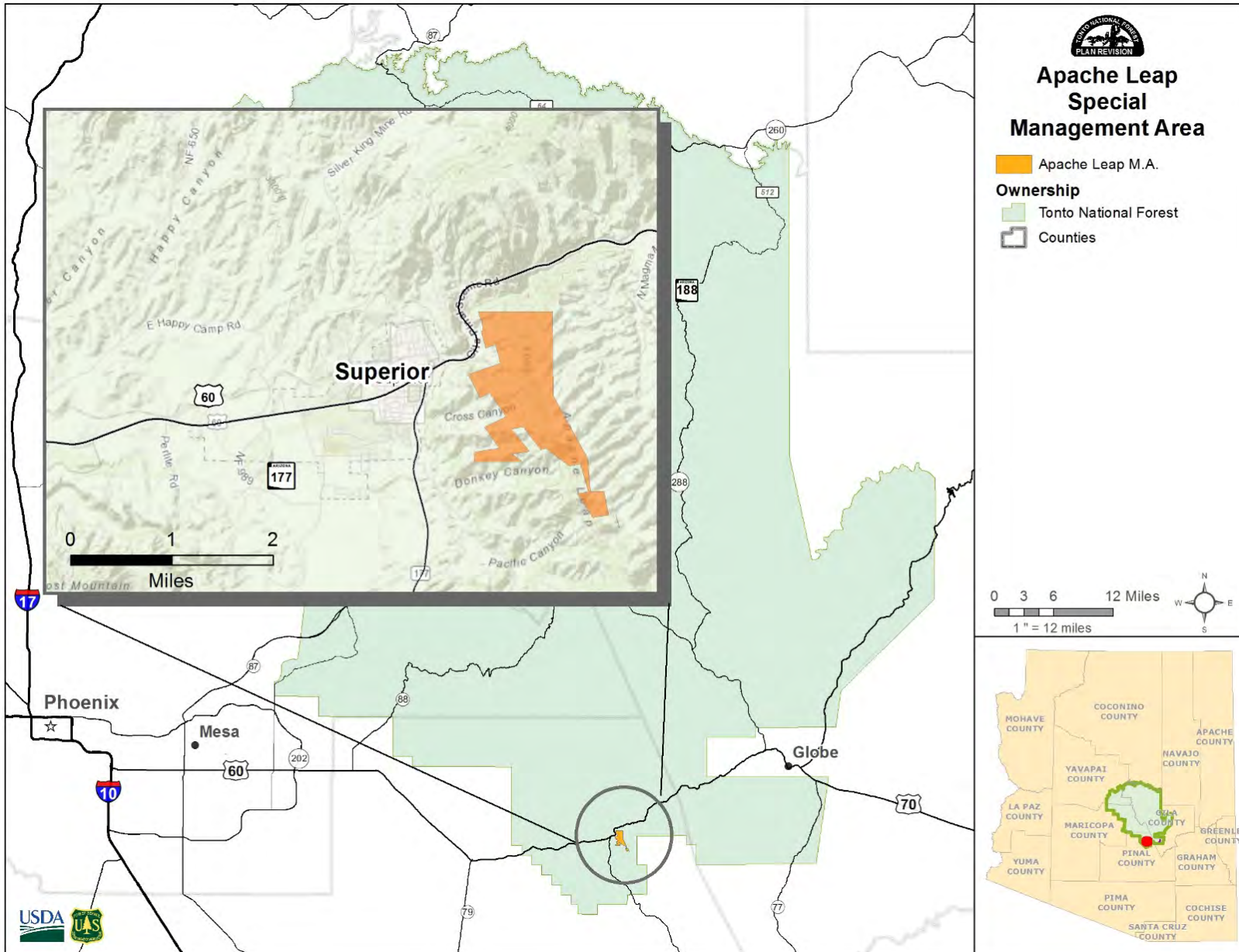


Figure A-11. Apache Leap Special Management Area

## Appendix B. Proposed Probable and Possible Future Actions

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

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 a strategy of adaptive management in its decision making and achievement of the plan’s desired conditions and objectives. An adaptive management strategy 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 the plan represent projects or activities intended to be accomplished during the planning period. These are listed below by resource area.

## Recreation

- 01 Develop at least one new partnership each year with a local organization or club who will provide quality long-term volunteer services and projects for the Forest.
- 02 Meet a 75% public satisfaction rating based on the results of recurring National Visitor Monitoring Use Surveys, or similar method, each 5-year period.
- 03 During each 10-year period of the plan, rehabilitate 5 to 7 areas on the Forest where dispersed recreation sites are causing erosion, sanitation issues, or other adverse effects on natural resources.
- 04 During the 10-year period following plan approval, develop and implement at least 3 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.
- 05 Within 10 years of plan approval, develop or modify 2 to 8 systems of sustainable designated motorized and non-motorized trails (e.g., mountain biking, equestrian, motorcycle, jeep, and all-terrain vehicle trails) to adequately provide for these user groups and reduce user conflicts.
- 06 Every 5 years, decommission 10 miles of motorized and/or non-motorized trails that are deemed unsustainable, low-use, have no remarkable destination value, or are duplicate trails to the same destination.

## Rangelands, Forage, and Grazing

- 01 At least 2 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. Conversion to forage reserves to improve resource management flexibility.
  - b. Grant to current or new permitted livestock producer.
  - c. Closure 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 10 years to contribute to forest product industry.

## Mining, Minerals, and Abandoned Mines

- 01 Initiate at least one environmental review for closure of one or more abandoned or inactive mine(s) every three years.

## Roads

- 01 Decommission at least 10 miles of roads identified for decommissioning and/or unauthorized user created routes every five years.

## 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 10-year period with both mechanical treatments and fire. About 22% 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 10-year period with only fire (no mechanical treatment). About 22% 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 and juniper grass and Madrean pinyon oak) as follows:
- a. 400 to 2,000 acres over a 10-year period with both mechanical treatments and fire. About 22% 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 10-year period. About 22% would be treated with prescribed fire, with the expectation that the rest would be treated wildfire.
- 03 Restore at least 500 acres of semi-desert grasslands, over a 10-year period.
- 04 Reduce the impact of invasive species (e.g., buffelgrass, fountain grass, and red brome) by surveying, inventorying, and treating 10,000 to 15,000 acres in desert ecological response units (Sonoran Desert plant communities and Sonora-Mojave mixed-salt desert scrub) over a 10-year period.

