United States Department of Agriculture

Draft Revised Forest Plan Gila National Forest

Catron, Grant, Hidalgo, and Sierra Counties, New Mexico

Forest Service Southwestern Region December 2019 MB-R3-06-11

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Draft Revised Forest Plan for the Gila National Forest

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Commonly Used Acronyms

BLM	Bureau of Land Management
BMP	best management practice
CCF	hundred cubic feet
CCVA	Climate Change Vulnerability Assessment
CDNST	Continental Divide National Scenic Trail
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFRP	Collaborative Forest Restoration Program
CWPP	Community Wildfire Protection Plan
DEIS	draft environmental impact statement
EIS	environmental impact statement
EO	Executive Order
EPA	Environmental Protection Agency
ERU	ecological response unit
FIA	Forest Inventory and Analysis
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	geographical information system
GNF	Gila National Forest
HUC	Hydrologic Unit Code
IRA	inventoried roadless area
ML	maintenance level
MMCF	million cubic feet
MOU	memorandum of understanding
MVUM	motor vehicle use map
n.d.	no date
NEPA	National Environmental Policy Act
NF	National Forest
NFMA	National Forest Management Act
NFS	National Forest System
NHD	National Hydrography Dataset
NM	New Mexico
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
OHV	off-highway vehicle
ONRW	outstanding national resource water
PFC	proper functioning condition
PM	particulate matter
RMZ	riparian management zone
RNA	research natural area
SCC	species of conservation concern
SMS	Scenic Management System
TEU	terrestrial ecological unit
TEUI	terrestrial ecological unit inventory
U.S.C.	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	U.S. Geological Survey
WSA	wilderness study area
WUI	wildland-urban interface

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Chapter 1 – Introduction

Purpose of this Document

This document is the draft of a revised land management plan, or forest plan, for the Gila National Forest (Gila). Forest plans establish a vision for management, as well as management requirements for resources and activities, and provide guidance for planning of projects and activities.

An interdisciplinary team of Gila staff compiled this draft forest plan using stakeholder input and earlier feedback on the preliminary draft plan. By presenting this document, Gila staff invite stakeholder feedback and hope to promote dialogue between Gila specialists; decision-makers; and stakeholders, including other Federal agencies, State and local governments, tribes, non-governmental organizations, and individual citizens. From this dialogue, Gila staff will gather information to improve on this draft plan. Gila staff also intend for this dialogue to promote understanding and strengthen relationships. Feedback received on this draft forest plan will be used as Gila staff revise and finalize the forest plan.

Forest Plans and the 2012 Planning Rule

A forest plan is the principal document that guides decisions about national forest land and resource management. Forest plans, which are intended to be applicable for 15 years, are required by the National Forest Management Act of 1976. The current Gila Forest Plan was approved in 1986. Since then, the forest plan has been amended 11 times to reflect changes in social, economic and ecological conditions. The 1986 Gila Forest Plan was written following guidance in the 1982 planning rule and related National Forest Service directives. Gila staff are revising the 1986 Gila Forest Plan using the provisions of the 2012 Planning Rule, as outlined in 36 Code of Federal Regulations - Part 219 and the accompanying Planning Rule Final Directives, which are composed of the Planning Manual (FSM 1920) and the Planning Handbook (FSH 1909.12, Chapters 10-90).

The 2012 Planning Rule differs from the 1982 planning rule by creating an adaptive framework to allow the Forest Service to better meet current and future needs, taking into account new understanding of science, land management, and a cross-jurisdictional collaborative approach for managing resources. It focuses more on outcomes and helps identify national forests' roles in the broader landscape. It aims to help create proactive land management plans that guide national forest contributions to ecological, social and economic sustainability. It emphasizes collaboration, improves transparency and strengthens public involvement and dialogue throughout the planning process. It also maintains the longstanding requirement to use the best available scientific information in decision-making.

Collaboration and Public Involvement

Gila staff hosted six formal rounds of public engagement around plan revision:

1. The first round (in winter 2015) introduced forest plan revision concepts; identified expectations, opportunities and methods for communication and engagement; and built or enhanced relationships between the Gila staff and Gila stakeholders.
2. The second round (in summer 2015) provided opportunities for stakeholders to share knowledge, plans, and data for the assessment.

3. The third round (in fall 2016) involved assessing key findings, identifying current plan needs-for-change, and continuing the dialogue between Gila staff and nearby residents, users, and interested individuals.
4. The fourth round (in spring 2017) helped create a shared understanding of desired conditions on the Gila and other plan components, while providing an opportunity to learn about and contribute input on the next steps in the forest plan revision process.
5. The fifth round (spring 2018) provided an opportunity for stakeholders to give feedback on the preliminary draft plan.
6. At the sixth round (in fall 2018) stakeholders discussed how significant issues (or issues that are important to the community) are reflected in the preliminary range of alternatives, with an opportunity to provide feedback and additional suggestions.

Seven extended technical meetings were held in 2017 and 2018, to allow more in-depth discussion by interested local governments, State and Federal agencies, non-governmental organizations, and the public on stakeholder-suggested topics. These technical meeting topics included multiple uses, riparian/watershed, designated areas, sustainable infrastructure, local economies, monitoring, and vegetation management tools. In addition, Gila staff, in cooperation with partner agencies and organizations, held a workshop in August 2017, to discuss the science supporting desired conditions, management activities, opportunities, and challenges for frequent-fire forest ecosystems.

Stakeholder engagement will continue throughout the release of the draft plan and draft environmental impact statement.

A Description of the Gila National Forest

Located in southwestern New Mexico, the Gila National Forest covers about 3.3 million acres of forested hills, majestic mountains and rangeland. One of five national forests in New Mexico, the Gila includes the former Apache National Forest lands east of the Arizona-New Mexico state line. In 1974, the administration and management of the Apache National Forest was divided between the Sitgreaves National Forest (now the Apache-Sitgreaves National Forests) and the Gila National Forest at the state-line to reduce the complexities of managing under laws and regulations of two different states and to reduce administrative costs. The Gila National Forest is divided into six ranger districts: Quemado, Reserve, Glenwood, Silver City, Wilderness, and Black Range. These ranger districts are located within portions of Catron, Grant, Hidalgo, and Sierra Counties (see figure 1).

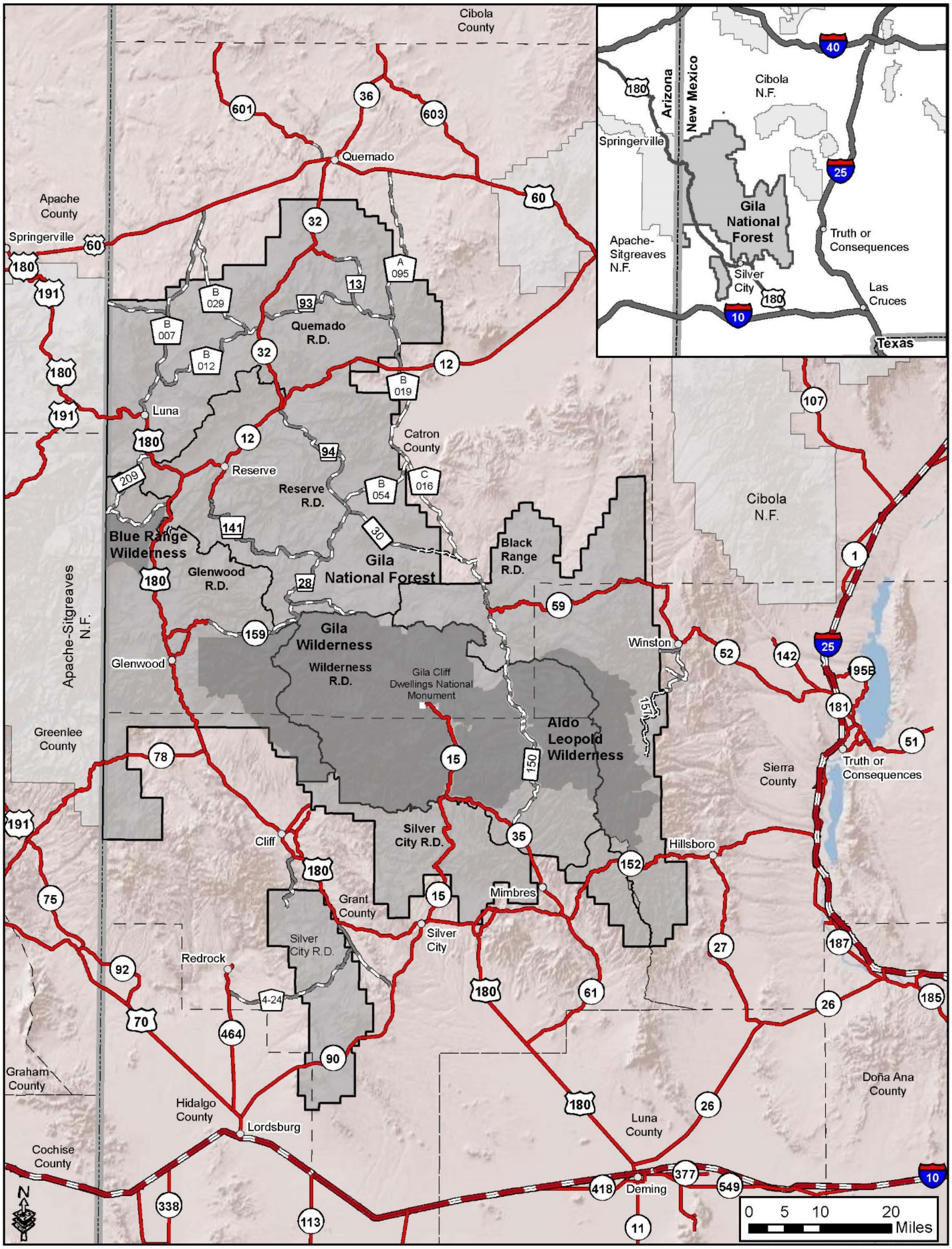

Figure 1. Location of the Gila National Forest

The Vision

People who care about the Gila have invested a lot of time and effort working with current leadership and staff to build this land management plan. Through this engagement, the forest supervisor has developed a vision for the path forward. This vision is to:

Connect individuals and communities to a healthy functioning landscape by recognizing and providing the opportunities for traditional uses and recreational experiences that stakeholders desire, and that the Gila National Forest is uniquely positioned to provide.

This unique position is described under the distinctive roles and contributions section that follows. This is the Gila's "niche." The intent of describing the vision here is two-fold. The first purpose is to change how leadership and staff use the forest plan. In the past, it has been used as a checklist to see whether a particular proposed action can be taken. In the future, the plan should drive what actions are proposed and implemented. The second purpose is that when it is time to "pass the baton," future leadership is empowered with an understanding of local issues, relationships, and working agreements so that they can stay true to the vision.

Staying true to the vision does not mean things will not change or are inflexible. Things always change and the plan has the flexibility within it to adapt to change. Urgent situations will arise and demand attention, opportunities that do not necessarily align with the niche will present themselves, and a change of tactics may be necessary to achieve desired conditions. Staying true to the vision means strategic continuity. It means honoring people and places, history, and hope for the future, all of which have deep roots in this forest plan and help define the Gila's niche.

The plan revision process has brought new energy and possibilities for strengthening existing and forging new productive relationships. In order to continue to grow relationships and build trust, the plan revision model for public engagement and collaboration needs to continue.

Distinctive Roles and Contributions

The Gila National Forest has a distinctive history and set of landscape characteristics that frame its roles to the local area, State, region and Nation. Landscape, geologic, climatic and ecological transition zones contribute to a high diversity of plant and animal life, which in turn provide for historic, current and future diversity of ecosystem services and multiple uses. Ecosystem services are the benefits people receive from the land. The Gila's distinctive roles and contributions can be described as part of three themes: traditional uses, undeveloped recreation, and restoration. The following subsections describe each theme and expand on the vision.

Traditional Uses

The most distinct characteristic of southwestern New Mexico is its diversity of people, culture, traditions, and values. The Gila has a rich cultural history, with archaeological resources reflecting more than 12,000 years of human presence, including some of the best preserved Mogollon and Mimbres sites in existence. The heritage, culture, traditions, and values that grew from this time period were handed down over generations and still exist today where Native American, Hispanic, Anglo-American, and other cultures have combined to make New Mexico a multicultural center. The Mogollon and Apache tribes, as well as Spaniards, Mexicans, soldiers, ranchers, mountain men, prospectors and miners, all contribute to the story of the Gila; and many individuals such as Mangas Coloradas, Geronimo, Aldo Leopold, and Ben Lilly left their mark in the Gila.

Catron, Grant, Hidalgo, and Sierra Counties are now home to more than 50,000 people, many of whom rely on the forest to varying degrees as a source of sustenance. Central to this sustenance are fuelwood and timber harvest, livestock grazing, and hunting.

Fuelwood Harvest has been an important use of the forest for centuries, and continues to be culturally significant to local and traditional communities. Firewood remains the sole source of heat for many homes, in part because it is more economical than propane, natural gas, and electricity. Gathering firewood is a cultural tradition, which is often a family event.

Gila National Forest managers envision a future in which they advance fuelwood harvest as a culturally and economically important use of the forest by opening new areas specifically for fuelwood collection, providing gathering opportunities as restoration activities generate fuelwood products, and leveraging opportunities to contribute to industry innovations by using commercial fuelwood harvest as a restoration tool.

Timber Harvest, similar to fuelwood harvest, has been an economically and culturally important traditional use for a long time. It is also a restoration tool that can help return the natural role of fire to the landscape. As of the date of this plan, there are two mills on the north end of the forest (Reserve and Luna, NM), with a couple of smaller, more mobile operators on the south end of the forest. Because of the economics of haul distances, including weight limits on county roads, low-value product, market conditions, and the large expanse of the national forest, there will always be challenges. However, they will not be insurmountable if there is collaboration and cooperation between Gila managers, State Forestry, and local governments.

Gila National Forest managers envision a future in which local operators thrive, industry innovation is enhanced, new markets emerge, and sustainable timber harvest contributes to rural prosperity and ecological restoration. Leadership advances this vision through partnerships and strategic placement of treatments that include timber sales.

Livestock Grazing is an economically and culturally traditional use valued by local communities and has been for generations. Like timber harvest, livestock grazing has its fair share of challenges, because forage and water availability change with environmental conditions. Adaptive management is the cornerstone of sustainable livestock grazing, providing managers with the flexibility and information needed to respond to changing conditions. Successful adaptive management hinges on good relationships, communication, and monitoring.

Gila National Forest managers envision a future in which livestock grazing is sustained as a culturally and economically important use of the national forest, forage is plentiful, and producers are prosperous. Leadership advances this vision by (1) restoring productive rangelands; (2) encouraging collaborative monitoring to support adaptive management; and (3) strategically selecting vacant allotments to serve as forage reserves, or swing allotments that provide flexibility to support current permittees during times of drought and other environmental disturbances.

Hunting is an important activity for the people of New Mexico. Many people in rural areas and small towns in southwestern New Mexico continue this traditional practice, which provides food, bonding opportunities between parents and children, and can be used to teach children about nature and natural lands. Hunting has also emerged as a popular recreational activity that can involve larger groups, off-highway vehicles, and hunting camps. The Gila is known for its high-quality hunts, especially elk, which attract hunters from all over the country. Many hunters return annually. The popularity of hunting has given rise to a community of commercial outfitters and guides that contribute to local and state economies.

Gila National Forest managers envision a future in which hunting is sustained as a culturally and economically important use of the forest and enhanced by collaborative restoration of high-quality, connected habitat.

Undeveloped Recreation

The Gila National Forest offers a variety of opportunities to connect with nature, rejuvenate, and escape from urban environments and lifestyles. Recreation contributes greatly to the physical, mental, and spiritual health of individuals, and bonds family and friends. Outdoor recreation in the forest also contributes to tourism and the economies of the local communities.

Because of its size, remoteness, light visitation, and the relatively sparse population of surrounding areas, the Gila NF provides for an unusually rustic recreation experience with ample opportunities for solitude and a range of recreation opportunities, including access via roads and trails to vast expanses of backcountry. With vast undeveloped areas extending across the mountains and volcanic calderas, the Gila provides high-quality backcountry opportunities including hiking, driving for pleasure, off-highway vehicle use, camping, horseback riding, hunting, fishing, and wildlife viewing. Magnificent mountain scenery, cool summer temperatures, and relatively warm winters permit a wide range of recreational opportunities year-round.

The Gila is home to the country’s first designated wilderness area, which was first envisioned and championed by conservationist Aldo Leopold, and now the forest is known for large, mostly contiguous wilderness areas. In addition, the Gila offers visitors the chance to view and admire the natural night sky without light pollution. One area, the Cosmic Campground, is the first International Dark Sky Sanctuary located on National Forest System lands and is the prime example of an opportunity that does not necessarily align with the backcountry, undeveloped recreation niche the Gila occupies. While similar developed recreation opportunities may arise in the future, they should not detract from the undeveloped focus, which is the trail system. This focus arose from an outpouring of public comment during plan revision. The national forest has more miles of trails than managers can maintain, and recent large wildfires have increased the frequency of required maintenance on many trail miles.

Gila National Forest managers envision a sustainable trail system that provides access and facilitates high-quality backcountry experiences. Leadership advances this vision through supporting a year-round trail crew, involving the public in sustainable recreation planning, and leveraging partnerships and volunteers to help with trail maintenance.

Restoration

The Gila NF provides habitat for many wildlife, fish, and plant species, several of which are valued as food, for medicinal properties, or as a draw for outdoor enthusiasts. Some species are rare or endemic. Compared to other national forests in the region, the Gila NF has one of the highest diversity of species, and some of the strongest remaining populations of rare species. Gila NF personnel have been engaged in efforts with partners to restore habitat to maintain species diversity and improve wildlife, fish, and plant resources. One example is the iconic Gila trout; extensive restoration work has been done on the forest to restore this species to its historic range, providing a unique opportunity to catch this fish.

As one of the first national forests where fire was used as a forest management tool for ecological benefits, the Gila National Forest is known as a place of fire management innovation and leadership.

Providing first for human health and safety, wildland fire has increasingly been allowed to function in its natural ecological role, burning with a range of intensity, severity, and frequency that helps ecosystems and watersheds to function in a healthy and sustainable manner. Although other restoration methods support the traditional uses of the national forest and are an important part of the vision for the future, fire has been and will remain the primary restoration tool. This is due to both economics and ecology.

The Gila does not compete well for funding for more expensive mechanical treatments, because of its remoteness and the area's low population density. The funding necessary to mechanically treat large acreages tends to go to national forests close to urban areas and the designated municipal watersheds those large population centers depend on. From an ecological standpoint, fire is the primary restoration tool because the Gila landscape evolved with frequent fire. It is a natural ecological process that helped shaped the national forest's plant and animal communities, watersheds, and hydrology before the fire suppression era began. But now, because the lack of fire on the landscape has contributed to higher tree densities, restoration with fire is like surgery with a chainsaw, trade-offs abound, and it is all about water.

Other Factors Relevant to the Niche

Access

Access to the Gila National Forest for the multitude of activities and uses is the greatest common thread tying together all aspects of the Gila's niche. One outcome of the public engagement is the knowledge that because access to the national forest is a fundamental need for all forest uses, whether by road for collecting firewood or by trail to attain solitude deep in the Aldo Leopold wilderness, it is perhaps the foremost concern of national forest management in most peoples' minds.

The Gila's transportation system is integral to allowing Forest Service personnel to access the national forest to perform resource management activities and supporting the many uses and opportunities the public enjoys. Gaining access to the Gila through roads is important for local residents to continue their traditional uses, which are integral in maintaining the social and cultural fabric of many Gila National Forest communities.

Forest visitors engaging in hiking, backpacking, mountain biking, horseback riding and packing, make use of the Gila's extensive single-track developed trail system. Many of these backcountry trips are multi-day in duration and involve the use of both pack and saddle stock. Day-use equestrians are more likely to use Gila trails adjacent to local communities.

Assessment Summary

The Gila's 2017 final assessment report provided information about ecological, social, and economic conditions, trends, and risks to sustainability. Following are the main points of the assessment report:

- **Ecological resilience and sustainability.** Past and current management actions, inactions, and a changing climate have contributed to ecosystem and watershed departure from what is known about the historic range of variability. For example, past fire suppression and historic overgrazing contributed to altered fire regimes and other ecological processes. Legacy issues associated with past management remain evident in many places. These issues include woody vegetation encroachment into grasslands, infill of forest and woodland openings, increased tree densities within forest and woodland patches, altered distributions of vegetation structural states and species composition, and impaired soil conditions. While current management has generally improved conditions across most of the forest, some ecosystems or ecosystem characteristics remain departed from the historic range of variability, and others continue to move away from that range of variability.

- **Social, economic and cultural resilience and sustainability.** The Gila NF is a relatively remote forest surrounded by many small towns, communities, and people who rely upon the forest to provide resources and uses important to their social and cultural traditions, way of life, and economic well-being. Risks to ecological sustainability pose real and direct threats to social, cultural and economic sustainability. The ability of the Gila NF to contribute sustainably to the social and economic welfare of local communities will be largely dependent on the success of Forest management's adaptation approaches to future climate, and the capacity and capability of its future landscape. The downward trends in budget and staffing levels continue to limit management's ability to keep up with the demand for forest resources and uses and represents a significant threat to forest management's ability to implement ecological restoration and adaptation in a timely manner.

Needs for Change Summary

The final assessment report also served as the basis for identification of 54 individual needs for change in management direction (found in the final Need for Change document), upon which this draft plan is based. A "need for change" describes a strategic change to the current (1986) forest plan necessary to address issues identified in the assessment report. Following is a summary of the needs for change statements addressing risks to sustainability.

Plan-Wide Changes

The ability of the Gila NF to continue providing desired social and economic benefits associated with recreation and tourism, ranching, hunting, timber, and other natural resources is affected by changing social, economic, and environmental conditions. The successful implementation of this forest plan requires good working relationships between the Gila NF and all stakeholders. The forest has not always capitalized on partners who are willing to help, and struggles to reach all stakeholders, which challenges relationships. The current forest plan imposes internal management boundaries, often with different management direction, which artificially fragments the landscape within the national forest boundary and creates unnecessary complexities. Many advances in scientific understanding, methods, and technology have occurred since 1986. The monitoring plan has not been amended for years, and it is out of date with current science and trends in resources. To address these issues, there is a need to:

- Develop a desired condition to recognize and improve the forest's role in contributing to local economies through recreation and tourism, timber and forest products, livestock grazing, and other multiple-use related activities and products, while balancing these uses with available resource capacity and emerging opportunities.
- Use collaboration with stakeholders, partnerships and volunteer opportunities as a management option to strengthen relationships and to promote movement toward desired conditions.
- Strategically leverage and streamline processes for engaging partners and volunteers during project implementation and monitoring.
- Emphasize public education about the Gila NF's diverse ecological, social, and economic resources, the multiple-use sustained yield philosophy, public laws and regulations, shared use ethics, and management strategies.
- Connect people—particularly youth and underserved populations—with public lands and nature.

- Reevaluate the number, arrangement, and boundaries related to current forest plan management areas.
- Encourage working with neighboring land managers to implement projects at a scale that improves landscape-scale connectivity across mixed ownerships where natural systems span multiple administrative boundaries.
- Develop a monitoring program that collects relevant data, tracks progress toward desired conditions, distributes information consistently, allows for a responsive adaptive management program with available resources, and uses updated terminology and methodologies.

Ecological Changes

Past fire suppression, historic overgrazing, and other activities have disrupted many natural processes, such as wildfire and natural vegetation succession. In the meantime, factors such as climate change, drought, and large extents of high-severity fire have made upland vegetation more vulnerable to insects, diseases, and non-native species, and have impacted soils, watersheds, riparian ecosystems and aquatic habitat. Restoring historic vegetation conditions can increase environmental resiliency, but restoring natural ecological processes such as fire is key to sustainability. Restored, resilient, and connected habitats are also necessary to maintain species diversity across the Gila NF. Fire is an important tool, but it is not the only tool available to facilitate restoration. Mechanical and manual vegetation treatments, along with managed fire, are expected to occur more often and over larger areas. These types of treatments have sometimes produced increases in shade-intolerant, re-sprouting native species such as alligator juniper. While there are not currently extensive issues with invasive species, in the future, such species may compound the challenges in effectively restoring ecosystem resiliency. To address these issues, there is a need to:

- Promote ecological restoration and resilience.
- Promote the restoration and maintenance of native herbaceous vegetation, and limit woody species encroachment/infill and non-native invasive plant establishment.
- Increase flexibility for restoring and maintaining fire as an ecological process, while addressing firefighter and public safety and health concerns.
- Recognize fire's natural role and its use as a management tool to help reduce fuel accumulations, reduce the risk of future undesirable fires, improve wildlife habitat and range conditions, and improve watershed and overall forest health.
- Address vegetation structure in within the wildland-urban interface
- Restore, maintain and sustainably manage watershed condition.
- Develop adaptive management approaches for water-dependent resources and multiple-uses.
- Inventory, restore, maintain, and sustainably manage riparian areas, including those associated with springs, seeps, and wetlands.
- Allow for managing toward terrestrial, riparian and aquatic habitat and population connectivity for terrestrial and aquatic species' movement across the landscape, while allowing for the restoration of the range of native species.
- Support ecological conditions that contribute to the conservation and recovery of federally recognized species, as well as maintain viable populations of species of conservation concern and other native species.

- Update plan direction regarding integrated pest management and provide plan direction on the use of pesticides for restoration.
- Address the presence of non-native species by encouraging the removal of existing populations and limiting the introduction and spread of new populations.

Social, Cultural, and Economic Changes

For many years, the lands of the Gila NF have provided economic, social, and religious value to Native Americans, Hispanics, and Anglo-American communities. Continued use of and access to the forest play a large role in continuing local culture and tradition. The previously identified risks to ecological integrity and sustainability may impact the forest's ability to contribute to some of the social, cultural and economic benefits desired and enjoyed by people in local communities, surrounding areas and visitors to the area. Woody species encroachment, climate change, drought, and invasive species may reduce rangeland productivity, while fire restoration objectives and the protection of endangered and threatened species can pose range management challenges. Forest restoration and landscape-scale restoration projects can help sustain forest and watershed health, and maintain the ability to sustainably meet local demand for forest products.

The Gila National Forest features a diverse range of recreational opportunities and recreational demands are increasing. Roads and trails across the national forest are important for access and fire management, and facilitate multiple uses, but limited funding has led to an increasing amount of deferred infrastructure maintenance. Historic and cultural sites are not fully inventoried and are vulnerable to natural and human processes such as erosion, wildfire, and recreational use. Designated areas represent identified exceptional areas that have distinct or unique characteristics warranting special designation. The plan revision process includes an inventory and evaluation process for lands and rivers that may be suitable for congressional designation, and other potential administrative designations will be considered. To address these issues, there is a need to:

- Provide management direction for historic and contemporary cultural uses, including economic and noneconomic uses for tribes and for those traditional communities not considered under tribal relations.
- Consider the value and importance of areas that may be identified as part of an important cultural landscape by tribes.
- Update plan direction for livestock management that incorporates increased flexibility and adaptive management to restore and maintain ecological integrity of rangelands.
- Update timber suitability determinations consistent with updated plan desired conditions.
- Address the long-term sustainability, changing trends in demands, and intended use of recreation infrastructure, trails, and facilities.
- Update plan direction for the road maintenance prioritization process and decommissioning of unneeded roads that accounts for budgets/resource needs and constraints, but also involves affected stakeholders.
- Emphasize the importance of scenery and recreation opportunity effects when planning projects.
- Stabilize, preserve, interpret, and protect historic and sensitive cultural properties.
- Manage existing or potential new designated areas to maintain desired character and values unique to each area.

- Encourage the protection of existing public access and the acquisition of new public access opportunities to National Forest System lands.
- Develop plan direction related to Forest Service land adjustments that are not covered by the existing forest plan.
- Include education and communication of policies regarding recreational mining and non-commercial rock and mineral specimen collection activities.

Plan Components, Management/Geographic Areas, Suitability of Lands and Other Content

This draft plan includes “plan components” and “other content” as described in the 2012 Planning Rule. Forest plan components are displayed in gray-shaded text boxes to distinguish them from other sections of the plan. Other plan content (non-plan components) are not displayed in text boxes. Once a plan is finalized and approved, any substantive changes to plan components require a plan amendment, with appropriate analysis and public involvement as required under the National Environmental Policy Act. A change to “other content” may be made using an administrative correction process with public notification. Administrative corrections are used to make changes such as updates to data and maps, monitoring plan, management approaches and relevant background information, and to fix typographical errors. The public is notified of all administrative corrections.

Plan Components

Forest plan components provide a strategic and practical framework for managing the Gila NF, are applicable to the resources and issues of the Gila, reflect the forest’s distinctive roles and contributions, and are inclusive of the needs for change identified at the end of the assessment process. Forest plan components may, but do not need to reiterate existing law, regulation or policy. Forest plan components include desired conditions, goals, objectives, standards, guidelines, and suitability of uses. With the exception of goals, these plan components are all content required by the 2012 Planning Rule. Although not every resource or activity must have every type of plan component, all must have desired conditions. Plan components are described below.

Desired conditions are descriptions of specific social characteristics, economic characteristics, ecological characteristics, or a combination of these characteristics of the forest plan area, or a portion of the forest plan area, toward which management of the land and resources should be directed. They must be described in terms that are specific enough to allow progress toward their achievement to be determined, but they do not include completion dates. They are not commitments or final decisions approving projects or activities; rather, they guide the development of projects and activities. They describe an aspirational picture of the Gila that is within the inherent capacity of the land.

Objectives are concise, measurable, and time-specific statements of a desired rate of progress toward a desired condition or conditions, and should be based on reasonably foreseeable budgets. Objectives are established for the work considered most important to address the needs for change and achieve desired conditions. They also provide a way to measure or evaluate accomplishments. Note: Just because there may not be a plan objective does not mean that management cannot or will not take some action related to that resource, activity, or issue.

Standards are mandatory constraints on project and activity decision-making, established to help achieve or maintain desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements. No deviation from a standard is allowed without a plan amendment. Note: In terms of upland vegetation management, the Gila has placed most standards under the activities they relate to, rather than placing them under each vegetation community type. The intent of this organization is to limit complexity and facilitate ease of use.

Guidelines are also constraints on project and activity decision-making and are established for the same reasons as standards. However, a guideline allows for departure from its terms, so long as the original intent of the guideline is met. Deviation from a guideline must be specified in the decision document with the supporting rationale. When deviation from the guideline does not meet the original intent, a plan amendment is required.

Suitability addresses which specific lands within the forest plan area will be identified as suitable or not suitable for various projects and activities based on legal and technical factors, and the desired conditions applicable to those lands. The suitability of lands need not be identified for every use or activity. Every plan must identify those lands that are suitable and not suitable for timber production. The Gila NF is only doing timber suitability for this plan revision. Suitability is discussed further in Chapter 4 – Suitability and Estimated Vegetation Management Practices.

Goals are optional plan components that 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 and do not include completion dates. Goals are not being used in the draft plan.

Organization of Plan Components

It must be clear to the public, governmental entities, and Forest Service employees where plan components apply. To that end, the forest plan identifies whether plan components apply Forest-wide or to specific management areas, geographic areas, or both, which are further defined below:

Forest-wide plan components apply to all areas of the national forest not included in a management or geographic area. Direction pertaining to forest-wide is detailed in Chapter 2 – Forest-Wide Plan Direction.

Management areas describe how plan components apply to specific parcels of the Gila NF, with locations shown on maps. Management areas are delineated areas with a common set of plan components that differ from forest-wide plan components and are established to meet specific management needs. Management areas are based on *purpose*.

> *Designated areas* such as wilderness are considered a subset of management areas. Designated areas have specific management objectives to maintain their unique characteristics. Official designation of areas are established by statute (statutorily designated areas or often called congressionally designated areas) or by administrative processes (administratively designated areas).

Direction pertaining to management areas is included in Chapter 3: Management Areas.

Geographic areas also describe how plan components apply to specific parcels of a forest, also with locations shown on maps. Geographic areas are delineated areas with a common set of plan components that differ from forest-wide plan components and are established to address the needs of a specific area. Geographic areas are based on *place*. The forest identified no geographic areas in the draft plan.

Other Required Plan Content

In addition to plan components, the 2012 Planning Rule includes other required plan content including a description of the distinctive roles and contributions of the forest plan area, identification of priority watersheds, a plan monitoring program, and proposed and possible actions.

- Distinctive Roles and Contributions of the Gila National Forest – Chapter 1
  Describes the Gila National Forest's distinctive contributions to the local area, region, and nation, and the roles for which the Forest is best suited, considering the Agency's mission and capabilities.
- Priority Watersheds – Chapter 2 in the Watershed section
  Priority watersheds have been identified using the Forest Service national Watershed Condition Framework (WCF) as areas where plan objectives for restoration focus on maintaining or improving watershed condition.
- Monitoring Plan – Chapter 5
  Monitoring includes testing assumptions, tracking changes, and measuring management effectiveness and progress toward achieving or maintaining the plan's desired conditions or objectives.
- Proposed and Possible Management Practices – Appendix B
  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.

Optional Plan Content

Optional plan content includes background information, management approaches, a glossary, and reference lists. Background information can include a description of the resource or resource use, existing conditions, and other contextual information, such as the list of at-risk species associated with each vegetation type. Management approaches help clarify how plan direction may be applied. Mini-glossaries are provided for each section in chapter 2 to eliminate the need to navigate between each section and a main glossary at the end of the document. Other chapters do not have glossaries, as there is less need for technical language. Also for ease of use and a more direct linkage between the plan content and the science that supports it, references are included as endnotes in each section in chapter 2. Other chapters do not have a references section, as there is no cited literature. To differentiate references to footnotes and endnotes in the text, footnotes are symbolized with lowercase letters. Endnotes are symbolized as numbers.

Key Plan Concepts

Forest plans rely on several concepts that are either foundational assumptions or frameworks that are used throughout to describe plan direction. These concepts are described below.

Adaptive management is a system of management practices based on clearly identified intended outcomes and monitoring to determine if management actions are meeting those outcomes. If needed, it facilitates management changes that will best ensure that those outcomes are met or re-evaluated. Adaptive management stems from the recognition that knowledge about natural resource systems is sometimes uncertain, particularly for dynamic issues such as long-term weather patterns and disturbances that are not easily predicted.

At-risk species are a combination of federally recognized threatened, endangered, proposed, and candidate species (1909.12 Chapter 10 sec. 12.51 of Land Management Planning Handbook), and potential species of conservation concern (1909.12 Chapter 10 sec. 12.52 of Land Management Planning Handbook). A listing of species is provided at the end of ecological response units (see below) section, as well as any pertinent sections that they specifically may occupy. Federally recognized species within these lists will be designated by an asterisk (*) after the species name.

Ecological integrity is the quality or condition of an ecosystem when its dominant ecological characteristics occur within the historic range of variation, or other reference condition, and can withstand and recover from most disturbances imposed by natural environmental dynamics or human influence.

Ecological response units are essentially vegetation types based on groupings of terrestrial ecological units with similar potential natural vegetation and historic fire regimes. The Ecological Response Unit framework is used by the U.S. Forest Service Southwestern Region to facilitate landscape scale analysis and planning. See the assessment report for more information about the Ecological Response Unit framework and concepts, and the relationship between terrestrial ecological units and Ecological Response Units (p. 14).

Historic range of variation references past conditions, disturbance regimes (such as windthrow, insect infestations, disease outbreaks, and fire regimes) and other ecological processes that provide important context and guidance relevant to the environments and habitats in which native ecosystems and species evolved.

Integration recognizes and identifies key relationships between various resources and management activities. Forest plan components are integrated to address a variety of ecological and human needs. For example, desired conditions for ponderosa pine incorporate habitat needs for a variety of species, the scenic components that visitors desire, and the forest products that contribute to local economies.

Resilience is the ability of an ecosystem and its components to absorb or recover from disturbance effects through maintenance, restoration, or improvement of its essential structures and functions and redundancy of ecological patterns across the landscape.

Restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. Ecological restoration focuses on reestablishing the composition, structure, pattern, and processes necessary to facilitate terrestrial and aquatic ecosystem sustainability, resilience, and health under current and future conditions.

Sustainability is the ability of a resource to meet the needs of the present generation without compromising the use of that resource by future generations. It embodies the principles and legal mandates of multiple use and sustained yield. Ecological sustainability refers to the capability of ecosystems to maintain ecological integrity. Economic sustainability refers to the capability of society to produce and consume or otherwise benefit from goods and services, including contributions to jobs and market and nonmarket benefits. Social sustainability refers to the capability of society to support the network of relationships, traditions, culture and activities that connect people to the land and to one another, and support vibrant communities. Sustainability it not a stationary target or static condition, rather it is a dynamic target that changes constantly in response to all the drivers and stressors of ecosystems, markets, and communities. Neither are the ecological, socio-economic aspects of sustainability independent from one another. While there may be short-term benefit, there is no socio-economic sustainability outside of what is ecologically sustainable.

Plan Consistency

As required by the National Forest Management Act and the 2012 Planning Rule, all authorized Gila NF projects and activities must be consistent with the Gila Forest Plan. In addition to consistency with plan direction, national forest projects and activities are developed to be consistent with applicable laws, regulations, and policies.

Ensuring Project or Activity Consistency with the Plan—where a proposed project or activity would not be consistent with a plan component, the responsible official has the following options per the 2012 Planning Rule (36 CFR 219.15(c)):

1. To modify the proposed project or activity to make it consistent with the applicable plan components;
2. To reject the proposal or terminate the project or activity;
3. To amend the plan so that the project or activity will be consistent with the plan as amended; or
4. To 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 that project or activity

See Appendix A – Consistency with Plan Components for more details.

Transition in the Implementation of the Forest Plan

The forest plan is used as a direction source for future projects, plans, and assessments. It is not expected that this new direction be used to re-evaluate or change decisions that have been made under the previously existing forest plan. A smooth and gradual transition to the new forest 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.

Plan Implementation

The plan implementation process involves several different stages, described below.

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

An Integrated Approach

This forest plan is not an assemblage of program plans with unique plan components for every resource. Rather, resource plan components are viewed as a whole and are combined to meet requirements for ecological integrity, diversity of plant and animal communities, multiple-use management, ecologically sustainable production of goods and services, and contribution to economic and social sustainability.

To effectively manage to achieve desired conditions of a forest resource, project planners and decision-makers must ensure that they use the entire plan and not just the forest plan components listed for that resource. Effective integrated resource management recognizes the interdependence of ecological, social, cultural, and economic resources.

To ensure that a project is consistent with the plan, its design and implementation should consider its setting, any management areas it overlaps, and guidance for resources or conditions that may be present in the area. It should also consider any potential conflicts with other authorized projects and activities. Project design should be consistent with the direction contained in Chapter 2 – Forest-Wide Plan Direction, except if superseded by more specific direction in Chapter 3 – Designated and Management Area Plan Direction.

Monitoring and Evaluation

Forest 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 used to determine management needs and adjust management strategies. As such, monitoring and evaluation are key elements of plan implementation, as they guide future management under the plan. The monitoring plan contained in Chapter 5 of this document, in conjunction with project-level monitoring, will provide the framework for enabling adaptive management on the Gila NF.

Chapter 1 References

U.S. Department of Agriculture, Forest Service. 2015. Forest Service Handbook 1909.12. USDA Forest Service Headquarters, Washington DC. https://www.fs.usda.gov/detail/planningrule/home/?cid=stelprd3828310.

Chapter 2 – Forest-wide Plan Direction

This chapter lays out desired conditions and the strategies the Gila intends to use to achieve them. Desired conditions define what the Gila NF's resources and opportunities should look like, and what ecosystem services or other benefits they should provide. Strategies consist of objectives, standards and guidelines. They define the actions needed to move toward desired conditions and the sideboards needed to constrain those actions to mitigate unintended and undesirable effects.

Throughout this chapter, plan components that constitute management direction are displayed within gray shaded text boxes. Text outside of gray shaded text boxes is not management direction; it is background material, explanations, or descriptions of management approaches. Explanations of key concepts, glossaries and references are provided at the end of each section.

Plan direction related to ecosystems and watersheds are presented first in this plan because they provide the setting or habitat where multiple uses, projects and activities take place. Desired conditions are integrated and are intended to reflect healthy, sustainable ecosystems, watersheds, and socio-economic systems.

Plan Management Approaches

The following two management approaches span ecological, social, cultural and economic plan content. The first management approach provides context and identifies the principal strategies contained within plan direction, and the gaps that collaborative work with partners could fill, to address the potential challenges of change and uncertainty around future climate. The second provides context and describes how plan direction related to restoration is likely to be implemented.

Management Approach to Change and Uncertainty

Change and uncertainty are not new to land management, or any other aspect of the human experience. While climate has always undergone change over time, there is sizeable body of science that suggests the extent, magnitude, and rate of change now occurring may prove to be unprecedented within the context of the last two million years[1]. By 2090, the climatic factors most important to the identity of the Gila NF's ecosystems (and species assemblages) are projected to be well outside the range of variability that is known to support them[2, 3]. This could mean a profoundly different Gila NF than the one described in the desired conditions statements found throughout this draft plan [2, 3, 4] - regardless of any management action or inaction.

Land management agencies and staff have very little influence over temperature and precipitation patterns, which are the primary factors governing species, species assemblages, and available water. The following map is taken from the Gila NF's Climate Change Vulnerability Assessment, which projects the relative likelihood of a climate-driven vegetation type conversion[5]. An example of a vegetation type conversion is a forested system becoming a shrubland system.

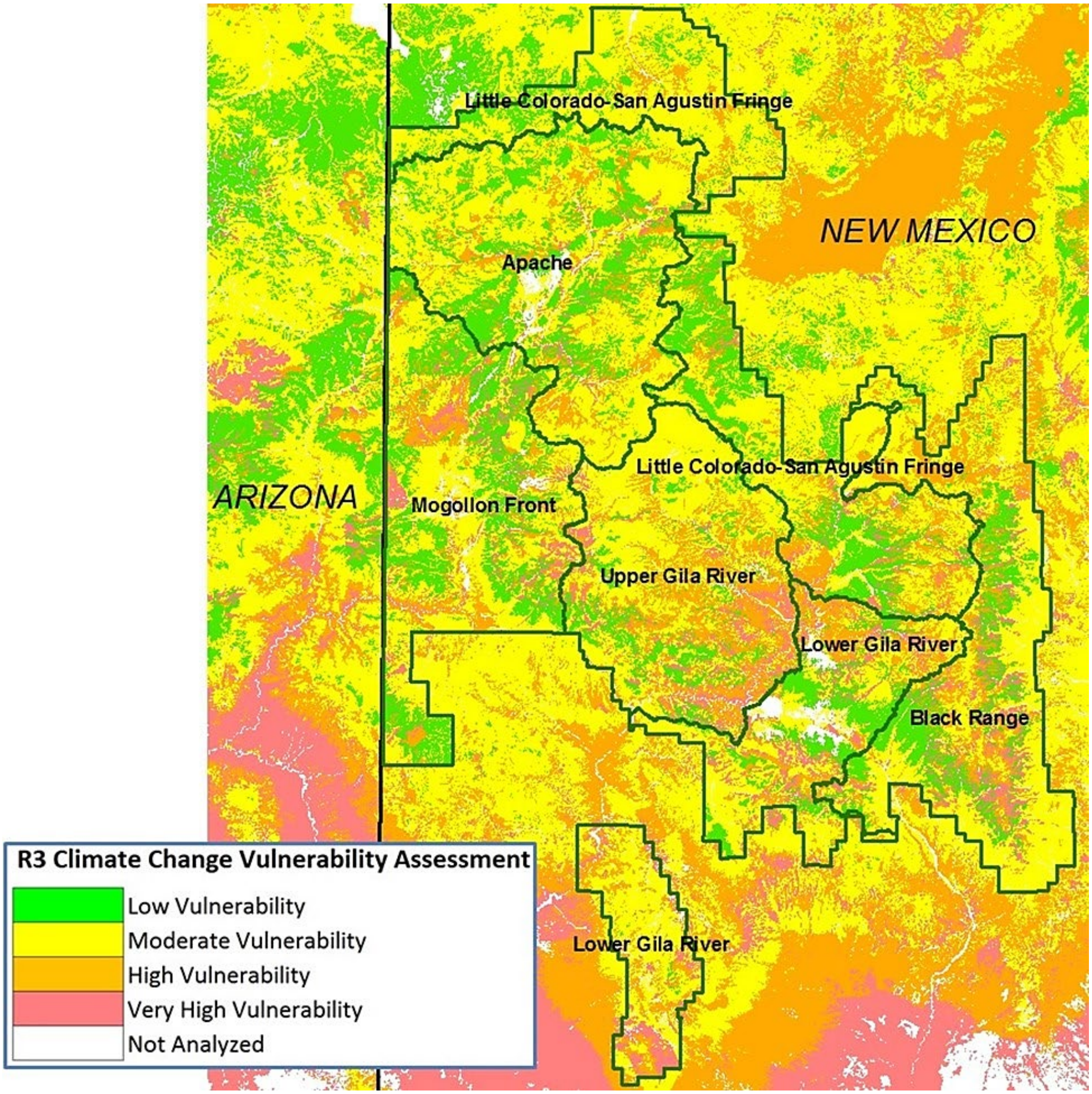

Figure 2. Relative climate change vulnerabilities across the Gila National Forest
Note: the smaller subdivisions within the Gila NF boundary are the local units used in the assessment; more information can be found in that report.

Still, there remains uncertainty[3, 5] as to what the future holds for landscapes, species and species assemblages, the ecosystem services they provide, and thereby, the multiple uses they sustain. Gila NF managers do not view this uncertainty as an excuse to maintain the status quo or to do nothing; management decisions and actions taken within the life of this plan have the potential to influence the trajectory of the landscape and its component species, including humans.

The following subsections outline the Gila NF's approach to addressing vulnerabilities and weather related threats identified by Gila NF staff, stakeholders[6] and the scientific community, as well as mitigation measures. Mitigation measures are those things the Forest can do to reduce or stabilize its greenhouse gas emissions.

Landscape

The landscape approach is defined by four primary elements: (1) heterogeneity; (2) connectivity; (3) process-based watershed restoration; and (4) monitoring. In this context, the word "landscape" is used generally and includes all spatial scales defined in the preceding background and description section.

1. Most financial advisors will tell their clients that diversity distributes risk. Using a similar analogy, landscape scale heterogeneity might be viewed as ecological "insurance", given its links with resilience[7, 8, 9], biodiversity conservation [10, 11, 12], and ecosystem function and service delivery[13].

   Landscape heterogeneity is defined, created and maintained by interactions between climate, soils, topography, vegetation, natural disturbance processes and human activities over time. Draft plan content most directly providing for heterogeneity includes the Ranges of Values management approach for all ERUs and associated "related plan content" for each individual ERU; plan components for seral state proportion and patch size; and the Restoration of Natural Fire Regimes management approach under the Wildland Fire and Fuels Management heading. Uneven aged-silvicultural practices also provide for landscape diversity and serve to distribute risk across age classes[7, 14].

   Reducing tree densities, with fire or mechanical treatments, is a tactic that can support landscape heterogeneity goals and desired conditions for vegetation communities, watersheds, habitats, natural processes and ecosystem services. Reducing tree densities is also an important adaptation tool. Its importance has been argued on the basis that it supports resistance and resilience to water stress, altered disturbance regimes, and may increase streamflow. While there is broad consensus in the scientific literature that thinning to restore forest structure and reduce fuel loading is a sound management practice regardless of climate, there is conflicting science related to its ability to reduce water stress, especially in the southwestern United States[13, 15, 16,17].

   With respect to streamflow, relatively small and short-lived increases may occur until re-growth[18, 19]. However, in the Southwest most of the increase is likely to be realized in the winter months and may lead to drier conditions during the summer months as increases in streamflow are offset by decreases in soil moisture. This may increase ecosystem vulnerability to anticipated hydrologic conditions and extremes[17].

   Given these ecological considerations and the economic reality managers face, science and analytical tools that can help determine and prioritize where on the landscape treatments are likely to be most effective[20, 21] and cost efficient are of increasing importance. The Forest seeks opportunities to incorporate such science-based tools into plan implementation.

2. Enhancing habitat connectivity is one of the most commonly advocated strategies to assist species survival based on the assumption that it will allow species to adapt their ranges. However, scientists and practitioners are beginning to raise questions about whether or not this is actually an adaptation strategy[22, 23]. Connectivity designs based on current habitat patterns are likely to fall short for many species. Additionally, even the most well-designed connectivity

plan may fail for those species whose dispersal rates lag behind the rate of climate change. Connectivity can also facilitate the expansion of non-native, invasive and noxious species[22]. In the near-term, managing ecosystems toward desired conditions should provide for the maintenance of habitat connectivity and species biodiversity across the forest *but*, providing for connectivity over the long-term will likely require a broader-scale, multi-jurisdictional collaborative effort outside of the forest plan process. Gila NF staff seek opportunities to work with interested partners and stakeholders in such a collaborative and incorporate climate-informed connectivity models into decision-making.

Connectivity and landscape heterogeneity are often, but not always compatible. The degree to which heterogeneity supports connectivity depends on the size, frequency and distribution of different habitat patches. Below some critical threshold, heterogeneity supports connectivity. Above that threshold, heterogeneity leads to habitat fragmentation. Periodic evaluation of seral state distribution and patch sizes could provide useful information about where the Gila NF is in relationship to thresholds, but thresholds first need to be established. Gila NF staff seek opportunities to work with interested partners and members of the scientific community to define these thresholds.

3. While management of the Gila NF has very little influence over temperature and precipitation patterns, it can contribute to resilient watersheds, riparian and aquatic ecosystems by basing watershed management on processes and functions [24, 25, 26, 27]. This foundation is provided by plan content for soils, watersheds, and riparian and aquatic ecosystems, and supplemented by activity and program area content throughout this draft plan. The previous discussion about landscape scale heterogeneity and plan content for vegetation and fire management can support resilient watersheds, although careful consideration of disturbance type, frequency, magnitude and intensity or severity[28, 29] will be required to maintain a balanced approach. This consideration is provided for in project-specific interdisciplinary NEPA analyses, wildfire decision making processes, and is reflected in the Annual Pre-Season Landscape Risk Assessment management approach under the Wildland Fire and Fuels Management heading.
4. As with all adaptive management approaches a well-designed and efficient monitoring plan is critical for success. Current staffing, workloads and budget allocations for monitoring represent significant, but not insurmountable challenges. Remote sensing data can provide the basis for periodic monitoring of some ecosystem characteristics, provided adequate field validation. However, the need for strategic course correction may be best understood by field-based monitoring data that can be used to evaluate the interacting effects of temperature, precipitation and management actions. Likewise, identifying the need for species-specific actions will benefit from field data. Collaboration with interested partners, volunteers and other stakeholders will be essential. The monitoring plan can be found in Chapter 5.

Species and Populations

In keeping with the coarse filter-fine filter concepts (see Wildlife, Fish, and Plants), the landscape approach (above) should provide for the best possible outcomes for the greatest number of species. However, given that responses to temperature and precipitation patterns are species-specific, individualistic adaptation approaches may be necessary for some. The first step in a species-based adaptation approach is to identify the vulnerability. The Gila NF does not have a species-specific vulnerability assessment per se, but there are a few things that in combination, may aid in identifying the most immediately vulnerable species: (1) the ecosystem vulnerability assessment[,5]; (2) at-risk species status[30]; (3) rare and endemic status[31,32]; (4) species life history requirements, and (5) monitoring.