## Watersheds and Water Resources

- 01 Ensure that at least two priority watersheds are identified at all times.
- 02 Implement at least one project identified in the Watershed Restoration Action Plan<sup>52</sup> for each priority watershed every year.
- 03 Improve or maintain watershed condition class (as defined in the Watershed Condition Framework or other acceptable method) of at least one 6<sup>th</sup> code (HUC12) watershed every 5 years.
- 04 Improve soil and water condition of 10,000 – 20,000 acres annually.
- 05 Complete at least four aquatic habitat restoration projects (e.g., increase pool quantity, provide stream cover, and bank stabilization) every 10 years.
- 06 Acquire 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) 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 restoration projects on 200 – 500 acres of riparian areas rated as nonfunctioning and functioning-at-risk (Proper Functioning Condition or similar protocol) during each 10-year period, with emphasis on priority 6th code watersheds.
- 02 Improve or maintain 10-15 individual springs during each 10-year period.

---

<sup>52</sup> Watershed Restoration Action Plans for priority watersheds are used to maintain or improve watershed condition and implement essential projects.

## Wildlife, Fish, and Plants

- 01 Implement at least 20 activities that contribute to the recovery of federally listed species every 10 years.
- 02 Complete at least 20 products or activities that educate the public about wildlife, fish, and rare plants every 2 years (e.g., educational signs and brochures, website pages, species checklists, presentations, volunteer projects that restore TES habitats, and field trips).

## Invasive and Noxious Species

- 01 Treat and control invasive and noxious species on 200-1,500 acres annually.
- 02 Treat and control invasive species on 2 – 10 stream reaches every five years.

## Possible Future Management Actions

Management approaches as outlined within chapter 2 and 3 of the 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 and user groups (e.g., Fish and Wildlife Service, Arizona Game and Fish Department, State Historic Preservation Office, State and Tribal Forestry, National Speleological Society, Friends of the Tonto, and Tonto Recreation Alliance).
- 03 Work to implement methods to recruit, train, and coordinate volunteers that are consistent across the Tonto National Forest.

## Recreation

- 01 Implement a sustainable recreation approach consistent with the most recent Tonto Sustainable Recreation Strategy, including the completion of the actions and objectives outlined in the action plan (e.g., develop concept plans, scenic byway corridor management plans, interpretive plans, wilderness plans, design narratives, and others).
- 02 Work to 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 Councils, 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 brainstorm solutions that meet the needs of the recreating public while also meeting the needs of the communities we serve.
- 04 Prior to approval, consider life-cycle costs for all new recreation infrastructure. Also consider use levels and trends.
- 05 Encourage marketing and tourism organizations (such as Chambers of Commerce and Boards of Tourism) to promote tourism and recreational opportunities on the forest through websites, brochures, conferences, and other educational/informative outlets.

- 06 Promote shared stewardship by increasing partnerships and volunteers (e.g., creation of a Partnership Council).
- 07 Develop partnerships and collaboration with agencies, groups, communities, volunteers, permit holders, and other individuals to increase forest stewardship, ecological awareness, volunteerism, user satisfaction, promote a sustainable recreation program, and support local recreation-based economic development.
- 08 Develop interpretive facilities 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.
- 09 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).
- 10 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).
- 11 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.

### **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 and concessionaires<sup>53</sup> to maintain and manage developed facilities, particularly in high use areas.
- 04 Conduct and utilize accessibility assessments for compliance with Forest Service Outdoor Recreation Accessibility Guidelines and the Architectural Barriers Act on all developed recreation sites.
- 05 Work to achieve 80% fee compliance in fee sites and continue to provide on-site payment methods for public convenience wherever sustainability attainable.

### **Dispersed Recreation**

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

---

<sup>53</sup>. An individual, organization, company, corporation, or cooperating State or local agency holding a valid special use permit authorizing the provision of commercial recreation services, facilities, or activities on National Forest System lands.

- 02 Utilize existing agency protocol, or 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 issues and user conflicts.
- 03 Encourage campers with saddle or pack animals to carry weed-free cubed, pelleted, or rolled feed to limit overuse of the vegetation and discourage establishment or spread of noxious weeds.
- 04 When designing and constructing new trails, consider separating motorized and non-motorized 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 non-motorized trail maintenance.

### ***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.

### ***Non-Motorized Recreation***

- 01 Encourage those participating in non-motorized cross country travel to use only National Forest System trails.
- 02 Develop and implement a strategy for a sustainable, "right-sized, forestwide, non-motorized 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 non-motorized trails.
- 04 Collaborate with established local and national climbing, caving, and canyoneering organizations to monitor popular and desirable climbing routes and develop best practices and management plans for these areas (e.g., cave management plans, climbing zones, vertical trails, individual route applications, canyoneering routes). Coordinate with local partners and climbing groups to either remove or implement maintenance and replacement of existing fixed anchors and to consider new routes when necessary to improve recreation opportunities and mitigate resource impacts (e.g., cultural or riparian resource damages).

### ***Water Based Recreation***

- 01 Coordinate with Arizona Game and Fish Department to manage boating opportunities (e.g., boat registration, facilities, and enforcement) on the Forest.
- 02 Work with the State of Arizona, Bureau of Reclamation, and Salt River Project to monitor water quality and ensure water quality standards for direct human contact are not being violated.

- 03 Work with partners and stakeholders to help manage for the safety of water based recreation and ensure ample opportunities for the future.

### ***Recreational Shooting***

- 01 Work with partners to identify recreational shooting opportunities, additional public needs, and improve recreational shooting opportunities on the Forest.
- 02 Consider the use of designated shooting areas, permitted and developed shooting ranges, special permit zones, and other management tools to meet demands for recreational shooting while meeting public safety and natural resource protection objectives and where compatible with other National Forest uses and objectives.
- 03 Work with partner agencies and groups to expand public education on safe recreational shooting practices and “Leave No Trace” standards. Coordinate enforcement efforts with partner agencies and groups to increase public education and build “self-regulation” within the recreational shooting community.
- 04 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). Work with partner agencies and groups to develop criteria for determining where recreational shooting is appropriate and where it is not appropriate.
- 05 Issue temporary closure orders in the areas of volunteer events to prohibit shooting for the day of the volunteer events such (e.g., area clean-ups).

### **Wildlife Related Recreation**

- 01 Work in collaboration with Arizona Game and Fish Department to:
  - a. Maintain and/or enhance habitat for species of economic and recreational importance.
  - 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 new and maintain existing partnerships and programs that promote local recreation through hunting, fishing, and watchable wildlife.
- 03 Identify and enhance watchable wildlife opportunities; 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 such as the State Wildlife Action 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 and opportunities to sustainably fish for native sport fish species.