Providing for species persistence is a fundamental requirement of the 2012 Planning Rule and Forest Service Directives. This draft plan contains standards requiring implementation of approved recovery plans, guidelines supporting recovery and conservation plans, plan content providing for rare and endemic species, and species-specific content where the need was identified. However, Gila NF staff and stakeholders have identified several items that could increase the ability to manage for species persistence in an uncertain future. These include refugia mapping[9, 10, 11]and a monitoring and seed collection strategy for vulnerable rare and endemic plants[30], regardless of whether they are on the species of conservation concern list or not.

Refugia are places where a population of organisms can survive through a period of unfavorable environmental conditions. Many climate studies utilize coarse, idealized climate data to predict how species may respond to increasing temperatures. These predictions may over or underestimate species vulnerability because they don't consider topographic exposure or regional weather patterns[11]. These two factors are the basis for a better, local understanding of climatic threats to species persistence given sufficient understanding of each species requirements. The CCVA provides a coarse, first approximation of where refugia are likely to be located, but it is not appropriate for identifying fine-scale refugial areas that may exist. However, given that the Gila NF is a frequent fire landscape, mapping of climatic refugia must consider conflicting science on the related concept of fire refugia. Fire refugia are places that are "minimally-impacted by fire and provide critical habitats for fire-sensitive species and seed sources for post-fire regeneration[33]." Although this topic is little studied, those studies that have been conducted demonstrate that areas that have filled this role previously may actually more likely to experience stand-replacement fire in subsequent wildfires[33, 34]. This implies mechanical treatments may be necessary to maintain some refugial areas.

The lack of specific information about the requirements of many rare and endemic species is an immediate concern. Monitoring efforts have the potential to provide more specific information. Collecting and preserving seeds and other propagules, within the existing legal and regulatory framework, is a proactive and protective approach to providing for rare and endemic plant persistence. The Forest seeks opportunities to work with the stakeholder(s) that have made these recommendations and offers of assistance, and engage researchers in the scientific community to leverage additional expertise.

Ecosystem Services

The most urgent ecosystem services vulnerabilities to address are associated with the distribution, intensity and amount of precipitation, which is largely beyond the control of Forest management. However, the Forest may address associated vulnerabilities by: 1) increasing water conservation and planning for reductions in upland surface water and groundwater supplies and 2) anticipating and planning for disturbances from intense storms.

Plan content most directly addressing water conservation can be found in the Conservation and Relationships management approach under the Water Uses heading. Implementation of the drought plan (standard and corresponding management approach under the Livestock Grazing heading) is also the mechanism of anticipating and responding to reductions in upland water supplies.

The landscape approach to managing in the face of change and uncertainty, and plan direction for soils, watersheds, riparian and aquatic ecosystems provide the most direct links to anticipating and planning for disturbances from intense storms. When these systems and their component parts are in good shape before an intense storm, they are better equipped to handle the disturbance and mitigate downstream impacts. However, the infrastructure component of vulnerability is not addressed by this plan content.

Infrastructure

The resources available to maintain existing infrastructure to existing standards is insufficient[35] , which means the ability to implement adaptation measures for roads, bridges and facilities is limited. Identifying high-risk watersheds and infrastructure sites and developing a range of design and treatment options based on a climate-aware risk assessment could help inform priority setting. Climate-aware design and treatment options include consideration of the following practices[26]:

- Instead of design storms or design runoff, use design storm scenarios with a range of explicit assumptions about changes in peak-flow probabilities to cope with uncertainties, and display risks. For example, consider risk in which the 100-year storm becomes the 50-year storm or the 10-year storm.
- Design infrastructure to limit the consequences of exceeding design capacity, consistent with the onsite and downstream values at risk. Build larger factors of safety into structures where failure would have substantial or unacceptable consequences.
- Design in-channel structures to maintain hydrologic and biotic connectivity, unless the structure is intended to protect at-risk species from non-native species.
- Prioritize and treat road networks by storm-proofing or decommissioning to restore natural flow patterns, reduce erosion and increase system durability.

Mitigation

There are two primary avenues by which Forest management can address greenhouse gas emissions: (1) ecosystem carbon management, and (2) sustainable operations.

Ecosystem Carbon Management

Ecosystems are naturally both a source and a sink for greenhouse gases, particularly carbon-based greenhouse gases. Although the body of science surrounding ecosystem carbon management is relatively limited, it is actively expanding. At present, the science suggests that at least in ponderosa pine systems, or similar dry forest types, restoration treatments that include both thinning and prescribed fire are the best way to maintain the forest as a net carbon sink under future climatic conditions[36, 37, 38, 39]. Thinning alone has not been demonstrated as effective in terms of mitigating or stabilizing carbon-based greenhouse gas emissions[37]. In moister forest types where the fire disturbance regime and carbon dynamics are different, the same treatment may lead to long-term declines in carbon storage capacity[37], necessitating project-level consideration of trade-offs.

Sustainable Operations

The agency and the Gila NF are committed to efficiently using energy and reducing consumption of resources in daily operations. This work was accelerated after the 2005 Energy Policy Act and a series of Executive Orders[a],. Under the agency-wide Sustainable Operations program, the Gila NF has and will continue to make progress toward improving energy efficiency and shifting to renewable energy; reducing water consumption in Forest Service buildings, grounds and related facilities; increasing

[a] https://www.fs.fed.us/sustainableoperations/documents/eo-factsheet.pdf

sustainability performance of purchased goods and services; improving transportation and travel practices; and minimizing waste generation and reducing landfill use. Gila NF staff work toward these goals while maintaining compliance with subsequent acts of Congress and Executive Orders, such as Executive Order 1377 – Enforcing the Regulatory Reform Agenda and Executive Order 13783 – Promoting Energy Independence and Economic Growth.

Management Approach to Restoration

Restoration methods are the means by which movement toward desired conditions are achieved. These methods can be manual, mechanical, prescribed fire, wildfire, biological and chemical. Manual methods include harvesting of trees using hand-held equipment like axes or chainsaws. Mechanical methods include timber harvest, non-commercial thinning, pushing, plucking, chaining or mastication of woody vegetation using heavy equipment such as backhoes, skidders, bulldozers, et cetera. Prescribed fire and naturally ignited wildfire are restoration tools when they occur under specific weather and fuel conditions. Biological methods include the use of livestock to control understory woody vegetation, and insects or other organisms that target non-native vegetation species. Chemical methods include the use of pesticides, which is a general term that is inclusive of herbicides, piscicides, insecticides, rodenticides, and fungicides.

On the Gila NF, all the tools are “in the toolbox,” and staff and stakeholders recognize that there are benefits, challenges and trade-offs associated with each method under the circumstances specific to a particular project. Often, these tools are not used in isolation, but are employed in combination. Although there is not always consensus or agreement on their use, the benefits, concerns and available mitigation measures associated with manual, mechanical, prescribed fire and wildfire methods of restoration are familiar to both staff and stakeholders. These methods continue to be employed on the Gila NF and forest staff and decision makers strive to address concerns and incorporate stakeholder input and feedback into projects that utilize these and other restoration methods.

Chemical and biological restoration methods have not been widely utilized in the past. Chemicals can be a safe and important restoration method, but forest staff recognize that strict adherence to the label and all other mitigation measures defined in the draft plan and in consultation with the US Fish and Wildlife Service are necessary to prevent unintended consequences and maintain the social license for its use. Gila NF managers only use chemical methods when and where an adverse effect to listed species, non-target species and human health is unlikely. Herbicide application guided by the design criteria provided by plan standards and guidelines in All Upland Ecological Response Units and Non-native Invasive Species.

Herbicide is often the only effective tool to control, contain, or eradicate noxious weed species due the characteristics of the species themselves, and logistical and economic considerations. When treating native re-sprouting alligator juniper or evergreen oak species, the purpose is to add herbicide to “the toolbox” with its use being determined through an interdisciplinary process considering lessons learned and economics. The purpose is not to promote a total dependence on herbicide to attain or maintain desired conditions, but to have it available as an effective treatment option at the appropriate scale necessary to meet objectives. Considerations when determining the appropriate use of herbicide include:

1. Lessons learned from past restoration efforts in similar settings indicate that maintenance or movement toward desired conditions is unlikely to be achieved through other methods. For example, the Gila NF staff and partners have been working to restore what was historically open-canopy woodlands (approximately 10 to 30 percent tree canopy cover) on North Star Mesa. Manual,

mechanical and prescribed fire have all been used, including re-treatment of some areas. However, re-sprouting and new tree establishment from the seed bank mean that restoration efforts may succeed in setting conditions back in time, but the trajectory remains away from desired conditions without constant maintenance. Instead of investing the same amount of time and resources to every mesa with similar vegetation and soil conditions before reaching the conclusion that herbicide may be an appropriate method to incorporate, lessons learned from North Star Mesa would be sufficient to establish a need for herbicide use.

2. The rate of progress toward desired conditions for the wildland-urban interface as a whole is hampered by maintenance needs and the fiscal capability Congress affords for the management of the Gila NF. For example, under existing and foreseeable funding sources, it may be possible to maintain desired conditions for a small percentage of the WUI in the forest using a combination of other methods. However, a significant amount of wildland-urban interface would remain untreated or go without needed maintenance. Where herbicide use would extend treatment longevity and allow more acres to be treated and maintained, herbicide would be an appropriate method to protect wildland-urban interface values.

Project-level monitoring over time may assist in identifying the lowest amount of active ingredient necessary for herbicide use to contribute to movement toward desired conditions for native plant communities and species composition.

Piscicides are only used to support native fish recovery. While there is no immediate need for the use of insecticide, rodenticide and fungicide use in the forest, it is anticipated that these tools could be considered in the future to address epidemic insect infestations or to support the reforestation program.

Biological methods have a high potential to produce unintended or undesirable consequences. Depending on the biological agent (grazing animal, insect, microorganism, et cetera), there are varying degrees of risk and likelihood of impacting non-target plant and animal species; therefore, biological methods will be considered for restoration purposes as a lower priority if there are other effective methods available.

Forest managers remain open to new technology, new restoration methods and new application of existing methods, given that they are based on relevant peer-reviewed science. In the absence of such science, experimental applications on small acreages may be pursued as long as they are consistent with foundational scientific understanding such as physics, plant function and animal behavior. Testing these methods should include standard scientific study design features such as controls and provide for statistical analysis of outcomes.

Ecosystems and Watersheds

Background and Description

This subsection provides the necessary background to provide a frame of reference for understanding ecological plan content, including ecological classification systems, the spatial scales that plan content is structured to and the objectives for upland vegetation communities.

Vegetation Classification

The plan components developed for upland vegetation are based on Ecological Response Units (ERUs). ERUs represent a classification system based on vegetation characteristics that would occur when natural disturbance regimes and ecological processes prevail. Spatial representation of ERUs (the ERU map)[b] is derived from a combination of Terrestrial Ecological Unit Inventory map unit delineations (TEUs)[a] and data derived from satellite imagery. A TEU is comprised of one or more subunits, referred to as components, with each being described by its' dominant climatic regime, geology, soil type, potential natural vegetation, elevational range, topographic characteristics and a subset of landscape processes. One ERU polygon may encompass multiple TEU polygons. Interdisciplinary field verification of the ERU map is necessary during project development and implementation, both to provide project level accuracy and to inform future updates to the ERU map.

Spatial Scales

Desired conditions for upland vegetation (ERUs) are presented at three spatial scales: landscape scale, mid-scale, and fine-scale. Desired conditions for riparian and aquatic ecosystems are presented at two spatial scales: watershed scale and fine-scale. Watershed desired conditions use only the watershed scale. Other natural resource topic areas do not specify a scale for desired conditions; rather those desired conditions are applicable at any and all scales.

The landscape scale for upland vegetation describes the "big picture" of desired conditions. The watershed scale for riparian and aquatic ecosystems serves to address habitat connectivity. Descriptions at the mid- and fine-scales provide additional detail necessary for guiding future projects and activities. Projects of any size should consider desired conditions at all scales and the relationships between them across the Forest. These scales are further described in the next two subsections.

Forest, Woodland, Shrubland and Grassland Spatial Scales

A landscape area is composed of mid-scale units (figure 3). Likewise, the mid-scale is composed of fine-scale units. Variability in biophysical conditions such as elevations, slopes, topographic position, aspects, soils, plant communities, and disturbance processes are typically greatest at the landscape scale, and generally decrease at the mid- and fine scales. However, variability for particular characteristics (for

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[b] Spatial data available at https://www.fs.usda.gov/detail/r3/landmanagement/gis/?cid=stelprdb5202474. The ERU spatial dataset is a region-wide product and the current version is posted. The TEUI dataset is a Forest-specific product. As of the release date of this draft plan, the most current Gila NF TEUI spatial data is not posted. Note that there can be a delay between when spatial data products are updated and when they are posted to this web address. Tabular TEUI information is currently available in Access database format.

example, tree density, fuel loading, etc.) is greatest at the fine scale, and generally decreases at the mid- and landscape scales.

The range of acres defining each scale are different between forest and woodland ERUs, and shrubland and grassland ERUs. For forests and woodland, the landscape scale is defined as 1,000-10,000 acres or more, mid-scale 10-1,000 acres and the fine scale is less than 10 acres. For shrublands and grasslands the landscape scale is defined as 1,000-10,000 acres or more, the mid-scale 100-1,000 acres and the fine scale is less than 100 acres. Mid- and fine scales are defined differently between forests and woodlands, and grasslands and shrublands because there is more structural diversity across smaller distances in forest and woodland settings than there is in grasslands and shrublands. Figure 3 (excerpted from work by Reynolds and others[40]) provides an illustrated example for forests and woodlands.

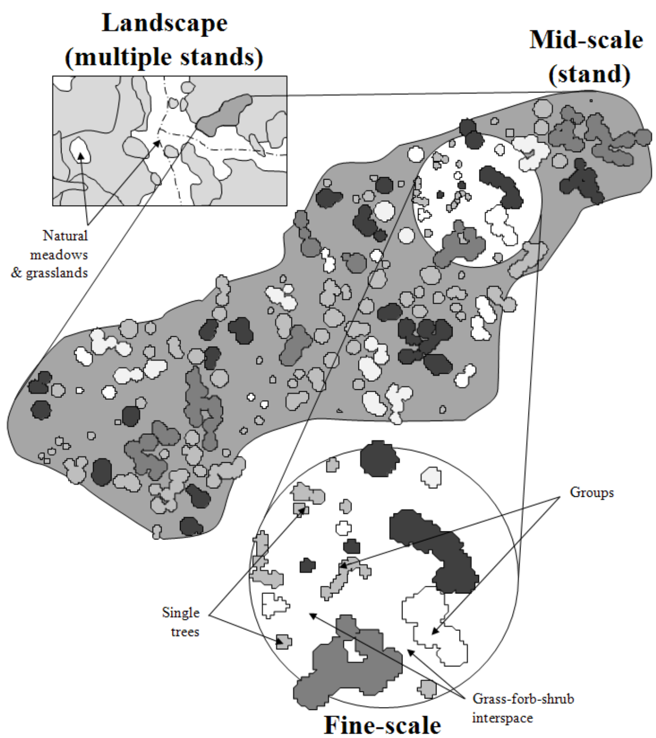

Figure 3. Spatial scales for forest, woodland, shrubland, and grassland ERUs

Riparian, Wetland, Aquatic Ecosystem and Watershed Spatial Scales

Watersheds are defined by the topographic extent of an area that drains to a single point in a stream or river system. They are cataloged using a uniform hierarchical system developed by the United States Geological Society (USGS). The United States is divided and subdivided into successively smaller "hydrologic units." There are six levels of hydrologic units: region (1st level), subregion (2nd level), basin (3rd level), subbasin (4th level or hydrologic unit code 8), watershed (5th level or hydrologic unit code 10) and subwatershed (6th level or hydrologic unit code 12)[41]. The word "watershed" is therefore both a general term, and a specific categorical term depending on the context in which it is used. Watershed-scale plan direction and other content applies to 4th, 5th, and 6th level watersheds, with the Forest measuring progress toward desired conditions at the 6th level watershed.

The fine scale is defined by the riparian management zone (RMZ) (see Riparian and Aquatic Ecosystems) associated with a stream reach, ERU polygon, or point feature such as a spring or seep. A stream reach applies to systems associated within a stream corridor. A reach is a length of stream between two points. These “start” and “end” points usually represent a natural geologic or topographic feature, such as a change in valley or channel shape or configuration, or may be a management feature, such a grazing allotment or pasture boundary. The ERU polygon applies to riparian, wetland and aquatic ecosystems in upland positions that are large enough to be delineated at the ERU scale. The RMZ alone defines the fine scale for systems associated with springs, seeps and non-riverine wetlands too small to be captured at the scale of the ERU map (point features). An illustrated example of the watershed and fine-scale units is provided in figure 4.

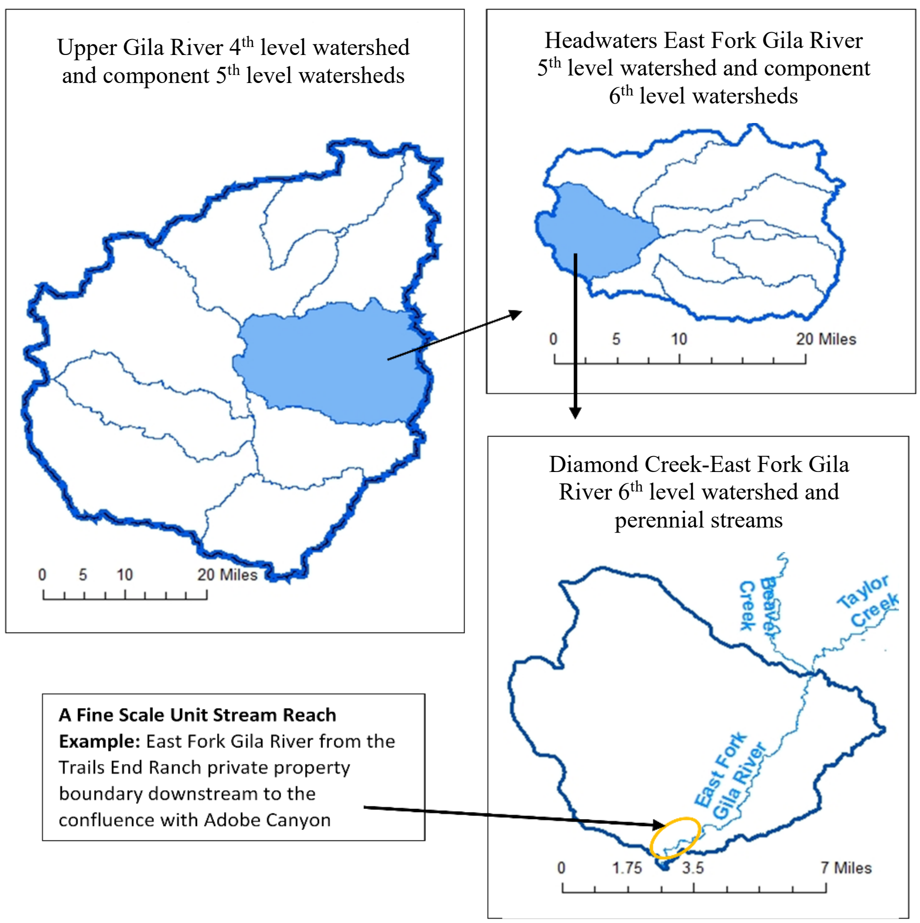

Figure 4. Watershed and fine-scale units

Upland Ecological Response Unit Objectives

The plan objectives for upland ERUs are intentionally broad and flexible. They include a wide range of acres expected to be treated each decade. The low end of the range represents what forest leadership and staff are confident can be accomplished with congressionally allocated dollars only. No acres accomplished with partner dollars are included to demonstrate the plan is within the fiscal capacity of the forest. This is a requirement of the 2012 Planning Rule. This decision was made under the philosophy that partnerships cannot be taken for granted. Competition for partner dollars is high, and their availability can vary widely based on numerous factors. It is expected that management will treat *at least* the low end of the range specified in each objective. It is hoped that far more work will be accomplished.

The high end of the range serves three purposes. First, it serves as an approximation of the ecological treatment need, as it was calculated based on the historic average fire rotation interval of each ERU. Secondly, it is intended to raise awareness of how much fire historically occurred on the landscape. Lastly, the high end of the range serves as a cap on how many acres can be treated and is intended to be a reminder that there is such a thing as too much disturbance. There is no expectation that management will be able to reach the high end of the range, but there is an expectation that it will not be exceeded.

The upland vegetation objectives also specify a range of acceptable treatment tools but do not specify how many acres may be treated with each tool. These tools include prescribed fire, naturally ignited wildfire and mechanical treatments. This provides the flexibility to select the tool that best fits the site, circumstances and resources available. It is expected that all of these tools will be used. However, it is expected that more acres will be treated with prescribed and naturally ignited wildfire for two reasons. First, the cost per acre is lower, which will facilitate more acres of treatment being realized. Secondly, mechanical treatments may mimic *some* of the ecological outcomes of fire and may facilitate the restoration of fire to the landscape, but they cannot replace an ecological process.

Glossary

Potential natural vegetation is vegetation classification system and an ecological concept referring to the late successional vegetation that would be expected under the constraints of the physical environment in the absence of human intervention or high severity disturbance.

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All Upland Ecological Response Units

Background Information

The Gila NF contains five forest, four woodland, one shrubland, and three grassland ERUs that make up approximately 98 percent of its lands and provide many ecosystem services. Vegetative biodiversity supports and reflects the biodiversity in animal life that has co-evolved with various plant forms over time. Habitat for wildlife is an important supporting role of vegetation communities. The genetic variation inherent in vegetative biodiversity provides for resilience through adaptive vegetation responses to an ever-changing environment, including long-term climatic variability.

Vegetation is an influential biotic driver of soil formation and the unique ability of plants to create food from the energy of the sun through the process of photosynthesis is the foundational support for nutrient cycling. Vegetation also moderates the passage of water across landscapes to mitigate floods and assists in holding soils in place so they can provide water filtration. Without soil, which is retained in part by the interlocking roots of many plants, clean water would be unattainable in the natural environment. Through transpiration, plants contribute to water cycling by pulling water up from the ground and releasing it into the air; this moisture contributes significantly to the Southwest's summer monsoon storms. Plants provide breathable air as they take in carbon dioxide and release oxygen as a byproduct of their respiratory process. Vegetation provides shade that can mitigate increases in ambient temperature, which is significant for the sustainability of many organisms, including other plants. It also provides forage, traditional foods and medicines, timber, firewood and other wood products, and opportunities for recreation, education, and research.

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

1. Natural disturbances (for example, insects, disease, wind and fire), and human activities that mimic the effects of natural disturbances, maintain fully functioning ecosystems and native vegetation communities that contain the full range of characteristic components, processes and conditions.
2. The adaptive capacity of the native vegetation communities to disturbances of varying frequency, extent and severity, including long-term drought and climatic variability is high, with adaptive capacity measured by the area where structure, composition, process, function and connectivity are restored and maintained.
3. The characteristic full range of natural variability in composition, structure, and pattern, reflective of each individual ERU, topographic characteristics, and soil properties are expressed (see TEU).
    a. Overstory and understory plant species composition are each least 66 percent similar to site potential as measured by each particular TEU, but can vary considerably at fine- and mid-scales owing to a diversity of seral conditions.
    b. All seral states are present. The relative proportions of seral states are at least 66 percent similar to the reference proportions as described in the most recent Region 3 Seral State Proportion Supplement.
4. Transition zones or ecotones between riparian areas, forest, woodlands, shrublands and grasslands are present. Transition zones shift in time and space due to climatic variability and natural disturbances such as fire.

5. Organic ground cover (leaf litter, needle cast, coarse woody debris, nonvascular plants and biological crusts, and basal area) is and vegetative canopy cover provide effective protection of soil, contribute to moisture retention and infiltration, nutrient cycling, plant and animal diversity and ecosystem function.
6. Above and below ground carbon stocks represent reference conditions for a given ERU, but are transitory and adaptive with site potential, characteristic disturbances and long-term trends in climate.
7. Ecological conditions support habitat quality, distribution, abundance and connectivity to self-sustaining populations of all native and desirable non-native plant and animal species that are healthy, well distributed and genetically diverse, including federally listed species, species of conservation concern, and rare and endemic species. Conditions provide for life history requirements, predator-prey interactions and natural population fluctuations of all species within the capability of the landscape.
8. Habitat availability, configuration, and connectivity allows wildlife populations to adjust their movements (seasonal migration, foraging, etc.) in response to long-term trends in climate. Populations of rare and endemic species that rely wholly on ERUs with high or very high vulnerabilities are known and conservation measures are in place.

Standards

1. Terrestrial Ecological Unit Inventory (TEUI) information (or similar ecological inventory information) will be used to inform restoration treatment design and implementation.
2. On soils derived from volcanic sediment (Datil soils), ground-based mechanical restoration treatments will be limited to slopes less than 15 percent rise unless site-specific analysis determines fire behavior poses a greater risk to watershed or urban interface values. Pushing or chaining will not be allowed on these soils regardless of slope gradient.
3. On soils with little to no soil development and those on erosional landforms, ground-based mechanical restoration treatments will be limited to slopes less than 25 percent rise unless site-specific analysis determines fire behavior poses a greater risk to watershed or urban interface values. Mastication or plucking is preferred over pushing or chaining. Pushing or chaining will not be allowed on these soils where slope gradients are greater than 15 percent.
4. On soil types not addressed by previous standards, ground-based mechanical restoration treatments will be limited to 40 percent rise. Timber harvest on steeper slopes are restricted to aerial technologies and appropriate cable systems unless site-specific analysis determines that fire behavior poses a greater risk to watershed or urban interface values and the technology[c] is available to do so safely.

[c] This technology includes specialized ground-based equipment and cut to length harvesting systems that have recently become available, as well as other advancements that may be developed in the future.

5. Herbicides will only be used in restoration treatments where they are deemed necessary to move toward desired conditions for vegetation communities or the urban interface. When herbicide treatment is chosen, the rationale for use will be documented and included in plan-level compliance monitoring and reporting. All standards for the use of herbicide provided under the Non-native Invasive Species heading will be followed.

Guidelines

1. Vegetation treatments should be designed to recruit under-represented seral states and thereby promote continuous recruitment of old-growth characteristics across the landscape over time.
2. For the purpose of efficiency, the use of Section 18 reviews should be considered as the first option before pursuing other National Environmental Policy Act avenues when there is a previous decision for an activity in an area.

Management Approaches

Ecosystem Services

The ecosystem services most valued by stakeholders that vegetation contributes to include flood mitigation and erosion control; water quality; biodiversity and abundance of plant and animal species; forage and wood product production; carbon sequestration; recreation and other cultural services[1, 2]. The ecosystem service approach to vegetation management balances the complex interrelationships and trade-offs between these services so that the sustainability of one is not compromised by a focus on another. To accomplish this, the forest (1) proactively engages stakeholders with diverse perspectives; (2) uses the best available scientific information; and (3) takes an interdisciplinary team approach to project development and implementation, wildland fire decision support processes, and post-fire Burned Area Emergency Response (BAER) processes; and (4) considers ecosystem service delivery when developing adaptation strategies.

Restoration and Relationships

The forest looks for opportunities to work collaboratively with local, state and other federal agencies, non-governmental organizations and individuals with a diversity of perspectives to accomplish shared restoration objectives. The forest strives to align restoration objectives with supporting local economics, cultures and long-standing traditions, providing products to people whenever possible and encouraging industry innovations.

Ranges of Values and Application of Science

Desired conditions for many vegetation characteristics include values or ranges of values at the mid-scale. Most of these values are informed by the historic range of variability (HRV) documented in the published literature as summarized by Forest Service Southwestern Regional Office staff[3]. Coarse woody debris values are based on calculations that balance trade-offs between fire intensity, site productivity and wildlife habitat requirements[3, 4, 5]. These ranges of values are averages established by a minimum value and a maximum value. In the case of tree basal area, which is being used to describe tree density in forested ERUs, the minimum and maximum values are themselves, averages[6].

While average or median values, or ranges of average values may be useful for coarse assessments or broad-scale reporting purposes, these values are not to be interpreted as explicit or implicit management targets[f 7,8]. They are not the management goal. According to North and others, average conditions were historically rare in active-fire landscapes due to variable fuels, topography and fire behavior interactions[9]. Instead, the management approach is to provide for the full range of historic variability within a vegetation type[10] using topographic characteristics, soils (including parent material) and fire behavior as a guide[9, 11, 12, 13, 14, 15, 16, 17, 18]. Topographic characteristics include landform, elevation, slope steepness, slope position, aspect, and valley width. All of these topographic characteristics interact and influence site microclimate, fire behavior, vegetation and soils.

Additional information regarding the what is known about the full range of historic variability, the state of the science and information intended to help implement this management approach is provided in the individual ERU sections under the heading “Related Plan Content.”

It may also be appropriate to manage for values outside the historic range of variability, for some characteristics, in some circumstances. For example, desired conditions in the wildland-urban interface includes lower densities of vegetation and coarse woody debris to reduce fire related risks to human life and property. Areas where desired conditions specific to purpose or location apply are identified in Chapter 3 – Designated and Management Area Plan Direction.

Key Concepts

Parent material is a soil science term that describes both the primary origin of the matter from which the soil is formed, either geologic or organic, and its last mode of transport. Parent materials on the Gila NF are geologic in nature and are dominated by volcanic and sedimentary rock types. Modes of transport include flowing water (alluvium), wind (eolian), gravity (colluvium), and standing water in lakes (lacustrine). If the material was not transported after its original deposition, it is referred to as residuum. It is important because it strongly influences the soil characteristics and properties that directly affect site potential and response to disturbance.

Vegetation succession is the process of change in the composition and structure of a community over time in response to natural growth, death and disturbance. In the Southwest, time scales between early and late successional states can be on the order of decades in grassland ecosystems, but are more often hundreds of years in forest and woodland ecosystems. **Seral states** are conceptualized, point in time snapshots of the successional process defined by a dominant canopy cover, size, and age class. **Seral conditions** (composition and structure) within the same ERU can vary between and within seral states depending on climate, soil, and time since disturbance. Topographic characteristics, as they influence microclimate and disturbance patterns can also lead to a diversity of conditions between and within seral states.

Glossary

Basal area is the area covered by tree trunks and stems of shrubs, forbs and grass species where they meet the ground.

Biological crusts are a community of organisms living on the surface of soils. They occur primarily in arid and semi-arid ecosystems and can be composed of cyanobacteria, green and brown algae, and microfungi, mosses and lichens. Bacteria, liverworts and fungi can also be components.

Chaining refers to knocking over and uprooting of multiple trees with a chain secured between two pieces of heavy machinery.

Endemic species are those that occur only in a certain area. In this context, the term is used to describe species that exist only on the Gila, or only in New Mexico and are found nowhere else in the world.

Heterogeneity is a term referring to the quality or state of consisting of dissimilar or diverse elements.

Life history requirements are those environmental and habitat conditions needed to allow an organism to develop from birth or germination, reproduce, and survive to its natural death.

Mastication refers to grinding, shredding, or chopping of individual trees, in place, with heavy machinery equipped with a specialized attachment.

Nonvascular plants lack specialized tissues to conduct water and nutrients throughout the plant. They include mosses, liverworts, hornworts and some algae.

Plucking refers to pulling individual trees out of the ground with heavy machinery.

Pushing refers to knocking over and uprooting individual trees with heavy machinery.

Site potential is a term used to describe the characteristic ecological conditions in the latest successional state, resulting from interactions among climate, soil and vegetation.

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Forested Ecological Response Units

Spruce-Fir Forest

Background Information

The Spruce-Fir Forest occurs on the coldest, wettest, and highest elevation sites in the forest, generally 9,000 feet and above, along a variety of slope gradients including gentle to very steep mountain slopes. Most of this ERU is located within the Gila (approximately 79 percent) and Aldo Leopold (approximately 3 percent) Wilderness Areas. Late successional forests at the lower elevations of the range are usually dominated by Engelmann spruce, white fir and occasionally blue spruce. Corkbark fir is a subdominant late-successional species with quaking aspen, Douglas-fir, white fir and southwestern white pine occurring as common early to mid-seral tree species. At the upper elevations, dominant tree species are Engelmann spruce and corkbark fir, with aspen typically being incidental, but it may occasionally be co-dominant as an early to mid-seral species. Rocky Mountain maple, currants, whortleberry, snowberry, ferns, sedges and a variety of other native perennial shrubs, and forbs are commonly found in the understory. Lichens and non-vascular plants such as mosses and liverworts, are also important components.

Spruce-Fir Forest occupies approximately 1 percent of the Gila[d]. Although it is rare, both in the Gila and in the broader landscape[e], it has significant ecological value in terms of overall biodiversity and habitat for several rare, endemic, and at-risk species. Because relatively more of it is located in the Gila, as opposed to the broader landscape, forest management has a greater influence on ecological integrity and sustainability.

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

1. The Spruce-Fir Forest vegetation community is a mosaic of structural and seral states ranging from young trees through old, and is composed of multiple species. The landscape arrangement is an assemblage of variably sized and aged groups and patches of trees and other vegetation.
    a. Patch sizes vary but are mostly in the hundreds of acres, with very infrequent disturbances creating patch sizes in the thousands of acres.
2. Tree canopies are typically more closed than in the Mixed Conifer with Aspen. Overstory canopy cover varies with seral state and time since disturbance, topographic characteristics and soil properties, often approaching complete canopy closure in mid- to late seral states (see TEU).
3. Old growth occurs over large, continuous areas. Old growth components include old trees, standing dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time because of natural growth, death, and disturbance.

[d] Based on ERU map dated August 25, 2015, with tabular adjustments for Gambel Oak Shrubland; while Gambel Oak Shrubland is an ERU farther north, the acres mapped on the Gila NF represent a seral state in the mixed conifer.

[e] The broader landscape refers to the context area defined in the final assessment report.

4. The Spruce-Fir Forest is composed predominantly of vigorous trees, but declining trees provide snags; top-killed, lightning- and fire-scarred trees; downed logs (greater than 12 inches diameter at mid-point, greater than 8 feet long) and coarse woody debris (greater than 3 inches diameter). Snags and coarse woody debris are well distributed. The number of snags and amount of coarse woody debris vary by site productivity, seral state and disturbance history.
    a. Snags greater than 18 inches diameter at breast height (DBH) have an average range between 5 to more than 30 per acre. Snag density in general (8 inches DBH and greater) averages 20 per acre with a range of 13 to 30. Average snag density increases with successional stage with less in early stages and more in late stages.
    b. Average coarse woody debris, including downed logs, varies from 5 to 30 tons per acre in early seral states; 30 to 40 tons per acre in mid-seral states; and 40 tons per acre or greater for late-seral states.
5. An understory of native grasses, forbs, and shrubs is typically present, with basal area, canopy cover, and species composition varying with seral state, degree of canopy closure, and TEU.
6. In the lower spruce-fir subtype, mixed-severity fires (Fire Regime Group III) occur infrequently. In the upper spruce-fir subtype, high-severity fires (Fire Regime IV and V) occur very infrequently. Patches created by stand-replacement fire typically do not exceed 1,000 acres.

Mid-scale Desired Conditions (10 to 1,000 acres)

1. The size and number of tree groups and patches vary depending on disturbance history, topographic characteristics and soil properties (see TEU). There may also be small disturbances resulting in groups and patches of tens of acres or less. Grass, forb, shrub interspaces created by disturbance may involve single trees or comprise up to 100 percent of the mid-scale area following infrequent, high severity disturbances. Aspen is occasionally present in large patches.
2. Average tree densities range from 20 to 250 square feet of basal area or greater per acre depending on time since disturbance, seral states of the groups and patches, topographic characteristics and soil properties.
3. The understory consists of native shrubs, perennial grasses and sedges, forbs, mosses and other non-vascular plants with basal area ranging from less than one percent to 20 percent or more, depending on soil properties (see TEU), seral state, and degree of canopy closure.
4. Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests typically contain at least 10 percent greater basal area than goshawk foraging areas and the general forest. Nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the Spruce-Fir.

Fine-scale Desired Conditions (less than 10 acres)

1. Mid- to old-age trees grow tightly together with interlocking crowns. Trees are generally of the same height (single story) and age in early group or patch development, but may be multi-storied in late development. Small gaps are present because of localized disturbances such as wind throw, insects, or disease.
2. Organic ground cover and herbaceous vegetation provide protection for soil, moisture infiltration, and contribute to plant diversity and ecosystem function.

Objective

1. Treat at least 250 and no more than 23,779 acres per decade using a combination of naturally ignited wildfire and prescribed fire methods to maintain or move toward desired conditions.

Management Approach

Seral State Proportion, Re-burn and Vulnerability

The Spruce-Fir Forest is the upland ERU that is most vulnerable to long-term trends in temperature and precipitation[1]. While there is evidence to suggest that the 2012 Whitewater Baldy Complex and 2013 Silver Fires, which resulted in significant losses of Spruce-Fir Forest late seral states, was actually not uncharacteristic[2, 3], it was outside the contemporary human experience. However, given its vulnerability, there is cause enough for concern. Since these fires, annual pre-season landscape risk assessments (see Wildland Fire and Fuels management approach Annual Pre-Season Landscape Risk Assessment) have repeatedly identified Spruce-Fir Forest and Mixed Conifer with Aspen as ecological values at risk. There are concerns about what remains of the mid- to late-seral states and potential impacts of re-burn. The vast majority of this ERU is located in remote and rugged terrain within designated wilderness areas, which poses management challenges. Given that the safety of firefighters and other agency personnel is the number one priority, the forest could evaluate potential management actions, if any, and develop a strategy. This strategy could include identification of some areas that might be protected from fire for a period of time; areas that would be targeted for prescribed fire; areas that could serve as refugia, with or without protection actions; and a monitoring plan

Areas would be targeted for prescribed fire within early and potentially mid-seral states to provide the foundation for seral state diversity as successional processes progress over time. Not all acres would be treated. Prescribed fire success would be defined by small footprints of surface fuel reductions over multiple entries. Small pockets of tree mortality, assuming there is regeneration, in the early seral states would also be important to building future seral state diversity. However, in the mid-seral states, the strategy would need to determine whether the size and distribution of those states warrants the same treatment, or if it is more appropriate to focus efforts on limiting stand-replacement patches of any size until forest development in early seral states reaches an identified threshold. Again, human life and safety concerns will define what is possible.

Related Plan Content

Content that follows under the Application of Tree Density Ranges of Values is provides additional information regarding what is known about the range of historic variability and the state of the science, to aid in implementing the Ranges of Values and Application of Science management approach under the All Upland Ecological Response Units heading, as previously described. Content that follows under the At-Risk Species for Spruce-Fir Forest heading is intended for reference during project planning and wildfire incidents.

Application of Tree Density Ranges of Values

Very few studies reconstructing forest structure have been conducted in Southwestern Spruce-Fir forests and studies from other regions are generally not applicable due to major differences in species composition, latitude, climate and other factors[4]. The range of average basal area presented in the mid-scale desired conditions reflects a Southwestern Regional summary of existing conditions derived from region-wide Forest Inventory and Analysis (FIA) plot data based on the assumption that the characteristic fire regime and forest structure has not been highly altered in high elevation, infrequent fire ecosystems[3, 5]. FIA data from the Gila and Aldo Leopold wildernesses suggest a basal area maximum (not average maximum) of 418 square feet per acre[6]. While FIA data documents basal areas of zero[6] in areas of stand replacement fire, having residual trees to act as a seed source is desirable.

At-Risk Species for Spruce-Fir Forest

Federally listed species are indicated by an asterisk. Species without an asterisk are not federally listed, but are species of conservation concern.

Mexican spotted owl*, marsh slug snail, notocris fritillary butterfly, western bumble bee, Mexican gray wolf*, Gooding's onion, heartleaf groundsel, Hess's fleabane, Mogollon death camas, Mogollon Mountain lousewort

Glossary

Refugia refers to areas where a population of organisms can survive through a period of unfavorable environmental conditions.

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Mixed Conifer with Aspen (Wet Mixed Conifer)

Background Information

Mixed Conifer with Aspen occurs between the Spruce-Fir Forest ERU at its upper elevational limit and the Mixed Conifer-Frequent Fire ERU and its lower elevational limit. It occurs along a variety of slope gradients including gentle to very steep mountain slopes between approximately 7,000 and 10,000 feet. Degree of canopy closure, seral state, topographic characteristics, and soil properties are determining factors of tree species composition, as they influence site temperature and plant available moisture. Douglas-fir and white fir are typically codominant, with southwestern white pine, maple, aspen, and New Mexico locust sub- or co-dominant. Aspen and New Mexico locust dominance is initiated by stand-replacement fire. Ponderosa pine may be present at the lower elevations, but as a minor component. Blue and Englemann spruce can occur in late-successional stages, but in the Gila NF, this has only been documented on basalt soils. Scouler's willow, mountain spray, osha, mountain lover, nine-bark, currants, sedges, and a variety of other native perennial shrubs, grasses, forbs, and ferns are commonly found in the understory. Lichens and non-vascular plants such as mosses and liverworts, are also important components.

The Mixed Conifer with Aspen occupies 2 percent of the Gila[f] and 65 percent of it is located in the Gila and Aldo Leopold Wildernesses. Although it is relatively rare, both in the forest and in the broader landscape[g], it has significant ecological value in terms of overall biodiversity and habitat for several rare, endemic and at-risk species. Because more of it is located in the Gila than within the broader landscape, forest management has a greater influence on its ecological integrity and sustainability.

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

1. The Mixed Conifer with Aspen vegetation community is a mosaic of structural and seral stages ranging from young trees through old, and is composed of multiple species. Species composition within tree patches depends on seral state. The landscape arrangement is an assemblage of variably sized and aged groups and patches of trees and other vegetation.
    a. Patch sizes vary but are mostly between 100 and 300 acres, with rare disturbances creating patch sizes in the thousands of acres.
2. Tree canopies are typically more closed than in the Mixed Conifer-Frequent Fire ERU. Overstory canopy cover varies with seral state and time since disturbance, topographic characteristics and soil properties, often approaching complete canopy closure in mid- to late seral states (see TEU).
3. Old growth occurs over large, continuous areas. Old growth components include old trees, standing dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time because of natural growth, death, and disturbance.
4. The Mixed Conifer with Aspen is composed predominantly of vigorous trees, but declining trees provide snags; top-killed, lightning- and fire-scarred trees; downed logs (larger than 12 inches diameter at mid-point, more than 8 feet long) and coarse woody debris (larger than 3 inches diameter).

5. Snags and coarse woody debris are well distributed. The number of snags and amount of coarse woody debris vary by site productivity, seral state and disturbance history, generally increasing from early through late succession.
    a. Snags 18 inches or greater diameter at breast height (DBH) have an average range between 1 to more than 5 per acre. Snag density in general (8 inches DBH and greater) averages 20 per acre with a range of 13 to 30.
    b. Average coarse woody debris, including downed logs, varies from 10 to 40 tons per acre or more depending on site productivity, disturbance history and seral state.
6. An understory of native grasses, forbs and shrubs is typically present, with basal area, canopy cover and species composition varying with seral state, degree of canopy closure and TEU.
7. Infrequent mixed-severity fire (Fire Regime Group III) is characteristic, especially at lower elevations of this type. High-severity fires occur very infrequently (Fire Regime Groups IV and V) and typically occur at the higher elevations of this type. Patches created by stand-replacement fire typically do not exceed 1,000 acres.

Mid-scale Desired Conditions (10 to 1,000 acres)

1. The landscape arrangement is a mosaic of variably sized groups and patches of trees, primarily even aged within groups or patches with ages varying between groups or patches. Groups and patches of tens of acres or less are relatively common. The size and number of tree groups and patches vary depending on disturbance history, topographic characteristics and soil properties (see TEU). Grass, forb, shrub interspaces created by disturbance may involve single trees or comprise up to 100 percent of the mid-scale area following major disturbances. Openness, species dominance and overall composition also varies within and between patches, depending on seral state. Aspen is occasionally present in large patches.
2. Average tree densities range from 20 to 180 square feet of basal area or greater per acre depending on time since disturbance, seral states of the groups and patches, topographic characteristics and soil properties.
3. The understory consists of native shrubs, perennial grasses and sedges, forbs, mosses and other non-vascular plants with basal area ranging from less than one percent to 20 percent or more depending on soil properties (see TEU), seral state, and degree of canopy closure.
4. Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests typically contain at least 10 percent greater basal area than goshawk foraging areas and the general forest. Nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas.

Fine-scale Desired Conditions (less than 10 acres)

1. In mid-aged and older forest groups, trees are typically variably spaced with crowns interlocking or nearly interlocking. Trees within groups can be of similar or variable species and ages. Small openings are present because of disturbances.

2. Organic ground cover and herbaceous vegetation provide protection for soil, moisture infiltration, and contribute to plant diversity and ecosystem function.

Objective

1. Treat at least 300 and no more than 73,934 acres per decade using a combination of naturally ignited wildfire, prescribed fire and mechanical methods to maintain or move toward desired conditions.

Management Approach

Seral State Proportion, Re-burn and Vulnerability

Similar concerns exist for Mixed Conifer with Aspen as with the Spruce-Fir Forest. The management approach to address seral state proportion, re-burn and vulnerability described for the Spruce-Fir Forest is also applicable to this ERU.

Related Plan Content

Content that follows under the Application of Tree Density Ranges of Values provides additional information regarding what is known about the range of historic variability and the state of the science, to aid in implementing the Ranges of Values and Application of Science management approach under the All Upland Ecological Response Units heading, as previously described. Content that follows under the At-Risk Species for Mixed Conifer with Aspen heading is intended for reference during project planning and wildfire incidents.

Application of Tree Density Ranges of Values

Few studies reconstructing forest structure have been conducted in the mixed conifer[1,2]. Of those studies conducted, most focused on frequent fire, dry mixed conifer sites where ponderosa pine, southwestern white pine, or both are dominant or co-dominant components[3]. The range of average basal area presented in the mid-scale desired conditions reflects a Southwestern Regional summary of existing conditions derived from region-wide FIA plot data based on the assumption that the characteristic fire regime and forest structure has not been highly altered in this ecosystem[4,5]. FIA data from the Gila and Aldo Leopold Wildernesses[6] suggest a basal area maximum (not an average maximum) of 353 square feet per acre. While FIA data documents basal areas of zero[6] in areas of stand-replacement fire, having residual trees to act as a seed source is desirable.

At-Risk Species for Mixed-Conifer with Aspen

Federally listed species are indicated by an asterisk. Species without an asterisk are not federally listed, but are species of conservation concern.

Mexican spotted owl*, Iron Creek woodlandsnail, marsh slug snail, Morgan Creek mountainsnail, Silver Creek woodlandsnail, western bumble bee, Arizona montane vole, Mexican gray wolf, Gooding's onion, heartleaf groundsel, Hess's fleabane, Mogollon death camas, Mogollon hawkweed, Mogollon Mountain lousewort, Porsild's starwort, yellow lady's-slipper

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Mixed Conifer-Frequent Fire (Dry Mixed Conifer)

Background Information

The Mixed Conifer-Frequent Fire ERU is transitional between the Ponderosa Pine Forest and the Ponderosa Pine-Evergreen Oak ERUs and the Mixed Conifer with Aspen. In the Gila NF, it typically occurs between 6,000 and 9,300 feet on steep slopes (40 to 120 percent rise) although sometimes it is found on gentler terrain. Degree of canopy closure, seral state, topographic characteristics, and soil properties are determining factors of tree species composition as they influence site temperature and plant available moisture.

Shade-intolerant trees such as ponderosa pine, southwestern white pine, quaking aspen and Gambel oak dominate the forest, with mid-tolerant species such as Douglas-fir being common. Shade tolerant species such as white fir may be occasionally be present. A wide range of native grasses, forbs, shrubs and ferns are present with variable species composition depending on latitude, elevation, aspect, and soil properties. Some common species include Oregon grape, screwleaf muhley, mountain muhley, Arizona fescue, mountain brome, pine dropseed, fleabane, penstemon, and wood sorrel. Lichens and non-vascular plants, such as mosses and liverworts, are also important components.

Mixed Conifer-Frequent Fire comprises 12 percent of the Gila[e] and is more common in the forest than within the broader landscape[f] providing management a greater opportunity to contribute to ecological integrity and sustainability.

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

1. The Mixed Conifer-Frequent Fire vegetation community is a mosaic of structural and seral stages ranging from young trees through old, and is composed of multiple species. Forest appearance is variable, but is generally uneven-aged and open; occasional patches of even-aged structure are present.
2. The forest arrangement is an assemblage of variably sized openings of grasses, forbs, and shrubs. Size, shape, and number of trees per group, and number of groups per area are variable across the landscape. Where they occur, groups of aspen and all structural stages of oak are present. Denser tree conditions exist on northerly aspects, steep slopes, toe slopes and in canyon bottoms.
3. Old growth occurs over large, continuous areas. Old-growth components include old trees, standing dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time because of natural growth, death and disturbance.
4. Mixed Conifer-Frequent Fire is composed predominantly of vigorous trees, but declining trees provide snags; top-killed, lightning- and fire-scarred trees; downed logs (more than 12 inches diameter at mid-point, over 8 feet long) and coarse woody debris (more than 3 inches diameter). Snags and coarse woody debris are well distributed. The number of snags and amount of coarse woody debris vary by site productivity, seral state, and disturbance history.
5. 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.

6. Frequent, low-severity fires (Fire Regime Group I) are characteristic, including throughout goshawk home ranges. Infrequent mixed-severity fire (Fire Regime Group III) is characteristic only in the higher elevations where this type transitions with Mixed Conifer with Aspen or where topography and other physical site conditions are predisposed to more severity.

Mid-scale Desired Conditions (10 to 1,000 acres)

1. The Mixed Conifer-Frequent Fire vegetation community is characterized by variation in the size and number of tree groups depending on disturbance history, elevation, aspect, topography, topographic position, and soil properties (see TEU). The more 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 less productive sites.
2. Average tree densities range from 40 to 125 square foot basal area per acre depending on disturbance history, topographic characteristics, and soil properties (see TEU).
3. Patch size, as measured by individual trees or clumps of trees, ranges from less than 1 acre to tens of acres. The mosaic of tree groups is generally composed of uneven-aged forest with all age classes and structural stages. Occasionally, small patches of even-aged forest structure are present, but are generally less than 60 acres. A small percentage of the landscape may be predisposed to larger even-aged patches. Even-aged stand size depends on the timing of regeneration establishment and the timing, frequency and severity of disturbance events.
4. Snags 18 inches or larger diameter at breast height (DBH) average 3 per acre. Snag density in general (over 8 inches DBH) averages 8 per acre.
5. Downed logs (over 12 inches diameter at mid-point) average 3 per acre within forested areas. Average coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre in forested areas, depending on site productivity, disturbance history, and seral state.
6. The understory consists primarily of perennial grasses and forbs capable of carrying low-severity surface fire, with basal vegetation values ranging between less than 1 and 25 percent depending on soil properties (see TEU) and seral state. Basal vegetation values at the low end of this range are typically restricted to soils formed from certain rhyolite and tuff units (see TEU).
7. Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests typically contain at least 10 percent greater basal area than goshawk foraging areas and the general forest. Nest areas have forest conditions that are multi-aged, but are dominated by large trees with relatively denser canopies than other areas.

Fine-scale Desired Conditions (less than 10 acres)

1. Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees in the mid-to-old age groups are interlocking or nearly interlocking. Groups in the mid-to-old age groups consist of 2 to approximately 50 trees per group. Size of tree groups is typically less than one acre. Trees within groups are of similar or variable ages and one or more species.