## Special Uses

- 01 Consider authorizing recreation special use permits for high-demand outfitting and guiding activities based on the results of a capacity study, to be re-evaluated as needed. Utilize available tools to increase administrative efficiencies (e.g., statewide outfitting and guiding authorizations, regional teams, and modernization efforts).
- 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 Utilize special use authorization terms and conditions as a means of protecting water dependent resources 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.

## 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.
- 02 Forest managers work continually with permittees to adjust timing, intensity, and frequency of livestock grazing to respond to changing resource conditions.
- 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 (e.g., Reading the Range and riparian photo points).

## Cultural and Historic Resources

- 01 Collaborate with American Indian tribes and other traditional communities to manage historic sites and other traditional areas of importance while conserving anonymity of such sites where appropriate, and to identify mitigation measures for historic properties, traditional cultural properties, and cultural landscapes during management activities.
- 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 Consider prioritizing baseline Heritage program work, and focus NHPA Section 110 survey as follows: (1) areas where eligible cultural resources are threatened or on-going impacts are

unknown and need to be assessed; (2) areas indicated to have high cultural value or high density of cultural resources; (3) areas of importance to traditional communities; and (4) areas where additional survey will contribute to a greater regional understanding of a specific area.

- 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 priority heritage assets, 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 mitigation measures 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., Cabins 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.

### 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 Utilize memoranda of understanding where useful to improve Forest Service relationships with tribal partners.
- 03 Work with American Indian tribes to understand their needs and build respectful, collaborative relationships; to develop ways of accomplishing desired conditions and goals; and to collaborate in ecosystem restoration efforts.
- 04 Actively seek opportunities to hire tribal work crews to assist with land restoration and other projects.
- 05 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.
- 06 Coordinate with American Indian tribes to develop programs focused on getting youth and elders involved in education activities on the forest.
- 07 Cooperatively develop interpretive and educational exhibits that focus on the history of the lands managed by the Tonto National Forest in collaboration with American Indian tribes to provide the public with a greater understanding and appreciation of our shared history, culture, and traditions.
- 08 Utilize the Tribal Monitor Program to better protect and manage sacred sites, traditional cultural properties, areas of tribal importance, and special forest products.

## Forestry and Forest Products

- 01 Consider preparing pest and invasive species control plans with forest health specialists that contain appropriate mitigation measures (e.g., planting resistant tree species, maintaining species diversity, removing damaged trees or invasive species, and using pesticides) and monitoring procedures. Monitoring may include:
  - a. Measuring effectiveness of treated areas.
  - b. Determining effects on non-target organisms.
  - c. Determining effects on water quality.
  - d. Determining effects of pesticide that enters the soil or air.
- 02 Discussions with tribes that collect plants for traditional, cultural, and ceremonial purposes are encouraged, to promote the plants' persistence during the planning of forest restoration projects.
- 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 Consider displaying interpretive or informational signs where management activities have short term negative impacts to scenery.
- 02 Update from the Visual Management System (VMS) to the Scenery Management System (SMS) on the Tonto National Forest.
- 03 Set priorities for rehabilitation of areas where existing scenic integrity is lower than identified in the visual quality objective map (as defined in the Visual Management System, or similar protocol).

## Mining, Minerals, and Abandoned Mines

- 01 Consider the use of sites for mineral collection areas during the development of a reclamation plan.
- 02 Use operating and reclamation plans to protect and restore surface resources through the phased introduction and monitoring of pioneer and successor species for vegetative communities. Utilize adaptive management principles to ensure effective reclamation.
- 03 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.
- 04 Seek opportunities to work with proponents to expand knowledge of local natural resources (e.g., proactive data collection and sharing, and development of conservation measures).
- 05 Develop general guidelines and informational brochures for public dissemination on rock hounding<sup>54</sup> and mineral collecting on Forest.

---

<sup>54</sup> Rock hounding is the recreational study and hobby of collecting rocks and mineral specimens from their natural environment.



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

## 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 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.

## Facilities

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

## Lands and Access

- 01 Develop a strategy to address known and suspected trespass and encroachment issues present on the forest.
- 02 Update the existing landownership adjustment plan, which will identify lands desirable for acquisition, as well as identify parcels as suitable for exchange or sale.
- 03 While addressing access problems on the forest, seek cooperation of private landowners.
- 04 Consult with local governments to synchronize Forest decisions regarding permits and easements with local planning and zoning ordinances where local and Forest objectives are complementary.

## Salt River Horses

- 01 Work with the Arizona Department of Agriculture and the Salt River Horse Collaborative to develop and implement a management plan for the Salt River Horses.

## 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, a hazard index, or a 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 2 years as management actions, 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 such as 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.

### **Desert Ecosystems**

- 01 Support or assist partners in monitoring Sonoran desert ecosystems to better understand post-disturbance (e.g., fire and off-highway vehicle impacts) recovery of desert plant species and plant communities to better guide management.
- 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.

### **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 grass species (e.g., Lehmann lovegrass, Buffelgrass, fountain grass, Boer lovegrass, red brome, and cheatgrass) 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 Treat 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 WUI on the Tonto National Forest and adjacent lands of other ownerships.

### **Riparian Ecological Response Units**

- 01 Use best available scientific information and adaptive management strategies 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 such as the Wildfire Strategic Response Zones 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. Five strategic zones were developed for the Tonto National Forest: 1) maintain, 2) restore, 3) protect, 4) exclusion, 5) high complexity. These zones are dynamic over time and space and will change as conditions change, affecting management opportunities. For example an area currently identified as a 'Restore' zone could become a 'Maintain' zone post treatment (mechanical and/or fire). Conversely, a 'Restore' zone could become a 'Protect' zone if changing fuel conditions change expected fire behavior and effects such that fire would not meet forest plan objectives.
- 05 Wildland fire may be coordinated across jurisdictional boundaries when resource 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 land owners 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.

## Watersheds and Water Resources

- 01 Work with partners to leverage resources and 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 System lands management purposes.
  - a. 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.