2. Interspaces surrounding tree groups are variably shaped and composed of a mixture of grasses, forbs, and shrubs. Some natural openings contain individual trees or snags.
3. Organic ground cover and herbaceous vegetation provide protection for soil, moisture infiltration, and contribute to plant diversity and ecosystem function.

Objective

1. Treat at least 6,875 and no more than 282,400 acres per decade using a combination of naturally ignited wildfire, prescribed fire and mechanical methods to maintain or move toward desired conditions.

Related Plan Content

Content that follows under the Application of Tree Density Ranges of Values provides additional information regarding what is known about the range of historic variability and the state of the science, to aid in implementing the Ranges of Values and Application of Science management approach under the All Upland Ecological Response Units heading, as previously described. Content that follows under the At-Risk Species for Mixed Conifer-Frequent Fire heading is intended for reference during project planning and wildfire incidents.

Application of Tree Density Ranges of Values

Few studies reconstructing forest structure have been conducted in the mixed conifer[1,2]. Of the studies conducted, most have focused on frequent fire, dry mixed conifer sites where ponderosa pine and southwestern white pine are dominant or co-dominant components, of which 15 are summarized by Reynolds and others[3]. The range of average basal area presented in the mid-scale desired conditions reflects their recommendations and corresponds with a range of average trees per acre between 20 and 100[3].

In this summary, only three of the 15 reconstruction studies reported a full range of variability. Most reported only single average values. The reconstruction study used to establish the maximum average value contained in the desired conditions statement documents a maximum (not average) of 235 square feet of basal area and a maximum of 151 trees per acre. The minimum average value corresponds with the mean reported for a single study in northern Arizona’s San Francisco Peaks[3].

Desired conditions statements demonstrate a pattern of decreasing tree density from Mixed Conifer-Frequent Fire, to Ponderosa Pine Forest (including perennial bunch grass and Gambel oak subtypes), on to Ponderosa Pine-Evergreen Oak[4]. However, this may be an oversimplified pattern, given that reconstruction studies in pine-oak document basal areas as high as 337 square feet per acre and 262 trees per acre[3]. The presence of re-sprouting species such as oak likely influences tree density, but will have less influence on basal area and more influence on trees or stems per acre. Reconstruction studies also demonstrate a strong bias toward basalt and limestone derived soils[3]. Whether there is a bias toward slopes under 40 percent remains somewhat speculative, as most of the publications, including those summarized by Reynolds and others, provide very little, if any discussion about this particular physical site characteristic.

Recent work by Rodman and others[5] has since demonstrated a positive relationship between slope steepness and trees per acre, and correlated basal area with parent material and TEU. Korb and others[6] strongly suggest a need to consider topography and other site variables and avoid generalization of structure and fire regimes in dry mixed conifer after finding an “unexpected diversity” in their reconstruction study. Local topography and its effects on microclimate may also buffer long-term changes in climatic variability[7] and signal potential refugia for some species[8, 9, 10].

Applying desired conditions, HRV and landscape heterogeneity goals to this ERU will benefit from TEUI applications (see Abella and others for an example[11]) and site-specific, field-based development of project-level desired conditions. In other recent work by Rodman and others[12], consideration of fine-scale site conditions and the life history requirements of specific tree species may also be useful in designing and implementing restoration projects. In general, values at the low end of the range might be expected to occur near transition zones with ponderosa pine types, in areas of low topographic relief and on southerly aspects. Conversely, higher tree densities might be expected where this ERU transitions to Mixed Conifer with Aspen, drainage bottoms, toe slopes, northerly aspects, and on some soils that are not capable of supporting a robust herbaceous understory (see TEU). A robust herbaceous understory can limit suitable germination sites; compete with seedlings; and carries frequent, low-severity fire with flame lengths sufficient to kill regenerating conifers. When comparing apples to apples (for example, southerly aspects to southerly aspects), tree density may increase with slope steepness[5], given soil depth and physical properties do not restrict tree growth[13]. Higher densities where local topography includes swales or concave pockets may also provide important fine-scale habitat elements for some species[13]. A final consideration relates back to slope angle. Standard land survey practices measure only the horizontal distance between two points, not true ground distance. Steeper slopes having greater surface area per acre and a correction for slope angle may be useful.

At-Risk Species for Mixed-Conifer-Frequent Fire

Federally listed species are indicated by an asterisk. Species without an asterisk are not federally listed, but are species of conservation concern.

Lewis's woodpecker, Mexican spotted owl*, Iron Creek woodlandsnail, marsh slug snail, Morgan Creek mountainsnail, Silver Creek woodlandsnail, western bumble bee, Arizona montane vole, Mexican gray wolf*, Gooding’s onion, Metcalfe’s penstemon, Mimbres figwort, Mogollon clover, Mogollon hawkweed, Porsild’s starwort, yellow lady’s-slipper

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Ponderosa Pine Forest

Background Information

The Ponderosa Pine Forest vegetation community includes two sub-types: Ponderosa Pine-Bunchgrass and Ponderosa Pine-Gambel Oak, which generally occur at elevations typically ranging from 6,000 to 7,500 feet. Ponderosa pine dominates both subtypes, which often include Gambel oak and evergreen oak species, or both, juniper and piñon pine. Aspen, Douglas-fir, and white fir may also be present, depending on physical site characteristics. The understory is composed of a wide diversity of native grasses, sedges, forbs, shrubs and ferns. Common grasses include blue grama, mountain muhley, screwleaf muhley, muttongrass, June grass and pine dropseed. Other common species include Fendler's buckbrush, New Mexico locust, lupine, penstemon, fleabane, vetch, and ferns. Lichens and non-vascular plants such as mosses and liverworts are also important components.

This ERU contains relatively small areas where Arizona pine (aka Apache pine), rather than ponderosa pine, is dominant. These areas are generally limited to rhyolite/tuff TEUs within the Gila and Aldo Leopold Wildernesses. Ponderosa Pine Forest is relatively common, representing 19 percent of the forest[e]. There is also more of it in the forest than in the broader landscape[f], providing management a greater opportunity to contribute to ecological sustainability.

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

1. The Ponderosa Pine Forest vegetation community is a composed of trees from structural stages ranging from young to old. Forest appearance is variable, but is generally uneven-aged and open; occasional areas of even-aged structure are present.
2. The forest arrangement is in individual trees, small clumps and groups of trees intersperse within variably sized opening of grasses, forbs, and shrubs similar to historic patterns. The size, shape, number of trees per group, and number of groups per area are variable across the landscape. Denser tree conditions exist on northerly aspects, steep slopes, toe slopes and in canyon bottoms.
3. In the Gambel oak subtype, all sizes and ages of oak trees are present.
4. Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, standing dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time because of natural growth, death, and disturbance.
5. The Ponderosa Pine Forest is composed predominantly of vigorous trees, but declining trees provide snags and coarse woody debris; downed logs (larger than 12 inches diameter at mid-point, over 8 feet long) and coarse woody debris (over 3 inches diameter). Snags and coarse woody debris are well distributed. The number of snags and amount of coarse woody debris vary by seral state.
6. Dwarf mistletoes occurs in less than 15 percent of host trees in uneven-aged forest structures and less than 25 percent in even-aged forest structures.
7. Frequent, low-severity fires (Fire Regime Group I) are characteristic, including throughout goshawk home ranges.

Mid-scale Desired Conditions (10 to 1,000 acres)

1. The Ponderosa Pine Forest vegetation community is characterized by variation in the size and number of tree groups depending on disturbance history, topographic characteristics, and soil properties (see TEU). The more productive sites contain more trees per group and more groups per area. Openness typically ranges from 52 percent in more productive sites to 90 percent in the less productive sites. In areas with high fine-scale aggregation of trees into groups, mid-scale openness ranges between 78 and 90 percent.
2. Tree density generally ranges from an average of 22 to an average of 89 square foot basal area per acre depending disturbance history, topographic characteristics, and soil properties (see TEU). Denser tree conditions exist on northerly aspects, steep slopes, toe slopes, and in canyon bottoms.
3. Patch size, as measured by individual trees or clumps of trees, ranges from less than an acre to 0.5 acre. The mosaic of tree groups is generally composed of uneven-aged forest with all age classes and structural stages. Occasionally, small patches of even-aged forest structure are present. A small percentage of the landscape may be predisposed to larger even-aged patches. Even-aged stand size depends on the timing of regeneration establishment and the timing, frequency, and severity of disturbance events.
4. Snags are typically 18 inches or larger diameter at breast height and average 1 to 2 per acre. In the Gambel oak subtype, large oak snags (more than 10 inches diameter at mid-point) are a well-distributed component.
5. Downed logs average 3 per acre. Average coarse woody debris, including downed logs ranges from 5[1,2] to 10 tons per acre.
6. The understory consists primarily of perennial grasses and forbs capable of carrying frequent, low-severity surface fire, with basal vegetation values ranging between less than 1 and 25 percent depending on soil properties (see TEU) and seral state; basal vegetation values at the low end of this range are typically restricted to soils formed from some rhyolites and tuffs (see TEU).
7. Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests typically contain 10 percent or greater basal area than goshawk foraging areas and the general forest. Nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas.

Fine-scale Desired Conditions (less than 10 acres)

1. Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees in the mid- to old-age groups are interlocking or nearly interlocking. Groups in the mid-to old age groups consist of 2 to approximately 40 trees per group. Size of tree groups is typically less than 1 acre, but average 0.5 acre. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine.
2. Interspaces surrounding tree groups are variably shaped and composed of a mixture of grasses, forbs and shrub. Some natural openings contain individual trees or snags.
3. Organic ground cover and herbaceous vegetation provide protection for soil, moisture infiltration, and contribute to plant diversity and ecosystem function.

Objective

1. Treat at least 6,320 and no more than 600,300 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.

Related Plan Content

Content that follows under the Application of Tree Density Ranges of Values provides additional information regarding what is known about the range of historic variability and the state of the science, to aid in implementing the Ranges of Values and Application of Science management approach under the All Upland Ecological Response Units heading, as previously described. Content that follows under the At-Risk Species for Ponderosa Pine Forest heading is intended for reference during project planning and wildfire incidents.

Application of Tree Density Ranges of Values

Most studies reconstructing forest structure have been done in ponderosa pine and pine-oak systems on basalt or limestone parent materials[3]. The range of average basal area presented in the mid-scale desired conditions reflects the recommendations of Reynolds and others, and corresponds with a range of average trees per acre between 11 and 124[3]. The average minimum is based on Woolsey plots near Tusayan, Arizona, and the average maximum is set by a site at Fire Point, Arizona. As with the Mixed Conifer-Frequent Fire, many of the studies summarized by Reynolds and others only report a single average value for tree density, but many report a full range. Of these, the minimum basal area value is zero, corresponding to a forest opening. The maximum basal area value (not average) for the site used to establish the average maximum is 132, with another site in the same study providing a maximum (not average) of 337. Both of these studies were done in pine-oak systems where Gambel oak was the dominant oak species. Published literature suggests lower basal area ranges might apply to the perennial bunchgrass subtype[3], although the science is not without limitations. Existing science describes northern Arizona ponderosa pine systems on basalt and limestone soils well[3], but may not reflect the full range of historic variability for the rest of the Southwest[4, 5].

Applying desired conditions, HRV and landscape heterogeneity goals to this ERU will benefit from TEUI applications (see Abella and others for an example[6]) and site-specific, field-based development of project-level desired conditions. In general, values at the low end of the range might be expected in areas of low topographic relief and on southerly aspects. Conversely, higher tree densities might be expected in drainage bottoms, on toe slopes and northerly aspects, transition zones with PJ Woodland, and on some soils that are not capable of supporting a robust herbaceous understory (see TEUI). A robust herbaceous understory can limit suitable germination sites, compete with seedlings and carries frequent, low-severity fire with flame lengths sufficient to kill regenerating conifers. When comparing apples to apples (for example, southerly aspects to southerly aspects), tree density may increase with slope steepness[5] given soil depth and physical properties do not restrict tree growth[7]. Higher densities where local topography includes swales or concave pockets may also provide important fine-scale habitat elements for some species[7].

At-Risk Species for Ponderosa Pine Forest

Federally listed species are indicated by an asterisk. Species without an asterisk are not federally listed, but are species of conservation concern.

Arizona toad, Lewis's woodpecker, Mexican spotted owl*, Iron Creek woodlandsnail, marsh slug snail, Morgan Creek mountainsnail, Silver Creek woodlandsnail, Western bumble bee, Arizona montane vole, Mexican gray wolf*, cliff brittlebrush, Metcalfe’s penstemon, Mimbres figwort, Mogollon clover, Mogollon hawkweed, Porsild’s starwort, yellow lady’s-slipper

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Ponderosa Pine-Evergreen Oak

Background Information

Ponderosa Pine-Evergreen Oak is a transition zone between the Ponderosa Pine Forest, Mixed Conifer-Frequent Fire, and the woodland ERUs. It generally occurs at elevations ranging from 5,500 to 7,200 feet. It is dominated by ponderosa pine and can be distinguished from Ponderosa Pine Forest by somewhat more even-aged dynamics and by one or more well-represented evergreen oak species such as Emory, silverleaf, or gray oak. Other species include juniper and piñon pine. Ponderosa Pine-Evergreen oak has two subclasses, one with a more continuous layer of native perennial grasses, forbs, and few shrubs, and one with an understory of primarily native evergreen shrubs, including manzanita, sumac, and mountain mahogany. Common grass species found in this ERU include blue and sideoats gramas, piñon ricegrass, and muttongrass. Lichens and non-vascular plants such as mosses and liverworts are also important components.

Ponderosa Pine-Evergreen Oak is relatively common, representing 12 percent of the Gila[e]. There is also more of it in the forest than in the broader landscape[f], providing management a greater opportunity to contribute to ecological integrity and sustainability.

Landscape-scale Desired Conditions (1,000 to10,000+ acres)

1. The perennial grass subtype of Ponderosa Pine-Evergreen Oak is composed of structural and seral stages ranging from young trees through old, and is composed of multiple species. Forest appearance is variable, but is generally uneven-aged and open at the landscape scale, although it can appear even-aged within tree groups; occasionally larger areas of even-aged structure are present.
2. The forest arrangement is in individual trees, small clumps and groups of trees interspersed within variably sized openings with grasses, forbs and shrubs. The size, shape, number of trees per group, and number of groups per area vary across the landscape. Denser tree conditions exist on northerly aspects, steep slopes, toe slopes, and in canyon bottoms.
3. All age and structural classes of oak are present with old trees occurring as dominant individuals and small groups occurring typically within openings. In the perennial grasses subtype, shrubs occur at low densities that do not inhibit ponderosa pine regeneration, typically averaging less than 30 percent canopy cover. In the evergreen shrub subtype, shrub canopy cover averages more than 30 percent.
4. Old growth occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Old-growth components include old trees, standing dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time because of natural growth, death, and disturbance.
5. Ponderosa Pine-Evergreen Oak is composed predominantly of vigorous trees, but declining trees provide snags and coarse woody debris; downed logs (larger than 12 inches diameter at mid-point, more than 8 feet long), and coarse woody debris (over 3 inches diameter). Snags and coarse woody debris are well distributed. The number of snags and amount of coarse woody debris vary by seral state.

6. Dwarf mistletoe occurs in less than 15 percent of host trees in uneven-aged forest structures and in less than 25 percent in even-aged forest structures.
7. Frequent, low-severity fires (Fire Regime Group I) are characteristic of the perennial grasses subtype, including throughout goshawk home ranges. Mixed-severity fire (Fire Regime Group III) is characteristic of the evergreen shrub subtype.

Mid-scale Desired Conditions (10 to 1,000 acres)

1. The Ponderosa Pine-Evergreen Oak is characterized by variation in the size and number of tree groups depending on disturbance history, topographic characteristics, and soil properties (see TEU). The more 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.
2. Patch size, as measured by individual trees or clumps of trees, ranges from less than 1 acre to tens of acres. The mosaic of tree groups is generally composed of uneven-aged forest with all age classes and structural stages, though tree groups and patches may be relatively even-aged. Occasionally, small patches of even-aged forest structure are present. A small percentage of the landscape may be predisposed to larger even-aged patches. Even-aged stand size depends on the timing of regeneration establishment and the timing, frequency, and severity of disturbance events.
3. Average tree density ranges from 20 to 80 square foot basal area per acre depending on disturbance history, topographic characteristics, and soil properties (see TEU). Denser tree conditions exist on northerly aspects, steep slopes, toe slopes, and in canyon bottoms.
4. Snags are typically 18 inches or larger diameter at breast height and average 1 to 2 per acre. Snags between 8 and 18 inches average 5 per acre. Large oak snags (over 10 inches diameter at mid-point) are a well-distributed component.
5. Downed logs average 4 per acre. Average coarse woody debris, including downed logs varies with seral state and ranges from 5[1,2] to 15 tons per acre in forested areas depending on site productivity, disturbance history, and seral state.
6. In both subtypes the understory consists primarily of native shrubs, perennial grasses, and forbs capable of supporting the natural fire regime with basal vegetation values ranging between 5 and 25 percent, depending on the TEU.
7. Forest conditions in goshawk post-fledging family areas (PFAs) are similar to general forest conditions except these forests typically contain 10 percent or greater basal area than goshawk foraging areas and the general forest. Nest areas have forest conditions that are multi-aged, but are dominated by large trees with relatively denser canopies than other areas.

Fine-scale Desired Conditions (less than 10 acres)

1. Trees typically occur in small groups and are variably spaced with some tight clumps. Crowns of trees in the mid-to-old-age groups are interlocking or nearly interlocking. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Size of tree groups is typically less than 0.5 acre in the evergreen shrub subtype and less than 1 acre in the perennial grasses subtype.
2. Interspaces surrounding tree groups are variably shaped and comprised of a mixture of grasses, forbs and shrubs reflective of each subtype. Some natural opening include large open-grown oaks.
3. Organic ground cover and herbaceous vegetation provide protection for soil, moisture infiltration, and contribute to plant diversity and ecosystem function.

Objective

1. Treat at least 1,000 and no more than 540,000 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.

Related Plan Content

Content that follows under the Application of Tree Density Ranges of Values provides additional information regarding what is known about the range of historic variability and the state of the science, to aid in implementing the Ranges of Values and Application of Science management approach under the All Upland Ecological Response Units heading, as previously described. Content that follows under the At-Risk Species for Ponderosa Pine-Evergreen Oak heading is intended for reference during project planning and wildfire incidents.

Application of Tree Density Ranges of Values

The Madrean influenced Ponderosa Pine-Evergreen Oak ERU[3] has very limited information on which to base an understanding of stand or age structure. Most studies have focused on fire history reconstructions. A single study near Durango, Mexico, provides tree density reconstructions[4]. Because it is not stated in the Forest Service Regional Office's science summary and desired conditions document[5], it is assumed that the average minimum and average maximum values presented in the desired condition statements represent the recommendations made by Reynolds and others for ponderosa pine and pine-oak systems[6] adapted based on the assumption that warmer, drier conditions in this ERU result in lower basal area values as compared to Ponderosa Pine Forest.

Applying desired conditions, historic range of variability, and landscape heterogeneity goals to this ERU will benefit from TEUI applications (see Abella and others for an example[7]) and site-specific, field-based development of project-level desired conditions. Careful consideration of the evergreen oak response, related changes in subtype and fire regime, maintenance requirements and available tools could aid in project development and implementation with best efforts being made to avoid converting the perennial grasses subtype to the evergreen shrub subtype and a predominantly frequent, low-severity fire regime into a mixed-severity fire regime[8].

In general, values at the low end of the range might be expected in areas of low topographic relief in the perennial grasses subtype (see TEUI). Conversely, higher tree densities might be expected in drainage bottoms, on toe slopes and northerly aspects, transition zones with PJ Woodland and PJ Evergreen Shrub, and on some soils that are not capable of support a robust herbaceous understory (see TEU). A robust herbaceous understory can limit suitable germination sites, compete with seedlings and carries frequent, low-severity fire with flame lengths sufficient to kill regenerating woody species. When comparing apples to apples (for example, southerly aspects to southerly aspects), tree density may increase with slope steepness[9] given soil depth and physical properties are not restrictive to tree growth[10]. Higher densities where local topography includes swales or concave pockets may also provide important fine-scale habitat elements for some species[10].

At-Risk Species for Ponderosa Pine-Evergreen Oak

Federally listed species are indicated by an asterisk. Species without an asterisk are not federally listed, but are species of conservation concern.

Arizona toad, Lewis's woodpecker, Iron Creek woodlandsnail, marsh slug snail, Morgan Creek mountainsnail, western bumble bee, Mexican gray wolf*, cliff brittlebrush, Mimbres figwort, Piños Altos flame flower

<u>References</u>

[1] Graham, R.T., A.E. Harvey, M.F. Jergensen, T.B. Jain, J.R. Tonn and D.S. Page-Dumroese. 1994. Managing Coarse Woody Debris in the Forests of the Rocky Mountains. United States Department of Agriculture, Forest Service, Intermountain Research Station. Research Paper INT-RP-477.

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[3] Wahlberg, M., F.J. Triepke, W. Robbie, S. Strenger, D. Vandendriesche, E. Muldavin, and J. Malusa. 2014 in draft. Ecological Response Units of the Southwestern United States. United States Department of Agriculture, Forest Service, Southwestern Region, Albuquerque, NM. 201 pp.

[4] Schussman, H. 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.

[5] USDA FS (United States Department of Agriculture – Forest Service). Updated 2017b. Desired Conditions for Use in Forest Plan Revision in the Southwestern Region: Development and Science Basis. Unpublished paper on file at USDA Forest Service, Southwestern Region. Albuquerque NM. 57 pp.

[6] Reynolds, R.T., A.J. Sánchez Meador, J.A. Youtz, T. Nicolet, M.S. Matonis, P.L. Jackson, D.G. Delorenzo, and A.D. Graves. 2013. Restoring Composition and Structure in Southwestern Frequent-Fire Forests: A science-based framework for improving ecosystem resiliency. United States Department of Agriculture, Forest Service, Rocky Mountain Research Station. General Technical Report RMRS-GTR-310.

[7] Abella, S.R., C.W. Denton, D.G. Brewer, W.A. Robbie, R.W. Steinke, and W.W. Covington. 2011. Using a terrestrial ecosystem survey to estimate the historical density of ponderosa pine trees. Research Note RMRS-RN-45. United States Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 9 pp.

[8] USDA FS (United States Department of Agriculture – Forest Service). 2017. Final Assessment Report of Ecological/Social/Economic Sustainability Conditions and Trends. Gila National Forest, NM. 932 pp.

[9] Rodman, K.C., A.J. Sánchez Meador, M.M. Moore, and D.W. Huffman. 2017. Reference conditions are influenced by the physical template and vary by forest type: A synthesis of *Pinus ponderosa*-dominated sites in the southwestern United States. Forest Ecology and Management 40:316-329.

[10] North, M., P. Stine, K. O'Hara, W. Zielinski, and S. Stephens. 2009. An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests. United States Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany CA. General Technical Report PSW-GTR-220 (second printing with addendum).

Woodland Ecological Response Units

Madrean Piñon-Oak Woodland

Background Information

The Madrean Piñon-Oak Woodland ERU occurs from approximately 4,500 to 7,000 feet. This ERU is transitional between Ponderosa Pine-Evergreen Oak and the Semidesert Grassland, and intergrades with other woodland types. The central tendency of Madrean Piñon-Oak Woodland is dominated by an open to closed canopy of evergreen oaks, alligator juniper, Mexican piñon, border piñon, Chihuahua pine, and other pines with a grassy understory. While the Madrean influence can be observed in the floristics throughout the southern half of the Gila NF, it is not strongly expressed.

Some areas in the forest where plant communities are dominated by tree-form evergreen oaks, with or without piñon and juniper co-dominants, have been placed in this ERU as a provisional resort, pending updates to the ERU framework. In these cases, composition varies from the communities of the Madrean province, although the structure and dynamics of the system are consistent with Madrean Piñon-Oak concepts.

In the Gila NF, in the “true” Madrean Piñon-Oak Woodland, two-needle piñon is dominant, with Mexican and border piñon being subordinate, and only occasionally codominant. Chihuahua pine is uncommon, but does occur. Gray, silverleaf, netleaf, and Emory oak are the dominant oak species. Alligator juniper is generally present, but subdominant. Sotol, silktassel, sumac, desert buckthorn, beargrass, mountain mahogany, agave and yucca species are common, as are a variety of grama grasses, three-awns, muhleys, a diversity of other perennial native grasses, forbs, ferns and cacti. Lichens and non-vascular plants such as mosses and liverworts are also important components.

On the other hand, the “true” Madrean Piñon-Oak Woodland in the forest deviates somewhat from the central tendency in that the potential for a grassy understory is limited. This ERU is currently[f] mapped on one TEU, which is characterized by shallow, weakly developed soils on rhyolite or tuff with relatively low moisture-holding capacity and fertility, and a significant bedrock outcrop component (25 percent). This leads to more of an evergreen shrub-dominated understory, rather than a grassy understory. Similar to the Ponderosa Pine-Evergreen Oak ERU, an understory dominated by perennial grasses may be an indicator of a frequent, low-severity surface fire regime; whereas an understory dominated by evergreen shrubs may be indicative of an infrequent, mixed-severity fire regime. The bedrock outcrop component, combined with steep slopes may also warrant consideration of some PJ Woodland fire regime concepts; on these sites, very infrequent high-severity fire may also be characteristic, or factors such as insect and disease may be the only disturbance agents that affect woodland development.

[f] During finalization on the Gila NF’s TEUI, this has expanded to include two additional TEUs. This content will need to be reviewed and updated as necessary when the ERU map is updated to reflect the final TEUI map and associated data products.

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

1. The Madrean Piñon-Oak Woodland is characterized by relatively homogenous structure, generally uneven-aged with open or closed canopies. Occasional patches of even-aged structure are present.
2. Old growth occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Old-growth components include old trees, standing dead trees (snags), downed wood (coarse woody debris), and structural diversity. Declining trees are a well-distributed component providing for snag and coarse woody debris recruitment. The location of old growth shifts on the landscape over time because of natural growth, death, and disturbance.
3. Infrequent mixed-severity fire (Fire Regime Group III) is characteristic, with high-severity fire occurring very infrequently (Fire Regime group V).

Mid-scale Desired Conditions (10 to 1,000 acres)

1. The majority of the woodland is in a moderately open condition with overstory tree cover averaging between 10 and 50 percent or more depending disturbance history, topographic characteristics, and soil properties (see TEU). Higher overstory tree cover values typically occur on northerly facing slopes, toe slopes, drainage bottoms and areas where local topography includes concave pockets.
2. Tree groups vary in size, shape, and number depending on disturbance history, topographic characteristics, and soil properties (see TEU). The more productive sites contain more trees per group and more groups per acre. Patch sizes, as measured by groups or clumps of trees, range from less than 1 acre to tens of acres, applicable at both the mid and fine scales.
3. Mixed-severity fire and other disturbances occasionally favor the development of even-aged patches at both the mid and fine scales.
4. All structural stages of oak are present with old trees occurring as dominant individuals and small groups.
5. The vegetation community is predominantly vigorous, but declining trees are a component and provide for well-distributed snags and coarse woody debris.
    a. Snags 18 inches diameter at breast height (DBH) or larger average 1 per acre; snags in general (8 inches DBH or larger) average 4 per acre; large oak snags (over 10 inches DBH) are also a well-distributed component.
    b. Coarse woody debris varies with seral state but averages 2 to 5 tons per acre.
6. Basal vegetation values vary from less than 1 to 5 percent, depending on disturbance history, seral state, degree of tree canopy closure, soil properties and shrub species (see TEU).
7. The amount of shrub canopy cover varies between less than 1 to more than 30 percent, depending on disturbance history, seral state, degree of tree canopy closure, soil properties, and shrub species (see TEU).

Fine-scale Desired Conditions (less than 10 acres)

1. The woodland arrangement is in individual trees, small clumps, and groups of trees interspersed within variably sized openings containing grasses, forbs, and shrubs. Some openings include large, open-grown oaks. Tree groups vary in size and number depending on climate, soil properties, 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 tens of acres.
2. Trees within groups are of similar or variable ages and may contain species other than oak, juniper, and piñon pine.
3. Crowns of trees within the mid-to-old-age groups are interlocking or nearly interlocking. These groups consist of 2 to approximately 40 trees.
4. Organic ground cover and herbaceous vegetation provide protection for soil, moisture infiltration, and contribute to plant diversity and ecosystem function.

Related Plan Content

Content that follows under the HRV and the State of the Science heading is intended to provide additional information regarding the range of historic variability, and the state of the science, to aid in implementing the Ranges of Values and Application of Science management approach under the All Upland Ecological Response Units heading, as previously described. The content that follows under the At-Risk Species for Madrean Piñon-Oak Woodland heading is intended for reference during project planning and wildfire incidents.

HRV and the State of the Science

Historic information supporting this ERU comes from 11 tree-ring studies from southeastern Arizona into northern Mexico[1]. Most of these studies focused on fire return intervals. Stand and age structure information comes from 3 of these 11 studies. See Schussman and Gori[1], and Wahlberg and others[2] for science summaries relevant to this ERU.

At-Risk Species for Madrean Piñon-Oak Woodland

Federally listed species are indicated by an asterisk. Species without an asterisk are not federally listed, but are species of conservation concern.

Arizona toad, Cockerell Holospira snail, Iron Creek woodlandsnail, western bumblebee, lesser long-nosed bat, Mexican gray wolf*, Piños Altos flame flower.

<u>References</u>

[1] Schussman, H. and D. Gori. 2006. Historical Range of Variation and State and Transition Modeling of Historical and Current Landscape Conditions for Madrean Pine-Oak of the Southwestern U.S. Prepared for the U.S.D.A. Forest Service, Southwestern Region by The Nature Conservancy, Tucson, AZ. 35 pp.

[2] Wahlberg, M., F.J. Triepke, W. Robbie, S. Strenger, D. Vandendriesche, E. Muldavin, and J. Malusa. 2014 in draft. Ecological Response Units of the Southwestern United States. United States Department of Agriculture, Forest Service, Southwestern Region, Albuquerque, NM. 201 pp.

PJ Evergreen Shrub

During finalization of the Gila NF's Terrestrial Ecological Unit inventory, the two map units this ERU was based on were lumped with other map units assigned to the PJ Woodland ERU. Plan content has been removed.

PJ Woodland (Persistent Woodland)

Background Information

Regionally, this ERU is a broad grouping of different plant associations for descriptive purposes, with variable species composition, but similar structure and function. Disturbances (such as fire, insects, and disease) are typically infrequent and high-severity. These disturbance patterns create and maintain the even-aged nature of this type. Development takes place in distinctive phases; ranging from open grass-forb, to early and mid-aged open canopy, to mature closed canopy conditions. Where fire is very infrequent, the fire regime is usually attributed to local site characteristics such as rock outcrop, etc. On these sites, factors such as insect and disease may be the only disturbance agents that affect woodland development. Common tree species are piñon pine, oneseed juniper, and alligator juniper. Understories are frequently sparse and composed of native perennial grasses and annual and perennial forbs. Cacti and rock ferns are not uncommon. The shrub component is typically sparse. Oak species, manzanita, silktassel, mountain mahogany, sotol, and agave are common shrub or sub-shrubs found in this ERU. Because of shallow soils and the predominance of rock outcrop, a proportion of the Gila NF's mature PJ Woodland are open-canopy, very infrequent fire systems.

PJ Woodland is the most common ERU in the Gila, representing approximately 26 percent of its lands[e] and ranging in elevation from 4,500 to 7,500 feet. There is a higher percentage of PJ Woodland in the Gila than in the broader landscape[f], providing management a greater opportunity to contribute to ecological integrity and sustainability.

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

1. The PJ Woodland ERU is characterized by even-aged patches of piñon and juniper species that at the landscape level, form multi-aged woodlands.
2. Old growth occurs throughout the landscape, and is often concentrated in mid- and fine-scale units as patches of old growth. Old-growth components include old trees, standing dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time because of natural growth, death, and disturbance.
3. Very old trees (more than 300 years old) are present, while snags and older trees with dead limbs and tops are scattered across the landscape.
    a. Snags 18 inches diameter at root crown and above average 1 per acre.
    b. Snags 8 to 18 inches at root crown average 5 snags per acre.
    c. Coarse woody debris increases from early successional states through later successional states and averages 2 to 5 tons per acre.
4. Fire as a disturbance is less frequent and variable due to differences in understory conditions, though some sites are capable of carrying surface fire. The fires that do occur are mixed- to high-severity (Fire Regime III, IV, & V).

Mid-scale Desired Conditions (10 to 1,000 acres)

1. Tree density and canopy cover are high, shrubs are sparse to moderate, and herbaceous cover may be low and discontinuous, depending on the TEU.
2. Trees occur in even-aged patches ranging from young to old, where patch size ranges from tens to hundreds of acres.
3. Understory basal vegetation values (shrubs, grasses and forbs) typically ranges from less than 5 percent to 25 percent, depending on soil properties (see TEU) and seral state.

Management Approach

Restoration and Verification of the ERU Map

While working with the ERU map[e] during the assessment, forest staff developed concerns regarding the classification accuracy within the woodland vegetation types. For example, much of the woodland area on North Star Mesa is mapped as PJ Woodland, but observations in the field suggest that historically these areas were Juniper Grass. They are mapped as PJ Woodland because departure from historic conditions is high. Conversely, there are open canopy areas mapped as PJ Woodland on the south end of the forest that satellite imagery and field observation indicate would be better classified as Juniper Grass. Restoration projects in woodland ERUs might be best initiated by field validating the ERU classification before determining which ERU desired conditions apply and what project-level desired conditions might be. Documentation of field validation will be important in coordinating with the regional office in future updates to the ERU map.

Related Plan Content

Content that follows under the HRV and the State of the Science heading provides additional information regarding what is known about the range of historic variability and the state of the science, to aid in implementing the Ranges of Values and Application of Science management approach under the All Upland Ecological Response Units heading, as previously described. Content that follows under the At-Risk Species for PJ Woodland heading is intended for reference during project planning and wildfire incidents.

HRV and the State of the Science

Information about persistent woodlands comes exclusively from four studies on the Colorado Plateau. See Gori and Bate[1] and Wahlberg and others[2] for science summaries relevant to this ERU.

At-Risk Species for PJ Woodland

Federally listed species are indicated by an asterisk. Species without an asterisk are not federally listed, but are species of conservation concern.

Arizona toad, Iron Creek woodlandsnail, western bumblebee, lesser long-nosed bat, Mexican gray wolf*, Davidson’s cliff carrot, Mimbres figwort, Piños Altos flame flower, Wright’s dogweed.

References

[1] Gori, D., and J. Bate. 2007. Historical Range of Variation and State and Transition Modeling of Historical and Current Landscape Conditions for Pinyon-Juniper of the Southwestern U.S. Prepared for the U.S.D.A. Forest Service, Southwestern Region by The Nature Conservancy, Tucson, AZ. 141 pp.

[2] Wahlberg, M., F.J. Triepke, W. Robbie, S. Strenger, D. Vandendriesche, E. Muldavin, and J. Malusa. 2014 in draft. Ecological Response Units of the Southwestern United States. United States Department of Agriculture, Forest Service, Southwestern Region, Albuquerque, NM. 201 pp.

PJ Grass and Juniper Grass

Background Information

The PJ Grass and Juniper Grass ERUs are typically found between 4,500 and 7,500 feet. Although they have the same elevational range and may intergrade, Juniper Grass is most often found on warmer and drier settings, beyond the environmental limits of piñon. Tree species include oneseed juniper, alligator juniper, and piñon pine, with piñon obviously absent in the Juniper Grass. Frequent, low-severity disturbances are characteristic of these systems, which creates and maintains an uneven-aged open canopy woodland. Understories are dominated by a diversity of native perennial grasses and both annual and perennial forbs. Shrubs are absent or scattered.

PJ Grass and Juniper Grass are not uncommon on the Gila (approximately 9 percent and 4 percent, respectively)[e]. There is a higher representation of PJ Grass, but a lower representation of Juniper Grass as compared to the broader landscape[f]. Opportunities for management to contribute to ecological integrity and sustainability in PJ Grass is higher than in Juniper Grass, although it is important to both ERUs.

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

1. PJ Grass and Juniper Grass are generally uneven-aged and open in appearance.
2. Old growth occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Old-growth components include old trees, standing dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time because of natural growth, death, and disturbance.
3. Fires are typically frequent and low-severity (Fire Regime I).

Mid-scale Desired Conditions (10 to 1,000 acres)

1. Snags and coarse woody debris are scattered across the landscape.
    a. Snags 18 inches diameter at root crown or above average 1 per acre
    b. Snags 8 to 18 inches diameter at root crown average 5 per acre
    c. Coarse woody debris increases from early seral states through late seral states and averages 1 to 3 tons per acre.
2. Scattered shrubs and a dense herbaceous understory including native grasses, forbs and annuals are present to support frequent surface fires, with shrub canopy cover averaging less than 30 percent and understory vegetation basal area values averaging between about 10 and 30 percent, depending on soil properties (see TEU).

Fine-scale Desired Conditions (less than 10 acres)

1. Trees occur as individuals, but occasionally in small groups ranging from young to old. Individual trees and clumps range from less than one-tenth to one acre. Occasionally patches of uneven-aged structure are present because of disturbance and regeneration establishment timing. 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.
2. Organic ground cover and herbaceous vegetation provide protection for soil, moisture infiltration, and contribute to plant diversity and ecosystem function.

Objectives

1. In PJ Grass, treat at least 4,000 and no more than 145,800 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.
2. In Juniper Grass, treat at least 4,000 and no more than 88,000 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.

Management Approach

Restoration and Verification of the ERU Map

See PJ Woodland Management Approach.

Related Plan Content

Content that follows under the HRV and the State of the Science heading provides additional information regarding what is known about the range of historic variability and the state of the science, to aid in implementing the Ranges of Values and Application of Science management approach under the All Upland Ecological Response Units heading, as previously described. Content that follows under the At-Risk Species for PJ Grass and Juniper Grass heading is intended for reference during project planning and wildfire incidents.

HRV and the State of the Science

According to Gori and Bate, most reference sites are small, isolated mesas and caution is warranted when applying HRV in larger, more contiguous landscapes. Gori and Bate also suggest that the studies establishing HRV may be conservative estimates of historical tree density. While there are many more studies to define HRV than for the persistent woodlands, Gori and Bate assert that the number and distribution of available studies is limited, given the extensive distribution of these systems in the Southwest. See Gori and Bate[1] and Wahlberg and others[2] for science summaries relevant to this ERU.

At-Risk Species for PJ Grass and Juniper Grass

Federally listed species are indicated by an asterisk. Species without an asterisk are not federally listed, but are species of conservation concern.

Arizona toad, western bumblebee, Gunnison’s prairie dog, lesser long-nosed bat, Mexican gray wolf*, Wright’s dogweed, Iron Creek woodlandsnail, Greene’s milkweed

References

[1] Gori, D., and J. Bate. 2007. Historical Range of Variation and State and Transition Modeling of Historical and Current Landscape Conditions for Pinyon-Juniper of the Southwestern U.S. Prepared for the U.S.D.A. Forest Service, Southwestern Region by The Nature Conservancy, Tucson, AZ. 141 pp.

[2] Wahlberg, M., F.J. Triepke, W. Robbie, S. Strenger, D. Vandendriesche, E. Muldavin, and J. Malusa. 2014 in draft. Ecological Response Units of the Southwestern United States. United States Department of Agriculture, Forest Service, Southwestern Region, Albuquerque, NM. 201 pp.

Shrubland Ecological Response Units

Mountain Mahogany Mixed Shrubland

Background Information

The Mountain Mahogany Mixed Shrubland ERU occurs in the foothills, canyon slopes, and lower mountain slopes of the Rocky Mountains and on outcrops and canyon slopes in the western Great Plains. It ranges from southern New Mexico extending north into Colorado. These shrublands are often associated with exposed sites, rocky substrates, dry conditions, and recurrent but infrequent historic fire that limited tree growth. Scattered trees or inclusions of grassland patches may be present, but the vegetation is typically dominated by a variety of shrubs including mountain mahogany, and gray, silverleaf or turbinella oak.

This general description fits much of the Mountain Mahogany Mixed Shrubland in the forest, which typically occurs between 4,500 and 7,500 feet. However, oak-dominated areas, primarily in the Gila Wilderness, have been mapped as Mountain Mahogany Mixed Shrubland when they are more accurately described as early seral states. This is the result of stand-replacement fire in what would most likely have been mapped pre-fire as Mixed Conifer-Frequent Fire or Ponderosa Pine-Evergreen Oak. Additionally, this shrubland is mapped in gentle sloping terrain in the Burro Mountains where oak species, predominantly as a shrub lifeform, are dominant. Mountain mahogany, desert ceanothus, catclaw, silktassel, sumac, and beargrass are typically subordinate. Historic overgrazing and granitic soils strongly influence existing vegetation in this area, which may represent an altered grassland state.

Mountain Mahogany Mixed Shrubland is relatively common in the Gila, representing 5 percent of the land area[e], but is rare within the broader landscape[f], making forest management of this ERU important to ecological integrity and sustainability.

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

1. The Mountain Mahogany Mixed Shrubland vegetation community is a mosaic of structural and seral states ranging from young trees through old, and is composed of multiple species.
2. Tree cover is less than 10 percent, except in dissimilar inclusions driven by local topography, microclimate, and soil properties (see TEU).
3. Infrequent, stand-replacement fire (Fire Regime Group IV) is characteristic of this vegetation type.

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

1. Shrub cover is greater than 10 percent and may exceed 30 percent in late seral states, depending on disturbance history, elevation, aspect, topography, and soil properties (see TEU). Shrub basal area values typically range from 5 to 15 percent or more.

Related Plan Content

Content that follows under the HRV and the State of the Science heading provides additional information regarding what is known about the range of historic variability and the state of the science, to aid in implementing the Ranges of Values and Application of Science management approach under the All Upland Ecological Response Units heading, as previously described. Content that follows under the At-Risk Species for Mountain Mahogany Mixed Shrubland heading is intended for reference during project planning and wildfire incidents.

HRV and the State of the Science

Studies from similar shrubland ecosystems establish the HRV for Mountain Mahogany Mixed Shrubland, as no research specific to this system as conceptualized in the ERU classification has been conducted. See Schussman and Smith[1] and Wahlberg and others[2] for science summaries relevant to this ERU.

At-Risk Species for Mountain Mahogany Mixed Shrubland

Federally listed species are indicated by an asterisk. Species without an asterisk are not federally listed, but are species of conservation concern.

Arizona toad, western bumblebee, Mexican gray wolf*

References

1 Schussman, H. and E. Smith. 2006. Historical Range of Variation and State and Transition Modeling of Historical and Current Landscape Conditions for Interior Chaparral of the Southwestern U.S. Prepared for the U.S.D.A. Forest Service, Southwestern Region by The Nature Conservancy, Tucson, AZ. 24 pp.

2 Wahlberg, M., F.J. Triepke, W. Robbie, S. Strenger, D. Vandendriesche, E. Muldavin, and J. Malusa. 2014 in draft. Ecological Response Units of the Southwestern United States. United States Department of Agriculture, Forest Service, Southwestern Region, Albuquerque, NM. 201 pp.

Grassland Ecological Response Units

Grassland ERUs collectively represent 9 percent of the Gila[e], and generally occur from 4,500 feet to 8,500 feet in elevation. Forest management is important to the ecological integrity and sustainability of grasslands, especially the Montane Subalpine Grassland that is more common in the Gila than it is within the broader landscape[f].

Background Information

Colorado Plateau-Great Basin Grassland

This grassland ERU is typically found on slightly cooler and wetter sites than the Semidesert Grasslands and warmer and drier sites than the Montane-Subalpine Grasslands. It is typically associated with woodland and forested ERUs where piñon pine is part of the potential natural vegetation. It is most common on the northern third of the forest, but is mapped as far south as the Mimbres valley. Common grasses may include but are not limited to blue grama, squirrel-tail, Wright's muhley, western wheatgrass, wolftail, and threeawn species. Historically, this ERU may have had more than 10 percent shrub cover, but less than 10 percent tree cover.

Montane/Subalpine Grasslands

Coolest and wettest of the grassland ERUs, the Montane/Subalpine Grasslands often harbor several distinct plant associations with varying dominant herbaceous species. Such dominant species may include Arizona fescue, mountain, screwleaf or Wright's muhleys, pine dropseed, a variety of sedges, bulrushes, wire rush, Rocky Mountain iris, and corn lily. Trees that may occur along the periphery of these grassland meadows include Englemann or blue spruce, corkbark, and Douglas- or white fir. Meadows are typically seasonally wet, which is tied to snowmelt. Montane/Subalpine Grasslands are frequently associated with the Herbaceous Riparian ERU. Tree and shrub cover were historically less than 10 percent each.

Semidesert Grassland

The Semidesert Grassland is the warmest and driest of the grasslands and is typically associated with shrubland and woodland ERUs. Historically, this ERU may have had more than 10 percent shrub cover, but less than 10 percent tree cover. Of the four Semidesert Grassland subtypes, the Foothill Grassland is the best fit for most of this system in the Gila NF. Sideoats, black, hairy and blue grama grasses, wolftail, plains lovegrass and a variety of threeawn and muhley species are common. Curly mesquite may be dominant in areas of heavier clay soils. While shrubs and sub-shrubs are clearly subordinate, they are common and sometimes abundant. The most common shrubs are sotol, beargrass, and yucca, although other shrub and sub-shrub species may include yerba de pasmo, Wright's beebrush, turbinella and gray oak, winterfat, mariola, featherplume and others. The presence and abundance of acacia, mimosa, turpentine bush and honey mesquite may be interpreted as indicators of drought or disruptions in the natural disturbance regimes.

All Grasslands

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

1. Vegetation is dominated by native herbaceous plants. Biological diversity is high. In mid- to late-seral states, species composition is at least 66 percent, similar to site potential (see TEU). There are inclusions of tree or shrub cover, or both, and variability within the landscape as well as ecotones on the fringes.
    a. Old-growth components may exist, but are limited to some savanna settings with sparse tree cover, where there are scattered large trees and occasional snags. The location of these components shifts over time because of natural growth and mortality, drought, and fire.
2. Fire plays its natural role on the landscape, thereby limiting conifer encroachment. Vegetation height and density carry frequent, low-severity fire. [g]
3. There is regeneration, seed head production, and a balance of native perennial grasses and forb species, including warm and cool season species in most years, reflecting the capability of soils, weather patterns, and the range of natural variability.

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

1. The composition, structure, and distribution of native vegetation reflect a mix of early, middle, and late seral states. Early seral states will typically contain more forbs, with older states being dominated by a diversity of native perennial grasses and fewer forbs. Native plant species are present in all age classes and are healthy, vigorous, and reproducing.
2. Tree and shrub cover are each less than 10 percent, except in the Colorado Plateau-Great Basin Grassland and Semidesert Grassland where shrub cover, but not tree cover, may occasionally exceed 10 percent.
3. Biological diversity is high. Within site capability, a mosaic of vegetation density exists across the landscape, ranging from densely vegetated areas to small bare areas that result from natural processes, such as freeze-thaw action or burrowing by small mammals.
4. Vegetation conditions provide hiding, nesting, and thermal cover in contiguous blocks for wildlife, including small mammals and songbird nesting.

[g] Low severity as defined by Monitoring Trends in Burn Severity data (MTBS). LANDFIRE classifies natural fire severity in grasslands as high, because the aboveground portions of grasses are consumed. MTBS describes severity in terms of percent change from previous condition; because perennial grasses are relatively quick to sprout after fire, this is typically classified as low severity.

Fine-scale Desired Conditions (less than 100 acres)

1. Within site capability, a mosaic of vegetation density exists across the landscape, ranging from densely vegetated areas to small bare areas that result from natural processes, such as freeze-thaw action or burrowing by small mammals.
2. Organic ground cover and herbaceous vegetation provide protection for soil, moisture infiltration, and contribute to plant diversity and ecosystem function

Objectives

1. In Colorado Plateau-Great Basin Grassland, treat at least 2,000 and no more than 59,500 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.
2. In Montane/Subalpine Grasslands, treat at least 4,600 and no more than 94,800 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.
3. In Semidesert Grassland, treat at least 800 and no more than 88,900 acres per decade using a combination of naturally ignited wildfire, prescribed fire, and mechanical methods to maintain or move toward desired conditions.

Related Plan Content

Content that follows under the HRV and the State of the Science heading provides additional information regarding what is known about the range of historic variability and the state of the science, to aid in implementing the Ranges of Values and Application of Science management approach under the All Upland Ecological Response Units heading, as previously described. Content that follows under the At-Risk Species for Grasslands heading is intended for reference during project planning and wildfire incidents.

HRV and the State of the Science

While grassland ecosystems are well studied, most are not able to provide the same quality or level of detailed information to describe HRV that is available for forests and woodlands. This is because of the herbaceous nature of these communities and the widespread overgrazing that occurred after European settlement. See Finch[1], Smith and Schussman[2], Schussman[3] and Wahlberg and others[4] for science summaries relevant to grasslands.

At-Risk Species for Grasslands

Federally listed species are indicated by an asterisk. Species without an asterisk are not federally listed, but are species of conservation concern.

Arizona toad, western bumblebee, Gunnison’s prairie dog, Mexican gray wolf*, Greene’s milkweed, lesser long-nosed bat.

References

[1] Finch, D.M. (ed.). 2004. Assessment of grassland ecosystem conditions in the Southwestern United States. Volume 1. USDA Forest Service Gen. Tech. Rep. RMRS-GTR-135-vol. 1. Rocky Mountain Research Station, Fort Collins, CO. Pp. 11-17.

[2] Smith, E. and Schussman, H. 2007. Historical Range of Variation for Montane and Subalpine Grasslands of the Southwestern U.S. Prepared for the U.S.D.A. Forest Service, Southwestern Region by The Nature Conservancy, Tucson, AZ. 43 pp.

[3] Schussman, H. 2006. Historical Range of Variation and State and Transition Modeling of Historical and Current Landscape Conditions for Semi-Desert Grassland of the Southwestern U.S. Prepared for the U.S.D.A. Forest Service, Southwestern Region by The Nature Conservancy, Tucson, AZ. 53 pp.

[4] Wahlberg, M., F.J. Triepke, W. Robbie, S. Strenger, D. Vandendriesche, E. Muldavin, and J. Malusa. 2014 in draft. Ecological Response Units of the Southwestern United States. United States Department of Agriculture, Forest Service, Southwestern Region, Albuquerque, NM. 201 pp.

Soils

Background Information and Description

Soil is a critical watershed and ecosystem component, as well as being a complex and dynamic ecosystem in and of itself. It consists of a mineral component, organic matter, air, water, and living soil organisms. It is formed over time by interactions between climate, parent material, topography, and organisms, both above and below ground. It provides air, water, nutrients, and physical support to plants, and is where many plant seeds accumulate and are stored until conditions are right for their germination and establishment. The topsoil layer is vitally important, as this is where the majority of plant and animal organic matter accumulate, decompose, and eventually become soil nutrients. It is the zone of maximum biological activity and nutrient release. A shovel-full of topsoil contains more biodiversity than an entire forest.

Soil receives and processes rainfall, and is a key factor in influencing how much rainfall becomes surface runoff, how much is stored for slow, sustained delivery to streamflow and groundwater recharge, and how much is used for soil processes[1]. Soil is not only an active participant in water and nutrient cycling, it is an active participant in global carbon cycling, as carbon dioxide is both released by the activity of microorganisms and sequestered as soil organic carbon. It also contributes to thermal regulation, absorbing heat energy when temperatures are high, and releasing it when temperatures are cool.