- b. 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).
- 03 Work with partners on developing appropriate environmental flows<sup>55</sup> 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 (US and Mexico)).
- 04 Identify aquifers, including important recharge areas, within the forest boundary and consider these areas during project planning and implementation.
- 05 Manage groundwater quantity and quality on National Forest System lands in cooperation with appropriate State agencies.
- 06 Manage groundwater and surface water on National Forest System as a hydraulically connected system.
- 07 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.
- 08 Identify and map Source Water Protection Areas on the forest.
- 09 Use the watershed condition framework, or other acceptable method, to assess and prioritize watersheds for restoration or maintenance activities.
- 10 Prepare Watershed Restoration Action Plans to improve or maintain watershed condition, which can include management activities or projects to maintain or improve riparian areas, seeps, springs, wetlands, and riparian management zones where these resources have been identified as impaired or functioning at risk.

### Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones

- 01 Use Tonto Stream Assessment Method, Proper Functioning Condition protocol, National Riparian Core Protocol, MIM (Multiple Indicator Monitoring), mapping efforts, or other accepted method for riparian assessments and monitoring.
- 02 Work with partners 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.
- 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.

---

<sup>55</sup> Necessary water flows to sustain water resources and the goods and services they provide to people.

- 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 Focus restoration efforts where the potential to restore self-sustaining ecosystems is high versus those that require repeated management actions (e.g., continual planting of vegetation, treating invasive species, or maintaining exclosures).

## 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 forests.
- 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 floristic 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.

## Invasive and Noxious 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 Consider conducting treatments in a timely manner to reduce or minimize spread
- 03 Locations of invasive and undesirable species are known, recorded, and managed using an integrated pest management (IPM) approach.
- 04 Noxious, invasive, and undesirable 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 current infestations, (4) use maps for management and control tactics, and (5) assess the impacts of the 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 and undesirable species. Work to develop educational materials for the public.
- 07 Encourage public land users to inspect and clean motorized vehicles prior to recreating on public lands to prevent the spread of invasive and undesirable species (e.g., quagga mussels and fountain grass).
- 08 Incorporate new technology and social media (e.g., Instagram, iNaturalist, EDDmaps, Avenza) to increase awareness regarding invasive and undesirable 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 TNF invasive and undesirable program. Attend trainings specifically geared toward the use of herbicide treatments for noxious weed control.
- 10 Coordinate with Animal and Plant Health Inspection Service to provide invasion sites on the forest, where appropriate, for the release and monitoring of biological controls. Ensure that biological control agents do not pose substantial risk to other native plants.
- 11 Encourage forest service employees to participate in scientific weed 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 and noxious weeds.

## 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.

## Caves and Karsts

- 01 Consider the development of a response plan for white-nose syndrome through continued collaboration with the US Fish and Wildlife Service (USFWS), Bat Conservation International, AZ Department of Game and Fish, the National Speleological Society, and others with interests in conservation management for bat species.
- 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 internally and externally increase awareness 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.

## Air Quality

- 01 Work with agencies, organizations, Tribes, and other entities to actively pursue actions designed to reduce the impacts of pollutants from sources within and outside the Forest.
- 02 Consider deploying smoke monitors when there is potential for significant impacts to the public.
- 03 To promote public awareness and protection of human health and safety, consider notifying stakeholders and the public about potential smoke from fire activities through methods of advanced notification through the media and smoke warning signs along roads when visibility may be reduced due to wildland fire.
- 04 Work with partners to develop strategies for managing wildfires to incorporate as many emission reduction techniques as feasible, subject to economic, technical, and safety criteria, and land management objectives.
- 05 Utilize Emission Reduction Techniques to minimize impacts to sensitive receptors of burn unit(s).

## Designated Wilderness

- 01 Establish a wilderness character baseline and implement and maintain a wilderness character monitoring program for each wilderness based upon the most recent wilderness character monitoring protocol recognized by agency policy. Complete a map of threats to wilderness character. Wilderness management decision making process will be informed by the results of threats to wilderness character mapping and by results of the monitoring trends in the condition of wilderness character by the wilderness character monitoring program. Forest staff will complete and implement wilderness use capacity studies, non-native invasive species inventories, and comprehensive vegetation inventories for each designated wilderness.
- 02 Where trends in monitoring indicate that opportunities for solitude are being degraded, consider implementing management actions that improve opportunities for solitude (e.g., promoting non-wilderness destinations, providing public information about periods of lower visitation, or evaluating the possible need for a permit system).
- 03 Where impacts from an increasing number of recreation sites or increasing impacts at individual sites are observed, management actions (e.g., public education, site restoration, and site or area closures) can be implemented to reduce cumulative impacts to wilderness character.
- 04 Consider assigning a wilderness resource advisor, or in absence of an available resource advisor a wilderness specialist, to all 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.
- 05 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.

- 06 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.
- 07 Wilderness managers should 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.
- 08 Coordinate with the Arizona Department of Game and Fish on management of native species within wilderness to maintain and enhance wilderness character during project implementation.
- 09 Use interpretation and education to encourage visitors to adopt techniques, equipment, and ethics specific to wilderness, including Leave No Trace Outdoor Ethics. Consider the use of news releases, postings, permit issuance, and individual visitor contacts to inform visitors of areas of concentrated resource damage and use restrictions. Develop educational materials and interpretation that encourage widespread and common understanding of and support for wilderness values, philosophy, resources, and benefits.

## Designated Wild & Scenic Rivers

- 01 Utilize the most recent version of the individual comprehensive river management plan to protect outstandingly remarkable values and classification. The following comprehensive river management plans and any future versions shall be incorporated by reference and are part of the plan:
  - a. Fossil Creek Wild and Scenic River Comprehensive River Management Plan<sup>56</sup>
  - b. Verde Wild and Scenic River Comprehensive River Management Plan
- 02 Collaborate with neighboring forests and agencies on the management of wild and scenic rivers.
- 03 Work cooperatively with the Coconino and Prescott National Forests to administer and track authorized activities within the designated wild and scenic segments of the Verde River and Fossil Creek.
- 04 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. Consequently, residents and visitors not only appreciate and learn about wild

---

<sup>56</sup> The Draft Fossil Creek Comprehensive River Management Plan (CRMP) and Draft Environmental Impact Statement was released for public comment December 1, 2018 through February 28, 2019. The Coconino and Tonto National Forests are working together on the CRMP and information is available on the forest [webpage](#).



and scenic rivers, but understand their role in protecting wild and scenic river values. This can result in increased stewardship, ecological awareness, partnerships, and volunteerism.