When management results in accelerated soil loss, these soil functions are altered or impaired, and ecosystem services are reduced. While some soil functions or a degree of soil function may be recovered within a human lifetime, soil itself is essentially a non-renewable resource due to the time it takes for soil to form. It has been estimated that in the water-limited Southwest, it can take 300 to 1,000 years to form an inch of soil[2].

At an ecosystem level, soil condition assessments are conducted using the Forest Service Southwestern Region's most current soil quality technical guidance. These assessments are based on the status of indicators, which reflect the soil's ability to support essential functions, relative to their natural capability.

At a watershed level, these assessments inform the Watershed Condition Classification's soil condition indicator. The Watershed Condition Classification evaluates soil condition in terms of erosion, productivity, and contamination. Contamination is primarily considered in terms of atmospheric deposition of sulfur or nitrogen[1], but may include pollutants associated with mining activities or landfills. The main concern with atmospheric deposition of sulfur or nitrogen is acidification. In the Gila NF and in the Southwest generally, soils are naturally well buffered against such changes in pH.

Desired Conditions (All Scales)

1. The soil is able to perform essential functions; sustain biological productivity and overall ecosystem and watershed health; and contribute to resilience. The ability of the soil to sustain ecosystem services within its natural capability is high.
   a. Soil functions are broadly resilient to the impacts of human activities and natural disturbances, including long-term climatic variability and extreme weather events, where resilience is measured by the area where soil condition is restored to, or maintained in satisfactory or equivalent condition class. Naturally unstable and other high-risk soils (see TEU) are influenced primarily by natural processes.
   b. Overstory and understory plant species composition support soil functions and are each at least 66 percent similar to site potential as measured by each particular TEU, but can vary considerably at fine- and mid-scales owing to a diversity of seral conditions (see also All Upland ERU Landscape Scale Desired Conditions).
   c. Organic ground cover (leaf litter, needle cast, coarse woody debris, nonvascular plants and biological crusts, and basal area) and vegetative canopy cover contribute to soil functions and maintain soil loss rates at near natural rates, thereby contributing to high water quality, watershed and ecosystem function (see also All Upland ERU Landscape Scale Desired Conditions).
   d. No new gullies or headcuts are forming and existing ones are stabilizing or have stabilized.
   e. Soil organic carbon represents reference conditions for a given ERU (see Regional Carbon Supplement), but are transitory and adaptive with site potential, characteristic disturbances, and long-term trends in climate (see All Upland ERU Landscape-scale Desired Conditions).

Objectives

1. Implement at least one action per year to improve an area of “impaired” or “unsatisfactory” soil condition.
2. Implement at least 10 projects per decade to address active headcuts or gully erosion. Examples of projects meeting the intent of this objective include construction or maintenance of watershed structures, or road maintenance and improvement of drainage features associated with active headcuts or gullies. Examples of projects not meeting the intent of this objective include prescribed fire and mechanical vegetation treatments.

Standards

1. Planned activities impacting vegetative canopy cover, groundcover, and soil stability (such as fire activities and vegetation treatments) will avoid soils with severe erosion hazard or high mass wasting hazard ratings unless site-specific analysis determines wildfire behavior poses a greater risk to soil functions and the long-term productivity of the land.
2. Best management practices (BMPs) will be followed to mitigate negative impacts to water quality and the long-term productivity of the land (see Related Plan Content below).

Guidelines

1. Projects and activities should incorporate the applicable management potentials, capabilities, hazard, suitability, and other interpretations for each TEU into design and implementation.
2. New activities that encourage concentrated use (for example, recreation sites, landings, construction, stock tanks, mineral supplements, and corrals) on poorly drained or saturated, unsatisfactory soils, or those with severe erosion hazard or high mass wasting hazards, should be avoided.
3. All projects and activities should provide for the maintenance of satisfactory soil condition (or equivalent condition class) and include actions to improve those soils not in satisfactory condition, within the capacity of the project.

Management Approach

Ecosystem Services

The ecosystem services most valued by stakeholders that soil contributes to include: flood mitigation and erosion control; water supply; water quality; biodiversity and abundance of plant and animal species; forage and wood product production; carbon sequestration; recreation; and other cultural services[3, 4]. The ecosystem services approach to soil management balances the complex interrelationships and trade-offs between those services so that the sustainability of one is not compromised by a focus on another. To accomplish this, the forest staff and leadership (1) proactively engage stakeholders with diverse perspectives; and (2) use TEUI information during project development and implementation, wildland fire incidents, and post-fire Burned Area Emergency Response (BAER) processes.

Restoration and Relationships

Forest staff and leadership look for opportunities to work collaboratively with soil and water conservation agencies and groups, permittees and other interested stakeholders to restore and maintain soil condition.

Related Plan Content

The following is a sampling of resources available to facilitate site- and project-specific BMP development. It is not a comprehensive list.

Best Management Practices Resources

The following is a sampling of resources available to facilitate BMP development. It is not a comprehensive list.

Busse, M.D., K.R., Hubbert, E.E.Y. Moghaddas. 2014. Fuel reduction practices and their effects on soil quality. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. Albany, C.A. General Technical Report PSW-GTR-241. 156 pp.

Dwire, K.A., K.E. Meyer, G. Riegel, and T. Burton. 2016. Riparian Fuel Treatments in the Western USA: Challenges and Considerations. US Department of Agriculture, Forest Service, Rocky Mountain Research Station. General Technical Report RMRS-GTR-352. 156 pp.

Edwards, P.J., F. Wood, and R.L. Quinlivan. 2016. Effectiveness of Best Management Practices that Have Application to Forest Roads: A Literature Synthesis. US Department of Agriculture, Forest Service, Northern Research Station. General Technical Report NRS-GTR-163. 171 pp.

New Mexico Department of Energy, Minerals, Natural Resources Department (NM EMNRD), State Forestry Division. New Mexico Forest Practices Guidelines. http://www.emnrd.state.nm.us/SFD/ForestMgt/documents/ForestPracticesGuidelines2008.pdf.

USDA FS (US Department of Agriculture – Forest Service). 2012. National Best Management Practices for Water Quality Management on National Forest System Lands. FS-990a. Vol. 1 165 pp.

Key Concept

Site potential is a term used to describe the characteristic ecological conditions in the latest successional state, resulting from interactions among climate, soil and vegetation.

Site potential boundaries is a concept linked to site potential that reflects the fact that not all soils were "created equal" in their ability to resist erosion, capture, store and release water, cycle nutrients, support vegetation and therefore their ability to provide ecosystem services. Differences are due to variability in the five soil-forming factors: (1) climate, (2) topography, (3) parent material, (4) interactions with living organisms (biota), and (5) time.

Glossary

Best management practices (BMPs) are site- and project-specific methods or measures to prevent or mitigate potential adverse impacts to environmental quality, especially water quality. They include protection measures to address potential detrimental changes in water temperatures, blockages of water courses, deposits of sediment in streams, streambanks, shorelines, lakes, wetlands and other bodies of water that are likely to seriously and adversely affect water conditions or fish habitat.

Erosion hazard is a management interpretation describing the relative magnitude (slight, moderate, or severe) of accelerated soil loss that would occur if all vegetative cover were removed. This interpretation is based on soil loss modeling with the Rangeland Hydrology and Erosion Model developed by the Agricultural Research Station. Soil surface texture, slope shape, and steepness are the primary influences on the erosion hazard rating. While management never intentionally proposes to remove all vegetative cover, this interpretation is useful for understanding the role of vegetative cover in soil stability.

Management interpretations, in the context of soil survey, are "predictions of soil behavior for specified land uses and specified land management practices. They are based on soil properties that directly influence the specified use of the soil"[5]. They do not prohibit or advocate particular management actions; rather they convey potential opportunities, challenges, considerations, or consequences of a particular land use.

Mass wasting hazard is a management interpretation that indicates the relative likelihood of mass movements such as landslides, debris flows, and other hillslope failures. Ratings are low, moderate or high[2]. This interpretation is a product of physical site characteristics and soil properties. Unlike the erosion hazard interpretation, it is not dependent on removal of all or even some vegetation cover. The hazard exists even if the site reflects desired conditions. Management should anticipate consequences if soils with high mass wasting hazards are disturbed.

Parent material is a soil science term describing both the primary origin of the matter from which the soil is formed, either geologic or organic, and its last mode of transport. Parent materials in the Gila NF are geologic in nature and are dominated by volcanic and sedimentary rock types. Modes of transport include flowing water (alluvium), wind (eolian), gravity (colluvium), and standing water in lakes (lacustrine). If the material was not transported after its original deposition, it is referred to as residuum.

Renewable resources have been defined in several ways. Here are two:

1. can be renewed as quickly as they are used up and can, in theory, last indefinitely, and
2. are naturally replenished within a human lifetime.

References

[1] Potyondy, J.P., T.W. Geier, P. Luehring, M. Hudy, B. Roper, R. Dunlap, T. Doane, G. Kujawa, P.T. Anderson, J. Hall-Rivera, J. Keys, M. Ielmini, A. Acheson, R. Thompson, B. Davis, S. Friedman, K.D. Rosa, and T. Brown. 2011. Watershed Condition Framework: A Framework for Assessing and Tracking Changes to Watershed Condition. United States Department of Agriculture, Forest Service, Washington DC. FS-977. 97 pp.

[2] USDA FS (U.S. Department of Agriculture - Forest Service). 1986. Terrestrial Ecosystem Survey Handbook. Southwestern Region (R3). Albuquerque, NM.

[3] USDA FS (United States Department of Agriculture – Forest Service). 2017. Final Assessment Report of Ecological/Social/Economic Sustainability Conditions and Trends. Gila National Forest, NM. 932 pp.

[4] Armatas, C., B. Borrie, and A. Watson. 2017 in draft. Gila National Forest Public Planning Meetings: Results of the Ecosystem Services Station. College of Forestry and Conservation, University of Montana and Aldo Leopold Wilderness Research Institute, Rocky Mountain Research Station, USDA Forest Service. 38 pp.

[5] USDA NRCS (U.S. Department of Agriculture, Natural Resources Conservation Service). 2018. National Soil Survey Handbook Part 617: Soil Survey Interpretations. National Soil Survey Office, Lincoln, Nebraska.

Water Quality

Background Information

The Federal Clean Water Act is administered by the Environmental Protection Agency (EPA) although the EPA delegates many functions to the Army Corps of Engineers and state governments. The New Mexico Water Quality Control Commission sets standards that define water quality goals by designating uses (e.g., domestic water supply, irrigation, livestock watering, wildlife habitat, and aquatic life), setting criteria to protect those uses, and establishing provisions to preserve water quality. Use Attainability Studies are conducted on a 3-year rotating basis to examine water quality standards for changes to reflect new technology, data, or scientific understanding.

Every two years, the New Mexico Environment Department (NMED) Surface Water Quality Bureau prepares an assessment of the quality of the state's surface waters, which includes a list of impaired waters. Impaired waters are those waters determined to be in non-attainment of standards for one or more of their designated uses. Due to limitations associated with budget and personnel, not all waters are assessed in any given 2-year cycle. The state water quality assessment is released in a document called the State of New Mexico Clean Water Act 303(d)/305(b) Integrated List and Report.

In 2010, the State of New Mexico's Water Quality Control Commission designated all perennial rivers, streams and wetlands located within wilderness areas as Outstanding National Resource Waters (ONRWs). Currently, only those perennial rivers, streams, and wetlands within wilderness areas carry this designation. The criteria for ONRW designations in New Mexico are set forth in the Water Quality Standards in Section 20.6.4.9.B of the New Mexico Administrative Code. These waters are subject to the same water quality criteria as other waters with the same designated uses, but receive a higher degree of protection from human activities that could negatively alter their water quality status. Any activities that may impact an ONRW have an associated reporting requirement, including fire suppression activities and piscicide applications for native fish recovery.

Nonpoint source pollutants are the primary source of water pollution in the State of New Mexico and in the Gila NF [1]. Point source pollutants can be traced back to a single point, such as a pipes or ditches from industrial or sewage treatment facility. Nonpoint source pollution is caused by water moving over and through the ground and carrying natural and human-made pollutants into streams and waterbodies, and remains the Nation's largest source of water quality problems. Common nonpoint source pollutants include temperature (too warm), excessive sediment, metals, bacteria, and nutrients. Activities potentially generating nonpoint source pollutants on National Forest System lands include mining activities, fire, grazing, roads, timber and fuelwood harvesting, recreational uses, and ground disturbance generated by off-highway vehicle use. Atmospheric deposition of pollutants created by emissions from off-forest industry can also affect water quality in the forest (see Air Quality).

The interrelationships between watershed condition, water quality, and aquatic ecosystems have contributed to the rise of integrated, watershed-based approaches to manage water quality at both the State and Federal government levels. The State of New Mexico's Nonpoint Source Management Plan[h] describes the State's adaptive and progressive approach to address nonpoint source water quality issues, which includes requirements for watershed-based plans (NMED 2016), which share some similarities with the watershed-based plans that are part of the Forest Service's Watershed Condition Framework (see Watershed).

[h] https://www.env.nm.gov/swqb/wps/Plan/index.html

Desired Conditions

1. Water quality meets or exceeds State water quality standards. Water quality is sustained at a level that retains the biological, physical, and chemical integrity of aquatic systems, and benefits the survival, growth, reproduction, and migration of native aquatic and riparian species (see also Soils, Watersheds, Riparian and Aquatic Ecosystems plan components and related content).

Management Approaches

Ecosystem Services

High water quality is an ecosystem service valued by many of the Gila NF's stakeholders[2, 3]. Site- and project-specific best management practices (BMPs) are the primary mechanism to protect water quality (see previous Soil section's Best Management Practices Resources).

Outstanding National Resource Waters (ONRWs) and Wildland Fire Management

As described in the background information section, ONRWs are protected from human activities that could negatively impact their water quality status. Fire management is the primary activity with the potential to affect ONRWs because they are all currently within designated wilderness. State regulations require fire management to limit potential degradation using BMPs. Retardant avoidance areas are an example of a fire management BMP. Planned actions are subject to a permitting process and reporting requirements. Emergency response actions are subject to notification and reporting requirements.

Restoration and Relationships

Forest leadership looks for opportunities to align the Gila's priority watersheds with those identified as priorities by NMED Surface Water Quality Bureau. Coordination and partnership with the bureau and other stakeholders is essential to accomplishing shared water quality goals.

References

[1] NMED (New Mexico Environment Department). 2016. 2016-2018 State of New Mexico 303 (d)/ 305 (b) Integrated Report and List for assessed surface waters. Santa Fe, NM: New Mexico Environment Department. Retrieved from https://www.env.nm.gov/swqb/303d-305b/2016-2018/index.html.

[2] USDA FS (United States Department of Agriculture – Forest Service). 2017. Final Assessment Report of Ecological/Social/Economic Sustainability Conditions and Trends. Gila National Forest, NM. 932 pp.

[3] Armatas, C., B. Borrie, and A. Watson. 2017 in draft. Gila National Forest Public Planning Meetings: Results of the Ecosystem Services Station. College of Forestry and Conservation, University of Montana and Aldo Leopold Wilderness Research Institute, Rocky Mountain Research Station, USDA Forest Service. 38 pp.

Watersheds

Background Information

In the American Southwest, every drop of water is important and will only become more vital in the future. With increasing human demand on water resources and uncertainty about future climate variability, managing for healthy, resilient watersheds is of the utmost importance to people, terrestrial, riparian and aquatic ecosystems and species. Securing favorable conditions of water flow, consistent with Federal and State water laws, was one of the foundational reasons for which the national forests and grasslands were established. It is the goal of watershed management.

Water from the Gila NF supports many uses in southwestern New Mexico, and farther downstream into southern Arizona. Information about New Mexico water law, water rights, and water uses is found in the Water Uses section of this plan. Streams, springs, seeps and other natural waters are centers of high biological diversity in arid landscapes, and their ecological health is essential to sustainability. Wildlife is more concentrated near water sources than in the surrounding landscape, and aquatic and semiaquatic species are dependent on these limited and scattered resources. Collectively, surface waters contribute to connectivity for wildlife across the landscape; potable water supplies; agricultural uses (livestock watering and irrigation); and recreation. Water, the water cycle, and springs are important to traditional cultures.

The forest is also a important source of recharge to groundwater in the Gila-San Francisco, Mimbres, Middle and Lower Rio Grande, Las Animas, Hot Springs Artesian, and Lordsburg Underground Water Basins declared by the New Mexico Office of the State Engineer. Groundwater recharge occurs as a result of mountain-front or alluvial mechanisms. Mountain-front recharge is very important in arid and semiarid regions like the Southwest. It occurs as the result of higher precipitation and lower temperatures in the mountainous areas, the relatively shallow nature of mountain soils compared to lower-lying area, and the fractured nature of the bedrock. Alluvial recharge occurs as a result of high-flow events, originating from streams that begin in the forest. The significance of alluvial recharge has been emphasized in the Mimbres subbasin[1].

Locally important, but relatively small, shallow alluvial aquifers are found in valley bottoms across the plan area. Groundwater is both recharged and discharged from these aquifers. Zones of recharge and discharge may change over time along any particular stream in response to surface runoff contributions and changes in channel and floodplain location and materials. Also of local importance are perched aquifers, which are relatively small areas of high groundwater tables above the larger, regional groundwater tables. Although comprehensive information describing their extent and distribution is not available, these aquifers support springs, seeps, and wetlands in the Gila. Groundwater is used in the forest and on surrounding lands for many purposes, including drinking, waste disposal, domestic use, livestock and wildlife watering, and to supply Forest Service facilities.

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 for state-designated beneficial water uses, and reduces the threat of fire and flood damage to Forest Service infrastructure and downstream values. The Gila NF intersects 202 6th level watersheds (see Spatial Scales).

Watershed Condition Framework (WCF)[i] was initiated in 2011, and is a comprehensive, national Forest Service approach for proactively implementing integrated restoration. The WCF includes the Watershed Condition Classification (WCC)[2], which is a nationally consistent approach to classifying watershed condition. It uses a comprehensive set of 12 indicators representing the underlying biological and physical functions and processes affecting watershed condition. The primary emphasis is on aquatic and terrestrial processes and conditions that Forest Service management activities can influence. Using this classification model, watersheds are evaluated and classified as functioning properly, functioning at risk, or impaired function[3]. Information related to the condition of 6th level watersheds can be found on the publically accessible website at https://apps.fs.usda.gov/wcatt/, which is updated annually if conditions have changed. Many of the desired conditions and other plan components for watersheds, and riparian and aquatic ecosystems in this plan have their origins in the science that supports the WCC. All indicators are addressed in plan direction, but may not be addressed directly in this subsection. Cross-references are provided.

The WCF also provides a mechanism to enhance communication and coordination with external agencies and partners, is the mechanism for identifying priority watersheds, and serves as an outcome-based performance measure for documenting actions to improve watershed condition at forest, regional, and national levels.

Priority Watersheds

Priority watersheds are identified using the WCF[2] as areas where plan objectives for restoration focus on maintaining or improving watershed condition. These priorities may and are likely to change over the life of this plan. Forest leadership identifies priority watersheds based on (1) ecological values and landscape restoration priorities; (2) alignment with regulatory requirements and objectives; (3) regional and national Forest Service priorities and those of other agencies, tribes, organizations, and stakeholders; and (4) the importance of water and watersheds.

Watershed Restoration Action Plans (WRAPs) are associated with priority watersheds identified through the WCF. The WCF map viewer located at https://apps.fs.usda.gov/wcatt/ contains the current WCF priority watersheds and associated information. The Gila also has “legacy” priority watersheds that pre-date the WCF. These are associated with Ecosystem Management Areas established under the 1986 Forest Plan. These watersheds and associated projects do not have WRAPs associated with them, but will remain priorities until restoration activities are completed. The plan direction and other content that follows applies to all watersheds, including priority watersheds.

[i] https://www.fs.fed.us/biology/watershed/condition_framework.html.

Desired Conditions (4th, 5th, and 6th Level Watersheds)

1. Watersheds are functioning properly (or equivalent condition class) and exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential condition as evaluated at the 6th level watershed as indicated by the following.
    a. Water quality is sustained at a level that retains the biological, physical, and chemical integrity of aquatic systems (see also Water Quality).
    b. Quantity and timing of water flows support ecological structure and functions, including aquatic and riparian species diversity, and downstream human values. Watershed resilience to drought, higher air temperatures, reduced snowpack, erratic runoff timing and other effects of long-term climate variability is sustained, maintained, or restored.
    c. There is a low likelihood of losing defining ecosystem components affecting hydrologic and sediment regimes due to natural disturbance or human activity as indicated by the following.
        - Vegetation structure supports fire frequencies, severities and extents that are characteristic of the watershed's component ERUs (see also All Upland Ecological Response Units).[j]
        - Insect and disease levels are within the natural range of variability (see also All Upland Ecological Response Units).
        - Understory vegetation communities are composed of native or desired non-native plant composition (at least 66 percent similarity to site potential) and herbaceous canopy and ground cover is at near-natural levels, as defined in the watershed's component TEUs (see also All Upland Ecological Response Units).
        - Invasive and noxious plant populations are absent (see also Non-native Invasive Species).
    d. Watersheds support high-quality, resilient aquatic habitat and stream channel conditions. All native aquatic communities and life histories appropriate to the site and watershed are present and self-maintaining. Desired non-native species, such as triploid rainbow trout in reservoirs may be present, but do not negatively impact the presence, distribution, or persistence of native species (see also Riparian and Aquatic Ecosystems and Wildlife, Fish, and Plants).
    e. Riparian vegetation communities are composed of native species and are in proper functioning condition or equivalent classification (see also Riparian and Aquatic Ecosystems).
    f. The density, distribution, and maintenance of roads and linear motorized features do not substantially alter hydrologic and sediment regimes.

[j] There are many potential ways that this may be evaluated. Seral state proportion departure could be used alone, with greater than 33 percent departure from the reference being the metric. Or, spatial predictions of the probability of high-severity fire (should a fire occur) prepared by Parks and others at the Rocky Mountain Research Station could be informative at identifying the extent to which soil functions, including hydrologic function might be compromised by existing fuel structure. Or, a combination of both could support evaluation of risk.

g. Soil condition is in satisfactory, functioning properly, or equivalent condition category (see also Soils).

2. Watersheds provide for groundwater recharge and sustain groundwater quantity and quality as indicated by a functioning properly (or equivalent) condition class rating.
3. Groundwater provides habitat for aquatic and riparian wildlife species and water sources for cultural uses within the forest boundary.

Objectives

1. Improve condition class in at least five 6th level watersheds within the planning period.
2. Aside from unavoidable consequences that may result from naturally ignited wildfire, maintain condition class in those 6th level watersheds currently in proper functioning condition (or equivalent condition class) over the planning period.

Standards

1. Project-specific best management practices (BMPs) will be developed and followed as part of the interdisciplinary process and as a principal mechanism for controlling nonpoint source pollutants to protect beneficial uses and riparian and aquatic ecosystem values (see Best Management Practices Resources in the Soils section).
2. Landscape-scale restoration activities will incorporate projects identified in watershed restoration action plans, other watershed-based plans, or other project-level activities to move toward soil and watershed desired conditions.

Guidelines

1. Management should strive for proper functioning condition (or equivalent condition class) in all indicators of watershed condition as described in the WCC technical guide[3]. If the Forest Service watershed condition model changes, the intent of this guideline will be met by managing for equivalent conditions as described by that model.
2. Management actions in designated municipal watersheds or those watersheds with human values at the outlet or in the floodplain should assess risk and develop mitigation measures to provide for favorable conditions of water flow (see also Timber, Forest, and Botanical Products and Wildland Fire and Fuels Management).

Management Approaches

Ecosystem Services

The ecosystem services most valued by stakeholders that watersheds contribute to include flood mitigation and erosion control; water supply; water quality; biodiversity and abundance of plant and animal species; wildlife habitat and connectivity; forage and wood product production; livestock grazing; recreation and other cultural services[4, 5]. The ecosystem services approach to watershed management balances the complex interrelationships and trade-offs between those services so that the sustainability of one is not compromised by a focus on another. To accomplish this, the forest (1) proactively engages stakeholders with diverse perspectives; and (2) uses TEUI information during project development and implementation, wildland fire incidents, and post-fire Burned Area Emergency Response (BAER) processes.

Restoration and Relationships

Forest staff and leadership continue to link landscape and watershed-scale restoration efforts. Management seeks to address the root cause of watershed-related issues, rather than just the symptoms, wherever and whenever possible. In this process, staff and leadership look for opportunities to work collaboratively with diverse agencies and groups, permittees, volunteers, and other stakeholders to restore and maintain watershed condition and actively support the New Mexico State Water Plan policies, goals and strategies for watershed management.

Glossary

Best management practices (BMPs) are site- and project-specific methods or measures to prevent or mitigate potential adverse impacts to environmental quality, especially water quality. They include protection measures to address potential detrimental changes in water temperatures, flow regimes, excessive deposits of sediment in streams, streambanks, shorelines, lakes, wetlands and other bodies of water that are likely to seriously and adversely affect water conditions or fish habitat.

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Riparian and Aquatic Ecosystems

Background Information

Riparian areas are affected by the presence of surface and subsurface, perennial or intermittent, flowing or standing bodies of water. They are composed of distinctively different vegetative species than adjacent areas where water is more limited. In these systems, terrestrial and aquatic ecological processes are integrated within watersheds.

Riparian areas are more productive than other vegetation communities in terms of plant and animal biomass per acre. As a result, they provide some of the most important habitat on the Gila NF and in the Southwest, and are vital to maintaining regional biodiversity[1,2,3,4]. The Gila River supports some of the highest numbers of bird species in the lower 48 states of the United States, including important breeding habitat[5]. This and other riparian areas in the forest provide essential habitat for wildlife and aquatic species, including federally recognized and proposed threatened or endangered, species of conservation concern, and rare or narrow endemic plants. Aquatic habitats and fish productivity are directly related to the health and function of riparian systems[6]. Riparian and aquatic ecosystem management have a strong and direct relationship.

Stream systems and their riparian zones function as important natural corridors for the movement of organisms and materials through landscapes. Riparian corridors are important for migrating animals and for dispersal for plant propagules. Plant propagules include seeds, roots, and stems from which new plants can become established. Movements of species facilitate gene flow on a broad scale, thereby contributing to genetic and biodiversity. Riparian ecosystems can also function as refuges during periods of widespread environmental shifts, such as periods of prolonged drought, thereby conserving regional biodiversity over the long term[7].

In addition to supporting high levels of genetic and species diversity, riparian systems provide numerous other ecological services. Riparian forests exert strong controls on stream microclimate, including temperature regimes, which regulates many biological processes and ecosystem functions. Water temperature influences the distribution, metabolism, behavior and life cycle events of stream organisms[7 among others]. Riparian forests also contribute substantial amounts of organic matter to streams, which is the foundation of stream food webs. Along with providing nutrients, riparian zones also serve as buffers against pollution from upland runoff and are critical to protecting water quality. Woody debris from riparian forests influence stream channel shape and function, sediment routing[3], and instream habitat. Healthy riparian areas slow water movement, which raises the water table, expands the saturation zone, and recharges aquifers. They also dissipate stream energy, which can reduce flood damage. Soils in riparian ecosystems play a key role in nutrient and water storage and distribution.

The diversity of species and ecological processes in riparian and aquatic ecosystems is sustained by dynamic natural disturbance regimes. Riparian areas are adapted to disturbance and defined by change; however, they are susceptible to degradation and loss. The ability of riparian and aquatic ecosystems to maintain ecological integrity and sustainability depends largely on the presence of water; the type, extent, frequency, and magnitude of disturbance; the status of their condition prior to the disturbance; and the natural events or human activities that occur concurrently or subsequent to the disturbance.

Riparian condition is currently assessed and described using the interdisciplinary proper functioning condition (PFC) field protocols[k], and is a dataset used in the Watershed Condition Classification described in the section on watersheds. The PFC protocol provides for assessing both streamside riparian and wetland areas, as well as those riparian and wetland areas associated with standing water. It describes three condition categories: proper functioning condition, functional at risk, and nonfunctional, and provides for a trend analysis.

Riparian areas in proper functioning condition have high ecological integrity, resilience, and adaptive capacity. A rating of functional at risk suggests ecological integrity, resilience, adaptive capacity and sustainability are compromised, and indicates a need to adjust management. A rating of nonfunctional suggests an area is no longer capable of supporting the ecological and human use values it previously supported, and may require substantial changes in management and investments in restoration to regain function.

More than half of the Gila NF's riparian and aquatic ecosystems are not properly functioning because of one or more of the following reasons:

1. non-native invasive aquatic species;
2. alterations in the amount, timing, and duration of water flows due to drought, diversions and withdrawals, or post-fire effects;
3. poor water quality related to excessive sediment or temperature;
4. riparian and wetland vegetation conditions resulting from drought, fire or post-fire effects, excessive herbivory by elk, livestock, or both; and
5. degraded channel shape and function resulting from the same factors impacting riparian and wetland vegetation conditions and alterations of water flow.

Direction contained in the subsections that follow, and in the watersheds, non-native invasive species and wildlife, fish and plants sections of the plan are all important to restoring and sustaining the ecological integrity of riparian management zones.

Riparian Management Zones

The following plan direction and other related content apply to riparian management zones (RMZs). These zones include those portions of watersheds around lakes, perennial and intermittent streams, groundwater-dependent ecosystems, wetlands, and high-elevation wet meadows that have characteristic riparian vegetation and provide riparian function, or have the ecological potential to do so. It encompasses any surface water and its associated aquatic habitat, connected shallow groundwater, aquatic and riparian vegetation, associated soils (that is, hydric and alluvial), and contributing fluvial landforms.

The exact width of RMZs will vary, but the following should be considered when developing the appropriate RMZ at the project level, providing special attention to the first 100 feet from the edges of all permanent surface water (FSH 1909.12 Chapter 20):

- Presence of at-risk or rare species;

[k] https://efotg.sc.egov.usda.gov/references/public/CO/TR_1737-15.pdf. https://www.blm.gov/or/programs/nrst/files/Final%20TR%201737-16%20.pdf.

- Ecological or water body type;
- Hydrologic and habitat connectivity;
- Width and slope of the riparian vegetation zone, soil type and hydrologic soil group and geomorphic factors;
- Condition of the riparian area, adjacent land use, and threat of contamination from pollutants or chemicals;
- Significant topographic changes, such as abrupt canyon edges may be used as boundaries as long as activities beyond the canyon walls do not negatively influence the functioning of the RMZ.

Watershed-scale Desired Conditions (4th, 5th, and 6th Level Watersheds)

1. Riparian areas have ecological conditions that contribute to the recovery of listed species and support the persistence of species of conservation concern, as well as native and desired non-native aquatic and riparian-dependent plant and animal species.
2. Aquatic and upland components are linked, providing access to food, water, cover, nesting areas and habitat connectivity for aquatic, riparian, and upland species.
3. The distribution and health of riparian, wetland, and aquatic communities perpetuates ecosystem functions and biological diversity. They are resilient to natural disturbances, human activities, and climate variability (see also Watershed). Riparian and aquatic health and resilience are determined by a functioning properly (or equivalent condition class) rating for watershed condition indicators addressing aquatic physical and biological processes at a 6th level watershed scale including the following:
    a. Riparian and aquatic habitat provides for self-sustaining populations of native fish, amphibians, aquatic and semi-aquatic species within their historic distribution. Habitat is resilient to long-term climate variability and extreme events. Streams and rivers provide a variety of habitats for aquatic species, including deep pools and overhanging banks, structure provided by large wood, off-channel areas and protective cover within the potential of each fine-scale unit.
    b. Streams exhibit full connectivity (more than 95 percent of historic aquatic habitats are still connected) except where barriers to movement are necessary to protect native species and prevent movement of non-native species (for example, fish barrier structures to protect Gila trout populations from non-native fish). Ephemeral watercourses provide for dispersal, access to new habitats, and perpetuation of genetic diversity, as well as nesting and foraging for riparian, aquatic and semi-aquatic species.
    c. Streambank and slope stability, wood delivery to streams and floodplains, and other organic matter input, thermal shading, microclimates, and water quality are consistent with natural disturbance regimes.
    d. The connections of floodplains, channels and water tables distribute flood flows and sustain diverse habitats. Hydric and alluvial soil functions are maintained, supporting natural sediment regimes, patterns of water flow, and amount and distribution of plant-available water and nutrients. Width-to-depth ratios are what would be expected in the absence of human influence and are stable in at least 95 percent of the 6th level watershed.

e. Within their type and capability, riparian vegetation communities are composed of a diversity of native species, functional groups, and multiple age classes (at least two) to provide large woody debris and groundcover, protect streambanks and capture sediment, dissipate stream energy, and protect and enrich soil. Native mid to late seral states occurs on more than 80 percent of the riparian/wetland areas in the 6th level watershed.

f. Wetlands and groundwater-dependent ecosystems in upland settings, including springs, seeps, and wet meadows, persist in size, seasonal and annual timing, and exhibit groundwater table elevations within their natural range and support stable, vigorous, native herbaceous and woody vegetative communities. Wet meadows have substantive ground cover, functional group diversity and a diverse species composition, especially of grasses and forbs.

g. Groundwater discharge supports base flows and water temperature in streams, springs, seeps, and wetlands that sustain the function of surface and subsurface aquatic ecosystems within their natural range of variability.

4. Riparian and aquatic conditions protect or improve dependent resources while allowing for management of other compatible uses.

Fine-scale Desired Conditions (RMZ associated with Stream Reach, ERU Polygon, or Point Feature)

1. Riparian areas are in proper functioning condition, or equivalent condition class as demonstrated by the following:

   a. Frequent flood flows (approximately 1.5-year recurrence interval) are capable of spreading out across the floodplain to dissipate energy, deposit sediment, recharge floodplain aquifers, inundate riparian vegetation, and redistribute organic matter and nutrients. In upland environments, saturation at or near the land surface maintains hydric soils and the potential natural riparian or wetland vegetation community.

   b. Riparian systems are in balance with the water and sediment being supplied by the watershed (that is, no excessive erosion or deposition) and floodplain and channel characteristics (such as rocks, woody material, vegetation, floodplain size, overflow channels) are adequate to dissipate energy. In streamside riparian systems, sinuosity, gradient and width to depth ratios are in balance with the landscape setting (that is, landform, geology, and bioclimatic region). Streams are laterally and vertically stable and are not incising.

   c. Riparian vegetation communities are dominated by vigorous native species, indicative of the site’s soil moisture characteristics, and are capable of stabilizing stream banks, dissipating energy during flood flows, and regulating water temperatures within State water quality standards. There is an adequate diversity of species and age classes (at least two) for maintenance and recovery.

   d. Native upland species are present where they are part of the potential natural vegetation community and are absent where they are not. Upland species composition and density in riparian corridors do not contribute to increases in fire frequency or severity.

e. Upland and riparian plant communities are an adequate source of large woody debris, which is recruited into the stream system at near-natural levels.

f. The area occupied by riparian and wetland vegetation is expanding or has achieved its potential extent, as defined by topography, soil properties, and water availability.

2. Hydric and alluvial soil functions are maintained, supporting natural sediment regimes, patterns of water flow, and amount and distribution of plant-available water and nutrients.
3. The location, characteristics, and condition of all RMZs are known.

Objective

1. Implement at least one riparian improvement project annually, above and beyond any noxious or invasive weed treatments.

Standards

1. Preferential consideration will be given to riparian and aquatic resources, with preferential consideration being determined by a condition class of properly functioning (or equivalent condition class) or a trend toward it. Resource uses and activities will occur to the extent that they support or do not adversely affect achievement or maintenance of desired conditions. Site- and circumstance-specific adaptive management actions will be used to ensure this does not preclude the exercise of private property rights recognized by Federal or State law.
2. Activities in and around surface waters will follow decontamination procedures that prevent the spread of non-desirable fungus, disease, non-native or invasive organisms[l].
3. Project-specific best management practices (BMPs) will be developed and followed as part of the interdisciplinary process and as a principal mechanism for controlling nonpoint source pollutants to protect beneficial uses and riparian and aquatic ecosystem values (see Best Management Practices Resources in the Soils section).
4. When new groundwater wells or improvements to existing groundwater wells are proposed, either in the Gila NF or on lands of other jurisdictions, potential adverse impacts to riparian and aquatic ecosystems in the Gila NF will be evaluated. If it is determined that adverse impacts (a downward trend or movement away from desired conditions) would occur as a result of proposed activities in the Gila NF, special use permits will not be issued. If it is determined that adverse impacts would occur as a result of activities on lands under other jurisdictions, the staff will communicate concerns to the State Engineer.

[l] Preventative measures are described in the most current version of Preventing Spread of Aquatic Invasive Organisms Common to the Southwestern Region and in the most current National Interagency Fire Center guidance.

5. When new surface water diversions or changes in point of diversion are proposed either in the Gila NF or on lands of other jurisdictions, potential adverse impacts to riparian and aquatic ecosystems in the Gila NF will be evaluated. If it is determined that adverse impacts (a downward trend or movement away from desired conditions) would occur as a result of proposed activities in the Gila NF, special use permits will not be issued. If it is determined that adverse impacts would occur as a result of activities on lands under other jurisdictions, the staff will communicate concerns to the State Engineer.

Guidelines

1. New construction or realignment of roads and motorized routes, recreation sites or other infrastructure should not be located within the 100-year floodplain or within 300 feet of an RMZ. Exceptions for stream crossings are made where determined necessary by site-specific analysis to reduce potential long-term investments in maintenance or adverse impacts (a downward trend or movement away from desired conditions) to floodplains and water resource features.
2. New or redesigned stream crossings, such as bridges and culverts should be wide enough to at least pass the bankfull width unimpeded and incorporate aquatic organism passage design.
3. When disturbance results in degraded riparian conditions, an interdisciplinary team and interested parties should evaluate and determine RMZ readiness for continuing activities.
4. Projects should leave downed woody material in RMZs in place, except where interdisciplinary teams determine it exists at excessive levels and poses a fire or safety concern.
5. All projects and activities that include RMZs within their project area should provide for the maintenance of those RMZs that are in properly functioning condition (or equivalent condition class), and include actions to improve RMZs that are not in properly functioning condition, within the capacity of the project. When the project or activity cannot result in upward trends for those RMZs not in properly functioning condition, it should not contribute to downward trends.
6. New or redeveloped spring developments should provide protection for the ecosystems supported by the spring without precluding property rights recognized by Federal or State law.

Management Approaches

Ecosystem Services

The ecosystem services most valued by stakeholders that riparian and aquatic ecosystems contribute to include flood mitigation and erosion control; water quality; biodiversity and abundance of plant and animal species; wildlife habitat and connectivity; forage production; livestock grazing; recreation opportunities and other cultural services[8, 9]. The ecosystem services approach to riparian and aquatic ecosystem management balances the complex interrelationships and trade-offs between services so that the sustainability of one is not compromised by an emphasis on another. To accomplish this, the forest (1) proactively engages stakeholders with diverse perspectives; and (2) uses the best available scientific information.

Inventory, Monitoring and Relationships

While remote sensing products are providing more and better information on the location and some characteristics or conditions of riparian and aquatic ecosystems, they cannot substitute for field-based inventory and monitoring data. This is especially true in the Southwest, where the widths of many stream systems are too small to be captured at the product scales commonly available. With limited staff and financial resources to conduct a field-based inventory and monitoring, most of the fieldwork that has been completed was associated with project-level activities. Forest staff seek opportunities to engage partners and volunteers to increase the ability to do this important work.

Restoration and Relationships

Given the value stakeholders and forest staff place on riparian and aquatic ecosystems and their associated ecosystems services, they are a management priority. This priority is demonstrated, within this plan and at the project level, in four concrete ways.

- Riparian and aquatic ecosystem conditions are emphasized in the watershed condition framework. Many of the essential projects identified in watershed restoration action plans are riparian and aquatic ecosystem projects.
- Riparian and aquatic ecosystem conditions are emphasized in many of the approved recovery plans for federally listed species. These recovery plans can require or compel the Forest Service to implement riparian and aquatic ecosystem protection measures, and this plan articulates and further enforces the forest’s obligation to recovery plans.
- Direction within this plan compels programs and activities to be consistent with the desired conditions for watershed, and riparian and aquatic ecosystems.
- Direction within this plan compels or encourages projects and activities to contribute properly functioning riparian conditions where possible, regardless of whether the plan objective, project, or activity is expressly defined as a riparian or aquatic project.

Riparian and aquatic ecosystem restoration can involve a watershed-based approach, site-specific activities, or both as needed. The forest supports regional riparian and aquatic strategies, and prefers natural recovery methods over structural design features. Providing for natural recovery means reducing or removing management-related stressors until conditions improve. After recovery, activities that resume use adaptive management principles to prevent degradation from reoccurring.

When circumstances necessitate natural recovery methods be supplemented by structural design features, native riparian plantings and loose rock structures are preferred. This is because they require relatively minimal investment and maintenance and are least likely to cause unintended damage if they fail. Where structural methods other than loose rock structure are needed, professional natural channel design expertise and proven methods are preferred. As with other restoration efforts, management looks for opportunities to work collaboratively with diverse agencies and groups, permittees, volunteers, and other stakeholders.

At-Risk Species for Riparian and Aquatic Ecosystems

Arizona toad, Chiricahua leopard frog*, narrow-headed gartersnake*, Northern Mexican gartersnake*, Gila woodpecker, Lewis's woodpecker, southwestern willow flycatcher*, western yellow-billed cuckoo*, Chihuahua chub*, Gila chub*, Gila trout*, headwater chub, loach minnow*, roundtail chub, spikedace*, Rio Grande sucker, A stonefly (*C. caryi*), bearded mountainsnail, “Gila” mayfly (*L. dencyanna*), no common name (*A.c. argenticola*), no common name (*A.t. animorum*), no common name (*A.t. inermis*), no common name (*A.t. mutator*), Sonoran snaggletooth snail, stonefly (*T. jacobii*), Whitewater Creek woodlandsnail, Arizona montane vole, New Mexico meadow jumping mouse*, Gooding's onion, Metcalfe's penstemon, Mimbres figwort, Mogollon clover, New Mexico groundsel, Wooton's hawthorn, yellow lady's-slipper, Gila springsnail, New Mexico hot springsnail

Glossary

Alluvial soils, in the context of riparian zones, are typically young soils with little to no subsurface development because flood-related erosion and deposition are relatively frequent event. Even though they are not well developed, they are highly productive due to the proximity of water and periodic nutrient replenishment that occurs with deposition of floodwater sediments.

Best management practices (BMPs) are site- and project-specific methods or measures to prevent or mitigate potential adverse impacts to environmental quality, especially water quality. They include protection measures to address potential detrimental changes in water temperatures, natural flow regimes, deposits of sediment in streams, streambanks, shorelines, lakes, wetlands and other bodies of water that are likely to seriously and adversely affect water conditions or fish habitat.

Fluvial landforms are those formed by flowing water such as stream channels, floodplains and terraces.

Geomorphic describes something that is controlled or influenced by the shape and configuration of the landscape.

Hydric soils are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions (without oxygen) in the upper part.

Hydrologic soil group is a management interpretation based on the soil's runoff potential. The four groups are A, B, C and D. A's have the lowest runoff potential because they have high infiltration and transmission rates. D's have the greatest runoff potential because they have very low infiltration rates, contain a high percentage of clay, are associated with a permanent high water table, are shallow, or have an impervious layer near the surface.

Recurrence intervals, or return intervals are an estimate of the likelihood of flood of a certain size in response to a given precipitation event.

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Cliffs and Rocky Features

Background Information

Cliffs are vertical or near vertical rock faces ranging in size from a few feet to hundreds of feet tall. Talus slopes are geological features composed of fine to coarse rock fragments at the base of mountains or cliffs accumulated through periodic rock fall from adjacent cliff faces or steep slopes. Both cliffs and talus slopes are inherently dynamic, subject to rock fall, ice, and wind and water erosion. Cliffs and rocky features (rock outcrops and talus slopes) are common in the mountainous West. They are found across a wide elevation range spanning cool alpine landscapes to desert environments, increasing scenic and biological diversity.

The unique geology, geomorphology, and microclimates associated with cliffs, provide habitat for plants and animals adapted to a vertical environment. They provide perches, roosts, and nest sites for raptors, and microsites for a variety of vegetation. In the Gila NF, these features provide important habitat for Rocky Mountain bighorn sheep, peregrine falcons, and several plants and land snails. They also support numerous other wildlife and plant species, including rare and narrow endemics, such as Hess's fleabane. Ecosystem services, such as rock climbing, rock hounding, and mineral exploitation, are also associated with these features. Rock art can be important to tribes. Talus slopes provide habitat and denning during the winter for small mammals, reptiles, and invertebrates. Many rare and endemic land snails occur on talus slopes of limestone outcrops in the Gila NF.

Desired Conditions (All Scales)

1. Cliffs and rocky features maintain natural levels of moisture and are subject to historic levels of sedimentation. They provide specialized habitats for a variety of species including lichens, plants, invertebrates and vertebrates, including rare and endemic species. They also provide nesting and feeding habitats for birds of prey; roosting habitat for bats; and escape, bedding, and lambing cover for bighorn sheep.

Guidelines

1. Management activities affecting rockslides and talus slopes should maintain habitat and unique components (for example, denning spaces and substrate) for wildlife (for example, small mammals, lizards, snakes, rare plants, and land snails), unless they are needed to maintain designated road or trail access or protect public safety.
2. Management activities should be designed to avoid disturbance or alteration of naturally occurring rocky outcroppings or cliff faces.
3. Rock climbing and related recreation activities should not disrupt the life processes of cliff- or rocky feature-dependent species (for example, American peregrine falcon, Mexican spotted owl, rare or endemic plants, or landsnails), or diminish the function of specialized vegetation (for example, mosses, lichens).
4. Installation of permanent rock-climbing hardware and use of motorized drills should be prohibited or restricted to acceptable areas using hardware that is less visible to the casual forest visitor, to maintain the geological and biological features and scenic quality of the climbing area.

5. Where rock climbing or other recreational activities have the potential to trample known populations of at-risk plant or animal species, or cultural sites, signs should be posted educating groups to stay in permitted areas to avoid impacts.
6. Talus slopes should not be altered or be used as a common variety mineral materials source where disturbance would destabilize the talus slopes and alter any endemic or rare species habitat or presence. In areas that harbor talus snails, vegetation treatments should be designed to retain microhabitat characteristics for endemic snails and other talus-dependent species.

Management Approach

Conservation, Education and Relationships

The forest seeks opportunities to collaborate with others to raise awareness and valuation of cliffs and rocky features, especially as it pertains to at-risk, rare and endemic species. This includes engaging climbing organizations in seasonal surveys and targeted monitoring, closures and collaborative education programs that provide public information on how to minimize impacts (for example, not installing permanent hardware or disrupting life functions of various species). The forest also supports research that fills information gaps on the rare and endemic species that use cliffs and rocky features, as more knowledge can improve management.

At-Risk Species for Cliffs and Rocky Features

Bearded mountainsnail, Black Range mountainsnail (*O.m. acutidiscus*), Black Range mountainsnail (*O.m. hermosensis*), Black Range woodlandsnail, Cockerell Holospira Snail, Mineral Creek mountainsnail, Morgan Creek mountainsnail, no common name (*A.c. pertubosa*), no common name (*O.m. radiata*), no common name (*O.m. concentrica*), Silver Creek woodlandsnail, Sonoran snaggletooth snail, Whitewater Creek woodlandsnail, cliff brittlebrush, Davidson's cliff carrot, Hess's fleabane, Metcalfe's penstemon, Mexican spotted owl*

Caves and Abandoned Mine Lands

Background Information

Caves are natural biophysical features that include any naturally occurring void, cavity, recess, or system of interconnected passages beneath the Earth's surface. This definition includes any fissure (large crack), lava tube, natural pit, sinkhole, karst feature, or other opening that is an extension of a cave entrance or an integral part of the cave. Cave resources include any material or substance occurring naturally in caves such as plant and animal life, archaeological materials, paleontological deposits, water and sediments, minerals, cave formations, and cave relief features.

Abandoned mines are the remains of former mining operations (see also Minerals). While some mines have interesting historical and educational features, some can pose hazards to the public. 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.

Cave resources and abandoned mines provide specialized seasonal and year-round habitats for a variety of wildlife species, including bats, cliff-nesting birds, snails, reptiles, and amphibians, some of them endemic. While many mammals use cave resources opportunistically, many species of bats depend on them. Eighteen bat species are known to regularly use caves or abandoned mines in the American Southwest, and New Mexico is home to all of these species. A cave's suitability for bat roost and hibernacula is determined primarily by cave microclimate—particularly temperature and humidity—as well as protection from disturbance. Cave ecosystems rely almost entirely on the surface for nutrients. Bats deposit considerable amounts of surface nutrients into caves via guano, which can support an entire ecosystem.

Caves may possess significant features, characteristics, values, or opportunities. Many caves also have important traditional cultural significance to tribes. Most cave resources are not replaceable or renewable. There are six caves in the Gila National Forest that have either been evaluated for significance, or currently are being evaluated, but no caves have yet been designated as significant. If designated, all significant caves will be managed to protect and maintain the caves and cave resources. When safe and appropriate, abandoned mines can provide opportunities for education and recreation.

Desired Conditions

1. Cave resources continue to develop or erode under natural conditions. Water flowing into, from, or within these systems contain naturally fluctuating background levels of water, sediment, organic matter, and dissolved minerals, and is not polluted by human causes.
2. Cave resources and abandoned mine lands provide habitat for species, particularly bats, that require specialized niches for raising young, roosting, and overwintering. Caves maintain humidity, temperature, and disturbance levels consistent with historic conditions. Caves known to be important for endemic, rare, federally listed, species of conservation concern, or cave-roosting bats are intact or provide habitat for these species. Disease is not spread by land management activities.
3. Cave resources, are not damaged by human activities such as painting walls, breaking off cave formations, etc. The cultural, archaeological, geological, hydrological, paleontological, biological, and scenic resources associated with these features are maintained.
4. Features, characteristics, values, or opportunities for which caves have been designated or nominated as "significant" are maintained[m].
5. Abandoned mine lands do not pose an environmental quality, public health, or safety hazard.

Standards

1. For caves that have been designated or nominated as "significant," management will perpetuate those features, characteristics, values, or opportunities for which they were designated.
2. When closing mine features and caves to public entry, pre-closure inspections shall be conducted to determine if cave-dependent or other species are present. Closures will be designed and implemented to address the needs of resident or historically occurring wildlife within the constraints of meeting public safety needs.

Guidelines

1. Environments in caves should not be altered except where necessary to protect associated natural resources or to protect health and safety. Where closures are necessary to protect human health and safety, closures should preserve habitats for wildlife, including roosting bats, and avoid direct impacts to bats. If bats or other species are present, closure structures, such as wildlife-friendly gates that meet the most current recommendations should be used, to allow species to continue using the cave. If gates are used, a lock or removable bar, or both, should be installed to allow future access for authorized personnel.

[m] As of the date of this draft plan, no caves in the Gila NF have been nominated or designated as significant.