### Eligible Wild & Scenic Rivers

- 01 Develop educational materials and interpretation of eligible wild and scenic rivers that encourage widespread and common understanding of the values, philosophy, resources, and benefits of wild and scenic rivers. Consequently, residents and visitors not only appreciate and learn about wild and scenic rivers, but understand their role in protecting wild and scenic river values. This can result in increased stewardship, ecological awareness, partnerships, and volunteerism.
- 02 Collaborate with neighboring forests and agencies on the management and monitoring of conditions within the stream corridors of eligible wild and scenic rivers.
- 03 Opportunities for enhancing outstandingly remarkable values may be considered in all project management activities within an eligible wild and scenic river corridor.

### 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 signing 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.

### National Trails

#### **Applicable to all National Trails**

- 01 Consider expansion of connector trails to accommodate user access when near towns and developed recreation facilities.
- 02 Work with volunteer groups, partners, local governments, and adjacent landowners to maintain national trail corridors, the condition and character of the surrounding landscape, and to facilitate support by trail users that promote Leave No Trace principles and reduces user conflict.
- 03 Ensure that Incident Management teams are aware of all national trails as a resource to be protected during wildland fire management activities. Clearly identify fire-related rehabilitation and long-term recovery of the national trail corridor(s) as high priorities for fire managers, Incident Management Teams, burned area emergency response (BAER) teams, and post-fire rehabilitation interdisciplinary teams.

## **Applicable to the Arizona National Scenic Trail**

- 04 Utilize the most recent version of the Arizona National Scenic Trail Comprehensive Plan when considering projects in the Arizona National Scenic Trail corridor.
- 05 Work with volunteer groups, partners, local governments, and adjacent landowners to maintain the Arizona National Scenic Trail corridor, the condition and character of the surrounding landscape, and to facilitate user support and reduce user conflicts on the trail.
- 06 Establish appropriate visitor use levels for specific segments of the Arizona National Scenic Trail and take appropriate actions if there is a trend away from the desired condition.
- 07 Identify and pursue opportunities to acquire lands or rights-of way within or adjacent to the Arizona National Scenic Trail as they become available.
- 08 Work with other land managers to provide consistent signage along the Arizona National Scenic Trail corridor at road crossings to adequately identify the Arizona National Scenic Trail and include interpretation at trailheads.
- 09 Encouraging trail partners and volunteers to assist in the planning, development, maintenance, and management of the trail, where appropriate and as consistent with the Arizona National Scenic Trail Comprehensive Plan.

## **Sierra Ancha Experimental Forest**

- 01 Coordinate all permitted uses and improvements (e.g., roads, trails, and fences) with the Sierra Ancha Experimental Forest manager and station director.
- 02 Work with the Rocky Mountain Research Station, Sierra Ancha Experimental forest managers to obtain information on historic and current research plots and other important features. Ensure data is maintained in FS GIS database.
- 03 Work with the Rocky Mountain Research Station Experimental Forest managers, local universities (Arizona State University, University of Arizona, Northern Arizona University), and colleges to explore opportunities for research and student involvement (e.g., outdoor classroom at Parker Creek camp).

## **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 by making information available at recreation sites, on social media, and through other media channels and partners.

- 03 Work with partners and volunteers to reduce the number of public safety incidents on the Lower Salt River.
- 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/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 Work with law enforcement and partners to identify needs for special orders such as restriction and closures when necessary to protect public health and safety.
- 08 Notify the public of major changes to management practices that are intended to improve the recreation experience or reduce public health and safety issues.
- 09 Encourage/incentivize permit holders and partners to develop a system of litter clean up and trash disposal and identify areas to implement a ban on disposable containers to reduce litter.

#### Apache Leap Special Management Area

- 01 Utilize direction from the with the Apache Leap Special Management Area management plan when conducting projects or activities in the Apache Leap Special Management Area.

## Appendix C. At-Risk Species and Associated Ecological Response Units

This appendix provides a cross-walk between individual at-risk species and the ecological response units (ERUs) for which they are located (table 28).

**Table 28. At-risk species and associated ecological response units (ERUs)**

Ecological Response Unit	Common Name	Scientific name	At-risk species status
Desert Ecosystems (ERU-DES) subclass: Sonora-Mohave Mixed Salt Desert Scrub (SDS)	Arizona cliffrose	<i>Purshia subintegra</i>	Endangered
Desert Ecosystems (ERU-DES) subclass: Sonora-Mohave Mixed Salt Desert Scrub (SDS)	Bezy's night lizard	<i>Xantusia bezyi</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonora-Mohave Mixed Salt Desert Scrub (SDS)	Gilded flicker	<i>Colaptes chrysoides</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonora-Mohave Mixed Salt Desert Scrub (SDS)	Horseshoe deer vetch	<i>Lotus mearnsii</i> var. <i>equisolensis</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonora-Mohave Mixed Salt Desert Scrub (SDS)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonora-Mohave Mixed Salt Desert Scrub (SDS)	Ripley wild buckwheat	<i>Eriogonum ripleyi</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonora-Mohave Mixed Salt Desert Scrub (SDS)	Roosevelt talussnail	<i>Sonorella rooseveltiana</i> (+ <i>S. r. fragilis</i> )	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonora-Mohave Mixed Salt Desert Scrub (SDS)	Rusby's milkwort	<i>Polygala rusbyi</i> (syn. <i>Rhinotropis rusbyi</i> )	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Arizona cliffrose	<i>Purshia subintegra</i>	Endangered
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Bezy's night lizard	<i>Xantusia bezyi</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Davidson sage	<i>Salvia davidsonii</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Fish Creek rock daisy	<i>Perityle saxicola</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Galiuro Talussnail	<i>Sonorella galiurensis</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Gila rock daisy	<i>Perityle gilensis</i> var. <i>gilensis</i>	Species of Conservation Concern

<b>Ecological Response Unit</b>	<b>Common Name</b>	<b>Scientific name</b>	<b>At-risk species status</b>
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Gilded flicker	<i>Colaptes chrysoides</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Grand Canyon century plant	<i>Agave phillipsiana</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Hohokam agave	<i>Agave murpheyi</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Horseshoe deer vetch	<i>Lotus mearnsii</i> var. <i>equisolensis</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Mapleleaf false snapdragon	<i>Mabrya acerifolia</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Rusby's milkwort	<i>Polygala rusbyi</i> (syn. <i>Rhinotropis rusbyi</i> )	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Salt River rock daisy	<i>Perityle gilensis</i> var. <i>salensis</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Tonto Basin agave	<i>Agave delamateri</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Mid-Elevation Desert Scrub (MSDS-SOS)	Verde breadroot	<i>Pediomelum verdiensis</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Arizona cliffrose	<i>Purshia subintegra</i>	Endangered
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Bezy's night lizard	<i>Xantusia bezyi</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Davidson sage	<i>Salvia davidsonii</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Fish Creek rock daisy	<i>Perityle saxicola</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Galiuro Talussnail	<i>Sonorella galiurensis</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Gila rock daisy	<i>Perityle gilensis</i> var. <i>gilensis</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Gilded flicker	<i>Colaptes chrysoides</i>	Species of Conservation Concern