2. Identified bat roosts should be managed to provide for the enhancement and protection of bat populations. Protection measures may include seasonal closures, public education, and wildlife-friendly gates. When bats are present in a mine feature identified for closure, closure activities should not begin until bats have left for the season. Current regional guidelines for mine and cave closures should be followed.
3. The most current Forest Service guidance or most recent decontamination procedures should be used to avoid spread of white-nose syndrome (*Geomyces destructans* fungus) or other diseases.
4. Management activities near a known cave or within 100 feet of an abandoned mine opening should not affect structural integrity of the cave or microclimate conditions by altering vegetation, hydrology, water chemistry, and sedimentation, except where necessary to protect associated natural resources or to protect health and safety.
5. Environments in abandoned mines should not be altered except where necessary to protect associated natural resources or to protect health and safety. Where closures are necessary to protect human health and safety, closures should preserve habitats for wildlife, including roosting bats, and avoid direct impacts to bats. If bats or other species are present, closure structures, such as wildlife-friendly gates that meet the most current recommendations should be used, to allow species to continue using the cave. If gates are used, a lock or removable bar, or both, should be installed to allow future access for authorized personnel.

Management Approaches

White-nose Syndrome Response Plans and Relationships

Currently, neither the cause nor the transmission of white-nose syndrome is well understood; however, it is known that a cave or abandoned mine environment containing this fungus is infectious to hibernating bats. The forest seeks opportunities to develop a response plan for white-nose syndrome through continued collaboration with the U.S. Fish and Wildlife Service (USFWS), Bat Conservation International, New Mexico Department of Game and Fish (NMDGF), the National Speleological Society, and others with interests in conservation management for bat species. The forest also seeks collaborative opportunities to increase awareness of white-nose syndrome and other pathogens at local and regional levels that includes a focus on best management practices for preventing outbreaks.

Cave Management Plans and Relationships

The forest would like to prepare cave management plans for all caves, especially those with important resource, educational or recreational values, hazardous conditions, or heavy use. These plans would include information on appropriate use, necessary restrictions, and monitoring. The forest seeks opportunities to foster the collaboration and exchange of information between governmental agencies, partners, and other stakeholders to address conservation, interpretation and education for cave resources, grottos, and associated species. This includes engaging caving organizations in cave management activities, such as seasonal surveys, inventory, monitoring, mapping, closures, and wildlife-friendly gate development at specific sites.

At-Risk Species for Caves and Abandoned Mine Lands

Mexican spotted owl*, lesser long-nosed bat

Wildlife, Fish, and Plants

Background Information

People enjoy high-quality hunting, fishing, and wildlife viewing in the Gila NF. All of the native big game species in the state occur in the forest: black bear, bighorn sheep, elk, javelina, turkey, mountain lion, pronghorn, mule deer, and white-tailed deer. Many of the state's small game species, such as Abert's squirrels and mourning doves, have abundant habitat in the Gila NF. Wildlife, aspen, and wildflower viewing, as well as nature photography are popular recreational activities in the forest.

Fishing opportunities are also available. The New Mexico Department of Game and Fish manages sport fish species in the state, and the Gila NF provides angling opportunities for many of these species in stream and lake habitats. Most sport fish species have been introduced to New Mexico from elsewhere, although Gila trout and Rio Grande cutthroat trout are native sport fish. Extensive restoration work has been done in the Gila NF to restore both of these trout species into their native streams providing a unique opportunity to catch these fish.

Wildlife, fish, and plant resources have long been used for practical uses such as food, clothing, and tools, as well as for economic purposes such as trading or providing goods. Wildlife, fish, and plants play important roles in nutrient cycling, seed dispersal, and pollination.

The needs of individual or groups of wildlife species include food, water, and shelter. Adequate habitat connectivity is also crucial to daily and seasonal movements, finding mates, being able to use available habitat across the landscape, and the ability to find new suitable habitats when landscape conditions change. Healthy, diverse vegetation and functioning ecosystem processes help ensure diversity of habitats and wildlife, while reducing risks to the sustainability of those habitats and species. In addition, unique habitats (for example, rocky areas, cliffs or crevices) are necessary to sustain other species.

Riparian areas make up less than 1 percent of the forest, yet are one of the most biologically diverse and important habitats. Stream ecosystems provide water, forage, shelter, migration corridors and habitat for nesting, roosting, and bedding. Species that require water for all or part of their life cycles (that is, aquatic and semiaquatic species) are entirely dependent on limited and scattered water sources in the forest. Federally listed and species of conservation concern (SCCs) are supported by stream ecosystems such as the southwestern willow flycatcher, several native fish, Chiricahua leopard frog, and Northern Mexican and narrow-headed gartersnakes. Springs are frequently more stable hydrologically than surrounding upland ecosystems in arid regions, and may offer biological refugia for some species, particularly endemic species. Constructed waters also provide water and food resources and improve habitat connectivity and wildlife distribution.

Plant and animal species are highly dependent on the function of ecosystems with specific conditions, which create areas favorable for particular species. Important drivers of biodiversity loss and ecosystem service changes are habitat change, long-term trends in climate, invasive species, overexploitation, and pollution (MEA 2005). This plan addresses species viability and persistence by providing guidance to maintain and/or enhance habitat elements that are important for species found in the forest, in addition to addressing threats specific to habitat and providing guidance for species-specific threats.

This will be done by adopting a complementary ecosystem and species-specific approach to maintaining species diversity, also known as coarse-filter/fine-filter (36 CFR § 219.9). The premise behind this approach is that native species evolved and adapted within limits established by natural landforms, vegetation, and disturbance patterns prior to human alterations. Therefore, maintaining or restoring ecological conditions and functions similar to those under which native species evolved (that is, coarse filter approach), offers the best assurance against losses of biological diversity and maintains habitats for the majority of species in an area. However, for some species, the coarse-filter approach may not be adequate, and a fine-filter approach may be necessary.

The fine-filter approach recognizes that for some species, ecological condition or additional specific habitat features (key ecosystem characteristics) may be required, the reference condition is not achievable, or there are non-habitat risks to species viability, and these factors may not be addressed by the coarse-filter approach. 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. The Gila NF has identified federally listed threatened, endangered, proposed, and candidate species and developed a list of potential species of conservation that may need the fine-filter approach. Maintaining species that are vulnerable to decline within the Gila NF will maintain diversity in the forest and thus, comply with the National Forest Management Act diversity requirement.

The Forest Service has the ultimate responsibility for managing habitat on National Forest System lands, but the New Mexico Department of Game and Fish (NMDGF) and the U.S. Fish and Wildlife Service (USFWS) are the lead agencies responsible for managing wildlife populations in New Mexico. The USFWS is responsible for managing federally endangered and threatened species, as well as migratory birds, while the NMDGF is responsible for managing all other wildlife species. Species and habitats are managed in conjunction with other resources according to the Multiple Use Sustained Yield Act of 1960 (Public Law 86-517). For federally endangered and threatened species on the Gila NF, habitat management and compatible multiple uses are determined in accordance with Section 7 of the Endangered Species Act as amended (Public Law 93-205). For species of conservation concern, habitat management and compatible multiple uses will be accomplished in such a way that ensures those species' persistence on the forest, per the 2012 Planning Rule.

Desired Conditions (All Scales)

1. Native populations are abundant and adequate to ensure that they are well distributed throughout a majority of their historic range and supported by healthy ecosystems and watersheds.
2. Habitats maintain species' richness and diversity by maintaining natural processes within low departure from reference conditions.
3. Life history, distribution, and natural population fluctuations of species are provided for by the diversity, quantity, quality and site potential of natural habitats in the forest as evidenced by low departure from reference conditions.
4. Interconnected terrestrial, riparian, and aquatic habitats promote species' movements and genetic exchange, allow for movement of wide-ranging species, contribute to self-sustaining populations (including at-risk species), and enable species to adapt to changing environmental and climatic conditions.
    a. Habitat loss and fragmentation is reduced and connectivity is enhanced between the national forests and other public and privately conserved lands.

6. Habitat conditions contribute to multiple uses and are consistent with the recovery of federally listed, proposed, and candidate species and the persistence of species of conservation concern. Hunting, fishing, plant-gathering and other species-based recreation and cultural opportunities exist but do not compromise species, populations or habitat.
7. Habitat features such as cliffs, caves, cavities, snags, large down woody material, herbaceous cover and shrub cover provide forage, cover, fawning and nesting sites for species requiring them.
8. Self-sustaining populations of native aquatic, semi-aquatic, riparian and terrestrial species are supported by riparian and aquatic ecosystem conditions. Wood and herbaceous overstory and understory, streambank and channel features provide fish habitat, regulate stream temperatures and maintain soil moisture in riparian management zones (RMZs).
9. Clean gravels for fish spawning, woody debris for hiding cover, and sites for germination and establishment of riparian vegetation are provided by stream substrates where potential exists. Diverse substrates such as silt, sand, gravel, cobble, boulders and bedrock provide appropriate habitat for a diversity of aquatic, semi-aquatic and riparian species.
10. Habitat and movement corridors for species are provided for by RMZs. Human-made barriers to movement may exist to protect native species and prevent movement of non-native species (for example, fish barrier structures to protect Gila trout populations from non-native fish).
11. Desirable non-native fish species provide recreational fishing in reservoirs and other artificial waters where those opportunities are not in conflict with the recovery of native species.
12. Foraging habitat for native pollinator species is provided by plant community composition, structure and pattern across the forest as described in the desired conditions of each ERU.

Objectives

1. Assess and maintain, reconstruct, or decommission based on the assessment 10 percent of upland water features constructed for wildlife per year.
2. Assess and maintain, reconstruct, or decommission based on the assessment 10 percent of constructed aquatic barriers per year.
3. Implement at least 20 activities that contribute to the recovery of federally listed species over each 10-year period.
4. Restore or enhance at least 100 miles of stream habitat over each 10-year period.
5. Implement at least 20 projects that maintain or enhance upland habitat connectivity over each 10-year period.

Standard

1. Constructed water features (for example, water tanks) must provide safe access and escape for wildlife, such as ramps or other climbing features (see also Livestock Grazing).

Guidelines

1. Guidelines for protecting northern goshawks include the following:
   a. A minimum of six nest sites (known and replacement) should be located per territory. Goshawk nest and replacement nest areas should generally be located in drainages, at the base of slopes, and on northerly (NW to NE) aspects. Nest areas should be 25 to 30 acres in size.
   b. Goshawk post-fledging family areas (PFAs) of approximately 420 acres in size should be designated surrounding the nest sites.
   c. In goshawk foraging areas and post-fledging family areas, groups of three to five reserve trees should be retained within management-created openings greater than 1 acre in ponderosa pine-evergreen oak and dry mixed-conifer communities, and six reserve trees should be retained within management-created openings greater than 0.5 acre in wet mixed-conifer and spruce-fir communities.
   d. Human presence should be minimized in occupied goshawk nest areas during nesting season (March 1 through September 30).
2. Where the Forest Service has entered into signed conservation agreements that provide 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 those conservation agreements.
3. Management activities occurring within federally listed species occupied, designated or proposed critical habitat should implement the most recent approved USFWS recovery plan and integrate habitat management objectives and species recovery, conservation and protection measures identified in the plan.
4. Constructed features (for example, exclosures, wildlife drinkers, range improvements, fences, and culverts) should be designed, modified if existing, and maintained to conserve wildlife and fish habitat connectivity. Constructed features should be removed when no longer needed (see also Livestock Grazing).
5. Except where artificial barriers are beneficial and necessary to achieve conservation goals for aquatic species, fragmentation of aquatic habitats and isolation of aquatic species should be avoided and passage for aquatic organisms should be maintained.
6. Projects and management activities should be designed or managed to maintain or improve habitat for native species and to prevent or reduce the likelihood of introduction or spread of disease.
7. All open top vertical pipes with an inside diameter greater than 1 inch should be capped or otherwise designed to prevent animal entrapments. Examples of open top vertical pipes are pipe used for fences, survey markers, building plumbing vents, or sign posts.
8. Trash cans and food storage boxes at developed recreation areas should be wildlife-resistant.
9. Management of coldwater streams should include streamside vegetation cover and width-to-depth ratio to move toward State of New Mexico standards for stream water temperatures. (See also Riparian and Aquatic Ecosystems.)

10. Where bighorn sheep occur, special use permits should not be issued, and management of vegetation with the use of domestic sheep and goats, should not be authorized to minimize transfer of disease to bighorn sheep.
11. As part of construction, maintenance, or reconstruction of wildlife habitat improvement projects, all materials (including barbed and smooth wire, storage tanks, pipe, etc.) that are no longer needed or in excess of what was needed should be removed to provide for the safety of forest visitors, wildlife, recreational and permitted livestock, and aesthetics. Such requirements should be incorporated into contracts, permits, and agreements. Forest personnel should resolve any such safety hazards identified during project or incident activities.

Management Approaches

Relationships

Coordinate with the NMDGF and USFWS regarding listed and native species, reintroductions, introductions, or transplants of listed or native species, control or eradication of non-native species, and the management of sport and native fishes, including the identification of refugia for native fish (that is, native-only stream reaches). Work with the USFWS, NMDGF, and other partners to develop conservation measures (for example, public education to reduce human impacts) to prevent listing and to aid to in the recovery and delisting of federally listed species. Cooperate with State and Federal wildlife management agencies to minimize conflicting wildlife resource issues related to listed, hunted, fished, and trapped species.

Educate the public on disease transmission of bighorn sheep from domestic sheep and goats. Coordinate with other program areas to survey and identify active raptor nests and fledging areas. Consider using timing restrictions, adaptive percent utilizations, distance buffers, or other means to minimize disturbance based on the best available information, as well as on site-specific factors (for example, topography and available habitat).

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 in 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, State and Federal agencies (for example, NMDGF and USFWS), and other nongovernmental organizations.

Coordinate with the NMDGF and their State Wildlife Action Plans, Statewide Fisheries Management Plan, or other plans, USFWS, sportsman groups, the scientific community, and other stakeholders regarding information, education, and knowledge gaps as they relate to promoting and improving wildlife, fish, and plant resources and management. Maintain strong partnerships between the Forest Service, State and Federal agencies, county and local governments, and nongovernmental organizations to accomplish conservation planning and management toward achieving desired conditions.

Coordinate with internal resource areas when developing projects to identify acres that are beneficial to wildlife habitat, as not all projects nor all acres are necessarily beneficial to wildlife. Habitat improvement acres will be a subset of total acres treated to move ERUs toward desired conditions and tracked through each specific ERU.

Collaborate with the Federal Aviation Administration, airport administrations, military and government agencies, and other aircraft (manned and unmanned) operators to minimize disturbances caused by aircraft over key wildlife areas during important times of their life cycle. Examples could include peregrine falcon or Mexican spotted owl nesting sites.

Collaborate with other adjacent land ownership to encourage improved landscape connectivity across mixed ownerships where natural systems span multiple administrative boundaries.

Rare and Endemic Plant and Animal Species and Habitats

Background Information

Rare species are those that are very uncommon, scarce, or infrequently encountered even though they may not be endangered or threatened. Endemic species are only found in a given region or location, and nowhere else in the world. For example, there are 109 plant species that only occur in New Mexico[1]. Geologic features that are discontinuous and scattered are the basis for some of the endemic species found only in the Gila NF, and in only one mountain range, or in some instances, one canyon.

According to the New Mexico Rare Plant Conservation Strategy[1], one of the central issues impeding meaningful and proactive conservation of New Mexico's rare plant species is the limited information regarding abundance, distribution, status, trends, life history and habitat requirements, and threats.

Desired Conditions

1. Locations and status (for example, abundance, threats, habitat requirements, and responses to management) of rare and endemic species are known.
2. Habitats and refugia for rare and endemic species are intact, functioning, and sufficient for species persistence.

Guidelines

1. If new information indicates concern about a species' capability to persist over the long term in the plan area, that species should be evaluated for species of conservation concern status. For new species of conservation concern, best available science and consultation with species experts should be used to determine what measures are needed to provide for their sustainability.
2. Collection of species recognized as rare or at-risk should not be allowed unless the forest has information indicating it will not be detrimental to species persistence, it is necessary for species conservation, is important for tribal collection, or is a research request that will aid in the management of that species.

Management Approaches

Rare and Endemic Species Conservation and Relationships

Seek to strengthen and develop programs to survey, monitor, and collect data on rare and endemic species, especially when basic distribution and species status information is lacking in 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, and nongovernmental organizations. Specifically, the forest looks for opportunities to:

- Coordinate and collaborate with the New Mexico State Forestry Division, Gila Native Plant Society, botanists, and other interested stakeholders in support of the New Mexico Rare Plant Conservation Strategy's goals and objectives.

- Collaborate with universities, State and Federal agencies (for example, Western New Mexico University, Forest Service Research and Development, U.S. Geological Survey, Natural Resources Conservation Service, New Mexico State Forestry, New Mexico Department of Game and Fish), and other organizations (for example, The Nature Conservancy, Natural Heritage New Mexico, Native Plant Society of New Mexico), to obtain, manage, and disseminate data and encourage research on rare and endemic species.
- Work with partners to promote public education and valuing of rare and narrow endemic species in the forest.

The forest prioritizes areas for floristic surveys by focusing on rare soil types, geological features, or biodiversity hotspots. Local Geographic Information Systems (GIS) database is the preferred database of record for rare and endemic species observations and population locations in the Gila National Forest.

References

[1] EMNRD (New Mexico Energy, Minerals and Natural Resources Department)-Forestry Division. 2017. New Mexico Rare Plant Conservation Strategy. Prepared and developed by Daniela Roth and the New Mexico Rare Plant Conservation Strategy Partnership. Santa Fe, NM.

Non-native Invasive Species

Background Information

Executive Order 13751, which amended Executive Order 13112, defines an invasive species as any non-native (or alien) organism to the ecosystem under consideration, whose introduction causes or is likely to cause economic or environmental harm or harm to human, animal, or plant health. Invasive species generally possess one or more of the following characteristics: aggressive and difficult to manage; poisonous, toxic, or parasitic; or a carrier or host of a serious insect or pathogen. Not all introduced species are invasive, and some, are considered desirable. For example, the triploid rainbow trout is not native, but it provides recreational fishing opportunities in reservoirs within and adjacent to the forest.

Some invasive plant species are so harmful they have been given a regulatory designation of "noxious" by the Federal or State Departments of Agriculture. Noxious weed species are highly competitive, disturbance-adapted, prolific reproducers, and are readily disseminated by wind, water, animals, and humans. They often have the advantage over native species because they have been introduced unaccompanied by their natural predators or diseases that would normally keep them in check. Invasive species pose an increasing threat to the integrity of ecosystems by decreasing native plant and animal diversity and range, interfering with natural fire regimes, and in some cases, increasing erosion and sedimentation.

The New Mexico Department of Agriculture (NMDA) coordinates weed management among local, State, and Federal land managers, as well as private landowners. The New Mexico Noxious Weeds Management Act directs the State Department of Agriculture to develop a state noxious weed list, identify methods of control for designated species, and educate the public about noxious weeds. A list of plants designated as noxious in New Mexico and additional information on these species and other troublesome species can be found on the NMDA website[n].

Species designated as Class A and B noxious weeds are the highest priority for treatment (NMDA 2009). Class A species are those not currently present in New Mexico, or have limited distribution. Class B species are limited to portions of the state, but are not widespread[1]. Class C species, are widespread throughout the state and management decisions for these species should be determined at the local level, based on feasibility of control and level of infestation[1].

Feral animals have been or are a problem in some areas in the Gila NF. These animals are managed by other agencies such as the USDA Animal and Plant Health Inspection Service (APHIS). While feral hogs are not documented in the Gila NF, there exists the potential for them to arrive and cause issues, as they do in other areas of the state. The State of New Mexico considers feral hogs unprotected and is actively trying to eradicate them in several areas. Efforts will be made to eradicate feral hogs if they are documented to occur within the Gila NF.[o]

[n] http://www.nmda.nmsu.edu/apr/noxious-weed-information/.

[o] Unclaimed, unauthorized, and unmanaged cattle—colloquially referred to as feral cattle—are the property of the state and may not be treated in the same manner as feral hogs, unless the livestock board were to issue formal, written permission. They must be rounded up, transported to a holding facility and kept there until proper legal notice has been published. If there is no substantiated claim of ownership within the allotted time, they may then be sold and sent to slaughter.

Many streams and rivers in the Gila NF have a high number of non-native aquatic species. There have been efforts to remove non-native fish from certain stream reaches to aid in native fish reintroduction or reduce competition for native fish. Gila trout and Rio Grande cutthroat trout have benefited from non-native fish removal. Invasive animals have the potential to adversely affect native species and ecosystem function. They can outcompete and prey upon native animal species, alter food web interactions, and impact native vegetation.

Invasive insects, disease, and pathogens pose an increasing threat to both aquatic and terrestrial native species. Chytrid fungus has been linked to infectious disease and dramatic die-offs in amphibians worldwide. White-nose syndrome has been decimating bat populations and slowly moving westward in North America (see Caves and Abandoned Mine Lands management approach). A native of Asia, white pine blister rust was first introduced to the United States from Europe in the early 1900s; it is established within the Gila NF and other forests across the Southwest (see Timber, Forest, and Botanical Products).

Although the Gila NF and most of the southwestern United States is outside areas generally known to be infested by the gypsy moth, forest managers have a long-standing (effective since 1989) Memorandum of Understanding (MOU) with APHIS to conduct detection monitoring in the forest. Such efforts are important because, if introduced populations go undetected and become established, eradication and control measures are costly and time-consuming.

Desired Conditions

1. Plant and animal communities are dominated by native species. Non-native invasive and noxious species are absent or exist at levels that do not cause economic harm or negatively impact human health, disrupt ecological processes, alter hydrologic or sediment regimes, reduce biodiversity, or affect the sustainability of native and desirable non-native species, such as non-reproducing triploid rainbow trout stocked in lakes or reservoirs.
2. Collaborative information and education programs build awareness of non-native invasive and noxious species and the threats they pose at all levels and across all jurisdictions.

Objectives

1. Contain, control, or eradicate at least 100 acres of noxious weed species annually.
2. Inventory up to 2,000 acres annually.
3. Reduce non-native fish and other aquatic species within native aquatic populations in at least four to six stream reaches during each 10-year period.
4. Eradicate non-native fish populations from at least one stream reach containing a natural or constructed barrier in compliance with recovery plans over a 10-year period.

Standards

1. Forest projects, authorized activities and special uses permits must include appropriate decontamination procedures to prevent the spread of invasive species, non-desirable fungi, and disease (see also Wildlife, Fish, and Plants, Wildland Fire and Fuels Management).
2. Integrated pest management (IPM) will be used to prevent, control, contain, or eradicate noxious species to maintain or improve ecosystem and watershed function, while minimizing treatment impacts on native species and human health. Chemical and biological methods of pest control will be used only when physical or cultural methods are unlikely to be successful.
3. Projects and special uses must use certified noxious weed-free products for all products where there is a certification process in place. Fill and rock material, and source areas will be visually inspected for invasive and noxious weeds, and treated if necessary, prior to transport and use elsewhere.
4. The forest's horses and packstock program must use and special use permits must require the use of certified weed-free feed products. Pastures used by forest stock will be surveyed for noxious weed species annually.
5. Projects and special uses will use native plant species, preferring local sources where the quantities required are available within project timelines. Exceptions apply to the use of non-native annual cereal grains for emergency watershed stabilization, as long as those cereal grain species are not designated as noxious by NMDA.
6. Domestic goats and sheep will not be used to control invasive plants in bighorn sheep-occupied range.
7. Application of all herbicides will be performed or directly supervised by a State or federally licensed applicator.
8. All treatment projects that involve using herbicides will develop and implement pesticide use plans that include transportation and handling specifications.
9. Herbicide use will be restricted to those formulations containing active ingredients that have both an Environmental Protection Agency (EPA) and Forest Service risk assessment. Mixtures of herbicide formulations may be applied only when the sum of all individual Hazard Quotients for the relevant application scenario is less than 1.0. [p]
10. All timing stipulations, terms and conditions, reasonable and prudent measures, buffers, or avoidance areas identified through consultation efforts (that is Tribal, Section 106, and Section 7 consultations) and site-specific analysis will be integrated into all application scenarios. If these differ from what is included in plan direction, the most restrictive criteria will be applied.
11. Only non-toxic adjuvants, such as surfactants or dyes, and inert ingredients included in Forest Service hazard and risk assessment documents will be used.

[p] The sum of Hazard Quotients for substances that affect the same target organ or organ system is called the Hazard Index. The total of exposures below a Hazard Index of 1.0 will not likely result in adverse non-cancer health effects to humans over a lifetime of exposure.

12. All application methods—except aerial methods—will be acceptable as permitted by the product label. To reduce or eliminate direct or indirect effects to non-target plants, animals and water quality, follow the label and consult the risk assessment. All label instructions will be followed.
13. Herbicide must not be sprayed within 100 feet of known rock art sites, caves, or rock shelters due to the possibility of perishable materials.
14. Site-specific soil characteristics, surface drainage patterns, proximity to surface water and local water table depth will be considered to determine the appropriate herbicide formulation, application timing and method, and if there is a need for buffers. Where herbicide is likely to be delivered to surface waters, only use products registered for aquatic use. For herbicide formulations not registered for aquatic use, the minimum buffers will be as follows:
    a. Class 0 herbicides, including aminocyclopyrachlor, aminopyralid, imazapic and imazapyr do not require a minimum buffer
    b. Class 1 herbicides require a minimum buffer of 30 feet from surface water or wetland edge. These herbicides include chlorsulfuron, clopyralid, glyphosate, isoxaben, metsulfuron methyl, picloram, sulfometuron methyl, tebuthiuron, acid formulations of fluroxypyr and non-aquatic amine salt formulations of triclopyr.
    c. Class 2 herbicides require a minimum buffer of 50 feet from surface water edge and at least 10 feet from native riparian vegetation. These herbicides include dicamba, non-aquatic amine salt formulations of 2,4-D, and ester formulations of triclopyr.
    d. Class 3 herbicides require a minimum buffer of 100 feet from surface water or wetland edge and at least 20 feet from native riparian vegetation. These herbicides include ester formulations of 2,4-D.
    e. For pool habitats, apply at least a 30-foot buffer from water’s edge when there is no surface flow in and out of pool.
15. Loading or mixing of herbicides will occur at a minimum of 300 feet from live water and private residences.
16. Backpack spray and boom/broadcast spray applications will use drift control agents to reduce the potential for drift to non-target species, food, and water sources.
17. To reduce the risk of offsite and non-target impacts, application will only occur under favorable weather conditions as identified in the label instructions and in accordance with equipment manufacturer’s specifications. All spraying will occur with winds less than 10 miles per hour and greater than 3 miles per hour unless otherwise indicated in the label instructions.
18. If there is a 50% or greater probability of local rain of 0.25 inch or more within 24 hours, then applications will only occur when it is anticipated that there will be sufficient time (at least four hours) for the application to dry before rainfall occurs.
19. Granular herbicides will not be used on slopes greater than 15 percent due to the probability of runoff carrying the granules into non-target areas.
20. Prior to the implementation of herbicide treatments, forest staff will ensure timely public notification. Treatment areas will be signed to inform the public and agency personnel of herbicide application dates and herbicides used. If requested, individuals will be notified in advance of application dates.

21. All treatment projects including herbicide use will be monitored for compliance with plan standards and included in the biennial plan monitoring report.
22. Treatment of invasive plant species will be prioritized according to the NMDA noxious weed classification except when weeds identified as noxious by APHIS or other state Departments of Agriculture not previously documented in New Mexico or not yet analyzed for designation as noxious by NMDA are found in the forest. If such exceptions occur, treatment of those species will take precedence in keeping with Early Detection Rapid Response (EDRR) principles.
23. If feral hogs are found in the forest, efforts to eradicate them will be made in coordination and cooperation with the NMDA and APHIS, consistent with the National Feral Swine Damage Management Program.[q]
24. In designated and recommended wilderness areas, non-native, invasive species will be treated using methods and in a manner consistent with wilderness character to allow natural processes to predominate.

Guidelines

1. When more than one herbicide may be suitable for a specific application scenario, the one with the lowest toxicity to wildlife should be selected, unless there is information to suggest that doing so would promote the development of resistance to the lower toxicity herbicide in the target species.
2. Ground-disturbing activities should be assessed for risk of noxious weed invasion or establishment (for example, latent seed in the seed bank) and incorporate measures that reduce the potential for the spread of noxious and invasive species.
3. Burned Area Emergency Response recommendations should include EDRR actions.
4. Desirable non-native fish species should be managed in such a way that they do not conflict with the recovery of native species or existing multiple uses.
5. When drafting water from streams or other water bodies, measures should be taken to prevent entrapment of fish and aquatic organisms and the spread of parasites or disease (for example, chytrid fungus, Didiymo, and whirling disease) (see also Wildland Fire and Fuels Management).
6. Measures should be incorporated into authorized activities, project planning, and implementation to prevent, control, contain, or eradicate priority infestations or populations of invasive species to ensure the integrity of native species populations and their habitats are maintained.
7. Habitat improvement and aquatic restoration projects within or adjacent to water sources occupied by Chiricahua leopard frogs, Northern Mexican or narrow-headed gartersnakes, or native fish should include provisions to remove non-native invasive animals.

[q] https://www.aphis.usda.gov/aphis/resources/pests-diseases/feral-swine/feral-swine-eis

Management Approaches

Early Detection Rapid Response (EDRR)

Although noxious and invasive species are generally not as large of a problem in the Gila NF as they are elsewhere in the Nation, additional survey is needed to fully understand the status of these species. Forest staff also recognize that because they are generally not a large problem in the Gila now, does not necessarily mean that will continue into the future. EDRR is a central tenet of the national interagency framework for managing invasive species[2, 3] and the Forest Service national strategy and implementation plan for invasive species management[4]. The forest will continue to invest in noxious weed surveys, but given limited workforce capacity and financial resources, collaboration and coordination amongst stakeholders, including Soil and Water Conservation Districts, New Mexico Department of Transportation, and county governments is key to success.

Also key to success is the ability to respond to emerging threats rapidly. This means being proactive with regard to the environmental analysis requirements and Clean Water Act permitting processes required for chemical use. In particular, forest managers intend to expand upon the herbicide environmental analyses completed prior to the date of this draft plan to facilitate rapid response actions in the future.

Integrated Pest Management and Relationships

The forest seeks opportunities to develop and improve relationships with other agencies, organizations, volunteers and other stakeholders, including Cooperative Weed Management Areas (CWMAs)[o]. CWMAs represent partnerships between Federal, State and local governmental agencies; tribes; individuals; and non-governmental agencies to manage noxious and invasive plants in a geographically defined area. CWMAs are opportunities to improve relationships, pool resources and leverage funding, and promote weed-related information and education. Portions of the Gila are located in the established Southwestern New Mexico, Sierra and Socorro/Catron CWMAs. If needed, tribal consultation can be conducted on a case-by-case basis. As with EDRR, collaboration and coordination amongst stakeholders contribute to the success of integrated pest management approaches to non-native invasive and noxious species management.

Survey and Documentation Strategy

During project-level work, forest staff document and report suspected populations of invasive species. Documentation includes location coordinates, estimates of population size and density, photographs and collection of several whole plant specimens including roots, vegetative parts, and reproductive parts.

Surveys not associated with project-level work prioritize unique and rare habitats first (for example, riparian areas and wilderness) and then areas of high use or disturbance second (such as material pits, trailheads, campgrounds, corrals, roads, boat ramps, and bridges).

Per agency mandate, the database of record is the Forest Service's Natural Resource Manager (NRM) database.

Plant Identification

Whether by forest staff, volunteer, or other stakeholder, correct plant identification is critical for two reasons: (1) treatment is a substantial effort of time, labor, and money; and (2) incorrect identification can lead to treatment of native species. Correct plant identification often requires the entire plant, including the root and reproductive parts. Management verifies correct identification with professional botanists before investing in treatment.

Information, Education and Research

Forest staff and leadership support information sharing, education and research related to non-native invasive and noxious species through interpretive signage at trailheads and other forest access points to alert recreationists about relevant invasive species and noxious weeds, encouraging public use of certified weed-free feed products, decontamination procedures, and scientific research. Staff and leadership look for opportunities to invest in conservation education that includes a non-native invasive and noxious species component and participate in collaborative education programs with NMDA and the Cooperative Extension Service through New Mexico State University.

Glossary

Integrated pest management is the process by which one selects and applies a combination of management methods or techniques to control a particular pest species with minimal adverse impacts to non-target species.

Memorandum of Understanding (MOU) is a document describing an agreement between two or more parties. It expresses common intention and line of action related to a given issue, but it is not a legal commitment.

References

[1] NMDA (New Mexico Department of Agriculture). 2016. New Mexico noxious weed list update. New Mexico Department of Agriculture. New Mexico State University. Las Cruces, NM. 3 pp.

[2] USDOI (United States Department of the Interior). 2016. Safeguarding America's Lands and Waters from Invasive Species: A National Framework for Early Detection and Rapid Response. Washington, D.C., 55 pp.

[3] National Invasive Species Council (NISC). Management Plan: 2016-2018. 2016. Washington D.C., 42 pp.

[4] USDA FS (United States Department of Agriculture – Forest Service). 2013. National Strategic Framework for Invasive Species Management. FS – 1017. Washington, D.C., 35 pp.

Air Quality

Background Information

Air resources on national forests are a vital resource to be protected. Air provides oxygen for respiration, carbon dioxide for photosynthesis, and global redistribution of atmospheric gases and heat. The public values the fresh air and sweeping views national forests provide, and high air quality supports water quality and healthy ecosystems.

The goals of air quality management are to meet human health standards, achieve visibility goals in areas of high scenic value, and address other air quality concerns, such as atmospheric deposition of pollutants (see also Water Quality). 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 (PM_{10}), particulate matter 2.5 microns in size or smaller ($PM_{2.5}$), ozone, and sulfur dioxide[r]. However, the states have the delegated authority and primary responsibility for implementation and enforcement.

Within the 1977 Clean Air Act, Congress designated all national parks over 6,000 acres and all wilderness areas over 5,000 acres as Class I areas. Other wilderness areas were designated as Class II areas, including those that meet the size criteria, but were established after 1977. The intention of this designation is to protect visibility in areas of high scenic value. Class I areas are subject to the highest visibility protection requirements in the Clean Air Act. Class II areas are subject to slightly less stringent requirements. The Gila Wilderness is a Class I area and the Aldo Leopold and Blue Range Wildernesses are Class II areas. The State of New Mexico has developed a State Implementation Plan (SIP) with long-term strategies to make “reasonable progress” in improving visibility in Class I areas inside the state and in neighboring jurisdictions and focuses on human-generated sources of emissions.

Airsheds are similar to watersheds in that they are defined geographic areas. The difference, and the challenge, is that air masses and air pollutants move between airsheds based upon larger weather and climatic patterns, whereas surface water does not naturally move between watersheds. This means that the Gila NF and surrounding communities may be impacted by air quality issues over which management of the Gila has little or no influence. One example was the smoke impacts experienced in southwestern New Mexico from fires in Arizona, the Pacific Northwest, Montana and Mexico during the summer of 2017. Air and water quality impacts resulting from non-fire emissions generated on lands under other jurisdictions, including atmospheric deposition of mercury into local reservoirs, also occur.

The primary air quality issue Gila NF management has the most influence on is particulate matter associated with smoke and dust generated by activities on the forest. The National Ambient Air Quality Standards pollutant of concern from wildland fire is fine particulate matter, both PM_{10} and $PM_{2.5}$. Because of its small size, $PM_{2.5}$ has an especially long residence time in the air and penetrates deeply into the lungs. Ozone is also a National Ambient Air Quality Standards pollutant. Smoke from prescribed fires and wildfires may contribute to ozone formation under certain atmospheric conditions, but at this time, there are no known ways to minimize ozone creation under these conditions. The same fine particulate matter that poses health risks is also largely responsible for visibility impairment.

[r] https://www.epa.gov/criteria-air-pollutants/naaqs-table.

Gila NF managers have and will continue to comply with Clean Air Act, Regional Haze Rule, and New Mexico State Smoke Management Program (and Title 20, Chapter 2, Part 65 of the New Mexico Administrative Code), as required under the approved State Implementation Plan (SIP). From a visibility standpoint, smoke generated from wildland fire is generally acceptable under the SIP. From a human health standpoint, the New Mexico State Smoke Management program includes requirements for burn registration, notification of local communities regarding burn date(s), visual tracking and reports for all prescribed fire or managed wildfires greater than 10 acres. If air flow (ventilation) conditions or air quality conditions are not within the parameters set in New Mexico Administrative Code 20.2.65, the prescribed fire must be postponed. Prescribed fire can also be postponed by order of NMED Air Quality Bureau for other reasons. Wildfires must be registered at 100 acres or greater.

Forest staff routinely monitors smoke generated by wildland fire, regardless of where that smoke is generated. Real time data from particulate monitors is available on the Interagency Real Time Smoke Monitoring website[s]. However, smoke impacts are always a concern and can be a challenge for relationships between the forest and local communities, especially as the agency works to restore the natural role of fire.

Heavy equipment used on paved and unpaved roads during the implementation of projects and activities, or other administrative or public motorized use has the potential to create localized impacts from fugitive dust. With dry conditions and high wind, this fugitive dust can be carried for many miles. These impacts can be reduced or mitigated with best available control measures or emission reduction techniques.

Desired Conditions

1. Air quality contributes positively to visibility, human health, quality of life, economic opportunities, quality recreation, and wilderness values.
2. Air quality meets or surpasses New Mexico and Federal ambient air quality standards.
    a. Air quality impacts are minimized during prescribed fire. The future risk to air quality, associated with wildfire, is lowered by prescribed fire.
    b. Air quality impacts associated with wildfire are minimized to the extent possible using multiple strategies.
3. Information and collaborative education programs result in community leaders and residents that are informed about air quality.
    a. Information related to smoke impacts from fires, occurring both in and off-forest, is timely, wide-reaching, and comprehensive.
4. Air quality-related values, including high-quality visibility conditions are maintained or improved over the long term in Class I and sensitive Class II areas in the forest.
5. Atmospheric deposition of pollutants does not negatively impact water quality and other ecosystem components (see also Water Quality).
6. Air quality is improved by increased energy efficiency and other environmentally sound practices.

[s] https://app.airsis.com/USFS/Units/Details?custId=2&unitId=1035.

Standards

1. Air quality will be taken into consideration to meet regulatory requirements.
2. If a known air quality hazard exists or is predicted, relevant information will be provided to the public in a timely manner using multiple methods.

Guidelines

1. Project design for prescribed fires should incorporate identification of smoke-sensitive areas and incorporate as many necessary emission reduction techniques as feasible, subject to economic, technical, and safety criteria.
2. During wildfire incidents, techniques to minimize smoke impacts (such as public notification, timing of ignitions, mass ignitions, limiting fire spread, etc.) should be considered, including the identification of smoke management objectives in the wildfire decision document.
3. Dust abatement should occur during project implementation where dust impacts are a concern.

Management Approaches

Smoke

Following the New Mexico SIP (and therefore the Regional Haze Rule and State Smoke Management Plan) is the primary means by which Gila NF management has, and plans to continue meeting its legal responsibilities to the Clean Air Act. Legal requirements aside, it is important that land managers be responsive to the public's tolerance thresholds for smoke in order to balance ecological benefits with social and economic values. Smoke-sensitive communities, or those likely to be impacted by a particular fire, are identified during the decision-making and documentation process for both prescribed fires and wildfires. Although, best efforts and provisions are made to minimize potential human health impacts as it pertains to prescribed fire, smoke impacts from wildland fires are inevitable, and sometimes uncontrollable (for example, when fires are burning on other jurisdictions).

Providing timely, relevant information to the public using a variety of effective methods is a standard forest managers hold themselves to. Developing a long-term particulate monitoring program to detect sudden changes in air quality not related to forest management activities and continuing to deploy particulate monitors during prescribed fire and wildland fire incidents in the Gila supports efforts toward providing timely, relevant information.

At a national level, the Forest Service has recognized and responded to the threat that wildfire smoke poses to public health and safety by spearheading the interagency Wildland Fire Air Quality Response Program. Under this program, air quality resource advisors are available to provide support when communities have the potential to be negatively impacted. These advisors prepare predictions, health warnings, press releases, and daily reports to inform the public and aid fire managers in decision making. Wildfire incidents occurring in the Gila NF include air resource advisors as needed and as they are available.

Prescribed fires and wildfires being managed for resource benefit are generally lower intensity, thereby reducing the potential for destructive wildfires and protecting long-term air quality. However, prescribed fires still generate smoke. Burn plans are developed for prescribed fires and contain measures to limit human exposure to smoke in relation to the predicted weather and ventilation conditions. These measures are often referred to as best available control measures or emission reduction techniques. While a suite of potential emission reduction techniques is available[1], not all are feasible, appropriate or equally effective in every situation. Management chooses the techniques best suited to the conditions of each individual fire. Coordinating the timing and duration of prescribed fires across the Gila and other jurisdictions could also contribute to minimizing impacts to regional air quality.

Forest staff and leadership welcome opportunities to collaborate with local governments to bring an air quality and smoke workshop to local communities in the future.

Atmospheric Deposition

Forest managers seek opportunities to support research establishing critical loads for pollutants that may impact Gila ecosystems and environmental quality. It continues to participate in regional air quality monitoring programs, including lichen studies in the Blue Range, Aldo Leopold, and Gila Wildernesses.

References

[1] Blades, J., M.S. Carraway, W.E. Cascio, S.A. Copeland, G. Curcio, S. Damon, M.A. Davies, S.A. Ferguson, P. Garbe, M. George, R. Gillam, S. Goodrick, T. Hall, P. Lahm, S. Larkin, S. McCaffrey, A. Matthews, C. Maxwell, M. Melvin, S. O'Neill, R.D. Ottmar, J. Peterson, B. Potter, T.E. Teinhardt, M. Rorig, R. Solomo, T. Strand, S.L. Stone, and T. Zimmerman. 2018. National Wildfire Coordinating Group (NWCG) Smoke Management Guide for Prescribed Fire. Peterson, J., P. Lahm, M. Fitch, M. George, D. Haddow, M. Melvin, J. Hyde, E. Eberhardt. Eds.PMS 420-2 NFES 001279.

Social, Cultural, and Economic Sustainability and Multiple Uses

The communities surrounding the Gila National Forest are reflective of a diverse and rich history of people and uses connected to the forest. Forest lands provide livestock forage, firewood and other forest products, recreation opportunities, scenery, cultural and heritage resources, clean water and air, minerals, fish and wildlife, a myriad of special uses such as communication sites and energy transmission corridors, and many other ecosystem services and benefits. These benefits contribute to the local economies and enhance the quality of life and sense of place for people in many communities.

The following sections guide the Gila National Forest's contribution to social and economic sustainability to provide people and communities with a range of social, cultural, and economic benefits for present and future generations.

Community Relationships

Background Information

One of the most distinct characteristics of southwestern New Mexico is its diversity of people, culture, traditions, and values. Understanding the unique characteristics, trends, history, and challenges of the communities is essential for public land managers working to meet the needs of the public.

Since its inception in the early 1900s as the Gila Forest Reserve, the Gila NF has been the provider for many of the needs required for settling this region of the southwestern frontier. It served Native American tribes, Spain, and Mexico long before it became a United States property and its borders were established. The heritage, culture, traditions, and values that grew from this time period were handed down over generations and still exist today where Native American, Hispanic, Anglo-American, and other cultures have combined to make New Mexico a multicultural center. The span of these diverse traditional uses include fuelwood and its importance for heating homes and cooking, the tradition and economic importance of grazing, hunting for subsistence and cultural purposes, maintaining acequias or irrigation ditches, and gathering forest products for ceremonies or building materials.

While those historical values are still prevalent, the social and cultural environment has also transitioned to include contemporary uses such as recreation and individuals seeking solitude and relaxation to get away from the social pressures and pace of their everyday world and reconnect with nature. In addition, local residents rely on the Gila NF for parts of their livelihood, by capitalizing on the opportunity to provide outfitting and guiding and other services on National Forest System (NFS) lands. Forest management continues to bring communities together over issues that affect them or to foster involvement through volunteer work on their favorite part of the forest. Others continue to engage in traditional uses. All of these uses help retain a strong connection to the land, maintain social cultures and longstanding traditions, and contribute to the quality of life.

Relationships are a key factor that can influence the success of how the forest plan is implemented. With the challenges the forest faces today, strong working relationships with all stakeholders, partners, and volunteer groups are vital to increase capacity and help meet desired conditions to care for the land and serve the people.

Desired Conditions

1. The Gila NF and the diverse communities and partners it serves are engaged and able to create shared understanding of issues, successfully implement programs and projects, and promote the social, economic, and ecological benefits that the forest provides.
2. The forest contributes to local economies through recreation and tourism, timber and forest products, livestock grazing, and other multiple-use related activities and products, while balancing these uses with available resource capacity. (See following sections for plan direction on specific uses and activities.)
3. The uniqueness and values of communities and the traditional uses important for maintaining cultures are recognized and valued as important. The long history and ties of communities and traditional uses to national forest land and resources are understood and appreciated.

4. The Gila NF has a network of dependable partners and volunteers who provide additional capacity to effectively and efficiently meet forest plan desired conditions beyond the ability of the Gila NF to achieve on its own.
5. Youth, diverse communities, volunteerism, citizen science, and conservation education support work across program areas, connect people with public lands, and foster a sense of stewardship.
6. Historically unrepresented communities and partners are represented and an essential part of the stakeholder engagement process.

Guideline

1. Engagement with communities should occur at the early stages of project planning and design to include community perspectives, needs, concerns, and knowledge.

Management Approaches

Relationships

Successfully achieving results desired by the public requires collaboration with a wide range of partners. Use collaboration with stakeholders, partnerships, and volunteer opportunities as a management option to strengthen relationships and to promote movement toward desired conditions. This includes but is not limited to local, State, and Federal agencies; local and tribal governments; elected officials; local communities; interested individuals; businesses; permittees; recreation and forest user groups; fire safety and community protection groups; environmental and conservation organizations; users with historic ties to the forest; volunteer and stewardship groups; educators; and youth groups.

Encourage working with neighboring land managers to implement projects at a scale that improves landscape-scale connectivity across mixed ownerships where natural systems, such as watersheds and wildlife habitat, span multiple administrative boundaries. Understand the plans and policies of Federal and State agencies, local governments, and other organizations associated with the Gila NF. Use formal and informal strategies to actively engage with Federal and State agencies, local governments, and other organizations through communication, collaboration, and cooperation. Consider the interactions and implications of resource management practices on the forest and on surrounding lands.

Outreach and Education

Emphasize public education about the Gila NF's diverse ecological, social, and economic resources; the multiple-use sustained yield philosophy; public laws and regulations; shared use ethics; and management strategies. Strive to connect people—particularly youth and underserved populations—with public lands and nature.

Develop sustainable recreation settings and opportunities along with programs that complement state, regional, and community tourism strategies (see Sustainable Recreation section for more details). Marketing and tourism organizations such as chambers of commerce and boards of tourism are encouraged to promote a diverse variety of tourism and recreational opportunities in the Gila NF through websites, brochures, conferences, and other educational or informative outlets.

Provide contracting opportunities in communities for small businesses where possible.

Tribal Importance and Use

Background Information

For much of the span of human history, American Indians were the only people to occupy and use the lands that encompass the Gila NF. Their use of the forest and the surrounding areas began with the earliest human occupation of the Western Hemisphere and continues to the present day.

The Gila NF maintains a governmental relationship with 10 federally recognized tribes, and routinely consults with these tribes on policy development, and proposed plans, projects, programs, and forest activities that have potential to affect tribal interests or natural or cultural resources of importance to the tribes. The forest strives to build and enhance its working relationship with these tribes. The Federal Government has certain trust responsibilities, and a unique legal relationship with federally recognized Indian tribes, defined by history, treaties, statutes, and court decisions.

The Gila NF routinely consults with 10 federally recognized tribes that are based in New Mexico, Arizona, Oklahoma, and Texas. These tribes include the Pueblos of Acoma, Laguna, Zuni, Ysleta Del Sur Pueblo, the Navajo Nation, the Hopi Tribe, the San Carlos Apache Tribe, the Ft. Sill Apache Tribe, the Mescalero Apache Tribe, and the White Mountain Apache Tribe. These tribes have all expressed some level of interest in the resources and management of the forest, and sometimes provide input to the forest pursuant to Section 106 of the National Historic Preservation Act and the National Environmental Policy Act. These tribes recognize the lands managed by the Gila NF as part of their aboriginal or traditional use areas, and many acknowledge contemporary use of these lands for traditional cultural and religious activities.

Resources, places, and properties the tribes value and use for a variety of purposes have been identified in every district of the Gila NF. Areas can possess traditional cultural or religious significance for many reasons including locations with long-standing cultural use, where buried human remains repatriated under NAGPRA lie, where ceremonial objects have been retired, where contemporary ceremonies occur, and where forest products are gathered for ceremonial use.

Desired Conditions

1. The uniqueness and values of the tribal cultures in the Southwest and the traditional uses important for maintaining these cultures are recognized and valued as important.
2. The long history of tribal communities and uses (for example, hunting, gathering plant and mineral materials, and use of sacred places) of NFS lands and resources are understood and appreciated.
3. Forest resources, such as plants, minerals, and animals, important for cultural and traditional needs, as well as for subsistence practices and economic support of tribal communities, are available and sustainable.
4. Tribes have access to sacred sites, traditional cultural properties, and collection areas for traditional and ceremonial use.
5. There are opportunities for solitude and privacy for tribal traditional and cultural activities.
6. Traditional cultural properties, sacred sites, and other locations of traditional and cultural use identified as important to tribes are unimpaired.

7. 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.

Standard

1. Confidentiality of sensitive tribal information and resources collected during consultation shall be maintained, unless permission to share information is given.

Guidelines

1. Requests for temporary closure orders for cultural and traditional purposes should be accommodated.
2. Consultation with tribes should occur at the early stages of project planning and design, and tribal perspectives, needs, and concerns, as well as traditional knowledge, should be incorporated into project design and decisions.
3. Tribal traditional use of medicinal plants and other botanical resources should take priority over applications for commercial harvesting.
4. Management activities and uses should be planned and administered in a manner that prevents or minimizes impacts to the physical and scenic integrity of places that the tribes regard as sacred sites, traditional cultural properties, or as part of an important cultural landscape.
5. Human remains and cultural items disinterred from NFS lands or adjacent sites should be treated with respect and in accordance with the wishes of affiliated tribes (for example, reburied in accordance with the requests of affiliated tribes).

Management Approaches

Relationships

Utilize federally authorized or advocated programs to develop collaborative proposals and partnerships with Native American tribes to implement projects of mutual benefit and economic development.

Consider developing and maintaining memoranda of understanding or other agreements to formalize work with American Indian tribes to understand community needs and build respectful, collaborative relationships to achieve mutually desired conditions. Provide training opportunities for Forest Service employees to gain a broader understanding of the unique legal relationship between the Federal Government and federally recognized tribes and pueblos, American Indian Law, customs, traditions, and values.

As appropriate, develop programmatic agreements, management plans, memoranda of understanding, or other management tools to manage traditional cultural properties (and other sacred sites) collaboratively with associated communities. Educate the public when appropriate on the importance of sacred sites and traditional cultural properties and issues related to their management, while protecting confidential or sensitive information.

Seek opportunities to develop, in collaboration with tribes, interpretive and educational exhibits or other media that focuses on the history of the lands managed by the Gila NF, to provide the public with a greater understanding and appreciation of shared history, culture, and traditions. 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.

Cultural Resources

Background Information

The Gila National Forest contains archaeological resources that demonstrate human occupation and use for approximately the past 12,000 years. The occupation and use of the forest by Native Americans (American Indians) with Pueblo and Athabaskan ethnic affiliations and groups ancestral to these ethnic affiliations has occurred over this entire time span. Occupation and use of the forest by Euro-Americans and other peoples from the Old World occurred over the past 400 years. As a result, the Gila NF includes locations with numerous historic properties and traditional cultural properties. Traditional cultural properties are those eligible for inclusion in the National Register of Historic Places based on its associations with the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community.

Archeological site densities vary from 5 or fewer to over 25 sites per square mile with only about 12 percent of the forest inventoried to an acceptable standard. Properties and sites are vulnerable to degradation by both natural processes (for example, erosion and high-severity wildfire), and human processes (for example, recreation and construction), which affect their intrinsic cultural value. Historic properties are a major source of information regarding the history of human occupation of the plan area. In addition, the cultural importance of the land itself and the connection of local communities to that land are important parts of their cultural identities.

Many cultural resources are considered traditionally significant to tribes and pueblos associated with the lands of the plan area. As of September of 2015, 6,168 archaeological sites had been recorded on the Gila NF. Based on current data, roughly 84 percent of the archaeological sites within the forest are associated with its prehistoric occupation (over 400 years ago). Archaeological resources associated with the historic occupation of the area (ca. 400 to 50 years ago) comprise roughly 16 percent of the known resources in the plan area.

Only eight sites in the Gila NF have been formally listed on the National Register of Historic Places. Roughly 33 percent of all cultural resources in the Gila NF have been recommended as being eligible for inclusion in the National Register of Historic Places, and only 7 percent of all resources have been recommended as being not eligible for inclusion. The eligibility of the remaining 59 percent of known cultural resources is currently undetermined. While the data should be treated as anecdotal, disturbances brought about by bioturbation, wind and water erosion, construction or land development, and vandalism have increased through time on all districts comprising the plan area. Cultural sites in the forest contribute to the social and economic health of the area, providing opportunities for cultural tourism, education, and research. They are also necessary for maintaining the cultural identity of traditional communities associated with the Gila NF.

Cultural resources are nonrenewable, with few exceptions. Once the resource has 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. Forest Service management activities, public use, and natural processes have affected cultural resources. Damage from vandalism (such as theft) continues to be a management issue, and the effects of climatic instability to cultural resources are anticipated to increase. Current forest management practices are aimed at minimizing or avoiding negative impacts to cultural resources.

Desired Conditions

1. Historic properties and other cultural resources that may be eligible for inclusion in the National Register of Historic Places are stable and retain site integrity.
2. Cultural resources are evaluated for their eligibility to the National Register.
3. Historic and prehistoric sites, including known American Indian sacred places and traditional cultural properties, retain their cultural importance.
4. Site integrity and stability remain intact where the values are rare or unique.
5. Site eligibility is not impacted by visitors. Priority heritage assets are all stable and their significant values are protected.
6. Vandalism, looting, theft, and damage to heritage resources are rare.
7. Interpretation and public involvement in archaeological activities increases appreciation and respect of cultural values and fosters a sense of stewardship for all peoples' shared heritage.
8. Heritage resources provide educational opportunities that connect people, past and present, to the land and its history. Public enjoyment is enhanced by opportunities to visit interpretive heritage resource sites.
9. Archaeological site etiquette information is readily available to Gila NF visitors.
10. Opportunities exist for volunteers to participate in heritage resource conservation activities such as research, site stabilization, conservation, and interpretation projects.
11. Heritage programs, interpretive presentations, publications, and interactive learning opportunities are available to provide the public with opportunities to learn about, understand, and experience the Gila NF's history and prehistory.

Guidelines

1. Cultural artifacts should be preserved in place, except when endangered, then they should be curated following current professional standards.
2. When adverse effects to cultural resources occur, known communities to whom the resources are important should have the opportunity to be involved in resolving the adverse effects.
3. Historic documents (for example, photographs, maps) should be properly preserved and made available for research and interpretation by Forest Service, contractors, other agencies, universities, American Indian tribes, and the public.
4. Heritage-based interpretive sites should be managed to enhance the public's understanding of the resource, and be consistent with tribal interests to protect the cultural setting of the site and visitor experience.
5. Unplanned user-created trails that lead to archaeological sites should be eliminated to protect sites from damage and looting.

6. Heritage interpretive sites, structures, and other resources, should be managed to develop visitor appreciation for the region's history and increase awareness of preservation efforts.
7. Through consultation with tribes who are descendants of the prehistoric people that have associations with the area, prehistoric sites should be managed to prevent or minimize adverse effects.
8. Cultural resources should not be actively managed or interpreted in congressionally designated wilderness. Visitor information regarding prehistoric and historic resources within designated wilderness should be provided at district offices or nearby educational and interpretive displays located outside of wilderness boundaries, and not within designated wilderness boundaries.

Heritage Program management

Achieve a balance between activities that ensure cultural resource management projects are in compliance with legal requirements (National Historic Preservation Act, Section 106) and activities that focus solely on the cultural resources themselves (National Historic Preservation Act, Section 110) by:

- Inventorying, documenting, studying and preserving sites; and
- Conducting a program of "public archaeology" to educate and inform people about cultural resources through hands-on interpretation and involvement in the archaeological process.

Prioritize site stabilization and restoration work based on the relative importance, tribal concerns, information potential, and uniqueness of a site. Implement a monitoring program after sites have been stabilized. Plan and perform maintenance before it becomes critical to the condition of a site.

Develop agreements with forest-approved repositories to curate records and artifacts. Periodically inspect collections and repository facilities to ensure they continue to meet professional standards.

Develop a program to scan primary site records, survey records, photographs, and historic records. Establish protocols for accessing digital information.

Cultural Resources Overview

When conducting analysis on archaeological sites, provide guidance on evaluating the significance of individual sites within the cultural context. Use these analyses to periodically update the Gila NF's cultural resources overview.

Periodically update the cultural resources overview as historic contexts are defined and property types are analyzed. The purpose is to synthesize information and the role of the forest's cultural resources to local, state, regional, and national heritage issues. Focus is on priority heritage assets and sites at risk from vandals, natural conditions, and structural instability. Monitoring of sites is prioritized in high visitation areas such as campgrounds, near roads, and trails. Prioritize sites for their ability to contribute to significant research issues at local, state, and national levels.

Interaction with other Program Areas

Early involvement of staff from all program areas during project development helps ensure that diverse resource concerns are considered during planning activities. Consider developing a database of fire-sensitive cultural sites, structures, and other resources, and making it available for fire management purposes to facilitate resource protection.

Non-project-related survey prioritization

Prioritize non-project-related surveys as follows: (1) areas where proactive survey (110 survey) could be anticipated to contribute to larger planning activities; (2) areas where eligible cultural resource are threatened or ongoing impacts are unknown and need to be assessed; (3) areas indicated to have high cultural value or high density of cultural resources; (4) areas of importance to traditional communities; and (5) areas where additional survey will contribute to a greater regional understanding of a management unit.

Relationships

Heritage resources provide educational opportunities that connect people, past and present, to the land and its history. Public enjoyment is enhanced by opportunities to visit interpretive heritage resource sites. Interpretation of the human history of the Gila NF promotes greater public understanding and appreciation of the prehistoric and historic cultures and communities that have depended on this landscape for their livelihood, recreation, and spiritual well-being, and provides connections between prehistoric, historic, and modern people.

Develop interpretive materials with children, tribal members, and community members. Cooperate with private industry, museums, secondary schools, universities, organizations, and other Federal, State, and local governmental agencies to provide for heritage tourism that enhances the overall experience of visitors to the Gila NF, results in preservation of heritage resources and their setting, and is consistent with tribal interests and desires. Encourage partnerships with American Indians, commercial ventures, volunteers, museums, and universities for documenting, preserving, interpreting, and managing sites and for evaluating and developing creative management opportunities.

Maximize opportunities for partnerships and volunteerism in all heritage program elements. Cooperate with local, State, and Federal agencies, organizations, educational institutions, and local tribes in accomplishing program goals and objectives. Consider providing orientation and training opportunities for Forest Service personnel, permittees, contractors, and volunteers that encourages efficiencies in National Historic Preservation Act processes. Find teaching opportunities to educate personnel on the identification, management, and protection of significant cultural resources.

Where possible, synthesize cultural resource findings and interpret and share them with the scientific community and public through prehistoric and historic contexts, formal presentations, publications, and educational venues. Look for opportunities to develop heritage tourism in concert with local communities and other proximal agencies.

Wildland Fire and Fuels Management

Background Information

Fire is an important ecological process that plays a variable role in every ecosystem in the Gila NF. Wildland fire management strives to maintain and restore the ecological process while protecting known values at risk. Fuels management strives to restore, maintain, and protect ecosystem health, while protecting values from adverse impacts of undesirable fire effects. The most important value is human life and safety.

Wildland fire and fuels management implements a coordinated risk management approach to building landscapes that are resilient to fire-related disturbances and preparing for and executing a safe, effective, and efficient response to fire. The National Interagency Fire Center Guidance for the Implementation of Federal Wildland Fire Management Policy[t] provides much of the current direction for managing wildland fire on Federal lands, including wilderness areas. The plan direction provided here is consistent with and supports the current interagency guidance and policy.

Wildland fire is a general term describing any non-structure fire that occurs in wildlands. It includes both wildfire and prescribed fire. Wildfire is an unplanned ignition of a wildland fire or an escaped prescribed fire. It includes unplanned fires that are human-caused and those that are naturally ignited by lightning. Prescribed fire is a wildland fire originating from a planned ignition to meet specific objectives identified in an approved prescribed fire plan for which applicable environmental analysis requirements have been met prior to ignition. Sometimes prescribed fire is referred to as a controlled burn; however, prescribed fire is a more precise term.

Whether wildfire or prescribed fire, the direct and indirect effects of any one fire are rarely all positive or all negative. Fire can restore or maintain landscape heterogeneity and vegetation structure, or it can reduce landscape heterogeneity or fragment habitat. It can increase nutrient availability, or it can result in a loss of nutrients and soil productivity. It can accelerate erosion and sediment delivery to streams, or reduce the risk of future undesirable fire effects, or both. It can result in the loss of carbon, but also increase the ability of the system to sequester carbon. The potential for any of these effects depends on many variables, including but not limited to fuel and weather conditions, topography, and management decisions. Fire effects are also cumulative and interact with previous or subsequent effects of other activities and disturbances in beneficial or detrimental ways. For example, watershed impacts and recovery time increase when two high-severity fires occur on the same piece of ground with insufficient recovery time between. On the other hand, multiple fires within an area over time can limit fire size, intensity, and undesirable fire effects.

Despite often unavoidable trade-offs, when appropriate weather and fuel conditions exist, fire is not only a natural process; it is the most cost-effective restoration tool. However, in some places, fuel reduction treatments may be needed before fire is restored to the system. The intent of vegetation treatments for hazardous fuels reduction is to change predicted fire intensity and duration, and mitigate the rate of fire spread, thereby restoring or maintaining natural fire regimes and reducing potential detrimental impacts to watershed health, wildlife habitat, and community values at risk. Not all fuels are hazardous. Some fuel loading is both characteristic and necessary to support natural fire regimes and other ecological processes, as described in plan direction for each vegetation type.

[t] https://www.nifc.gov/policies/policies_main.html.

Fuels treatment activities include, but are not limited to those that provide wood products to individuals, tribes, businesses and organizations, as discussed in the Timber, Forest, and Botanical Products section. These treatments are also expensive as compared to fire, and while they may mimic the outcomes of natural processes, they cannot substitute for them. With limited resources, strategic placement and design of these fuel treatments are critical to achieve maximum cost and treatment effectiveness.

Alternately, livestock grazing can compete with fire restoration objectives because the fine fuels necessary to support fire occurrence, spread, and flame lengths sufficient to thin stands, is also the forage crop grazing permittees depend on. There are times and locations where a lack of adequate fuel loading is the challenge to restoring the natural role of fire.

Restoring the natural role of fire is not necessarily the desired outcome in the wildland-urban interface (WUI). Providing for the opportunity to protect human values and prevent fire from crossing ownership boundaries is the desired outcome. Management direction for the WUI is found in Chapter 3: Management Areas.

Wildfires may be concurrently managed for one or more objectives. Objectives are developed based on fuel conditions, current and expected weather, current and expected fire behavior, topography, resource availability, and values at risk. Objectives can change as the fire spreads across the landscape, and in response to fuel and fire weather conditions. Parts of a fire may be managed to meet protection objectives, while other parts are managed to maintain or enhance resources. The resource benefit objective means making progress toward or maintaining desired conditions. Site-specific analysis is conducted for prescribed fires and for any wildfire that extends beyond initial attack. For prescribed fire, the decision document is the signed National Environmental Policy Act (NEPA) decision. For prescribed fire, environmental analysis requirements under the National Environmental Policy Act must be met. Wildfires are exempt from that particular legal requirement; however, an interdisciplinary environmental analysis is conducted using a tool like the Wildland Fire Decision Support System (WFDSS)[u] and signed by the decision maker.

Desired Conditions

1. Safety of firefighters, other agency personnel, and the public is the first priority in every fire and fuels management activity. Fire and fuels management activities minimize the risk of loss of life or injury and damage to property, and improve ecosystem and watershed function.
2. Fire management uses an "all lands"approach that is risk-based, consistent with current national policy guidance and strategy, responsive to the latest fire and social sciences, and adaptable to rapidly changing conditions. The full range of fire management activities and tactics is recognized and used by forest administrators as an integral part of achieving sustainability and ensuring firefighter and public safety.
3. In the wildland-urban interface, fuel reductions provide the opportunity to contain or reduce fire intensity before it travels to lands of other ownership, or moves from lands of other ownership to the forest (see Chapter 3: Management Areas, Wildland-urban Interface).

[u] https://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml.

4. Information and collaborative education programs result in:
   a. Children and adults who recognize their responsibility for preventing human-caused fires.
   b. Home and business owners, community leaders, service providers and permittees invested in or adjacent the forest who are knowledgeable about wildfire risk. They recognize that wildland fire is a natural process integral to sustainability and they understand the need to adapt their communities, properties, and structures to wildfire.
   c. Individuals and communities are informed about smoke-related human health impacts; smoke generated from fires, both in the forest and off; and measures the forest and other agencies take to balance trade-offs between wildfire management and air quality (see also Air Quality).
5. Wildland fire is allowed to function in its natural ecological role, burning with a range of intensity, severity, and frequency that allows ecosystems and watersheds to function in a healthy and sustainable manner.
   a. Wildland fire functions in its natural ecological role on a landscape scale and across administrative boundaries, under conditions where safety and values at risk can be enhanced, mitigated, or protected.
   b. Frequent, low-severity fire mitigates high-severity disturbances and protects social, economic, and ecological values at risk.
   c. High-severity fires rarely occur where they were not historically part of the fire regime. Where high-severity fire is part of the fire regime, patch sizes larger than what is known to have occurred historically are rare.
6. Non-native invasive and noxious species, diseases and pathogens are not introduced or spread by wildland fire and fuels management activities and associated equipment.

Standards

1. Human life shall be the highest priority in all fire response actions.
2. Managers will use a decision support process to guide and document all wildland fire management decisions. Appropriate response strategies will be developed based on consideration of risks to life, safety, and potential resource impacts with interdisciplinary participation from forest resource staff; other agency personnel; and other agencies, authorities, and jurisdictions, if needed and as appropriate.
3. Vegetation conditions around all structures on administrative and permitted sites will be maintained to provide defensible space and assist with protection.
4. Whether in the forest or at another location, forest personnel must follow the operational guidelines for invasive species and aquatic invasive species provided in the most current Interagency Standards for Fire and Fire Aviation Operation (see also Non-native Invasive Species standards and guidelines).
5. Aerial application of retardant to water, riparian, wetland, and aquatic ecosystems must be avoided unless it is necessary to protect human safety or prevent property loss.

Guidelines

1. Natural ignitions should be managed to meet multiple objectives when fire weather and fuel conditions facilitate progress toward desired conditions for ecosystems and watersheds.
2. To avoid unintended and unacceptable negative post-fire watershed effects as a result of fire management activities, soil erosion and mass wasting hazard ratings should be considered during planning and decision-making processes.
3. Fuels treatments should retain amounts and distributions of coarse woody debris (1,000-hour fuels) as described in desired conditions for each ERU. For coarse woody debris amounts appropriate to WUI situations, see Chapter 3: Management Areas (see also Timber, Forest, and Botanical Products).

Management Approaches

Restoration of Natural Fire Regimes

In general, restoring natural fire regimes is not about managing for the mean fire return interval or other measures of central tendency, nor can the number of fires an area "missed" due to the suppression era be calculated based on mean values [1,2,3]. Fire history reconstructions clearly demonstrate the minimum, maximum, and average number of years between fires in the same vegetation type vary from location to location, and are synchronized with climatic fluctuations[3]. It is the stochastic nature of natural fire that supports landscape heterogeneity.

The Gila NF approach to restoring natural fire regimes recognizes the relationships between vegetation, fire, climate and weather, topography, and previous disturbances[1,3,4,5,6,7,8,9]. It provides for the full range of historic variability in fire frequency, severity, size, and pattern to promote landscape heterogeneity and support or accommodate progress toward desired conditions for natural resources and resource uses. The more locally relevant the information about historic variability in fire regime characteristics, the greater consideration it is given. Published studies by Abolt[7], Baisan and Swetnam[10], Rollins and others[9] and Margolis and others[11] represent some of the more locally relevant information, with some or all of their study locations in the Gila NF.

In some cases, it may be desirable to put prescribed fire on the ground within the historic mean fire return interval. In others, it may not be necessary, as existing fuel conditions are capable of supporting characteristic fire resulting from natural ignitions. There may be greater benefit to focus efforts on fuel treatments and prescribed fire activities in areas where conditions do not currently support the natural fire regime, or where there is an unacceptable probability of stand-replacement fire[12]. Additionally, there is some evidence that there may be a threshold for prescribed fire rotations once forest structure has been restored; two climate-informed modeling studies have demonstrated rotations shorter than 20 years may lead to vegetation type conversions[13],[14]. Others predict that longer fire-free periods will be necessary for natural regeneration to occur in a warmer, drier future[15]. The forest looks for opportunities to balance maintenance with forward progress, considers climate-informed fire science, and actively fosters relationships with the research community.

Annual Pre-Season Landscape Risk Assessment

Every year before fire season begins, leadership and resource specialists from all disciplines convene to evaluate resource conditions, and ecological and human values at risk based on current fuel moisture and upcoming seasons' fire weather outlook. The consensus built during this assessment provides an integrated, holistic strategy for managing wildfire, personnel, and equipment for a variety of scenarios that might occur during the season. Forest managers then engage local governments, fire departments and volunteers, and Community Wildfire Protection Plan (CWPP) coordinators to discuss the strategies that have been developed, determine if additional community values need to be protected, and incorporate strategies that protect those values. Concerns identified through this process are carried forward into project planning and prioritization to mitigate risk into the future (see also Hazardous Fuels and Relationships management approach below).

Smoke

See Air Quality.

Infrastructure, Restoration and Relationships

When infrastructure (for example, roads, range, and recreation infrastructure) is damaged as a direct result of any suppression action from a wildland fire, the Incident Management Team and forest personnel representing the affected program area identify qualifying needs for immediate repair or reconstruction and prepare a plan. The Incident Commander communicates with the Agency Administrator who holds the decision authority for approving the emergency repair or reconstruction plan. If approved, the plan is implemented under the fire's funding mechanism. Any action that is intended to check the fire's growth or provide for human safety, including but not limited to burning out to minimize fire intensities, fire-line construction, or safety zone construction is a suppression action. However, not all incident-related damage qualifies for emergency funding. For example, if a burnout operation occurs adjacent to a fence, that fence would qualify. As the fire from that burnout progresses, additional fences damaged by that fire do not qualify for suppression dollars. Forest Service handbook direction provides guidance on qualifying infrastructure. Applying this management approach improves relationships, builds support for restoring fire to the landscape, and helps maintain management ability to support existing multiple uses.

Fire, Fuels and Relationships

The wildland-urban interface is the hazardous fuel treatment priority. Relationships play a pivotal role in the success of the hazardous fuels program. From identifying and setting priorities, designing projects, funding implementation, to implementation itself, the management can only be successful if existing relationships are strengthened and new relationships are developed. Forest staff and leadership continue to work with its partners and stakeholders involved in the community wildfire protection plans, Joint Power's Agreement, Cohesive Strategy and Collaborative Forest Restoration Program to meet the broad intent and goals of those plans and provide products to people. When a prescribed fire is used without a mechanical treatment, this could potentially include making an area available for fuelwood gathering by the public prior to the burn.

As science provides new information and tools capable of providing valuable information to the priority-setting process, the forest uses this science to identify where investing resources will result in the greatest return[12]. This includes a landscape-level wildfire risk assessment[16,17] specific to the Gila that facilitates strategic placement of mechanical treatments to support restoration of natural fire regimes. This information is then integrated with pre-season landscape risk assessment strategies and the values and priorities of all partners and stakeholders.

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Water Uses

Background Information

Water is considered an ecological resource and is a vital life-sustaining requirement. The social concern regarding adequacy of water was one of the elements for which the Forest Service was created. The headwaters of major river systems have played influential roles in the history of communities in and around the Gila NF. These systems have provided and continue to provide critical water resources for agriculture and ranching, and assist in sustaining a quality of life for communities. The integrity of these upper watersheds is important in supporting the delivery of quality water to users and uses downstream. Forest staff and leadership have a role in supporting this need through management, protection, and restoration activities. The management of the forest to ensure a sustainable supply of clean water will continue to be a major consideration into the future.

All natural waters flowing in streams and water courses and found underground in New Mexico are declared to be public and subject to appropriation for beneficial use. In New Mexico, beneficial use includes the following: domestic use, livestock and wildlife watering, irrigation, prospecting and mining, and construction of public works, highways and roads. Water for fish culture is not, nor are instream flows considered a beneficial use by the state. The four basic rules that govern New Mexico water law are:

1. “First come, first served.” Water in New Mexico is governed by the “doctrine of prior appropriation.” The fundamental principle of this doctrine is that the first person to divert water from a stream has the right to continue that use in times of shortage.
2. Water must be applied to a beneficial use. “Waste” of water is prohibited under New Mexico water law.
3. Water rights are freely transferable. In New Mexico, water rights may be bought, sold, and moved around rather freely within the basin. Users may change both their “point of diversion” and type of use.
4. “Use it or lose it.” Unlike other property rights, simple failure to use water for a period of time may result in a permanent forfeiture of the right to use water in the future.

Surface water and groundwater is managed and administered by the New Mexico Office of the State Engineer through a permitting process. This applies to new appropriations, transfers of location, changes in beneficial use, or changes in point of diversion. Stream systems and underground basins as outlined by the State Engineer determine which rules and regulations each water right claim will fall under.

The most common water right claims within the Gila NF include spring developments, stock tanks, and wells. Spring developments and stock tanks fall under surface waters that are regulated by stream system, while wells fall under groundwater, which is regulated by declared underground water basin. Approximately 75 percent of the forest lies within the Gila-San Francisco stream system and its associated groundwater basin. The remainder lies within the Little Colorado, Rio Grande, Lordsburg, Animas, and Mimbres stream systems and their associated declared underground water basins. Maps of the New Mexico stream systems and groundwater basins can be found on the State Engineer’s website. While similar in many cases, the map boundaries are not the same as the National Hydrography Dataset watershed currently used by the Forest Service, and coordination is always necessary to ensure that State Engineer maps are used for water rights claims.

The Gila-and San Francisco stream system have been adjudicated (that is, court has determined water rights), and is considered fully appropriated, with no new appropriations permitted by the Office of the State Engineer. Transfers of water from surface to ground, changes in points of diversion, places, and purposes of use are common. Any new developments that were constructed by the agency in this stream system after July 3, 1978, where forest management did not claim a reserved right (see discussion below), would have to be transferred from some other development within the basin that had been filed upon or declared with the State Engineer. Other adjudications that have been completed that pertain to Gila NF lands include the Animas and Mimbres stream systems. The only active adjudication that affects the Gila NF is the ongoing Lower Rio Grande stream system, which was initiated in 1997.

In those stream systems that are not adjudicated (Rio Grande, Lordsburg, and Little Colorado), forest management routinely files on and constructs spring developments, drills wells in declared groundwater basins, and constructs stock tanks for small amounts of water for beneficial uses that support the agency's multiple use-sustained yield mandate. A permit is required to impound surface water in unadjudicated stream systems, including surface water for livestock. [v]

There are 29 declared underground water basins in New Mexico, of which the Gila NF occupies portions of eight, with the largest of these being the Lordsburg, Mimbres, and Gila-San Francisco declared underground basins. Most of the eight basins within which the Gila NF is located were declared between 1960 and 1965, with the remaining being declared in 2005.

Reserved rights are water rights that accompany land that was reserved or withdrawn from the public domain under the authority of the Organic Administrative Act of 1897, to establish a national forest. Sufficient water to fulfill the purposes of the reservation was also withdrawn through implication. The principle also holds that the priority date for the withdrawn water is the date of the land withdrawal, even though the water may not be put to beneficial use for years. The Gila NF has exercised reserved water rights for (1) continuous supply of timber, including water for such things as administrative sites, road construction for timber, forest fires, etc., and (2) favorable conditions of water flow, which includes water impounded by earthen dams to stabilize gullies and retain sediment. The intent of these is not to impound water, but to minimize the quick blast of water and sediment that the gully system may produce.

The Gila NF has entered into a number of agreements with other water right holders to use water on National Forest System lands for varying uses. Three types of agreements are currently in place.

1. Water Use Agreements – There are multiple water use agreements in the Gila NF. These agreements provide for the use of privately held water rights to be used on National Forest System lands. These agreements, to date, have only occurred between a livestock grazing permittee and the Gila NF.
2. Lease Agreements – The Gila NF currently has one lease agreement in place with Freeport-McMoRan Inc., a neighboring mining company. This lease agreement provides water to be used for livestock and wildlife purposes in the Silver City Ranger District over a 10-year period.

[v] A permit is required by the New Mexico Office of the State Engineer for the Rio Grande and Lordsburg basins. For the Little Colorado River, a permit is required by the Arizona Department of Water Resources.

3. Emergency Water Use Agreements – The Gila NF currently has entered into one emergency water use agreement. This agreement covers the use of Bear Canyon Reservoir, which is located on private lands immediately adjacent to National Forest System lands in the Wilderness Ranger District. The use is limited for firefighting emergencies and coordinates the use between the Forest Service, New Mexico Department of Game and Fish, and irrigation.

Acequias, or community ditches, are community operated and organized water irrigation systems. Many of the State's acequia associations have been in existence since the Spanish Colonial period in the 17th and 18th centuries. Acequia and community ditch associations are political subdivisions of the State of New Mexico and occupy a unique place in forest management (NMSA 1978 §73-2-28). Many acequias were established before the land on which they are located was reserved for national forest purposes. Such acequias are within valid rights-of-way granted by the United States under laws and treaties that pre-date the Federal Land Policy and Management Act, and do not require Forest Service authorization for the use and occupancy of National Forest System lands within the historic right-of-way.

Much of the water diverted by acequias comes from National Forest System lands and can be affected by forest management activities upstream. Acequias are still relevant and are vital water delivery and community organizing systems today. Currently, 30 acequias or community ditches depend on water that flows from the Gila NF. They serve as important water infrastructure for communities, and their associations are important community organizations.

Desired Conditions

1. Watershed condition supports favorable conditions of water flow and permitted water uses both in the forest and downstream (see Watershed desired conditions).
2. Where they are necessary, watershed structures slow water flow and retain sediment to support favorable conditions of water flow.
3. Permitted water rights held by the forest provide water for designated beneficial uses that adequately support multiple uses in the forest.
4. Water uses in the forest support state water conservation and the public welfare.
5. Acequia and community ditch systems in the Gila NF are accessible for operation, maintenance, repair, and improvement.

Guideline

1. Acequia and community ditch associations should be provided access to operate, repair, maintain, and improve acequia infrastructure located in the forest.

Management Approaches

Reserved and Permitted Water Rights

Forest management follows state law as it exercises its federally reserved water rights, maintains existing permitted water rights, and looks for opportunities to acquire new permitted water rights to support multiple uses in the forest.

Conservation and Relationships

Forest management seeks to make the most efficient use of existing water sources to benefit the public and multiple uses in the forest and supports the water conservation goals of the State Water Plan. As opportunities arise, the forest staff and leadership seek to develop conservation plans with interested partners.

Livestock Grazing

Background Information

The production of forage to support livestock grazing is a benefit humans derive from many of the forest's ecosystems. Livestock grazing in the Gila NF contributes to the livelihood of the permittees and to the economy of local communities and counties. It is a traditional cultural use of the forest, and one of the multiple-use elements for which the Forest Service is managed.

Adaptive management is the cornerstone of sustainable livestock grazing, providing managers with the flexibility and information needed to respond to changing conditions. Successful adaptive management hinges on good relationships, communication, and monitoring. However, without sufficient and functional range infrastructure (that is, fences, water sources), there can be less management flexibility, more inconvenience, and additional costs.

Some range infrastructure is in poor condition or is non-functional due to age, lack of maintenance, poor design features or locations, damage associated with recent fires, or a combination of these factors. Permittees and forest staff have invested substantial efforts to address fire-damaged infrastructure with limited financial resources, but much work remains to be done. Infrastructure in poor or non-functional condition poses challenges to grazing management, and can and has resulted in injury to other forest users and livestock that encounter downed and obscured barbed wire fencing material.

Desired Conditions

1. Sustainable livestock grazing contributes to the long-term social, economic and cultural diversity and stability of local communities, and helps to preserve the rural landscape, cultural heritage, and long-standing tradition.
2. Livestock use provides for conditions that support movement toward natural fire regimes.
3. Livestock grazing and use is compatible with the desired conditions for ecosystems, soils, watersheds, native plant and animal species, and other activities and resources.
4. Range infrastructure facilitates livestock management and the production of forage, allows wildlife safe and reliable access to water, provides for habitat connectivity and wildlife movement, and does not negatively affect the safety of forest users or Forest Service personnel.
5. Required environmental analyses are conducted in a thorough and timely manner to reduce regulatory uncertainty and encourage investment by permit holders[w].

[w] NEPA decision-making process is outlined in the most current Forest Service Handbook (FSH) 2209.13 Chapter 90: Rangeland Management Decisionmaking. As of the date of this draft, https://www.fs.fed.us/im/directives/fsh/2209.13/2209.13_90_Rangeland%20Management%20Decision-Making.doc

Objectives

1. Implement at least one action per year to improve poor or very poor range condition (or equivalent condition class), other than mechanical treatments targeting woody invaders (woody invaders are addressed through the objectives for Upland Ecological Response Units).
2. In cooperation with every permit holder, evaluate consistency with annual operating instructions and document pasture rotation, utilization compliance, and improvement maintenance annually[x].

Standards

1. Livestock management will be compatible with carrying capacity and address ecological resources (such as forage, invasive plants, at-risk species, soils, riparian health, and water quality) that are departed from desired conditions, as determined by temporally and spatially appropriate data[y].
2. Recommended project-specific best management practices (BMPs) will be followed to maintain or enhance soil, water, riparian, and aquatic resources.
3. New or reconstructed range improvements will be designed to prevent wildlife entrapment (for example, escape ramps in water troughs and cattleguards) and allow for wildlife passage except where specifically intended to exclude wildlife (for example, elk exclosure fence) and/or to protect human health and safety (see also Wildlife, Fish, and Plants).
4. New livestock handling facilities designed to hold or concentrate livestock (for example, corrals, traps, water developments) will be located outside of riparian management zones, known archeological sites, and known occupied sites of at-risk species.
5. Permit conversions to domestic sheep or goats will not be allowed, to minimize the risk of disease transfer to bighorn sheep.
6. The Congressional Grazing Guidelines for Wilderness shall be applied to all decision making regarding management of commercial grazing in wilderness areas.

Guidelines

1. Existing livestock handling and watering facilities located in RMZs should be modified, relocated or removed where an interdisciplinary team determines they are incompatible with movement toward desired conditions for other resources. Any modification, relocation or removal of

[x] If these evaluation meetings are held annually with every permit holder, this objective is met.

[y] Guidance can be found in the Grazing Permit Administration Handbook, Regional Supplements, and National Best Management Practices for Water Quality on National Forest System Lands and other best available science.

infrastructure may not impede the use of permitted water rights recognized by the State of New Mexico.

2. Mineral (for example, salt) or vitamin supplements should not occur on or adjacent to known occupied sites of at-risk plant species, known archaeological sites, or poorly drained or saturated, unsatisfactory soils, or those with severe erosion hazard or high mass wasting hazard ratings.
3. Mineral (for example, salt) or vitamin supplements should not be allowed within 0.25 mile of water sources. Exceptions may occur if prior written approval is obtained from the appropriate line officer and one or more of the following sets of circumstances are present: (1) the water source is not in a riparian management zone and special circumstances dictate a short-term need; (2) the water source not in a riparian management zone and the intent of placing the supplement near water is to draw use away from riparian areas; or (3) the water source is not in a riparian management zone and the particular supplement requires that it be close to water to encourage better distribution (for example, high-protein liquid feed).
4. Restocking and management of grazing allotments following wildfire or other major disturbance should be evaluated by an interdisciplinary team and the allotment permit holder to evaluate readiness. Livestock use of recovering riparian vegetation should be managed to maintain or improve canopy cover of native riparian and wetland species, including regeneration of woody riparian species.
5. Stocking and management of grazing allotments should be evaluated by an interdisciplinary team and the permittee before applying prescribed fire to balance the availability of forage and fine fuels, and after prescribed fire to evaluate and determine readiness.
6. Vacant allotments should be considered for temporary use by holders of a current permit during times or events when their allotment(s) require growing season recovery time because of wildfire or other disturbance, or to minimize livestock and wildlife conflicts.
7. As part of all management activities range infrastructure and associated materials (including barbed and smooth wire, storage tanks, pipeline, etc.) that are no longer functioning or in excess of what was needed for maintenance, reconstruction or construction, should be removed to provide for the safety of forest visitors, wildlife, recreational and permitted livestock, and aesthetics. Such requirements should be incorporated into contracts, permits, and agreements. Forest personnel should resolve any such safety hazards identified during project or incident activities.
8. All monitoring data collected by non-Forest Service personnel that adhere to protocol identified in the plan-level monitoring implementation guide should be accepted for consideration and made available to permit holders for allotment management.

Management Approaches

Restoration and Relationships

Restoration presents both opportunities and challenges for grazing permit holders and the forest management. Challenges arise because the herbaceous vegetation that provides forage for livestock is the same vegetation that provides the fine fuels necessary to support the natural role of fire on the landscape. Fire damage to range infrastructure is another significant, but not insurmountable challenge. Restoring fire to the landscape provides opportunities to improve forage production, and address tree densities and encroachment. Forest staff and leadership continue to work with grazing permittees and other interested stakeholders to minimize challenges and maximize opportunities to the extent possible. This includes addressing fire damage to range infrastructure within existing authorities (see Wildland Fire and Fuels Management) and evaluating grazing permits that are waived back to the forest for opportunities to increase management flexibility. If these allotments can be used to help increase options available to permittees during drought years, before or after fire, and when there are conflicts between livestock and wildlife, they may be considered for conversion to forage reserves. The agency is responsible for the maintenance and upkeep of range infrastructure and developments within these areas when they are not being used so that they are ready to be stocked when the need arises. As out-year project planning and program coordination identify potential future needs to use the forage reserve in a particular area, priority setting of work prompts the needed maintenance to occur through internal resources, contracts, or partnerships.

Range Infrastructure and Partnerships

Grazing permittees are delegated responsibility for the maintenance, reconstruction or construction of structural improvements, including costs. Forest staff continue to provide what assistance is possible with their limited Range Betterment monies. The Natural Resources Conservation Service (NRCS) also has funding mechanisms to assist producers. The Environmental Quality Incentives Program (EQIP) and the Regional Conservation Partnership Program are two examples of NRCS producer assistance programs. The forest seeks opportunities to partner with permittees, the NRCS, local governments, state agencies, and others to leverage resources and improve management flexibility.

Many permit holders have also inherited range infrastructure and materials (especially barbed and smooth wire) that are no longer functional and may be in such a state that they pose a safety hazard to other forest users, agency personnel, wildlife, and recreational and permitted livestock. This is also true in some areas that are no longer allotted. The volume of this material across the Gila NF is substantial. There are potential volunteers who are willing to help clean up, and forest management seeks opportunities to engage those individuals or groups.

Working with Other Entities

Forest management informs local governments and allotment permit holders of major changes to allotments. Forest staff and leadership are open to receiving technical expertise from Soil and Water Conservation Districts, New Mexico State University Extension Research Service, Water Resource Research Institute, Range Improvement Task Force, New Mexico Department of Agriculture, and New Mexico Association of Conservation District and New Mexico Coalition of Conservation District technical support teams. Forest leadership also seeks opportunities to facilitate dialogue between the New Mexico Department of Game and Fish and permit holders about ungulates (elk, deer, and livestock) and the cumulative impacts on national forest resources. All scientifically defensible monitoring should be considered in allotment management.

Rangeland Monitoring

Forest management strives toward collaborative range monitoring, including allotment permit holders and other partners in such efforts. Management also looks for opportunities to hold monitoring training for interested allotment permit holders with potential co-sponsors such as soil and water conservation districts, New Mexico State University, and cooperative extension service. Annual allotment inspections could be conducted in the field with the permit holder to facilitate discussion of any issues that may be a factor.

Drought Plan

Drought is an inevitable occurrence in the southwestern United States. The question is not *will* drought occur, but *are managers and permittees prepared for drought*? Allotment management plans include allotment-specific drought plans. The intent of this management approach and its associated standard is to provide a flexible, but consistent and cohesive approach to drought across the forest. First, early communication between managers and permittees provides maximum time for permittees to develop coping strategies for their operations and provide suggestions to the Forest Service. Consistent, effective communication with others such as the NRCS, BLM, State and local governments, as well as non-governmental organizations regarding the effects of drought and potential collaborations is essential. The forest strives for early and effective communication and provides information about resources that may be available to assist permittees. Where possible, this includes active support and participation in the drought strategies identified by the New Mexico State Water Plan.

The Standardized Precipitation Index (SPI) is a unit of measure that compares recent precipitation values for a period of interest with long-term historical values to assess moisture conditions in a given area. In the Gila NF, any time the SPI reaches a value of -1.00 or less for the preceding 12-month period, an interdisciplinary team evaluation of drought conditions is triggered. The interdisciplinary team should consider: local precipitation data and departures from normal; current forage production, vigor, species diversity, drought-induced grass mortality and the extent and connectivity of bare soil patches; current range management status, stocking levels, and available water; and management intentions of the permittee. From the evaluation, recommendations are developed. District rangers have the responsibility to consider recommendations and implement appropriate management in consultation with the permittee. Drought evaluations should be conducted periodically to reassess conditions and evaluate the need for further action. When the SPI for the preceding 12-month period becomes positive, an evaluation for indications of recovery from drought is triggered. Additional provisions for vegetative recovery when developing annual operating instructions after severe droughts may or may not be warranted.

Livestock and Wildlife Conflicts

Management for threatened and endangered species, species of conservation concern, and rare or endemic species also presents challenges for livestock management. In an effort to address these challenges, a multi-agency effort developed and incorporated the Streamlined Grazing Guidance Criteria into the consultation process for threatened, endangered, and proposed species with the USFWS. This criteria outlines activities and measures associated with livestock grazing, including monitoring, to reduce or eliminate effects to species, simplifying and speeding up the consultation process if the criteria are met. The forest continues to use the streamlined grazing process and follow the guidance criteria. See also Restoration and Relationships above.

As conflicts relate to recovery of the Mexican gray wolf, the forest staff work with the Wolf Interagency Field Team (IFT), who, in turn, work with grazing permittees to improve husbandry practices that may benefit producers along with wolves, especially during high-risk periods such as calving. The IFT carries out on-the-ground activities for the Mexican wolf recovery and is responsible for the day-to-day management of wolves. The Forest Service employs a biologist as a liaison for the Southwestern Region who is integrated with the IFT. The IFT coordinates with grazing permittees to provide the management flexibility to alter the timing and location of livestock movement and other science-based conflict-reduction mechanisms[1,2,3,4].

Unauthorized and Excess Livestock

Unauthorized and excess livestock use is prohibited by law, regulation, and policy, regardless of where it occurs, but remains an ongoing challenge.

In the Gila NF, the bulk of the issue involves unauthorized, unclaimed cattle in un-alloted portions of the Gila Wilderness. The forest continues to address unauthorized and excess livestock use within the constraints of law, regulation, and policy, while looking for opportunities to engage the New Mexico livestock board to develop and use more effective methods to address unauthorized, unclaimed livestock.

Glossary

Carrying capacity is the average number of livestock and wildlife that may be sustained on a management unit (such as an allotment) compatible with management objectives *for that unit*. In addition to site characteristics, it is a function of management goals and management intensity (FSH 2209.13 Chapter 90 R3 Supplement 2209.13-2016-1).

Grazing capability is a qualitative expression of the inherent ability of an ecosystem to support grazing use by various kinds and classes of livestock while maintaining sustainability of the resource and providing for multiple uses and ecosystem services. Grazing capability of a land area is dependent on the interrelationships of the soils, topography, vegetation, forage production, and animal behavior (FSH 2209.13 Chapter 90 R3 Supplement 2209.13-2016-1).

Riparian management zones include those portions of watersheds around lakes, perennial and intermittent streams, groundwater-dependent ecosystems, wetlands and high elevation wet meadows that have characteristic riparian vegetation and provide riparian function, or have the ecological potential to do so. It encompasses any surface water and its associated aquatic habitat, connected shallow groundwater, aquatic and riparian vegetation, associated soils (that is, hydric and alluvial), and contributing fluvial landforms. More information about identifying these zones is provided in the direction for riparian and aquatic ecosystems.

Unauthorized livestock is any cattle, sheep, goat, hog, or equine not defined as a wild free-roaming horse or burro by 36 CFR 22.20(b)(13), which is not authorized by permit (or Bill for Collection) to be upon the land on which the livestock is located and which is not related to use authorized by a grazing permit. Noncommercial pack and saddle stock used by recreationists, travelers, other forest visitors for occasional trips, as well as livestock to be trailed over an established driveway when there is no overnight stop on Forest Service-managed land do not fall under this definition.

Excess livestock is any livestock owned by a holder of a National Forest System grazing permit, but grazing on NFS lands in greater number, or at times or places other than permitted under Part 1 of the grazing permit or authorized on the annual Bill for Collection.

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[3] McManus, J.S., A.J. Dickman, D. Gaynor, B.S. Smuts, and D.W. MacDonald. 2014. Dead or alive? Comparing costs and benefits of lethal and non-lethal human-wildlife conflict mitigation on livestock farms. Oryx, 2015, 49(4), 687-695 © Fauna and Flora International. Doi:10.1017/S0030605313001610.

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Timber, Forest, and Botanical Products

Background Information

National Forest System lands were established with the intent of providing goods and services to satisfy public needs over the long term, which includes the production of a sustainable supply of timber, forest and botanical products. Timber products include but are not limited to firewood, sawtimber, pulpwood, non-sawlog materials removed in log form and biomass for electricity. Forest products include but are not limited to Christmas trees, posts, poles and vigas. Botanical non-forest products include but are not limited to piñon nuts, bark, berries, boughs, cones, herbs, wildlings (plant transplants), mushrooms, pine needles, and wildflowers.

The production of timber, forest and botanical products are ecosystem services provided by the forest's ecosystems. These benefits are sustainable when the removal of these products maintains or improves ecosystem and watershed function, or does not detract from it. There are areas in the forest where the removal of wood products provides socio-economic value, improves wildlife habitat, forest health, reduces fuel loading and meets other project specific objectives. This is also discussed in the background information provided for Wildland Fire and Fuels Management. Similarly, there are areas where the removal of wood products can reduce the risk of epidemic levels of insect or disease activity.

In 2000, Congress passed the Community Forest Restoration Act (Public Law 106-393, Title VI). The Act authorized the establishment of the Collaborative Forest Restoration Program (CFRP) in New Mexico to provide cost-share grants to stakeholders for forest restoration projects on public land designed through a collaborative process. These projects may be entirely on any combination of Federal, tribal, State, county, or municipal forest lands, and must include a diverse and balanced group of stakeholders in their design and implementation. Each project must also address specific restoration objectives including (1) wildfire threat reduction; (2) reestablishment of historic fire regimes; (3) reforestation; (4) retention of desirable quantities of old and large trees; and (5) increased utilization (percent) of small diameter trees. CFRP projects and grants have been and are anticipated to remain one of several important tools for establishing and building partnerships and businesses that contribute to the sustainability and resilience of social, cultural, economic and ecological systems within and surrounding the forest.

Plan direction for the timber program is subject to several requirements under the National Forest Management Act (NFMA), the 2012 Planning Rule and associated Forest Service directives, including but not limited to a suitability analysis (FSH 1909.12 Chapter 60).

Desired Conditions

1. Silvicultural treatments (for example, prescribed fire, manual, mechanical, and chemical treatments) and utilization of products promotes movement toward, achievement, and maintenance of ecosystem and watershed desired conditions.
    a. Treatments mimic the outcomes of natural ecological processes, integrating considerations for socioeconomic values, soil and water quality, wildlife habitat, recreation, and aesthetics.
    b. Soil impacts are minimized and previously managed areas that have incurred detrimental soil disturbance recover through natural processes or restoration activities. Organic matter and woody debris remain on site after treatments in sufficient quantities to retain moisture, maintain soil quality, and enhance soil development and fertility by periodic release of nutrients as they decompose (see individual ERU mid-scale desired conditions).
    c. Treatments promote long-term sustainability of ecosystems by reducing the risk of undesirable effects from altered disturbance regimes, including fire, drought, wind, insect infestations, and disease epidemics.
2. A sustainable diversity of forest products supports individuals, tribes, businesses and organizations and contributes to social, economic, and cultural stability of local and regional communities.
    a. Forest products are available to individuals, tribes, businesses and organizations, through a variety of methods such as permits, sales, grants or agreements consistent with desired conditions for other resources and activities, applicable laws and regulations.
    b. Sustainably scaled industry infrastructure and capacity are supported by predictable forest product yields that meet local and regional market demand.
    c. Lands identified as suitable for timber production have a regularly scheduled timber harvest program that contributes jobs and income, while achieving and maintaining ecosystem and watershed desired conditions, and other management direction.
    d. In areas suitable for timber production, existing infrastructure facilitates salvage of dead or dying trees, recovering as much of the economic value of the wood as possible while retaining enough material to provide for wildlife habitat, soil productivity, and shelter for future regeneration of trees (see individual ERU mid-scale desired conditions)
    e. In areas suitable for timber production, post-treatment environments favor natural regeneration and seedling survival, support the natural fire regime, and retain sufficient tree density to sustain ecosystem services. Following high severity disturbances, planting environments favor seedling survival. Artificial regeneration in these areas provides tree densities sufficient to act as seed sources for long-term recovery.
    f. Lands identified as not suitable for timber production, but where timber harvest could occur for other multiple-use purposes, harvest supports achievement of ecosystem and watershed desired conditions and other management direction while providing benefits to people.
    g. The collection of live plants, mushrooms and other forest and botanical products does not negatively impact species' persistence.

Standards

1. During project planning, interdisciplinary teams must incorporate recreation, range, watershed, timber, wildlife, rare plants, aquatic, cultural resources, fire and fuels program areas as appropriate.
2. No timber harvest for the purposes of timber production may occur on lands identified as not suited for timber production (see Chapter 4 – Suitability).
3. No timber harvest for any purpose shall occur where soil, slope or other watershed condition would be irreversibly damaged (see Chapter 4 – Suitability).
4. Recommended project-specific best management practices (BMPs) will be followed to protect, maintain, or enhance soil, water, riparian, aquatic, and air resources.
5. Project planning and implementation must provide for forest health through detection, monitoring, and control[z].
6. Clearcutting and other such even-aged harvest methods will be used only where an interdisciplinary team has assessed the potential environmental, biological, aesthetic, engineering and economic impacts, and consistency with the multiple uses of the project area, and determines those methods are appropriate and will contribute toward achieving both project and plan-level desired conditions.
    a. Openings created by even-aged harvest methods will adhere to the established maximum size limits (FSH 1909.12 Chapter 60) in any one harvest operation and must be consistent with the desired conditions for the relevant ERU(s). Exceptions may be allowed based on threats and approval from the responsible official (FSH 1909.12 Chapter 60). This limitation does not apply to salvage or sanitation harvest as long as it remains consistent with other plan components.
    b. Project design and layout will include the use of natural terrain, consider seral state proportion for the relevant ERU(s), the distribution of those proportions across the landscape.
    c. Even-aged stands shall have reached or surpassed the culmination of mean annual increment (CMAI) (95 percent CMAI as measured by cubic volume) prior to regeneration harvest, unless such harvest would assist in reducing fire risk within the wildland-urban interface, to address severe stand damage, disease or insect infestation, or when such harvest will trend landscapes toward the desired conditions for the relevant ERU(s).
7. Projects and activities will be planned such that reasonable assurance of adequate restocking within five years of final regeneration harvest is provided.

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[z] During project development and implementation, insects and disease infestations not captured by annual detection flights may be detected during field visits. Regardless of detection method, silvicultural prescriptions and other project design features would be adjusted as necessary. Depending on the insect species or disease agent, mitigation measures, such as timing restrictions for the Ips beetle would also be included in the project.

8. When selecting the timber harvesting system, cost efficiency, infrastructure and harvest requirements must be considered, but the selection must be made based on how effectively it will achieve desired conditions and not its ability to provide the greatest dollar return.
9. The quantity of timber sold per decade must be equal to or less than 10 times the estimated quantity that can be removed annually in perpetuity on a sustained-yield basis (see Chapter 4 – Suitability). This does not prohibit salvage or sanitation harvest above this limit. Harvest levels above this limit, other than salvage or sanitation harvests, will be allowed if the purpose is to accelerate movement toward desired conditions.
10. Permits, contracts, and agreements that authorize removal and or use of forest and botanical products will include provisions to protect, maintain, or enhance relevant resource values.

Guidelines

1. Permits, contracts, and agreements should not allow for collection of plant species or plant parts recognized as rare or at-risk unless the forest has information that indicates it will not be detrimental to species' persistence, it is necessary for species conservation, is important for tribal collection, or is a research request that will aid in the management of that species.
2. Projects and activities should determine whether manual, mechanical, aerial, chemical, prescribed fire or other methods are the most effective means to promote desired conditions. When the method generates timber or other forest products, those products should be provided to people.
3. Projects and activities should promote movement toward plan-level desired conditions for habitat connectivity, seral state diversity, species composition, size class distribution, old growth, patch size, and coarse woody debris (see All Upland Ecological Response Units and individual Ecological Response Unit desired conditions).
4. Where ponderosa or piñon pine are present, projects and activities should reduce opportunities for *Ips* beetle populations to increase through treatment timing and management of residual green slash.
5. Projects and activities should support long-term retention of plant and animal diversity.
    a. Implement guidelines and recovery objectives in the most current recovery plans for all federally listed species that have those plans (see also Wildlife, Fish, and Plants).
    b. Encourage release and development of healthy southwestern white pine and aspen as minor components where it occurs.
    c. Sustain representation of healthy spruce and corkbark fir where they occur on appropriate sites.
6. Projects and activities should retain coarse woody debris sufficient to meet wildlife needs, maintain site productivity and support natural fire regimes (see individual ERU mid-scale desired conditions), except when necessary in the WUI (see Chapter 3: Management Areas).