<b>Ecological Response Unit</b>	<b>Common Name</b>	<b>Scientific name</b>	<b>At-risk species status</b>
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Hohokam agave	<i>Agave murpheyi</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Horseshoe deer vetch	<i>Lotus mearnsii</i> var. <i>equisolensis</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Mapleleaf false snapdragon	<i>Mabrya acerifolia</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Ripley wild buckwheat	<i>Eriogonum ripleyi</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Rusby's milkwort	<i>Polygala rusbyi</i> (syn. <i>Rhinotropis rusbyi</i> )	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Salt River rock daisy	<i>Perityle gilensis</i> var. <i>salensis</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Tonto Basin agave	<i>Agave delamateri</i>	Species of Conservation Concern
Desert Ecosystems (ERU-DES) subclass: Sonoran Paloverde-Mixed Cactus Desert Scrub (MSDS-SP)	Verde breadroot	<i>Pediomelum verdiensis</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Aravaipa sage	<i>Salvia amissa</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Arizona hedgehog cactus	<i>Echinocereus triglochidiatus</i> var. <i>arizonicus</i>	Endangered
Interior Chaparral (ERU-IC)	Bezy's night lizard	<i>Xantusia bezyi</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Broadleaf lupine	<i>Lupinus latifolius</i> ssp. <i>Leucanthus</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Fish Creek fleabane	<i>Erigeron piscaticus</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Gila rock daisy	<i>Perityle gilensis</i> var. <i>gilensis</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Hodgson's fleabane	<i>Erigeron hodgsoniae</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Hohokam agave	<i>Agave murpheyi</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Pinaleno Mountain rubberweed	<i>Hymenoxys ambigens</i> var. <i>ambigens</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Pringle's fleabane	<i>Erigeron pringlei</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Salt River rock daisy	<i>Perityle gilensis</i> var. <i>salensis</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Sierra Ancha fleabane	<i>Erigeron anchana</i>	Species of Conservation Concern

<b>Ecological Response Unit</b>	<b>Common Name</b>	<b>Scientific name</b>	<b>At-risk species status</b>
Interior Chaparral (ERU-IC)	Tonto Basin agave	<i>Agave delamateri</i>	Species of Conservation Concern
Interior Chaparral (ERU-IC)	Toumey groundsel	<i>Packera neomexicana</i> var. <i>toumeyi</i>	Species of Conservation Concern
Semi-Desert Grasslands (ERU-SDG)	Arizona hedgehog cactus	<i>Echinocereus triglochidiatus</i> var. <i>arizonicus</i>	Endangered
Semi-Desert Grasslands (ERU-SDG)	Metcalfe's tick-trefoil	<i>Desmodium metcalfei</i>	Species of Conservation Concern
Semi-Desert Grasslands (ERU-SDG)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Semi-Desert Grasslands (ERU-SDG)	Salt River rock daisy	<i>Perityle gilensis</i> var. <i>salensis</i>	Species of Conservation Concern
Pinyon-Juniper Woodland (ERU-PJO)	Arizona giant sedge (syn. Cochise sedge)	<i>Carex ultra</i>	Species of Conservation Concern
Pinyon-Juniper Woodland (ERU-PJO)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Pinyon-Juniper Woodland (ERU-PJO)	Mt. Dellenbaugh sandwort	<i>Eremogone aberrans</i> syn. <i>Arenaria aberrans</i> )	Species of Conservation Concern
Pinyon-Juniper Woodland (ERU-PJO)	Pinaleno Mountain rubberweed	<i>Hymenoxys ambigens</i> var. <i>ambigens</i>	Species of Conservation Concern
Pinyon-Juniper Woodland (ERU-PJO)	Pringle's fleabane	<i>Erigeron pringlei</i>	Species of Conservation Concern
Pinyon-Juniper Woodland (ERU-PJO)	Richinbar talussnail	<i>Sonorella ashmuni</i>	Species of Conservation Concern
Pinyon-Juniper Grass and Juniper Grass (ERU-PJJUG)	Metcalfe's tick-trefoil	<i>Desmodium metcalfei</i>	Species of Conservation Concern
Pinyon-Juniper Grass and Juniper Grass (ERU-PJJUG)	Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened
Pinyon-Juniper Grass and Juniper Grass (ERU-PJJUG)	Mexican wolf	<i>Canis lupus baileyi</i>	Endangered, experimental population, non-essential
Pinyon-Juniper Grass and Juniper Grass (ERU-PJJUG)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Madrean Encinal Woodland (ERU-MEW)	Aravaipa sage	<i>Salvia amissa</i>	Species of Conservation Concern
Madrean Encinal Woodland (ERU-MEW)	Arizona hedgehog cactus	<i>Echinocereus triglochidiatus</i> var. <i>arizonicus</i>	Endangered
Madrean Encinal Woodland (ERU-MEW)	Blumer's dock	<i>Rumex orthoneurus</i>	Species of Conservation Concern
Madrean Encinal Woodland (ERU-MEW)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Madrean Encinal Woodland (ERU-MEW)	Ocelot	<i>Leopardus pardalis</i>	Endangered
Madrean Encinal Woodland (ERU-MEW)	Toumey groundsel	<i>Packera neomexicana</i> var. <i>toumeyi</i>	Species of Conservation Concern
Madrean Encinal Woodland (ERU-MEW)	Yellow-eyed junco	<i>Junco phaeonotus</i>	Species of Conservation Concern
Pinyon-Juniper Evergreen Shrub (ERU-PJC)	Aravaipa sage	<i>Salvia amissa</i>	Species of Conservation Concern