7. Natural reforestation should be the preferred method unless there is an inadequate seed source, or a need to change species composition to move toward desired conditions. Artificial reforestation efforts should consider reforestation potential information in the TEUI.

Management Approaches

Integrating Restoration and Social, Economic, and Cultural Diversity and Stability

Healthy forest and woodland ecosystems provide timber, fuelwood and other forest and botanical products. The forest's timber and fuelwood programs can also contribute to the sustainability of ecological, social, economic, and cultural systems. Herbicide is a restoration tool the forest intends to add to its "toolbox." Appropriate use of herbicide can contribute to sustainability in three ways: (1) it can extend the life of treatments in the wildland-urban interface; (2) reduce the response of undesirable native and non-native species after thinning treatments and help restore or preserve native species composition, vegetation structure, and in some cases, fire regimes, and by doing so; (3) reduce the cumulative effects of maintenance treatments to soil and watershed conditions.

The forest continues to improve existing relationships, and build new ones with other Federal, State, and local agencies, tribes, private organization and individuals to accomplish restoration work and promote the use of forest products that result from restoration activities. The forest maintains and shares a 5-year treatment plan and continues to: (1) design projects to accommodate both small- and large-scale operators; (2) promote and develop markets for low-value timber and other wood products; (3) use stewardship contracting authority when appropriate to achieve integrated natural resource management goals, including ecological restoration and provisioning of wood products; (4) look for opportunities to encourage the use of forest products generated by efforts to increase safety and site distance in transportation corridors and; (5) work with tribal members to facilitate collection of forest products needed for traditional, ceremonial, and subsistence purposes.

Timber Suitability

The timber suitability analysis conducted at the plan level is not intended to be a precise accounting of every acre, nor is there an existing dataset that could facilitate that. There are acres suited for timber production within areas mapped as not suited. Likewise, there are acres that are not suited for timber production within areas mapped as suited. Project planning and implementation may identify these finer scale areas asking the following questions that supported the plan-level suitability analysis.

1. Are the lands outside of designated wilderness, recommended wilderness, designated or proposed research natural areas, eligible, suitable or designated wild and scenic river corridors and inventoried roadless areas? If yes, then move to criterion 2. If no, then not suited for timber production.
2. Does the potential natural vegetation community and climate class[aa] described in the TEUI indicate the area is a timber type ERU? If yes, then move to criterion 3. If no, then not suited for timber production.
3. If none of the following soil and slope combinations is present, then area is suited. If any of the following soil and slope combinations are present, then not suited for timber production.

[aa] Climate classes of 5 0, 5 +1, 6 -1, 6 0, 6 +1, 7 -1 and 7 0 indicate a timber type.

a. The area is on soils derived from volcanic sediment (Datil soils), and slopes are greater than 15 percent.

b. The area is on soils with little to no soil development, as defined in plan standard 3 for upland vegetation, and slopes are greater than 25 percent.

c. The soils are not as above, and slopes are greater than 40 percent.

Outside of designated areas established by laws that prohibit motorized equipment and/or roads, a classification of not suited does not prohibit timber harvest for reasons other than timber production and does not imply a limit to the number of entries that may be required to meet project-level objectives. It simply means that the area cannot be depended on for predictable, regular, periodic timber harvest.

Firewood Program

Firewood harvesting is a long-standing traditional use in the forest, as firewood is the sole source of heat for many local residents. Collecting firewood without a permit or outside of designated areas is illegal, and can have negative ecological impacts. The forest continues to provide legal opportunities for firewood gathering through the permitting system. Green and dead firewood areas are designated through the permit guide, which is updated as needed. The permit guide also includes descriptions of available wood for purchase, and cutting and removal procedures including tree species, size, timing, and other restrictions. The guide and the permits are readily available at any of the forest's offices for a small fee.

The forest looks for opportunities to contribute to the sustainability of ecological, social, economic, and cultural systems by using firewood harvest as a restoration tool to restore grasslands and historically open canopy woodlands and forest/timberland vegetation types.

Reforestation Program

Reforestation success is unpredictable in the Southwestern climate, in the sense that it can take up to a decade or longer for climatic conditions to produce a good cone crop that subsequently aligns with conditions that support germination, establishment, and growth of seedlings. Natural regeneration has been the forest's preferred approach to reforestation in the recent past, but large-scale disturbances have resulted in areas with inadequate seed sources. The forest is in the process of developing an operational reforestation and cone collection strategy to address this issue where it can. The reforestation program provides for: (1) traditional and new, innovative planting strategies to establish seed sources within deforested areas; (2) site preparation by manual, mechanical, aerial, chemical, prescribed fire, or other methods as best suits site conditions; (3) reforestation through manual or mechanical planting, manual, mechanical or aerial seeding, or though natural seeding; (4) protective seedling shelters, control of rodents, and protection from elk and cattle (fencing or other methods) when necessary.

The forest seeks opportunities to engage interested volunteers and other stakeholders to assist in implementing its reforestation program.

Key Concepts

Silviculture the art and science of controlling the establishment, growth, composition, health and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis. **Silvicultural treatments** are methods or systems of methods for tending, harvesting and re-establishing a stand of trees.

Glossary

Adequate restocking is a determination made by a silviculturist that describes the number of seedlings, saplings, and other size classes that must be established to provide for a sustainable supply of timber into the future.

Artificial reforestation or regeneration refers to planting tree seedlings, saplings or seeds.

Best management practices (BMPs) are site- and project-specific methods or measures to prevent or mitigate potential adverse impacts to environmental quality, especially water quality. They include protection measures to address potential detrimental changes in water temperatures, blockages of water courses, deposits of sediment in streams, streambanks, shorelines, lakes, wetlands and other bodies of water that are likely to seriously and adversely affect water conditions or fish habitat.

Culmination of mean annual increment (CMAI) is the age of a tree or stand at which the average annual growth stops increasing and begins to decline.

Even-aged harvest methods regenerate and maintain a stand with one or two age classes. These methods may be part of an even-aged system, in which a stand composed of a single age class is the desired condition, or they may be used within an uneven-aged system as one step toward the desired condition of multiple age classes.

Natural reforestation or regeneration refers to allowing natural processes to govern the germination and establishment of trees.

Salvage harvest is the practice of logging trees in forest areas that have been damaged by wildfire, severe windstorms, disease, insect infestation, or other natural disturbance to recover economic value that would otherwise be lost.

Sanitation harvest is timber harvest for removing insects or diseases from a stand of trees or to prevent diseases or pests from spreading to nearby trees.

Timber harvest is the activity of cutting trees either for timber production, or for restoration. Where timber production is the objective, regular, periodic timber harvest is predictable and supports the achievement and maintenance of non-timber-related desired conditions. It does not imply or require that timber yields be maximized. Under the restoration objective, harvest may be unpredictable, unnecessary, or undesirable based on desired conditions and objectives.

Timber harvesting system is a term referring to the procedure by which a stand of trees is harvested.

Timber production is a resource use based on the objective of growing, tending, harvesting, and regenerating crops of trees on a regulated basis to produce logs or other products for industrial or consumer use.

Uneven-aged harvest methods regenerate and maintain a stand with three or more age classes.

Utilization [percent], as it applies to timber and some forest products, is the estimated volume of a standing tree, log, or log input to a mill, and the volume of its manufactured or merchantable product. In other words, it is a measure of how much of the tree results in useable products with commercial value.

Lands

Background Information

The National Forest System land administered by the Gila National Forest, is primarily land proclaimed National Forest System land in numerous Presidential Proclamations and Executive Orders, and eventually combined and identified as the Gila National Forest. The portion of the Apache National Forest that is located in New Mexico was combined administratively with the Gila in 1971. Also, an area of approximately 2,000 acres, which was once part of the Fort Bayard Military Reservation and was transferred to the Veteran’s Administration was “administratively given” to the Gila National Forest in 1948, to administer, along with the rest of the adjacent forest.

Since the forest was created, numerous land transactions have added and subtracted portions of the land area, via land exchanges, purchases, donations, and sales. Currently, the forest consists of approximately 3.3 million acres of land, which makes it one of the largest national forests in the Nation, but it is not all contiguous. There are several communities and numerous inholdings of private and other governmental ownerships within the boundaries. A separate mountain range (Burro Mountains), located away from the main body of the forest, is included as a part of the forest.

The functions of the forest lands program are land survey and boundary management, land adjustments, and special uses. Boundary management ensures that the forest secures and protects the rights, title, values, and interests of the American public on National Forest System lands. This includes the management of boundary lines within the forest that border state, private, and other Federal agency lands while resolving encroachment issues, as well as secured right-of-way for public and administrative access to the forest. Land adjustments consolidate and improve management efficiency through land transactions including sales, purchases, exchanges, conveyances, donations, and easements within the proclaimed Gila NF boundary.

Desired Conditions

1. Land ownership adjustments assist in allowing for greater accessibility, continuity, efficient management and resource protection of the forest and fostering sound community development.
2. Residents and visitors are aware of Forest Service regulations and common property boundaries.
3. All interior and exterior boundaries of NFS land have been surveyed, posted, and monumented (permanently marked). Boundaries of areas with special management direction (for example, designated wilderness, wilderness study areas, and research natural areas) are surveyed and clearly marked at common access points to avoid unauthorized use.
4. The construction or placement of fences and gates, structures, signs, or other private personal property on NFS lands (that is, occupancy trespass or encroachments not authorized under a special use permit) no longer occur on the forest.
5. Owners of private inholdings have reasonable and appropriate legal access across the forest to reach their property.
6. Documented road and trail easements enable adequate access to areas in the forest, across both private lands and lands administrated by other governmental agencies, where necessary.

7. Vegetation conditions and land uses within a right-of-way or easement facilitate the operation and management of the associated facilities and structures, and may differ from the surrounding vegetation desired conditions.

Objectives

1. Annually, post an average of 2 to 5 miles of unposted property boundary.
2. Annually, maintain an average of 2 to 5 miles of previously posted property boundary.
3. Annually, resolve an average of two existing encroachment/trespass cases.

Standard

1. Access to privately owned property surrounded by NFS lands shall be provided to interested applicants, subject to reasonable terms and conditions, as defined by the Alaska National Interest Lands Conservation Act (ANILCA) of December 2, 1980.

Guidelines

1. Boundary lines between National Forest System lands and other ownerships that have been surveyed, posted, and marked should be protected and maintained to keep them visible, to protect the investment, and to deter encroachment.
2. Property boundary management surveys should be prioritized by the following criteria:
    a. Where known litigation is pending, a title claim has been asserted, encroachments are suspected or the probability of encroachment can be reduced.
    b. Where significant resource values exist and use or manipulation of resources is planned (this includes the location, by survey, of rights-of-way or easements necessary for resource management).
    c. To ensure that any land, resource, or restoration project that occurs near or adjacent to any Forest Service boundary line does not proceed until the legal National Forest System boundary lines are properly located and physically marked in the field prior to any management action.
    d. To provide an accurate delineation and location of NFS boundary lines to help prevent boundary disputes or loss of valued NFS land and its resources.
    e. All remaining property lines.
3. Land exchanges should not result in the creation of isolated NFS parcel inholdings surrounded by other ownerships.
4. Land acquisitions and exchanges should evaluate, and possibly include, associated beneficial encumbrances (for example, water rights, mineral rights, easements, etc.).

5. Land exchanges should not result in a net decrease of riparian, wetland, or perennial stream habitat in National Forest System ownership.
6. Inholding patented properties owned individually should have only one access point to the inholding as entitled under the Alaska National Interest Lands Conservation Act.
7. Acquired easements should include public access in addition to administrative access.
8. Road closure decisions over acquired easements should prioritize public access interests. If the road closure remains in effect, the easement should be retained for possible future considerations.
9. All road easements for roads for which the maintenance responsibilities are being transferred or delegated should be retained by the United States, as these easements have value and the government wants to ensure that the easement be retained in case the road is returned to the government for maintenance responsibilities.

Management Approaches

Land adjustments

Land adjustments (for example, exchanges, purchases, donations, sales) help to consolidate the NFS land base, reduce administrative problems and costs, enhance public access and use and support resource management objectives. Management emphasis is to work with local communities to understand their community expansion needs and retain access to NFS land. Notify local governments, congressional representatives, all parties affected (for example, permittee in the case of a potential loss of acreage), and adjacent landowners about land adjustment proposals and easements and their justification to provide an opportunity to provide feedback on the proposal. Encourage local governments or agencies, private landowners, and/or other appropriate entities (for example, land trusts) to protect the resources and character of the national forest through methods such as conservation easements, land trust management, deed restrictions, or public acquisition of adjacent, high-priority parcels.

Lands desirable for acquisition generally meet one or more of the following criteria:

- Lands that enhance public access and use, recreation opportunities, and protection of aesthetic values.
- Land that would provide needed access to adjacent NFS land.
- Wetlands, riparian areas, and other water-oriented lands.
- Lands needed for important wildlife habitat and for protection of threatened and endangered species.
- Lands needed to protect significant historical or cultural resources when these resources are threatened or when management may be enhanced by public ownership.
- Lands needed to protect and manage administrative and congressionally designated areas.
- Lands needed to reduce expenses of both the Forest Service and the public in administration and utilization.

- Lands with water rights that can be used to accomplish purposes for which the national forest was created, or related resource obligations.
- Inholding tracts of land (completely surrounded by NFS land).
- Consolidation of split land ownership estates.
- Lands that improve public land management (for example, improves fire or watershed management), meet specified administrative need, provide for multiple uses, or benefit other NFS programs.

Federal land conveyances by exchange or other specific authority generally meet one or more of the following criteria:

- Lands inside or adjacent to communities or intensively developed private land, and chiefly valuable for non-NFS purposes. Lands that support community expansion.
- Parcels of land that will serve a greater public need in state, county, city, community, or other Federal agency ownership.
- Inaccessible parcels isolated from other NFS lands or scattered parcels intermingled with private land that cannot be efficiently managed.
- Parcels under long-term special-use permits or having existing uses whose use and purpose are not substantially consistent with national forest purposes and character. Parcels do not have significant recreational, cultural, or ecological value, and the transfer does not affect public access or resource management objectives.
- Parcels that have boundaries, or portions of boundaries with inefficient configurations (projecting necks or long, narrow strips of land, etc.). Lands that result in more logical and efficient management.
- Parcels eligible for transfer under the Small Tracts Act, Townsite Act, or other statutory authorities.
- Transfers retain existing public access with right of ways or easements.

Boundary Management

Education, partnerships, and law enforcement are used to reduce encroachment and trespass issues along property boundaries. Survey and proper posting of boundaries between NFS lands and other lands is a key objective. Bureau of Land Management resurveys are requested where townships and section corners have not been surveyed or monumented, especially in areas of complex land patterns, where development is taking place or where impacted by landscape-scale disturbance. Use the Title Claims Encroachment Management System database so any known land title problems are identified and available for review by both Forest Service management and Congress. Identify and resolve trespass cases, title claims and encroachment occurring on NFS lands, and act to reduce the likelihood of future trespass.

Access

Encourage the protection of existing public access and the acquisition of new public access opportunities to forest lands. Acquire and grant rights-of-way that meet resource access needs of the Forest Service and public users. Prepare and keep current site-specific plans to guide rights-of-way acquisition, and ownership boundary marking, posting, and management. Work with adjacent landowners to minimize conflicts between public land users and private landowners. Work closely with the New Mexico Game and Fish Department access programs and be proactive on access of public lands through traditional routes.

Special Uses (Lands)

Background Information

Special-use permits are authorized when the proposed activities support the Forest Service mission, meet demonstrated public needs, and are consistent with the desired conditions for the use area. Permits are a partnership between the Forest Service and private businesses, academia, non-governmental organizations, or individuals. Special uses are divided into two categories—lands and recreation. Most of the direction for managing special uses is specified in Forest Service directives and regulations.

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

Desired Conditions

1. Special uses are minimized to only those uses required and/or needed by law or to assist in providing a needed benefit to the public without interfering with forest objectives.
2. Special uses are current, including both the authorization and the correct responsible holder.
3. Research conducted in the forest continues to be permitted, with the research and studies promoting a greater understanding of the ecological and socioeconomic systems studied.
4. Special uses protect public health and safety, conserve natural resources, and are consistent with National Forest System management plans.
5. Special uses are administered based on sound resource management objectives and business principles.

Standards

Communication Sites

1. Site use shall be allocated to users on a facility-needed basis.
2. Maintenance of National Forest System roads and trails to access communication sites, above and beyond normal Forest Service maintenance, or use and maintenance of private roads, will be carried out by the facility owner or association only after obtaining the proper authorizing document (for example, road use permit).

3. Clearing of vegetation will be limited to that which poses a hazard to facilities and operational efficiency (see the communication site plan for further direction).
4. At communication sites, any potential electromagnetic interference must be resolved by the site users before construction can proceed. Senior uses on a site have priority over new or proposed uses. Microwave corridors will be protected from electromagnetic interference.
5. All new and replacement towers must be self-supporting.

Guidelines

1. New buildings and structures should be co-located with existing ones.
2. Special uses should have expiration dates, to ensure that the authorizations are updated on a regular basis.
3. All single-purpose uses should be documented and authorized by a permit or other authorization.
4. Special uses should be consolidated whenever possible (roads, linear utilities, communications sites, etc.), to minimize impacts to natural and visual resources. This includes uses being located together and many linear uses being routed parallel to each other. Where possible, uses should be combined on the same infrastructure (same tower or pole locations) and/or within the same area.
5. The color of buildings and towers at communication sites should blend into the landscape where possible. Reflective materials should not be used.
6. New and replacement antennas and towers should be below the height for which the Federal Aviation Administration requires lights because of the interference with the fire lookout tower and aesthetics.
7. Where agency or applicant goals can be met outside of designated wilderness, special use permits should not be issued in wilderness unless a valid existing right or use existed prior to the designated wilderness status.
8. Project effects of electronic interference to the National Radio Astronomy Observatory should be kept within acceptable limits.

Management Approaches

Special-use Permit Management

Proposed uses are evaluated for consistency with the mission of the Forest Service to manage lands and resources, and that the use cannot be reasonably accommodated on lands of other ownership. Evaluate adjacent areas off the forest to ensure that the desire to use the national forest is not prompted by the ease of obtaining approval or lower cost. Special-use authorization applications should meet special-use proposal screening and application criteria, as presented in 36 CFR 251.54. Use authority granted under the Federal Power Act to participate in Federal Energy Regulatory Commission (FERC) licensing requirements for power projects affecting NFS lands. Maintain existing communications sites and complete site management plans for sites with multiple users for cooperation purposes.

Relationships

Consult with representatives of the National Radio Astronomy Observatory (aka the Very Large Array) for any project that may cause electronic interference.

Minerals

Background Information

It is Forest Service policy to support responsible, environmentally sound energy and mineral development and reclamation. Federal law and mineral type prescribe how minerals may be searched for or acquired in the national forest. Minerals of economic interest are classified as leasable, salable, or locatable. Coal, oil shale, oil and gas, phosphate, potash, sodium, geothermal resources, and other minerals that may be acquired under the Mineral Leasing Act of 1920, as amended, are referred to as leasable minerals. Common varieties of sand, stone, gravel, pumice and clay that may be acquired under the Minerals Act of 1947 are considered salable minerals or mineral materials. Minerals that are not salable or leasable, such as gold, silver, copper, tungsten and uranium, are referred to as locatable minerals. Locatable mineral deposits include most metallic deposits and certain nonmetallic and industrial minerals. Locatable minerals are subject to the General Mining Law of May 10, 1872, as amended.

The Gila National Forest and surrounding areas contain mineral resources, with past mining for metallic minerals primarily producing gold, silver, copper, lead, manganese, zinc, iron, and tin. Future demand for locatable minerals will likely occur in and around known mining districts. Mining is an especially important industry in southwestern New Mexico. Recreational gold panning is permitted in the forest. Uranium and rare earth elements occur in the Burro Mountains, but the future potential is low at least in the near term. The plan area contains many salable minerals, mineral materials, and common variety minerals such as sand, gravel, and rock. There are abandoned mine lands from historical mining operations in the plan area, some of which could pose physical, safety, and environmental hazards.

Sources of energy in the forest are limited. There are no known commercial quantities of leasable minerals (that is, coal, oil, oil shale or natural gas) in the Gila NF. There is currently little to no renewable energy production in the forest; although, the potential for solar, wind, and geothermal energy sources does exist. Currently, two large high-voltage transmission lines cross the Gila NF, but the forest is not positioned in the direct path of transcontinental or multi-state connection routes for energy and transportation.

Locatable Minerals

Background Information

The Gila NF hosts occurrences of important mineral resources, and mineral extraction has resulted in large quantities of ore being mined and processed from the area, even before the national forest was established. Evidence of this historical work is evident throughout the mountainous landscape. Within the mineralized portions of the forest, there are numerous historical mining communities, mostly no longer occupied, with evidence of mine workings still evident. Within these former workings, there are hazards to public health and safety. As economic conditions fluctuate, certain mineral commodities can become more valuable, prompting new or renewed interest in prospecting, exploration, and mining of these minerals. Management of mineral activities in the Gila NF facilitates the development of mineral resources and contributes to local, national, and global markets for valuable commodities. The forest provides appropriate access to mineral resources in accordance with the law, while facilitating mineral development in a manner that minimizes adverse impacts to other resources. Particular types of minerals along with sand and rock aggregates are also sought after by the general public for a wide variety of uses such as landscaping and road improvement.

Abandoned mines are the remains of former mining operations (see also Caves and Abandoned Mine Lands). 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 with 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.

Desired Conditions

1. Mining activities meet the legal mandates to facilitate the development of minerals in a manner that minimizes adverse 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.
2. Historic mining operations and hazards have been reclaimed and their hazards removed, and are no longer a concern to the health and safety of the public or the environment.
3. Information on Forest Service operating requirements and opportunities for mining activities considered recreational in nature (gold panning, sluicing, rock and mineral collecting, etc.) is made available in the forest and complied with.

Standards

1. All mining operations shall be conducted under an approved Notice of Intent and/or Plan of Operation.
2. Adequate reclamation bonds will be required from operators for all proposed mineral activities that will potentially cause significant surface disturbance and require site rehabilitation.
3. All operations of locatable minerals must have a registered mineral claim with the Bureau of Land Management located on the area of disturbance and owned or leased by the operator. These operations must be conducted under a Forest Service approved Plan of Operation.
4. Access on and off mining claims shall be authorized where necessary for mineral development. Road construction, reconstruction, and commercial road use on and off mining claims shall be authorized through a Plan of Operations. When mine development proposals include roads, the NEPA process shall be used to analyze and evaluate proposed routes along with the operation itself.
5. For those lands where the Federal Government owns the mineral estate, any mineral activity on these lands, if allowed, must be negotiated and approved by the Federal Government prior to any type of mineral assessment and/or entry.

Guidelines

1. Structures and/or occupancy for mining purposes should be limited to only those that are necessary and incidental to approved mining operations.
2. Locatable mineral operations should attempt to accommodate desired conditions of other resources.
3. Streambed material disturbed by placer mineral operations should be replaced in its source location for stream stability as soon as possible following its processing.
4. Given the requirements of the mineral operation, mineral developments should be located so as to blend in with the environment, not to detract from the scenic character and remain visually subordinate to the surrounding landscape.
5. Long-term or final reclamation should return the land to a planned use that is consistent with the overall land use objectives of the area. Reclamation plans should be appropriate for the setting (for example, soils, vegetation, climate, or slope). Seed mixes, vegetation, and soil used for reclamation should be representative of the local ecosystem (see also Non-native Invasive Species). Areas reclaimed should blend in with the surrounding landscape.
6. Reclamation bonds should be sufficient to ensure the full costs of reclamation, including reasonable Forest Service administrative costs, restoration of productivity and maintenance of long-term physical, chemical and biological stability. Approved Plans of Operation should include requirements for regular (annual or biennial) review of bonds.
7. Where settlement ponds, tailing dams, or impoundments are planned and implemented, each should be located, designed, constructed, and inspected under the development and supervision of a professional engineer.
8. Unless otherwise authorized, all garbage or refuse should be removed from National Forest System lands and deposited in a certified landfill or other State-approved designated disposal location.
9. Key cultural sites, research natural areas, wilderness areas, and administrative and recreation sites with an investment in facilities should be withdrawn from mineral entry to protect resources and existing infrastructure.
10. Abandoned mines that are used by bats should be managed to prevent disturbance to species and spread of disease (for example, white-nose syndrome). (See also Caves and Abandoned Mine Lands.)

Management Approaches

Relationships

Coordination of the Gila NF's mineral program with the Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department, Mining Environmental Compliance Section of the New Mexico Environment Department, and the Bureau of Land Management under the current memorandum of understanding (MOU) is desirable and advantageous to all agencies. Sharing information regarding mining operations and mineral claimants in the forest creates opportunities to ensure consistency with operational and closure requirements, and helps to share resources by coordinating inspections and enforcement. Continue to work alongside the State of New Mexico Mining and Minerals Division on approving operations and holding joint bonds.

Administer active mineral operations in accordance with approved plans of operation, conduct NEPA analysis for the activity, and require the posting of an adequate reclamation bond to be able to reclaim the area of the identified disturbance, if needed. Continue to recommend existing mineral withdrawals to the Department of the Interior for retentions, revocations, and modifications. Conduct reviews of the existing withdrawals on a regular basis.

Residences on Mining Claims in the Forest

In the past, numerous mining operators declared that they needed to live at the mining operation to protect it from intruders (or have a full-time guard present). This has resulted in numerous cases where the proposed or existing mining operation was potentially used as an excuse for someone to reside cost-free in the national forest. Their presence deterred others from venturing on to the area, as the permitted area was considered the resident's property. Because of these situations, the case for any kind of residence on a mining claim in the forest in support of a mining venture should be shown to be necessary. This necessity should be proven and continue to be upheld throughout any period of time this activity occurs. Historical use or a pending need should not be accepted as justification for such occupation.

Reclamation

Reclamation in the Gila NF goes hand-in-hand with all mineral activities and operations. Each operation has a reclamation component that is site-specific and tied to that single operation. For example, appropriate reclamation is discussed with operators for small sluicing operations as well as required in plans of operation for mining. It is the responsibility of the operator to reclaim mineral activity sites as authorized in their plan of operation. In addition to plans of operation, bonds collected by the Forest Service ensure that money is available for site reclamation. The bond can be returned once satisfactory reclamation is completed by the operator.

Abandoned Mine Lands

Cooperate with the State and other agencies to inventory, mitigate, and rehabilitate hazardous abandoned mines and mined areas. Continue to inventory known abandoned mines, search for unknown sites, consider appropriate long-term management, and prepare and implement restoration plans to address any biological and physical resource concerns including chemical instability. Identify areas containing hazards to the public's health and safety on a map, and post on the ground and make off-limits to the casual person coming across an area needing to be reclaimed. To reduce disturbances from human activities and prevent the spread of disease, construct and install bat gates in priority mine entrances used as habitat and shelter for bats, when there are no conflicts with cultural resources.

Information for Recreational Prospecting

Make information on recreational rock collecting and gold prospecting (panning, sluicing, etc.) available to the public in a handout or pamphlet available at all offices, as well as in an online document. This would assist the casual collector or prospector in understanding the forest's policies.

Salable Mineral Materials

Background Information

Mineral materials (for example, sand, decorative rock, building stone, and gravel) have traditionally been gathered in dry stream washes and other convenient places where deposits of the materials naturally gather. This method of removal has, at times, created problems for other resources such as causing erosion, altering stream channels, or damaging riparian habitat. Because of this, we need to study quarries and areas where the materials exist to ensure that removing the material will not adversely affect other resources.

Demand for these mineral materials from the Gila NF is low, though significant because the materials are often used or sold locally. Permitted uses are predominantly small private sales from common use pits, a single-operator commercial pit, and various pits for State, County and Forest Service uses (primary crushed gravel). Sales of these materials are divided into commercial-use versus personal-use operations. Quantities desired usually determine what category the use is. Commercial use usually requires a pit plan to ensure the unused resource is left intact and associated problems do not materialize.

Desired Conditions

1. Mineral materials are provided for personal, commercial, and Forest Service use; and other governmental use as appropriate with other resources; and are subject to applicable laws, regulations, offered locations, and availability.
2. Quarries and other areas set up for this extraction are convenient and accessible.

Standards

1. Permits and authorizations for exploration and development of common variety minerals shall include terms and conditions for controlling operating methods and timing to prevent degrading effects to resources and uses.
2. Close-out plans will be developed and implemented.

Guidelines

1. Quarries and other areas set up for extraction should be analyzed and mitigated for possible effects to other resources.
2. Mineral material mining activities should be conducted in a manner that minimizes adverse impacts to other surface and subsurface resources.
3. Mineral material resource sites should be located where economical and the scenic integrity objectives can be met.

4. Existing designated mineral material collection areas and community pits should be fully used before new areas are developed. Additional mineral material development should balance private and community needs, while providing for sustainable administrative use.
5. Abandoned mine lands or unneeded mineral material pits should be restored, closed and/or rehabilitated to provide for resource protection and public health and safety.
6. Streambed and floodplain alteration or removal of material should not occur if it prevents attainment of riparian, channel morphology, or streambank desired conditions.
7. Mineral materials (such as sand and gravel) from designated areas should be made available for use on the Forest Service transportation system for road maintenance activities, and should be issued as free-use on a mineral material permit to other Federal, State, County, and local agencies for use in public projects in accordance with 36 CFR 228 part C, 228.57(d) and 228.62.
8. Mineral materials should be made available to support internal resource management needs, such as erosion control features, rock dams, and recreation site materials (barriers and landscaping).
9. Personal-use mineral material sites should be evaluated periodically to prevent resource damage due to over-use.
10. Once a borrow site is depleted of desirable materials, or if unanticipated significant resource damage is occurring, the site should be closed and a different site should be used for future permits.
11. Talus slopes should not be used as a common variety mineral materials source where disturbance would destabilize the talus slopes and alter any at-risk species habitat or presence.

Management Approaches

Common variety mineral resources

Identify and provide suitable locations for the development of common variety mineral resources. Areas for mineral material sales should be planned, studied, and made available, if compatible with other resource concerns. Permits for landscape rock, sand, soil, and other mineral materials in these areas should be issued to the public for personal use. Although the mineral materials program is a discretionary use of the forest, responding to requests for mineral materials desired by local landowners and the public are the drivers of this program, and the use of these resources should be encouraged, where available.

Borrow pits

Identify and select the location of borrow pits to support the needs of this resource, especially facilitating the road system in the forest. Communicate with other governmental agencies to assist one another in obtaining and using the desired product. Coordinate and cooperate with other Federal and State agencies having authority or expertise in mineral-related activities.

Roads

Background Information

Gila NF is accessed through a network of Federal, State, and county routes. Several different agencies are responsible for keeping these roads open and safe for all users. The Gila NF's transportation system is integral to allowing Forest Service personnel to access the forest to perform resource management activities and supporting the many uses and opportunities enjoyed by the public. Roads allow access to gather firewood, hunt, fish, hike, and recreate. Local businesses and communities benefit from visitors who want to use the forest. Gaining access to the forest through roads is vital for local residents to continue their traditional uses, which are integral in maintaining the social and cultural fabric of many forest communities.

The Forest Service uses a road maintenance plan to prioritize, plan, budget, schedule, and perform maintenance of National Forest System roads. When roads are scheduled for maintenance, the maintenance performed should meet the criteria for the road's assigned maintenance level (ML). Maintenance levels range from 1 to 5. An ML 1 road is closed and an ML 5 is associated with roads providing the highest level of service. NFS roads managed as ML 3, 4, or 5 see more traffic traveling at higher speeds than ML 2 roads, and thus, more time and money are directed toward maintaining these facilities.

The forest's motor vehicle use map (MVUM) shows 3,334 miles of National Forest System roads open for motorized use by the public. An additional 329 miles of routes are designated for administrative use or by written authorization only, and 908 miles of closed National Forest System roads. Approximately 2,932 miles (88 percent) are ML 2. The remaining designated NFS roads (402 miles or 12 percent) are ML 3 to ML 5 and are managed for passenger car use. The Gila NF has 12 road bridges as part of its transportation system. The forest has worked with local county agencies to clarify jurisdictional issues associated with roads passing through the Gila NF. The result is a transfer of nearly 400 miles of National Forest System roads to Catron and Grant Counties.

Roads across the forest are crucial for access and fire management, and facilitate multiple uses, but can be susceptible to negative ecological impacts. Infrastructure contributes to ecological sustainability when it is properly designed, integrated within the landscape, and well maintained. However, the Gila NF struggles to keep pace with maintaining its transportation system, given current road maintenance funding levels. Flash floods from isolated thunderstorms, persistent monsoon rains, downed trees from the past winter or spring winds, and potholed pavements from freeze-thaw cycles comprise some of the maintenance challenges throughout the year. Emerging trends are the impacts of larger and more severe fires, and the subsequent monsoon rains that follow, leading to increased flooding and roadway washouts.

Desired Conditions

1. Roads, bridges, and trails are well marked and provide safe, reasonable access for public travel, recreation uses, traditional and cultural uses, and land management and resource protection activities, as well as contributing to the social and economic sustainability of local communities. The forest's transportation system is interconnected with Federal, State, and local public roads and trails to facilitate access to lands, infrastructure (for example, buildings, recreation facilities, municipal water systems, reservoirs, electronic and communication sites, and utility lines), and inholdings.
2. The transportation system provides a variety of motorized recreation opportunities from motorized trails to paved scenic byways, while limiting resource and user conflicts.
3. Bridges and other roadway features provide for public safety to the appropriate standard for the intended use.
4. Roads have minimal impacts on ecological and cultural resources.
5. Unneeded roads are closed to motor vehicle use and decommissioned to reduce impacts to ecological resources (that is, watersheds, wildlife and fish habitat, and soil erosion).

Objective

1. Decommission 50 miles of roads within 10 years of plan approval.

Standards

1. Motor vehicle use off the designated system of roads, trails, and areas identified on the Gila NF's most current motor vehicle use map (MVUM) is prohibited, except as authorized by law, permits, or orders in connection with resource management and public safety.
2. Road construction and maintenance should incorporate best management practices (see also Soils, Water Quality, and Watersheds) to minimize impacts to water quality.

Guidelines

1. Roads should be located, designed, and maintained considering other uses and resources to achieve the forest's desired conditions.
2. Construction and maintenance of roads and trails should accommodate terrestrial and aquatic wildlife species movement and habitat connectivity.
3. Construction of new roads should be avoided in riparian areas. Where unavoidable due to terrain or topography, new road construction should incorporate best management practices to minimize impacts.

4. Reconstruction and rehabilitation of existing roads should be emphasized over new road construction.

Management Approaches

Relationships

Collaborative relationships with adjacent stakeholders, public land managers, and Federal, State, county, and other local transportation authorities are actively encouraged to develop contiguous road systems across multiple ownerships. Cooperate with local and county governments, New Mexico Department of Transportation, and the Federal Highway Administration on the planning, design, construction, and maintenance of highway corridors. Work closely with State, counties, and other Federal agencies to resolve right-of-way issues and to ensure that public access to the various parts of the Gila NF on State, county, or permanent National Forest System roads meets management objectives for all ownerships. Where possible, acquire rights-of-way to promote road connectivity and manageability needed to administer the forest and provide public access. Collaborate with utility companies to ensure access to rights-of-way and infrastructure.

Road System Management

Develop and maintain road management objectives for all National Forest System roads. Road management objectives are used to describe the level of service provided by a specific NFS road and help determine the road's maintenance level. When developing new roads, consider recreation opportunity spectrum objectives to maintain recreation opportunities and settings. Work with the New Mexico Department of Game and Fish and New Mexico Department of Transportation to identify any wildlife habitat needs, potential barriers to wildlife movement, and explore ways to mitigate these issues. Relocate roads away from floodplains, perennial stream channels, and riparian areas, when opportunities and funding allow, to reduce resource concerns and reoccurring maintenance. Notify county and other potentially affected users (including permit holders) of changes in road status and/or significant deviations in traffic pattern.

Prioritize decommissioning of high-risk, low-value roads based on the following factors: redundant routes; roadbeds in sensitive soils susceptible to severe erosion; built close to waterbodies; or have adverse impacts to water quality, at-risk species, or cultural resources; or within inventoried roadless areas that negatively affect roadless character. When developing the proposed action for a NEPA project, consider incorporating any decommissioning of roads within the project area that meet these decommissioning priority factors while involving affected stakeholders.

Encourage stakeholders to provide specific feedback on the road system to assist with travel management implementation, and look for opportunities to resolve issues in an adaptive management approach. Encourage private landowners who use forest roads to take maintenance responsibility for roads that serve primarily private uses. Look for opportunities to use technology to assist users and stakeholders reporting road condition issues to the forest.

Facilities

Background Information

The forest manages a variety of facilities for many purposes that enable the Forest Service to fulfill its mission. These include administrative facilities (offices, warehouses, employee housing, and fire facilities) and public recreational facilities (visitor centers, campground or picnic ground restrooms, storage buildings, etc.), associated water and wastewater treatment systems, airstrips, and communication sites.

Maintenance requirements across the portfolio of assets is increasing, with much of the preventative maintenance (annual and/or cyclic activities) becoming deferred. The accumulation of deferred maintenance leads to deteriorated performance, increased costs to repair, and decreased asset value. As the workforce and mission services continue to evolve, existing infrastructure may become obsolete from the originally designed purpose and will require the forest to look at adaptive reuses, multi-uses, and other ways to address accumulating deferred maintenance.

Desired Conditions

1. All facilities function as intended or are adapted to accommodate the current and/or anticipated demands.
    a. Administrative infrastructure provides employees a safe and mission-oriented working environment.
    b. Recreational infrastructure aligns with the recreational uses for that area.
2. Facilities provide an environment free from recognized hazards for people, while avoiding or minimizing negative impacts to natural and cultural resources.
3. Facilities are in a well-maintained condition to enhance public service, support health and safety, and provide long-term sustainability of the capital investments.
4. Potable water systems, where provided, serve the public or administrative needs, while complying with current standards.
5. Facilities comply with applicable accessibility guidelines and current building or occupancy standards.

Standard

1. Where construction, reconstruction and maintenance of facilities have the potential to impact water quality, best management practices will be incorporated to mitigate those impacts (see also Soils, Water Quality, and Watersheds).

Guidelines

1. Emerging technologies and sustainable concepts consistent with the Built Environment Image Guide[1], or similar guidance, should be incorporated in facility design, maintenance, and renovation to improve energy efficiency, conserve water and other natural resources, improve functionality, and ensure consistency with the scenic character of the Gila NF.
2. Construction of new facilities in floodplains, wetlands, and other environmentally sensitive areas should be avoided. When a practical alternative does not exist, the footprint area of disturbance should be as small as possible.
3. Facilities and structures should be designed and maintained to consider the needs of physically challenged individuals and to prevent or mitigate impacts to terrestrial and aquatic species.
4. Facilities no longer used as intended should be repurposed to accommodate a new use or should be decommissioned to minimize maintenance backlog and infrastructure deterioration, and to protect public safety and health.
5. Adaptive reuse of historic properties should be pursued when cost to maintain or rehabilitate do not exceed other practical measures; maintenance and renovations should maintain historic design.

Management Approaches

Facilities Management

The facilities master plan, sustainable recreation plan, recreation site analysis, and other long-term planning documentation dictate how infrastructure will be maintained, modified, or removed from service. Develop and implement a comprehensive preventive maintenance program for buildings and infrastructure to minimize major unplanned repairs or replacements. Match the facility inventory with current management needs, including decommissioning and disposing of those facilities that are no longer required. Reduce the backlog of accrued facility deferred maintenance, particularly those items associated with health and safety.

Prioritize potable water systems and other infrastructure needs and investments for current need and long-term planning goals as described in the facilities master plan, sustainable recreation plan, recreation facility analysis, and other resource planning documents, and health and safety requirements for employees and visiting public. All infrastructure with employee occupancy is subject to the Occupational Safety and Health Administration standards and will be evaluated regularly to protect the health and safety of the forest's employees, volunteers, and the visiting public. Work with the Heritage Program to administer and maintain facilities according to the facility master plan and any developed preservation maintenance plans (historic property plans) for administrative facilities and infrastructure that are historic resources.

Airstrips

Consider recreational aviation activities and access to airstrips and National Forest System lands for recreational purposes when developing projects for recreation and infrastructure. Encourage volunteers and partners such as the New Mexico Pilots Association and Recreational Aviation Foundation to assist with the maintaining backcountry airstrips where appropriate.

Reference

[1] USDA FS. 2001. The Built Environment Image Guide. FS-710. https://www.fs.fed.us/recreation/programs/beig/

Sustainable Recreation

Background Information

The Gila NF consists of approximately 3.3 million acres, and offers spectacular scenery, ranging from high, cool mountains of aspen and Douglas-fir to warm semi-arid lowlands with juniper, oak, and cactus. It remains one of the most remote, uniquely continuous, and least-developed national forests in the southwestern United States. Twenty-four percent of the Gila's land mass consists of congressionally designated wilderness to be managed for primitive and semi-primitive non-motorized use. The forest is home to the first designated wilderness and has a proud history of wilderness management in the Gila, Aldo Leopold, and Blue Range Wilderness Areas.

The most popular recreation activities are hiking or walking, hunting, viewing natural features, driving for pleasure, relaxing, fishing, picnicking, viewing wildlife, horseback riding, and off-highway vehicle use. Other activities that are known to occur include mountain biking, developed camping, rock climbing, spelunking, and river floating. Dispersed camping is also popular, and is often associated with hunting.

Along with the previously mentioned wilderness areas, there are a variety of specially designated areas, trails, and byways in the Gila. Local communities' quality of life and economic opportunities are interwoven with the national forest's future. This is best summarized in the Gila National Forest Recreation Facility Analysis (USDA Forest Service Gila NF 2007), which identified the Gila's niche and desired condition:

> *"From wilderness to western heritage, visitors to the Gila National Forest have the opportunity to 'find themselves' in the wildness of the forest. The essence of the Gila is the freedom to explore vast expanses of backcountry. Heritage and cultural connections allow local communities, Native Americans, and recreationists to establish long-term bonds with the forest. Traditional gathering of forest products and hunting bring visitors from near and far. Rivers and lakes, uncommon in the Southwest, provide relief from heat across the forest."*

Common to Overall Sustainable Recreation

Desired Conditions

1. The Gila National Forest is visited and enjoyed by a diverse group of visitors, including those considered underserved, by providing a variety of recreation opportunities that are appropriate for each recreation setting while protecting resources and minimizing conflict between uses.
2. There exists a diverse range of high quality recreation settings, uses, activities, and opportunities that is sustainable with currently available and projected future resources, and that are adaptable to changing uses and trends, while satisfying public demand and contributing to the desired conditions of other natural and cultural resource values. Recreation settings provide a range of opportunities as described by the recreation opportunity spectrum. Recreation settings and opportunities indirectly contribute to local economies by attracting visitors to the area, and stimulating recreation-related commerce.

3. The unique cultural, historical, and ecological resources of the Gila NF are highlighted through a diversity of recreation opportunities, education, and interpretation. Visitors are connected to and are appreciative of the importance of their public lands.
4. Quality conservation education, visitor information, and interpretation opportunities are provided to inform and connect visitors and local communities to the Gila NF's unique recreation setting and cultural, historical, and ecological resources.

Objective

1. Implement at least 75 percent of the specific action items identified within the Gila's Sustainable Recreation Action Plan within 5 years following the action plan implementation.

Standards

1. The recreation opportunity spectrum classifications shall be used to analyze effects to recreation opportunities to inform line officer decisions when conducting all project planning across all Gila NF program areas.
2. The Scenery Management System (SMS) shall be used to analyze effects to scenic character desired conditions to inform line officier decisions when conducting project planning across all Gila NF program areas.
3. The Gila NF shall establish and enforce forest-wide length of stay limits.[bb] Unless a decision is made otherwise by the responsible official, the default length of stay limit for any individual shall be by default 14 cumulative days within a 30-day period. Exceptions may only be granted by written permission of the forest supervisor or designated agent, including when approved as terms and conditions for special-use permits on a case-by-case basis, and groups or individuals that agree to mitigation terms and demonstrate a high proficiency for Leave No Trace Ethics. Changes shall be made to the default forest-wide length of stay limits when approved by the forest supervisor and informed by recommendations from analysis of effects completed by an interdisciplinary team.
4. The forest shall issue closure orders and implement appropriate rehabilitation activities to mitigate resource damage that is determined to be due to excessive or inappropriate recreation use.

[bb] Implementation and enforcement of this standard requires issuance of a closure order.

Guidelines

1. All management decisions should be in alignment with recommendations and contribute to program goals identified within the Forest Sustainable Recreation Strategy.
2. Management activities for all resources should be consistent with desired recreation opportunity spectrum settings.
3. Potential conflicts between incompatible uses should be avoided during project planning and decision making regarding allowable recreation activities.
4. Recreation developments and improvements should be planned, designed, and managed for activities and capacities that do not cause long-term resource damage.
5. Project-level decisions and management activities should be consistent with mapped classes and setting descriptions in the recreation opportunity spectrum to sustain recreation settings and opportunities in the Gila NF.
6. Management activities that affect visitors should be scheduled outside of the major recreation season to prevent negative socioeconomic impacts.

Management Approaches

Sustainable Recreation Strategy

Develop the Sustainable Recreation Action Plan and implement all of the actions and objectives outlined in strategy. Review and update the Recreation Strategy at a minimum of every five years.

Relationships

Develop partnerships and collaboration with agencies, groups, communities, volunteers, permit holders, and other individuals to increase forest stewardship, ecological awareness, volunteerism, user satisfaction; to promote sustainable recreation resources and opportunities; and to provide support for local recreation-based economic development. Develop relationships with local communities, partnerships, volunteers, other government agencies, cooperators, and permit holders to help co-manage sustainable recreation resources and opportunities, including planning, design, implementation, and operations and maintenance. Recognize partners for their roles in providing recreational opportunities when possible.

Outreach and Education

Promote established resources and opportunities and develop new conservation education programs at schools, youth activities, fairs, and volunteer events that help connect people to nature and their public lands, reach underserved populations, and encourage responsible use of natural resources. Minimize conflicts between incompatible uses through careful consideration during project planning and by implementing public education activities. Provide multilingual interpretation in recreation areas popular with non-English-speaking visitors. The recreation program works with local communities to establish partnerships to contribute to forest management and bettering the economic, cultural, and social conditions of surrounding communities.

Provide interpretive services within administrative capabilities, through visitor centers, ranger stations, developed recreation sites, and by developing educational tools. Develop interpretive materials to address educational, interpretive, and informational needs of each district, and identify key messages for the Gila NF's diverse ecological, social, and economic resources; the multiple-use sustained yield philosophy; public laws and regulations; shared use ethics; and management strategies. Incorporate information technology (for example, QR-codes, web addresses, and interactive maps) into signs and interpretive materials to direct the public to additional information.

Make use of a variety of techniques (for example, handouts, websites, presentations, social media platforms) to educate users on topics ranging from land ethics to forest history. Educate the public on ethical land stewardship and low-impact recreation by promoting established programs (such as TreadLightly!®, Leave No Trace, Kids in the Woods, Passport in Time, Bear Aware) while developing in-house, locally significant conservation education programs that connect visitors and encourage responsible use at schools, youth activities, fairs, volunteer events, etc.

Recreation Opportunity Spectrum Desired Conditions

The recreation opportunity spectrum is a management objective and provides a way of describing and providing a variety of recreation opportunities (USDA Forest Service 1982). The recreation opportunity spectrum provides a framework for stratifying and defining classes of outdoor recreation environments, activities, and experience opportunities. The settings, activities, and opportunities for obtaining experiences have been arranged along a spectrum divided into six classes defined in terms of its combination of activity, setting, and experience opportunities. Opportunities for experience represent a range from a very high probability of solitude, self-reliance, challenge, and risk (primitive) to a very social experience where self-reliance, challenge, and risk are less important (rural or urban; USDA Forest Service 1986).

As part of the current forest plan revision process, a new recreation opportunity spectrum inventory process was completed (USDA FS Gila NF 2016d). The forest will continue to develop, implement, and update as needed a recreation opportunity spectrum desired conditions GIS layer, making use of the data developed during the plan revision process, but also accounting for all areas that may fall within distance thresholds for one opportunity classification, but is managed for a different opportunity.

An example would be recreation opportunity spectrum within designated or recommended wilderness; there may be areas within the area boundaries that are within the distance threshold from a motorized road or trail to meet the definition of "semi-primitive motorized," but by law, the area is required to be managed for primitive recreation experiences. In all such instances, the desired conditions GIS layer should be adjusted to reflect that all areas within wilderness and recommended wilderness boundaries are managed for "primitive" recreation opportunity spectrum opportunities.

Other areas besides recommended and designated wilderness where this may also be applicable include, but are not necessarily limited to, recommended and designated research natural areas, eligible wild and scenic river corridors, rare and endemic vegetation management areas, national recreation trails, and the Continental Divide National Scenic Trail.

Developed Recreation

Background Information

Developed recreation occurs in developed Forest Service sites, such as campgrounds, picnic areas, or fishing access areas. Developed recreation is defined as recreation that requires facilities and results in concentrated use of an area. Developed recreation provides a more accessible experience, with available parking, shelters, running water, or other facilities. In many cases, these sites are a gateway to the natural benefits that the forest provides, such as trailheads and campgrounds, but others are an attraction themselves, such as group sites and fishing piers.

The Gila NF has 33 developed campgrounds (including 2 group sites); 6 picnic sites (including 3 group sites); 98 developed trailheads; 3 public target shooting ranges (operated under special-use permits with the corresponding counties) in the Glenwood, Silver City, and Reserve Ranger Districts; an observation site; and an Interpretive Visitor Center shared with the National Park Service near the Gila Cliff Dwellings National Monument. Developed sites and areas experience greater use during the summer and fall seasons and on holidays, although several facilities (primarily on the southern and lower-elevation portion of the national forest) remain open and receive use year-round.

Desired Conditions

1. Developed recreation areas are safe, well-organized, and capable of supporting concentrated visitor use. The number and size of constructed facilities are appropriate for the use level and activity types that occur at each site.
2. Developed campsites meet the minimum needs of vehicle-based camping. The overall capacity of sites meets demand in high-use seasons, including providing for large groups.

Objective

1. Implement a fee program on at least 50 percent of developed campgrounds that do not currently charge a fee, but have been identified by a recreation site and market analysis to warrant, and have been approved by the Forest Leadership Team as a fee site, within 5 years of implementation of the forest plan.

Standards

1. New developed campgrounds shall not be located within floodplains or other areas prone to flooding or difficult to evacuate in case of emergencies, and shall have more than one point of ingress/egress in case of emergency evacuation.
2. Existing developed campgrounds located within floodplains or other areas prone to flooding or identified as difficult to evacuate in case of emergencies are a priority for decommissioning, replacement, or both, to a safer location.

3. All facilities that have the potential to impact water quality should be designed, constructed, or maintained using current best management practices to mitigate those impacts (see Soils, Water Quality, and Watersheds.

Guideline

1. New developed trailheads and day-use areas should be located away from riparian areas, floodplains, and other environmentally sensitive areas, and should have more than one point of ingress/egress except where it is not possible.

Management Approaches

Developed Recreation and Sustainability

Continually assess the developed recreation resources and opportunities and prioritize sites identified as unsustainable for decommissioning, closing, or repurposing of facilities, and shift limited resources to prioritized sites. Implement a developed recreation fee program to help facilitate a sustainable developed recreation program in the context of decreased availability of appropriated funds. Use sustainable operations at developed recreation sites (for example, recycling receptacles, electric maintenance vehicles, etc.).