<b>Ecological Response Unit</b>	<b>Common Name</b>	<b>Scientific name</b>	<b>At-risk species status</b>
Pinyon-Juniper Evergreen Shrub (ERU-PJC)	Fish Creek rock daisy	<i>Perityle saxicola</i>	Species of Conservation Concern
Pinyon-Juniper Evergreen Shrub (ERU-PJC)	Hodgson's fleabane	<i>Erigeron hodgsoniae</i>	Species of Conservation Concern
Pinyon-Juniper Evergreen Shrub (ERU-PJC)	Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened
Pinyon-Juniper Evergreen Shrub (ERU-PJC)	Mexican wolf	<i>Canus lupus baileyi</i>	Endangered, experimental population, non-essential
Pinyon-Juniper Evergreen Shrub (ERU-PJC)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Pinyon-Juniper Evergreen Shrub (ERU-PJC)	Pinaleno Mountain rubberweed	<i>Hymenoxys ambigens</i> var. <i>ambigens</i>	Species of Conservation Concern
Pinyon-Juniper Evergreen Shrub (ERU-PJC)	Pringle's fleabane	<i>Erigeron pringlei</i>	Species of Conservation Concern
Pinyon-Juniper Evergreen Shrub (ERU-PJC)	Richinbar talussnail	<i>Sonorella ashmuni</i>	Species of Conservation Concern
Pinyon-Juniper Evergreen Shrub (ERU-PJC)	Sierra Ancha fleabane	<i>Erigeron anchana</i>	Species of Conservation Concern
Pinyon-Juniper Evergreen Shrub (ERU-PJC)	Toumey groundsel	<i>Packera neomexicana</i> var. <i>toumeyi</i>	Species of Conservation Concern
Pinyon-Juniper Grass and Juniper Grass (ERU-PJJUG)	Gila rock daisy	<i>Perityle gilensis</i> var. <i>gilensis</i>	Species of Conservation Concern
Pinyon-Juniper Grass and Juniper Grass (ERU-PJJUG)	Grand Canyon century plant	<i>Agave phillipsiana</i>	Species of Conservation Concern
Pinyon-Juniper Grass and Juniper Grass (ERU-PJJUG)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Pinyon-Juniper Grass and Juniper Grass (ERU-PJJUG)	Pringle's fleabane	<i>Erigeron pringlei</i>	Species of Conservation Concern
Pinyon-Juniper Grass and Juniper Grass (ERU-PJJUG)	Salt River rock daisy	<i>Perityle gilensis</i> var. <i>salensis</i>	Species of Conservation Concern
Pinyon-Juniper Grass and Juniper Grass (ERU-PJJUG)	Tonto Basin agave	<i>Agave delamateri</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Ancha Mountainsnail	<i>Oreohelix anchana</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Arizona bugbane	<i>Cimicifuga arizonica</i> (syn. <i>Actaea arizonica</i> )	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Blumer's dock	<i>Rumex orthoneurus</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Flagstaff Beardtongue	<i>Penstemon nudiflorus</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Gila rock daisy	<i>Perityle gilensis</i> var. <i>gilensis</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Hodgson's fleabane	<i>Erigeron hodgsoniae</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	James' rubberweed	<i>Hymenoxys jamesii</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Metcalfe's tick-trefoil	<i>Desmodium metcalfei</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Mexican wolf	<i>Canus lupus baileyi</i>	Endangered, experimental population, non-essential



<b>Ecological Response Unit</b>	<b>Common Name</b>	<b>Scientific name</b>	<b>At-risk species status</b>
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Milk Ranch Talussnail	<i>Sonorella micromphala</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Mt. Dellenbaugh sandwort	<i>Eremogone aberrans</i> syn. <i>Arenarwia aberrans</i> )	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Pringle's fleabane	<i>Erigeron pringlei</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Richinbar talussnail	<i>Sonorella ashmuni</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Senator mine alumroot	<i>Heuchera eastwoodiae</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Sierra Ancha fleabane	<i>Erigeron anchana</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Sierra Ancha talussnail	<i>Sonorella anchana</i>	Species of Conservation Concern
Ponderosa Pine-Evergreen Oak (ERU-PPE)	Toumey groundsel	<i>Packera neomexicana</i> var. <i>toumeyi</i>	Species of Conservation Concern
Ponderosa Pine Forest (ERU-PPF)	Blumer's dock	<i>Rumex orthoneurus</i>	Species of Conservation Concern
Ponderosa Pine Forest (ERU-PPF)	Broadleaf lupine	<i>Lupinus latifolius</i> ssp. <i>Leucanthus</i>	Species of Conservation Concern
Ponderosa Pine Forest (ERU-PPF)	Flagstaff Beardtongue	<i>Penstemon nudiflorus</i>	Species of Conservation Concern
Ponderosa Pine Forest (ERU-PPF)	Metcalfe's tick-trefoil	<i>Desmodium metcalfei</i>	Species of Conservation Concern
Ponderosa Pine Forest (ERU-PPF)	Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened
Ponderosa Pine Forest (ERU-PPF)	Mexican wolf	<i>Canus lupus baileyi</i>	Endangered, experimental population, non-essential
Ponderosa Pine Forest (ERU-PPF)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Ponderosa Pine Forest (ERU-PPF)	Mt. Dellenbaugh sandwort	<i>Eremogone aberrans</i> syn. <i>Arenarwia aberrans</i> )	Species of Conservation Concern
Ponderosa Pine Forest (ERU-PPF)	Senator mine alumroot	<i>Heuchera eastwoodiae</i>	Species of Conservation Concern
Mixed Conifer-Frequent Fire (ERU-MCD)	Ancha Mountainsnail	<i>Oreohelix anchana</i>	Species of Conservation Concern
Mixed Conifer-Frequent Fire (ERU-MCD)	Arizona bugbane	<i>Cimicifuga arizonica</i> (syn. <i>Actaea arizonica</i> )	Species of Conservation Concern
Mixed Conifer-Frequent Fire (ERU-MCD)	Blumer's dock	<i>Rumex orthoneurus</i>	Species of Conservation Concern
Mixed Conifer-Frequent Fire (ERU-MCD)	Broadleaf lupine	<i>Lupinus latifolius</i> ssp. <i>Leucanthus</i>	Species of Conservation Concern
Mixed Conifer-Frequent Fire (ERU-MCD)	Metcalfe's tick-trefoil	<i>Desmodium metcalfei</i>	Species of Conservation Concern
Mixed Conifer-Frequent Fire (ERU-MCD)	Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened

<b>Ecological Response Unit</b>	<b>Common Name</b>	<b>Scientific name</b>	<b>At-risk species status</b>
Mixed Conifer-Frequent Fire (ERU-MCD)	Mexican wolf	<i>Canus lupus baileyi</i>	Endangered, experimental population, non-essential
Mixed Conifer-Frequent Fire (ERU-MCD)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Mixed Conifer-Frequent Fire (ERU-MCD)	Senator mine alumroot	<i>Heuchera eastwoodiae</i>	Species of Conservation Concern
Mixed Conifer-Frequent Fire (ERU-MCD)	Yellow-eyed junco	<i>Junco phaeonotus</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	A caddisfly	<i>Wormaldia planae</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	A mayfly	<i>Fallceon eatoni</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	American dipper	<i>Cinclus mexicanus</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Aravaipa sage	<i>Salvia amissa</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Arizona bugbane	<i>Cimicifuga arizonica</i> (syn. <i>Actaea arizonica</i> )	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Arizona giant sedge (syn. Cochise sedge)	<i>Carex ultra</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Arizona hedgehog cactus	<i>Echinocereus triglochidiatus</i> var. <i>arizonicus</i>	Endangered
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Blumer's dock	<i>Rumex orthoneurus</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Broadleaf lupine	<i>Lupinus latifolius</i> ssp. <i>Leucanthus</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Chihuahuan sedge	<i>Carex chihuahuensis</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Chiricahua leopard frog	<i>Lithobates chiricahuensis</i>	Threatened
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Colorado pikeminnow	<i>Ptychocheilus lucius</i>	Endangered, experimental population, non-essential
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Davidson sage	<i>Salvia davidsonii</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Desert pupfish	<i>Cyprinodon macularius</i>	Endangered
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Fish Creek fleabane	<i>Erigeron piscaticus</i>	Species of Conservation Concern

<b>Ecological Response Unit</b>	<b>Common Name</b>	<b>Scientific name</b>	<b>At-risk species status</b>
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Fossil springsnail	<i>Pyrgulopsis simplex</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Gila chub	<i>Gila intermedia</i>	Endangered
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Gila rock daisy	<i>Perityle gilensis</i> var. <i>gilensis</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Gila topminnow	<i>Poeciliopsis occidentalis occidentalis</i>	Endangered
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Gila trout	<i>Oncorhynchus gilae</i>	Threatened
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Hodgson's fleabane	<i>Erigeron hodgsoniae</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Hohokam agave	<i>Agave murpheyi</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	James' rubberweed	<i>Hymenoxys jamesii</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Loach minnow	<i>Tiaroga cobitis</i>	Endangered
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Lowland leopard frog	<i>Lithobates yavapaiensis</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Mapleleaf false snapdragon	<i>Mabrya acerifolia</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Marsh rosemary	<i>Limonium limbatum</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Mexican wolf	<i>Canus lupus baileyi</i>	Endangered, experimental population, non-essential
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Monarch butterfly	<i>Danaus plexippus</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Narrow-headed gartersnake	<i>Thamnophis rufipunctatus</i>	Threatened
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Net-winged midge	<i>Agathon arizonicus</i>	Species of Conservation Concern

<b>Ecological Response Unit</b>	<b>Common Name</b>	<b>Scientific name</b>	<b>At-risk species status</b>
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Northern Mexican gartersnake	<i>Thamnophis eques megalops</i>	Threatened
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Pacific wren	<i>Troglodytes pacificus</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Razorback sucker	<i>Xyrauuchen texanus</i>	Endangered
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Roundtail chub	<i>Gila robusta</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Salt River rock daisy	<i>Perityle gilensis</i> var. <i>salensis</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Senator mine alumroot	<i>Heuchera eastwoodiae</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Sierra Ancha fleabane	<i>Erigeron anchana</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Sonoran maiden fern	<i>Thelypteris puberula</i> var. <i>sonorensis</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	Endangered
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Spikedace	<i>Meda fulgida</i>	Endangered
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Verde Rim springsnail	<i>Pyrgulopsis glandulosa</i>	Species of Conservation Concern
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	Threatened
Riparian Areas, Seeps, Springs, Wetlands, and Riparian Management Zones (RMZ)	Yuma Ridgeway's rail	<i>Rallus obsoletus yumanensis</i>	Endangered
Watersheds and Water Resources (WAT)	A caddisfly	<i>Wormaldia plana</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	A mayfly	<i>Fallceon eatoni</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	American dipper	<i>Cinclus mexicanus</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	Aravaipa sage	<i>Salvia amissa</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	Arizona bugbane	<i>Cimicifuga arizonica</i> (syn. <i>Actaea arizonica</i> )	Species of Conservation Concern
Watersheds and Water Resources (WAT)	Arizona hedgehog cactus	<i>Echinocereus triglochidiatus</i> var. <i>arizonicus</i>	Endangered

<b>Ecological Response Unit</b>	<b>Common Name</b>	<b>Scientific name</b>	<b>At-risk species status</b>
Watersheds and Water Resources (WAT)	Blumer's dock	<i>Rumex orthoneurus</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	Broadleaf lupine	<i>Lupinus latifolius ssp. Leucanthus</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	Chiricahua leopard frog	<i>Lithobates chiricahuensis</i>	Threatened
Watersheds and Water Resources (WAT)	Colorado pikeminnow	<i>Ptychocheilus lucius</i>	Endangered, experimental population, non-essential
Watersheds and Water Resources (WAT)	Desert pupfish	<i>Cyprindon macularius</i>	Endangered
Watersheds and Water Resources (WAT)	Fish Creek fleabane	<i>Erigeron piscaticus</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	Fossil springsnail	<i>Pyrgulopsis simplex</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	Gila chub	<i>Gila intermedia</i>	Endangered
Watersheds and Water Resources (WAT)	Gila topminnow	<i>Poeciliopsis occidentalis occidentalis</i>	Endangered
Watersheds and Water Resources (WAT)	Gila trout	<i>Oncorhynchus gilae</i>	Threatened
Watersheds and Water Resources (WAT)	James' rubberweed	<i>Hymenoxys jamesii</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	Loach minnow	<i>Tiaroga cobitis</i>	Endangered
Watersheds and Water Resources (WAT)	Lowland leopard frog	<i>Lithobates yavapaiensis</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	Narrow-headed gartersnake	<i>Thamnophis rufipunctatus</i>	Threatened
Watersheds and Water Resources (WAT)	Net-winged midge	<i>Agathon arizonicus</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	Northern Mexican gartersnake	<i>Thamnophis eques megalops</i>	Threatened
Watersheds and Water Resources (WAT)	Razorback sucker	<i>Xyrauchen texanus</i>	Endangered
Watersheds and Water Resources (WAT)	Roundtail chub	<i>Gila robusta</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	Sierra Ancha fleabane	<i>Erigeron anchana</i>	Species of Conservation Concern
Watersheds and Water Resources (WAT)	Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	Endangered
Watersheds and Water Resources (WAT)	Spikedace	<i>Meda fulgida</i>	Endangered