Where possible, move infrastructure such as vault toilets from decommissioned sites to appropriate and sustainable developed sites to increase capacity and/or reduced maintenance backlog. Take into account factors such as visitor safety, location within floodplains, volume of use, resource protection, operating costs, opportunities for partnerships, and concession fee or rental opportunities.

Consider management actions such as seasonal closures or seasonally adjusted reduced services to limit the costs associated with site management during low-use periods. Consider implementing an online reservation system (i.e., rec.gov) for larger campgrounds and group areas; this will help reach the largest and most diverse population possible.

Consider the primary user groups in establishing developed use sites (for example, campgrounds popular with hunters should accommodate larger RVs, camp trailers, and groups; popular all-terrain vehicle or off-highway vehicle areas may provide loading ramps; wilderness trailhead parking is appropriately sized to discourage overuse of popular trailheads, etc.)

Dispersed Recreation

Background Information

Dispersed recreation activities occur outside and completely independent of designated recreation sites or developed recreation facilities. The large size of the Gila NF and contiguous forest land ownership provide a unique opportunity for dispersed recreationists to experience solitude outside of designated wilderness areas. Dispersed recreation includes a variety of both motorized and non-motorized activities, and may occur throughout the year.

Motorized dispersed recreation activities may include, but are not limited to, off-highway vehicle driving, scenic driving, and car camping. Most dispersed motorized recreation use occurs on existing National Forest System roads or motorized trails, which vary in condition and level of development.

Non-motorized dispersed recreation activities include, but are not limited to, hiking, backpacking, climbing, mountain biking, horseback riding and packing, some dispersed camping, fishing, hunting, boating, exploring caves, geocaching, and nature viewing.

Rock climbing and spelunking (cave exploration) do occur at some locations in the Gila. One limiting factor to the popularity of rock climbing has been the poor quality of the rock at many locations within forest boundaries, compared to better quality locations nearby, but outside of the forest boundary. Similarly, cave exploration is also known to occur in the Gila, primarily in locations in the Black Range District, but is not a significantly popular activity.

Although the Gila NF is located within a semi-arid landscape, fishing and water-based recreation opportunities are available on approximately 957 miles of perennial streams and rivers, as well as in three reservoirs: Quemado Lake (112 acres), Lake Roberts (68 acres), and Snow Lake (72 acres).

Desired Conditions

1. Dispersed recreation areas provide visitors with natural, tranquil settings without conflicts between different user groups, and do not substantially affect the quality of natural habitats, including riparian areas, streams, lakes, and wetlands.

Objectives

1. In addition to areas already identified, within 5 years of implementation of the forest plan, identify at least three additional dispersed recreation concentrated use areas for preapproved recreation events, non-commercial group use, weddings, etc.
2. Annually, implement at least one small-scale recreation project that enhances visitor access for dispersed uses, including but not limited to providing improved trailhead parking, access, and functionality, and improved access and functionality for dispersed camping opportunities.

Standard

1. Impacts to recreation opportunities resulting from the construction of temporary roads, facilities, and structures needed for management activities must be mitigated upon completion of the project.

Guidelines

1. When closing or mitigating adverse effects to dispersed recreation areas, native vegetation and natural barriers should be used.
2. Rock climbing, spelunking (cave exploration), and backcountry river floating should be managed to balance demand for the activity and the need to support at-risk species, designated area management requirements, and other natural and cultural resources.

Management Approaches

Dispersed Recreation Management

Educational techniques (for example, brochures, signs, websites, and social media) should be used to enhance visitor knowledge of proper non-motorized and motorized trail use etiquette. Dispersed camping should be discouraged near cultural sites, sensitive wildlife areas, interpretive sites, and sensitive water resources. Barriers and signage should be used to control unauthorized use in areas with a high potential for illegal cross-country motorized vehicle use.

Dispersed recreation areas should be closed and information should be posted to redirect use and encourage public compliance in rehabilitation efforts or effects when campsite conditions have deteriorated; there are persistent user conflicts; unacceptable environmental damage is occurring, or both. Information should be provided to encourage overnight 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.

Management plans should be developed and updated as needed for lesser-known recreation activities with potential to grow in popularity, create conflict with other recreational uses, or become controversial. These include (but are not limited to) spelunking (cave exploration), rock climbing, and backcountry river floating.

Special Uses (Recreation)

Background Information

Recreation special-use permits are authorized when the proposed activities do not conflict with the Forest Service mission, meet demonstrated public needs, and are consistent with the desired conditions for the use area. The Gila manages a variety of recreation special-use permits including outfitting and guiding, tours, trail guides, special events, weddings, family reunions, school field trips, commercial photography and filming, recreation residences, and many others.

The majority of permitted outfitter-guide use of all types (including, but not limited to hunting, fishing, equestrian, and backpacking) in the Gila currently occurs within designated wilderness areas, and these uses are expected to grow, particularly the demand for hunting for trophy elk.

Authorization of special-use permits enables the Forest Service and its partners to serve visitors and local communities by providing a broad range of nature- and heritage-based outdoor recreation and tourism opportunities that promote the responsible use and enjoyment by local communities and their visitors. Permit fees from many, though not all, recreation service providers are returned to the Gila and used to improve services and facilities, providing benefits for those permit holders, their clients, and the other members of the public who also use the facilities.

Desired Conditions

1. The number of special-use authorizations, including outfitters and guides, balances public demand with prohibited uses of designated areas and protection of sensitive natural and cultural resources.
2. Permitted recreation uses, including recreation special events or guided activities, are consistent with recreation settings, consider natural and cultural resources, and support community goals.

Standards

1. All decisions to approve permitted recreation special uses, including (but not limited to) recreation special events, guided activities, commercial filming, and recreation residences, shall be consistent with Forest Service Handbook and policy direction, and provide for the protection of natural and cultural resources.
2. Recreation residences located in 100-year floodplains will not be rebuilt if destroyed by fire, flooding, or natural disaster.
3. Authorized commercial use of domestic sheep or goats (for example, outfitter-guide and filming) in bighorn sheep ranges is prohibited.
4. All outfitter-guide activities in wilderness shall include appropriate wilderness practices, including (but not limited to, at the forest supervisor’s discretion) Leave No Trace principles, and the requirement to incorporate awareness for wilderness values in interactions with clients and other visitors.

Guidelines

1. Issued outfitter-guide permits for congressionally designated wilderness should not exceed the limits determined by the most recent capacity analysis for that area.
2. In the event that the current number of permits issued at the time of an outfitter-guide capacity analysis within a wilderness should exceed the determined capacity, no additional permits should be issued, and the correct number should be achieved by attrition as existing outfitter-guides choose not to renew their permits.
3. Where agency or applicant objectives can be met outside congressionally designated wilderness, special-use permits should not be issued in wilderness.
4. Organized group events authorized to take place at developed recreation facilities should occur in designated group sites, unless authorized by special-use permit.

Management Approaches

Special Uses Management

Periodically conduct outfitter-guide capacity studies within congressionally designated wilderness in alignment with current Forest Service handbook and policy direction to help inform decisions of the number of current outfitter-guide permits that are to be issued for each wilderness.

Operations and maintenance plans for recreation residence special-use authorizations should include direction to use the most recent edition of *A Guide to Maintaining the Historic Character of Your Forest Service Recreation Residence* for guidance on any improvements or maintenance to eligible historic or unevaluated recreation residences.

Authorizations for recreation events and group uses should not be for approved for popular, high-use trails and recreation sites. Instead, authorize these uses for previously identified group-use areas and trails that are lesser used, minimizing impacts to existing uses.

Scenic Character

Background Information

The 2012 Planning Rule defines scenic character as "A combination of the physical, biological, and cultural images that gives an area its scenic identity and contributes to its sense of place. Scenic character provides a frame of reference from which to determine scenic attractiveness and to measure scenic integrity." (36 CFR 219.19)

The Gila NF features an abundance of spectacular scenery, ranging from high cool mountains forested with aspen and Douglas-fir to warm semi-arid lowlands of juniper, oak, and cactus. Landform types found in the forest include steep rugged mountains, rolling hills, valleys, steep canyons, water features, and vast open grasslands. Where multiple and/or unique landforms occur in a single location, it tends to create unique landmarks that enhance scenic opportunities within the Gila NF.

National Forest System lands that provide the scenic backdrop to adjacent communities offer a sense of place and contribute to the identity of those communities, while benefiting the local and regional economies. It is important to manage scenic resources to provide natural-appearing landscapes that ensure quality sightseeing and other recreation opportunities for the public, as well as maintaining natural landscapes for communities adjacent to the forest. Natural-appearing scenery provides the basis for high-quality recreation experiences in the forest. In other words, scenery is an integral component of all forest settings, and contributes to the quality of visitors' recreation experience. Scenic resources or natural settings are recognized as a central component of the recreation niche of the forest.

When the Gila National Forest Plan was developed and approved in 1986, the Visual Management System provided the framework for inventorying the visual resource and providing measurable standards for managing it. The Forest Service replaced the Visual Management System in 1995, with the Scenery Management System for the inventory and analysis of the aesthetic values of National Forest System lands. The Gila NF is in the process of updating the scenery inventory using the Scenery Management System as part of this forest plan revision.

Desired Conditions

1. The forest provides a variety of visually appealing landscapes that reflect ecosystem diversity, enhance recreation settings, and sustain scenic character in ways that contribute to the quality of life, sense of place, and connection with nature for local communities and forest visitors.
2. The forest appears predominantly natural and includes cultural landscapes that are valued by both forest users and local communities for their scenic and traditional values.
3. High quality scenery dominates the landscape in areas the public values highly for scenery (for example, scenic byways, major roads and trails, developed recreation sites, and high scenic integrity areas such as Wildernesses and eligible Wild and Scenic Rivers).

Standard

1. The Scenery Management System shall be used to identify management actions that may result in degradation of the quality of scenic character from the desired scenic quality objectives when conducting all planning projects across all Gila program areas.

Guidelines

1. Constructed features, facilities, and management activity effects should blend with the natural-appearing landscape. The concepts of form, line, color, texture, and pattern common to the desired scenic character being viewed should be applied during project planning and design.
2. Management activities should minimize visual disturbances and be consistent with or move the area toward achieving scenic integrity objectives (as defined by the Scenic Integrity Objective map).
    a. In areas with very high scenic integrity objectives, the scenic 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.
    b. In areas with high scenic integrity objectives, the scenic character should appear intact, but may include deviations that are not evident (for example, complementarily repeating the scenic attributes of size, shape, form, line, color, texture, or patterns common to the scenic character).
    c. In areas with moderate scenic integrity objectives, the scenic character may appear slightly altered. Management activities, structures and facilities should not dominate the scenic character (for example, repeat the scenic attributes of size, shape, form, line, color, texture, or patterns common to the scenic character).
    d. In areas with low scenic integrity objectives, the scenic 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 (for example, repeat the scenic attributes of size, shape, form, line, color, texture, or patterns common to the scenic character)
3. Management activities that result in short-term impacts inconsistent with the scenic integrity objectives should achieve the scenic integrity objectives over the long-term. Short-term and long-term timeframes should be defined during site-specific project planning.
4. Projects should include mitigation measures to address impacts to scenic resources.
5. Management activities that affect scenic quality should not be scheduled on weekends or holidays during the major recreation season, except in cases of wildland fire management or when doing so would otherwise not achieve project goals.
6. Effects to scenery from prescribed fire should be considered during project planning and implementation. Efforts should be made to minimize high-intensity fire along areas valued highly by the public for scenery unless necessary to meet management objectives or ensure public safety.

Management Approaches

Relationships

Cooperate with other entities, such as the New Mexico Department of Transportation, tribal and local governments, and commercial and private entities to manage for scenic integrity on and adjacent to the national forest, including along scenic byways. Provide the Scenery Management Inventory and Scenic Integrity Objective map to local adjacent and neighboring land management agencies for integration into projects and plans. Develop public education opportunities and information about the importance and impacts of scenery.

Implementation

Use the Built Environment Image Guide and other available best practices for environmentally sustainable design in construction or reconstruction of Forest Service facilities to ensure consistency with the scenic character of the Southwestern Region. Prior to vegetation work in developed recreation sites or administrative facilities, develop vegetation management plans that outline activities to sustain the desired scenic character and key visual elements over time.

Rehabilitation Prioritization

Rehabilitate areas where existing scenic integrity is lower than the scenic integrity map. Set priorities for rehabilitation considering the following:

- Foreground (within 300 feet to ½ mile) of high public use areas has the highest priority;
- Relative importance of the area and the amount of deviation from the scenic integrity objectives;
- Length of time it would take natural processes to reduce the visual impacts so that they meet the scenic integrity objectives;
- Length of time it will take rehabilitation measures to meet the scenic integrity objectives;
- Benefits to other resource management objectives to accomplish rehabilitation; and
- Restoration of scenic integrity in areas where it has been negatively impacted as other project work is accomplished or funds are available.

Trails

Background Information

The Gila NF manages a total of 1,927 miles of trails. There are 179 miles of motorized trails, 861 miles of trails within wilderness areas, and 891 miles of non-wilderness / non-motorized trails. Trails in the Gila NF are a vital contribution to recreation and infrastructure in the forest because they provide access to the wilderness areas, range or wildlife improvements, livestock management, lookout towers, and for fire management. Many National Forest System trails are backlogged for maintenance, and have been degraded by fire, flooding and erosion. With limited funding and fewer personnel available to maintain the existing trail system, it will be necessary to develop a sustainable trail system that meets the needs of the trail users but is manageable with available resources.

The trend of use for off-highway-vehicle recreational use has increased over the five-year period from 2011 to 2016. Many of the roads and trails across the forest are user-created that later became system roads or trails during a roads inventory process in the 1990s. These specific routes and areas identified for motorized travel under Travel Management have been selected to provide motorized access to areas, while limiting resource damages.

Forest visitors engaging in hiking, backpacking, mountain biking, horseback riding and packing, make use of the Gila's extensive single-track developed trail system. According to the 2011 National Visitor Use Monitoring survey, hiking/walking is the most popular primary recreation activity of forest visitors. Equestrian use (horseback riding and backcountry stock-packing) is also a popular form of non-motorized recreation that occurs primarily within wilderness and less-developed forest areas adjacent to communities. Many of these backcountry trips are multi-day in duration, and involve the use of both pack and saddle stock. Day-use equestrians are more likely to make use of forest trails located immediately adjacent to local communities. Conflicts between user groups are more likely to occur on popular trails located near population centers.

Desired Conditions

1. Trails are well-marked and provide safe access for public travel, recreation uses, traditional and cultural uses, and land management and resource protection activities, as well as contributing to the social and economic sustainability of local communities.
2. Motorized and non-motorized trail systems consist of interconnecting loops and trails that connect other national forest destinations. Motorized and non-motorized opportunities are generally not on shared routes, and when this occurs, they are moved to separate alignments at the earliest opportunity.
3. Trail and trailhead level of development is appropriate to the site conditions, use, and setting. Trails vary in length and challenge, with links that provide "loop" trail opportunities and provide linkages to local neighborhoods, communities, and other public lands.
4. Where new and existing designated trails encounter springs, trails are designed and maintained to prevent erosion, trampling, compaction, and inadvertent introduction of invasive and undesirable plants, animals, and disease to the spring, while still allowing access by wildlife.
5. Use of National Forest System trails is consistent with the respective trail management objectives to prevent resource damage and user conflicts.

6. Motorized and non-motorized trail systems have been designed, constructed, and are in well-maintained conditions to be sustainable with available resources, consistent with user demands, diminish user conflicts, and do not negatively affect other forest resources.
7. The trail system provides a variety of opportunities and settings for visitors, while being sustainable with minimum maintenance needs and accommodating to use levels compatible with other resource values.
8. The forest-wide motorized trail system is appreciated by visitors, providing adequate recreation experiences to meet public demand, so user-created trails are not present on the landscape.
9. An adequate sign system provides for traveler safety, location information, and compliance rules and regulations.

Objectives

1. Annually, the Gila will fully restore to standard at least 1 mile of trails (motorized or non-motorized) that have been degraded from desired conditions by past wildfires or post-fire events such as flooding or fallen trees.
2. Annually, the Gila will trail restore or improve at least 5 miles of National Forest System trails (motorized or non-motorized) to standard. This includes realignment, reconstruction, or deferred maintenance beyond that which would be considered routine annual maintenance by handbook direction.
3. Within 5 years of implementing the forest plan, identify at least 20 miles of trails for either being reclassified to Trail Class 1 (minimally developed and maintained) or for full decommissioning and removal from the national forest trail system.

Standard

1. All National Forest System trails will be designed, constructed, rerouted, or maintained utilizing current best management practices to promote sustainable design while providing desired recreation opportunities and other resource needs. (See Soils, Water Quality, and Watersheds.)

Guidelines

1. National Forest System trails should not be used for management activities, including timber harvest activities (for example, landings and skid trails) that negatively impact trail conditions, unless alternatives entail greater resource damage. Adverse impacts to system trails should be mitigated upon project completion.
2. When National Forest System trails intersect fences, accessible, activity-specific pass-through areas should be provided to allow for easier passage.

3. Trails that are found to substantially adversely impact natural and cultural resources should be evaluated for closure and alternative travel routes or locations developed.

4. Trails should be closed or effects mitigated when:

    a. Trail conditions have deteriorated to the point they create a hazard to public health and safety;

    b. There are persistent user conflicts;

    c. Environmental damage is occurring; and/or

    d. It has become evident the trail receives little use, and may no longer be needed

5. Newly constructed trails should avoid travelling through meadows, wetlands, seeps, springs, streams, riparian areas, floodplains, sacred sites, and areas with high concentrations of significant archeological sites unless their purpose is to provide for resource protection.

6. Trail markings, kiosks, and interpretive signage should be consistent across all areas of the forest, and should be designed to complement the scenic and cultural character of the surrounding landscape.

Management Approaches

Outreach and Education

Signing, enforcement, public information, seasonal and special closures, maintenance, construction, and restoration take place as appropriate. Educational techniques (for example, brochures, and signs) enhance visitor knowledge of proper motorized and non-motorized use etiquette. Encourage those participating in non-motorized cross-country travel by uses other than hiker and pedestrian use, such as those on horseback, to use only National Forest System trails. Messaging provided for both frontcountry and backcountry trailhead information kiosks should be applicable to specific settings, but generally consistent across the forest, and also be consistent with regional or national messaging such as that provided for the Continental Divide National Scenic Trail.

Use management tools (for example, increased signage, visitor contacts, or education efforts) to educate about appropriate trail use. Encourage trail users 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.

Provision of Current Public Inforation on Trail Conditions and Closures

Make use of regularly updated signs and postings at trailheads, offices, visitor centers, and other areas, postings on websites, and social media) to inform the public regarding current trail conditions and closures. When possible, provide information graphically using maps or mapping applications (such as StoryMaps) that are also displayed prominently on kiosks, within offices and visitor centers, and available on websites and through social media.

Sustainability

Develop and implement a strategy for a sustainable, “right-sized,” forest-wide motorized and non-motorized trail system. Develop a forest-wide protocol to assess the sustainability, objective, and use of

National Forest System trails and dispersed campsites, and prioritize work needed to address resource issues and conflicts in use.

When developing the forest-wide trail strategy, consider key elements of the Forest Service National Trails Strategy, incorporating elements such as maximizing opportunities for partnerships and shared stewardship with stakeholders, leveraging an expanded and combined workforce to increase stewardship capacity, and identifying a sustainable trail system.

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

Relationships

Develop partnerships and collaboration with agencies, groups, communities, volunteers, permit holders, and other individuals to increase forest motorized and non-motorized trails stewardship, awareness, volunteerism, user satisfaction, promote a sustainable trail system, and support local trail-based economic development. Work to implement methods to recruit, train, and coordinate volunteers that are consistent across the Gila NF. Promote shared stewardship by increasing partnerships and volunteerism. Collaborate with partners, user groups, and volunteers to maintain trails, including the Adopt-A-Trail Program. Partnerships are in place prior to new motorized and non-motorized trail construction to ensure facilitation of future trail maintenance needs. Work collaboratively with partners and volunteers on forest trails-related issues and empower them to take action to move approved projects forward when they can provide funding, volunteers, and other resources for environmental analysis or project implementation.

Trail Priorities

Trail maintenance priorities are based on providing user safety, minimizing erosion, providing appropriate recreation opportunities, and accommodating administrative needs. Reconstruct or add motorized and non-motorized trail systems near population centers or developed recreation sites to provide additional or enhanced recreational opportunities.

Motorized Trails

Background Information

Motorized trail use involves the operation of motorized vehicles (for example, all-terrain vehicles, off-highway vehicles, or motorcycles) on routes developed and maintained for recreation and transportation. Motorized trail use is a popular recreational opportunity that occurs on roads and trails throughout the forest.

Desired Conditions

1. Opportunities exist for motorized recreation where designated, with varying experiences for a variety of vehicle classes. Forest visitors can enjoy semi-primitive motorized recreation and explore the backcountry in off-highway vehicles along designated routes.
2. Off-highway vehicle trailheads provide a relatively dust-free environment that prevents erosion. Trailheads provide parking and access to trails where they are most critically needed.
3. Motorized use is consistent with existing regulations. Control systems, such as law enforcement activity or outreach and education developed specific to individual circumstances ensure resource impacts are minimized as population and visitor use increase.
4. TreadLightly!®[cc] principles are commonly practiced.

Standards

1. Motor vehicle use off the designated system of roads, trails, and areas shall be prohibited except as identified on the motor vehicle use maps and as authorized by law, permits, and orders in connection with resource management and public safety.
2. Motorized vehicle travel shall be managed to occur only on the designated system of National Forest System roads and motorized trails and designated motorized areas identified on the most current motor vehicle use map.
3. Unless specifically authorized, motorized cross-country travel shall be managed to occur only in designated motorized areas.
4. Motorized trail maintenance and construction activities shall be designed to reduce sediment (for example, water bars, sediment traps, grade dips), while first providing for user safety.
5. Temporary motorized routes or road construction authorized for valid existing legal rights or by forest supervisor permission in semi-primitive non-motorized recreation opportunity spectrum settings must be rehabilitated to a natural state as it existed prior to disturbance.

[cc] https://www.treadlightly.org/

Guidelines

1. Trail markings, kiosks, and interpretive signage should be designed to complement the scenic and cultural character of the surrounding landscape.
2. New motorized trails should be designed and located to avoid Mexican spotted owl protected activity centers, northern goshawk post-fledging family areas, and other identified sensitive areas.
3. Motorized trails or designated motorized areas should be located to avoid meadows, wetlands, seeps, springs, riparian areas, stream bottoms, sacred sites, and areas with high concentrations of significant archaeological sites. The number of stream crossings should be minimized or mitigated to reduce impacts to aquatic species.
4. New motorized trails should avoid hilltops, ridges, and any landform with more than 10 percent surface grade to mitigate potential erosion and to promote sustainable design principles.
5. As projects occur in riparian or wet meadow areas, unneeded roads or motorized trails should be closed or relocated, drainage restored, and native vegetation reestablished to move these areas toward their desired condition. Existing meadow crossings should be relocated to less sensitive locations or redesigned, as needed, to maintain or restore hydrologic function using appropriate tools such as French drains and elevated culverts.
6. As projects occur, motorized trails that are redundant or contribute to negative impacts on cultural resources should be closed or relocated.
7. All motorized trails removed from the transportation network should be rehabilitated in a manner to avoid future risk to hydrologic function and aquatic habitat.
8. Motorized trails should be designed and located so as to not impede terrestrial and aquatic species movement and connectivity.
9. After management activities occur in areas with high potential for cross-country motorized vehicle use, methods (for example, barriers, signing) should be used to control unauthorized motorized use.
10. Motorized uses in semi-primitive non-motorized recreation opportunity spectrum settings should be limited to those reasonably incidental to valid existing rights, emergency access, administrative activities, and by written approval of the forest supervisor. New permanent motorized trails or areas should not be constructed or designated in semi-primitive non-motorized recreation opportunity spectrum settings except in cases of valid existing legal rights or written approval of the forest supervisor.

Management Approaches

Explore options for improving off-highway vehicle opportunities by developing or connecting motorized trail systems and providing loop opportunities.

Non-motorized Trails

Background Information

Non-motorized trail uses include activities which are not dependent upon motorized transportation and equipment, including hiking, backpacking, hunting, wildlife viewing, equestrian use, or mountain biking.

Desired Conditions

1. Non-motorized opportunities are available in a variety of settings that provide differing levels of challenge and seclusion.
2. Forest land accessible from populated areas is available for non-motorized opportunities. These areas are free from the sights and sounds of motorized recreation.
3. Opportunities for primitive recreation are available.
4. A well-maintained and environmentally sound non-motorized trail network is in place, providing for user safety and access to locations of interest for a variety of uses.
5. Non-motorized trails are defined and marked appropriate to the setting.
6. Destination and loop trails exist for non-motorized users.

Guidelines

1. National Forest System trails should not be used for timber harvest activities (for example, landings and skid trails). Impacts to system trails should be avoided, and mitigated upon project completion if unavoidable.
2. Newly constructed trails should avoid travelling through meadows, wetlands, seeps, springs, streams, riparian areas, floodplains, sacred sites, and areas with high concentrations of significant archeological sites unless the purpose is to provide for resource protection.
3. Non-motorized travel opportunities should be provided (for example, constructing new trails or improving existing trails) where such access is currently unavailable, where it is an appropriate use compatible with other uses currently occuring in that area, and when it is in alignment with the Sustainable Recreation Action Plan.
4. To enhance and protect wilderness character, any new trails planned or realigned within wilderness should be constructed and maintained in a sustainable design and at a maximum of Trail Classes 1 or 2, depending upon individual circumstances of amount and type of uses.

Chapter 3 – Designated and Management Area Plan Direction

Several areas in the Gila NF require management that differs from the forest-wide plan components in chapter 2. These areas are identified as designated areas and management areas. Designated areas in the Gila NF represent identified exceptional areas that have distinct or unique characteristics that previously warranted special designation. A management area represents a management emphasis for an area or several similar areas on the landscape.

Plan components for a designated or management area may differ from forest-wide guidance by:

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

Forest-wide plan components are applied, unless there is management direction for a designated or management area. Throughout this chapter, plan components that constitute management direction for a designated or management area are displayed within gray-shaded text boxes. Text outside of gray-shaded text boxes is not management direction; it is background material, explanations, or descriptions of management approaches. See appendix C of this document for maps of designated and management areas.

Designated Areas

Designated areas have specific management objectives to maintain their unique characteristics and are important ecologically and socially for the exceptional values they offer. Official designation of areas is established by statute (statutorily designated areas or often called congressionally designated areas) or by administrative processes (administratively designated areas).

Designated areas provide some level of protection for the values they were designated for and can play a role in conserving biodiversity and facilitate connectivity. In addition, designated areas can provide important social and economic services including significant recreational and scenic opportunities, places to connect with nature and/or history, and places for research, in addition to contributing to the local tourism industry.

Wilderness

Background Information

The Gila NF holds a unique distinction internationally among designated areas as the location of the world’s first designated wilderness, and regionally because of its three large wilderness areas in relatively close proximity together totaling over 790,000 acres. Popular wilderness uses include hiking, backpacking, horseback riding, hunting, and fishing.

The concept of managing some areas within the National Forest System as wilderness was first applied in 1924, with the administrative designation of the Gila Wilderness at the urging of the conservation pioneer Aldo Leopold. The Gila Wilderness became a part of the National Wilderness Preservation

System when Congress passed the Wilderness Act of 1964. The definition of wilderness from the 1964 Wilderness Act is:

> "A Wilderness in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."

In 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." In 1980, the Blue Range and Aldo Leopold Wilderness Areas became part of the National Wilderness Preservation System with the passage of the New Mexico Wilderness Act. The three wilderness areas together total around 792,584 acres, or approximately 24 percent of the Gila NF.

The Wilderness Act prohibits permanent roads and the use of any form of motorized or mechanized transport within wilderness areas. The Wilderness Act requires management of human-caused impacts and protection of the area's wilderness character to ensure that it is "unimpaired for the future use and enjoyment as wilderness."

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

- Untrammeled – 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 it is essentially without permanent improvements or human occupation
- 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 that are truly unique and essential to the character of a particular wilderness, but this may not be applicable to all wilderness areas.

Gila Wilderness

The cache of being the world's first formally designated wilderness, combined with the association to the legacy of conservationist Aldo Leopold, makes the Gila Wilderness a national and international destination. However, the Gila is also a draw for visitors who seek a primitive natural experience, regardless of its place in the history of wilderness management. At 559,688 acres, the Gila Wilderness is New Mexico's largest, with an extensive trail system providing access. High mesas, rolling hills, and deep canyons distinguish the eastern portions, as do piñon and juniper woodland and a few grassland areas. Ponderosa pines blanket the central portion, with sheer cliffs outlining the Gila River. The west and southwest portions boast high mountains with spruce-fir forests, particularly within the Mogollon Range, with elevations up to 10,895 feet at Whitewater Baldy. The headwaters of many important rivers and creeks originate in the Gila Wilderness.

Of all the wilderness areas in the forest, the Gila Wilderness receives the majority of recreational use. Most of this use occurs from early spring through late fall. Popular recreation activities in the Gila Wilderness include backpacking, day hikes, horse / pack trips, and big game hunting. Current visitation is generally light, with minimal user conflicts. Some areas within the Gila Wilderness do experience periods of high use, in particular the East, Middle, and West Forks of the Gila River and trails located near Gila Cliff Dwellings National Monument. When water levels in the rivers are high enough, recreationists can raft and kayak on the Gila River from Grapevine Campground to Mogollon Box. These areas are popular because they are near water sources and the wilderness boundary. The Gila Wilderness is the only class 1 airshed within the Gila NF.

Aldo Leopold Wilderness

The Aldo Leopold Wilderness spans 203,797 acres (New Mexico’s third largest), and straddles the crest of the Black Range. Containing some of the most rugged portions of these mountains, the crest of the range overlooks a series of east-west trending steep and narrow stream valleys, 1,000 or more feet deep. The Continental Divide cuts across the center ridgeline of the wilderness, and a section of the Continental Divide National Scenic Trail (CDNST) is present. Hiking and backpacking are the major recreational activities, but scarce water inhibits many potential visitors, as most streams and springs are seasonal and unreliable. The Aldo Leopold Wilderness is often considered New Mexico's "wildest wilderness" with low use and excellent opportunities for solitude. Only NFS Road 150 separates the Aldo Leopold Wilderness from Gila Wilderness. Before this road was constructed, the area that is now the Aldo Leopold Wilderness was part of the original administratively designated Gila Wilderness. Hunting is another popular activity within the Aldo Leopold Wilderness. Rugged terrain and limited access points reduce the number of hunters that are able to use remote areas within the wilderness.

Access into the Aldo Leopold Wilderness is limited, and many trailheads are in remote areas and accessed by forest roads that require high clearance vehicles. Most trailheads are located off paved roads and require hiking several miles before entering the wilderness boundary. This limitation on direct access is a contributing factor to lower visitation numbers than the neighboring Gila Wilderness. The majority of visitors to the Aldo Leopold Wilderness stay for multiple days, likely due to the remoteness of the area.

Blue Range Wilderness

The Blue Range Wilderness is the smallest wilderness area in the Gila NF at 29,099 acres, and is located immediately adjacent to the Blue Range Primitive Area (199,505 acres) of the Apache-Sitgreaves National Forests in Arizona. The state line is all that separates the two areas, with New Mexico's Wilderness tucked into the Blue Range Mountains and halved by the Mogollon Rim, a dramatic edge of the Colorado Plateau that runs east to west. The Blue Range Wilderness is managed with an emphasis on the primitive end of the recreation opportunity spectrum. There are six trails located in the wilderness, two of which may only be accessed from the Arizona side of the boundary. All of the trails have higher degrees of difficulty to follow, and no dependable water sources are available. There is minimal visitation to this area by hikers and in the fall by hunters, offering excellent opportunities for solitude. However, many visitors to the area seeking opportunities for solitude tend to visit either the Gila Wilderness or Blue Range Primitive Area in Arizona, because of more trail opportunities and available sources of water, which contributes to low visitation of the Blue Range Wilderness. The risk of a trend of low visitation is becoming a low priority for trail maintenance. This may further limit opportunities for trail users, while enhancing the experience for visitors seeking a primitive wilderness experience.

Desired Conditions

1. 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, opportunities for solitude and primitive recreation opportunities, and protection of other wilderness values.
2. Wilderness character and values of designated wilderness that are defined by the Wilderness Act are preserved and protected for the use and enjoyment of current and future Gila NF visitors.
3. Natural processes (for example, insects, disease, blowdown, and fire) are maintained and function in their natural ecological role to the extent possible and with limited human intervention within the untrammeled and natural qualities of wilderness character.
4. Wilderness areas have no occurrences of non-native invasive species, native species that are indigenous to the wilderness area are present and supported by properly functioning habitat conditions in keeping with the natural quality of wilderness character.
5. Natural disturbances, including fire and flooding, are able to play their natural role within the wilderness area while accounting for public health and safety concerns outside of the wilderness area, in keeping with protecting the untrammeled quality of wilderness character.
6. In keeping with the undeveloped quality of wilderness character, the environment within the wilderness area is essentially unmodified, and naturally occurring scenery dominates the landscape.
7. Wilderness character provides recreation opportunities where social encounters are infrequent and occur only with individuals or small groups, so that there are opportunities for solitude. Visitors also experience self-reliance, challenge, and risk while enjoying opportunities to pursue non-motorized or non-mechanized activities in keeping with wilderness character.
8. Unique features and experiences within wilderness are preserved as the other features of value element of wilderness character as identified in the Wilderness Act of 1964.
9. Well-marked boundaries result in wilderness areas free of motorized and mechanized intrusions.
10. Special-use permits authorizing activities in congressionally designated 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.
11. The tribal and cultural importance of known cultural resources within the congressionally designated wilderness are acknowledged and valued.

Objectives

1. Annually rehabilitate at least five wilderness trail segments, campsites, or other areas that have been impacted by use fire or other management to restore wilderness character.

2. Within five years of implementation of the forest plan, all congressionally designated wilderness areas should be managed to at least a minimum standard as defined by the current wilderness performance reporting measures.

Standards

1. Wilderness character, as identified within the Wilderness Act of 1964, shall be maintained or improved by all management decisions and actions in wilderness.
2. A Minimum Requirements Analysis shall be performed for decision making when considering all non-emergency authorization of non-conforming uses as defined by the Wilderness Act, and shall be conducted using any template or tool, such as the Minimum Requirements Decision Guide, currently required by direction of policy or regulation.
3. Agency-ignited, prescribed fire shall only be used as a management tool to reduce the risks and consequences of large, contiguous extents of high-severity wildfire within designated wilderness, and shall not be used to enhance wilderness character and values.
4. Naturally occurring wildfires shall be allowed to perform their natural ecological role when condtions are favorable to allow it to occur without placing private property or other identified forest values at risk.
5. The forest shall establish and enforce group size limits. The default group size limit shall be 15 persons and 25 head of pack and saddle stock. Exceptions to group size limits may only be granted by written permission of the forest supervisor or designated agent, including when approved as terms and conditions of special-use permits on a case-by-case basis, groups that agree to mitigation terms and demonstrate a high proficiency for Leave No Trace Ethics, for fire management activities, and all emergencies involving health and safety. Changes shall be made to the default group size limits for any individual wilderness when approved by the forest supervisor, and informed by recommendations from analysis of effects to wilderness character completed by an interdisciplinary team.
6. The forest shall establish and enforce length of stay limits. Length of stay limit for any individual wilderness shall be by default the forest-wide length of stay limit of 14 cumulative days within a 30-day period. Exceptions may only be granted by written permission of the forest supervisor or designated agent, including when approved as terms and conditions for special-use permits on a case-by-case basis and groups or individuals that agree to mitigation terms and demonstrate a high proficiency for Leave No Trace Ethics. Changes shall be made to the default length of stay limits for any individual wilderness when approved by the forest supervisor and informed by recommendations from analysis of effects to wilderness character completed by an interdisciplinary team.
7. Areas significantly impacted by human activity that has caused degradation to natural conditions and wilderness character shall be rehabilitated to a natural condition, making use of native vegetation or other natural materials native to the area.

8. The sale and gathering of commercial forest products or permitted Christmas tree cutting shall be prohibited in congressionally designated wilderness.
9. Any research conducted in wilderness shall first 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.
10. Non-native, invasive species shall be treated using methods and in a manner consistent with wilderness character in order to allow natural processes to predominate.
11. Where management conflicts occur, the protection of wilderness character and values shall take precedence over recreation uses.
12. Modern non-conforming structures, improvements, and developments that do not meet requirements of the Wilderness Act or the Congressional Grazing Guidelines for Wilderness shall be removed from wilderness.
13. Historic structures shall be allowed to remain, but may not be repaired or maintained for administrative or visitor use, and must be allowed to gradually degrade over time. If historic structures pose a hazard to health and safety, they must be closed and/or removed rather than repaired and improved for continued administrative use. This standard does not apply to improvements used under a grazing permit.
14. Unauthorized, user-created structures shall be dismantled, rehabilitated, and/or removed from designated wilderness. The exception is appropriately located and constructed campsites and user-created fire rings for wildfire prevention and in keeping with Leave No Trace Outdoor Ethics.

Guidelines

1. Intervention in natural processes through management actions should only occur when shown by a minimum requirements analysis that the management action is necessary to preserve wilderness character, protect public health and safety, and manage the area for the purposes identified within the Wilderness Act.
2. All management activities should be consistent with the scenic integrity objective of “very high” within any designated wilderness in keeping with the public purpose of “scenic” as identified in the Wilderness Act.
3. To protect wilderness character, any use of signage in wilderness should be limited to those identified as essential for resource protection and user safety, and identified by location and content that is consistent forest-wide within a wilderness sign plan and inventory document. All signage identified for installation by each wilderness sign plan and inventory should be limited to the minimum necessary for each unique circumstance in order to protect wilderness character and opportunities for self-reliance and challenge. Directional signs without distances should be placed only at major intersections. All other signs should be removed.

4. New trail construction or existing trail realignment should be only be considered for health and safety concerns or for purposes of enhancement and protection of wilderness character, such as opportunities to improve solitude, primitive recreation, or natural conditions in wilderness.
5. Where trends in monitoring indicate that opportunities for solitude are being degraded, adaptive management actions such as promoting non-wilderness destinations, providing public information about periods of lower visitation, or evaluating the possible need for a permit system should be implemented to improve opportunities for solitude.
6. Where substantial impacts from an increasing number of recreation sites or increasing impacts at individual sites are observed, adaptive management actions such as public education, site restoration, and site or area closures should be implemented to reduce substantial cumulative impacts to wilderness character and values.
7. Limited use of wilderness-appropriate trail markers, such as axe blazes or rock cairns may be used where it is difficult to navigate the trail. Trail markers should be widely spaced so that at maximum, only one additional marker is visible from the other, and all painted blazes should be removed.
8. Modern, human-made developments should be rare, substantially unnoticeable, and use natural or complementary materials. They should be present only when of cultural or historic importance, or when determined by a minimum requirements analysis to be necessary as the minimum tool required for public safety or protection of wilderness character and public uses as directed by the Wilderness Act.
9. Fire operations within wilderness areas should be conducted with minimum impact suppression tactics and should not compromise wilderness character. The use of retardant in wilderness should be kept to the minimum amount and occurrence necessary to achieve fire management objectives.
10. Helispots, spike camps, and water source locations outside of wilderness should be considered over locations within designated wilderness. Firelines and spike camps should not be constructed adjacent to trails or camp areas within wilderness to protect wilderness values.
11. Commercial activity should not be permitted in wilderness areas, unless the activity is wilderness-dependent and the activity cannot be conducted or replicated outside of wilderness. This would include activities by organizational groups and/or training classes.
12. Projects and management activities should be designed to prevent motorized and mechanized transport access into adjacent wilderness areas.
13. Wilderness interpretation materials should emphasize topics such as Leave No Trace outdoor ethics, group size limitations, mechanized transport limitations, importance of self-reliance, and sensitive ecological features, to help preserve wilderness opportunities and character.
14. All wilderness boundaries should be clearly identified by markers and signage.

Management Approaches

Wilderness Management

In keeping with the legal mandates of the Wilderness Act of 1964, make management decisions with a commitment to humility and restraint, accepting wilderness on its own terms. Guide wilderness management based upon agency direction outlined in the Forest Service Handbook, the Forest Service Wilderness Stewardship Performance Guidebook (or superseding direction), and by implementing the Four Cornerstones of Wilderness Stewardship developed by the Arthur Carhart National Wilderness Training Center to help implement law and agency policy that address the evolving issues of wilderness management:

1. Manage wilderness as a whole.
2. Preserve wildness and natural conditions.
3. Protect wilderness benefits.
4. Provide and use the minimum necessary.

Establish a wilderness character baseline, and implement and maintain a wilderness character monitoring strategy 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 strategy. Forest staff will complete and implement wilderness use capacity studies, non-native invasive species inventories, and comprehensive vegetation inventories for each designated wilderness. Wilderness boundaries will be clearly identified through signage at official entry points and needed locations (such as informal access points), with trail maps, and boundary markers and signage that is consistent.

Fire Management

Assign 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 the initial attack.

Trails

Trails will be evaluated 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 or reconstruct needed trails. Priorities for trail reconstruction are to be based on potential for impacts to wilderness character and recreation opportunities, and the trails that receive the greatest use. The forest will regularly publish up-to-date trail maps for all wildernesses, in a variety of formats, including digital.

Adaptive management and corrective measures will be used if overuse causes unacceptable resource damage. Overuse can be determined from limits of acceptable change studies, other resource analyses, wilderness management plans, or professional judgment. Providing regular wilderness ranger patrols will be considered in wilderness areas to the degree necessary to meet the levels of acceptable change or other appropriate standards for each area. If funding is limited, volunteers or seasonal employees will be used to accomplish as much of this work as possible. Wilderness ranger patrols will be conducted to provide interpretation, education, stewardship projects, and when necessary, enforcement to enhance visitor experiences and preserve wilderness character and values.

The forest will manage 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, staffing presence will be increased to enhance education or enforcement efforts to address observed violations. Forest orders that restrict visitor use in wilderness will be periodically evaluated for effectiveness; forest orders deemed as no longer necessary to protect the wilderness resource will be considered for termination.

Overflights

The forest will collaborate with the Federal Aviation Administration, airport administrations, air tour operators, military and government agencies, and other aircraft operators to minimize disturbances caused by aircraft over designated wilderness areas of the Gila NF. Aircraft disturbances include, but are not limited to, diminishing solitude and primitive recreation opportunities and disrupting key wildlife areas during important times of their life cycle. Examples could include peregrine falcon nesting sites and big game wintering habitat. Encourage aircraft operators to adhere to the Federal Aviation Administration's Notice to Airmen regarding minimum altitudes over wilderness.

Relationships

Wilderness managers should seek opportunities and collaborate with stakeholders, local partners, volunteers, Adopt-a-Trail organizations, and other organizations for wilderness stewardship, including trail maintenance and construction. Partnerships and collaboration with stakeholders will help to build a volunteer base for wilderness stewardship, including recruiting and training volunteer wilderness rangers. Partnerships will be expanded to increase awareness of wilderness values and etiquette. Provide residents who live near wilderness with information that will increase their awareness and understanding of wilderness. The forest will coordinate with the New Mexico Department of Game and Fish on management of native species within wilderness to maintain and enhance wilderness character during project implementation. Opportunities to collaborate will be pursued 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.

Make use of the Wilderness Fellows (or superseding program), any similar or complementary programs in partnership with the Society for Wilderness Stewardship or other wilderness stewardship organizations, other partnerships with stakeholders, and individual volunteers to implement and maintain a wilderness character monitoring strategy, beginning with establishing a wilderness character baseline and mapping threats to wilderness character.

Outreach and Education

Interpretation and education will be used to encourage visitors to adopt techniques, equipment, and ethics specific to wilderness, including Leave No Trace Outdoor Ethics. News releases, postings, permit issuance, and individual visitor contacts will be used 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. As visitors appreciate and learn about wilderness, they can understand their role in protecting ecological systems and wilderness values. This can result in increased stewardship, ecological awareness, partnerships, and volunteerism by members of the public.

Recreation Special Uses

Conduct outfitter-guide wilderness needs and capacity studies that will be used to inform decision making regarding issuing outfitter-guide special-use permits within each designated wilderness.

On a case-by-case basis, consider authorization to exceed group size limits and length of stay limits in congressionally designated wilderness (in the form of terms and conditions within a special-use permit and accompanying plan of operations) by the forest supervisor or authorized agent when the following conditions are met:

1. The outfitter-guide and their employed staff demonstrates sufficient knowledge and proficiency in the elements of Leave No Trace Outdoor Ethics to travel and camp with large groups or over extended periods of time with minimal impacts to wilderness character.
2. The outfitter-guide agrees to follow all applicable mitigations stipulated or recommended by and contained within the special-use permit and plan of operations, to minimize impacts to wilderness character and experiences of other visitors.
3. The authority is acknowledged by the outfitter-guide to be only for the specific circumstances as described within the permit and plan of operations, and is not a blanket authorization beyond those specifics; any use beyond what is specified in the plan will require additional authorization.

Suggested mitigations could include the following, but are not necessarily limited to nor are applicable to all circumstances:

- Where possible, use existing, hardened campsites that are appropriate to the size of the group; if no campsites are available, care should be taken to locate campsites on durable surfaces to prevent impacts and care should be taken so the area is left as it was prior to its use as a temporary campsite.
- If a campsite that is both remote from other visitors and appropriate to accommodate the size of the group cannot be located, break into smaller groups; and locate existing or temporary campsites on durable surface away from occupied areas to minimize impacts to other visitors.
- Locate campsites for larger groups in areas as distant as possible from occupied areas to not impact solitude experiences of other visitors.
- When exceeding length of stay, travel primarily over large distances and through infrequently visited areas, not remaining for long in locations, and relocating campsites frequently; this may not be applicable when chosen locations and length of stay facilitate stewardship projects dependent upon being in a few locations or one location.
- Break large overall groups into smaller groups to travel, and take different routes to reach common destinations.
- Perform service projects that will be of benefit to the overall wilderness character of the area during the trip, such as wilderness stewardship enhancement projects and trail maintenance, with approval and under the guidance of appropriate Forest Service staffs.

Wilderness Study Areas

Background Information

When the New Mexico Wilderness Act was passed in 1980, it designated two areas, the Hell Hole and Lower San Francisco Wilderness Study Areas for review to determine if they feature wilderness characteristics to make them worthy of congressional designation as wilderness. The 1986 Forest Plan evaluated the Hell Hole and Lower San Francisco Wilderness Study Areas for wilderness suitability as directed by Congress and the New Mexico Wilderness Act, and recommended at that time that these areas not be designated as wilderness. Until Congress acts on this recommendation, the forest plan calls for managing these lands to maintain existing wilderness character. However, no baseline monitoring data have been collected for wilderness character within these wilderness study areas.

Hell Hole Wilderness Study Area

The Hell Hole WSA (18,860 acres) is located south of Mule Creek, New Mexico, with its boundary running along the Arizona state line. Access is from the north via Highway 78 west of Mule Creek. A county road heading south from Mule Creek forms the eastern boundary of the WSA.

Topographic features including deep, rugged canyons, rocky peaks, and steep cliffs dominate the landscape of the southern portion of the WSA. The northern portion of the WSA is primarily rolling hills. Vegetation varies greatly with elevation and aspect. The presence of ponderosa pine in the WSA is somewhat unusual, as it is scarce in surrounding areas. The area lends itself to a variety of primitive recreation activities. The degree of difficulty and variety of conditions found in the WSA provide an adequate level of challenge regardless of user's skills. Current recreation activities are primarily hunting and viewing scenery and wildlife. There are no developed recreation sites or designated trails within the area. The present and expected future use of this area is low.

Lower San Francisco Wilderness Study Area

The 8,800-acre Lower San Francisco WSA is located north of the Hell Hole WSA, west of Highway 180 and the town of Glenwood, New Mexico and extends to the Arizona-New Mexico state boundary. Popular recreation activities include accessing the San Francisco River at Big Dry Creek to picnic, fish, and hunt. There are no NFS trails within the WSA. In spring, when the river is high enough, rafting and kayaking occur. Rafters typically put in above the San Francisco Hot Springs south of Glenwood and take out at Martinez Ranch in the Apache Sitgreaves NFs in Arizona.

Desired Conditions

1. Designated wilderness study areas maintain their wilderness character and potential to be included in the National Wilderness Preservation System that existed at the time they were designated by Congress until such time as Congress either designates the area as wilderness or releases the areas to other management.

Standards

1. Subject to any valid existing rights, designated wilderness study areas shall be administered so as to maintain their wilderness character and potential to be included in the National Wilderness Preservation System that existed at the time they were designated by Congress until such time as Congress either designates the area as wilderness or releases the areas to other management.

Inventoried Roadless Areas

Background Information

Inventoried roadless areas were established under the 2001 Roadless Area Conservation Rule (36 CFR Part 294). The "inventoried" part of the name comes from two Roadless Area Review and Evaluation (RARE) national forests conducted in the 1970s (RARE) and 1980s (RARE II). Approximately 22 percent of the Gila NF's land mass (733,836 acres) is located within 29 individual inventoried roadless areas. All Gila inventoried roadless areas and their acreages appear in table 1.

Table 1. Gila National Forest inventoried roadless areas

Inventoried Roadless Area Name	Official Acres
1978 Administratively Endorsed Wilderness Proposal	4,286
Apache Mountain	17,506
Aspen Mountain	23,783
Brushy Mountain	7,199
Brushy Springs	5,735
Canyon Creek	9,824
Contiguous to Black & Aldo Leopold Wilderness	111,811
Contiguous to Blue Range Wilderness	1,980
Contiguous to Gila Wilderness and Primitive Area	79,048
Devils Creek	89,915
Dry Creek	26,719
Eagle Peak	34,016
Elk Mountain	6,550
Frisco Box	38,977
Gila Box	23,759
Hell Hole	19,553
Largo	12,730
Lower San Francisco	26,459
Meadow Creek	34,167
Mother Hubbard	5,895
Nolan	13,050
Poverty Creek	8,770
Sawyers Peak	59,743
Stone Canyon	6,801
T Bar	6,823
Taylor Creek	16,639
The Hub	7,498
Wagon Tongue	11,411
Wahoo Mountain	23,121
TOTAL	**733,836**

The Roadless Area Conservation Final Rule (Roadless Rule) prohibits road construction, reconstruction, and timber harvest, except under certain circumstances, in inventoried roadless areas because they have the greatest likelihood of altering and fragmenting landscapes, resulting in immediate long-term loss of roadless area values. Some existing roads may be present within inventoried roadless areas. The Roadless Rule does not prohibit motorized travel on existing roads or motorized trails.

The regional forester reviews the cutting, sale, or removal of generally small-diameter timber when needed for one of the following purposes:

- To improve threatened, endangered, proposed, or sensitive species habitat;
- To maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects within the range of variability, that would be expected to occur under natural disturbance regimes of the current climatic period; or,
- For administrative and personal use, as provided for in 36 CFR 223, where personal use includes activities such as Christmas tree and fuelwood cutting, and where administrative use includes providing materials for activities such as construction of trails, footbridges, and fences.

The regional forester reviews all projects involving road construction or reconstruction and the cutting, sale, or removal of timber in inventoried roadless areas, with the exception of the following management activities, which are reviewed by the forest supervisor with optional review by the regional forester:

- Any necessary timber cutting or removal or any road construction or reconstruction in emergency situations involving wildfire suppression, search and rescue operations, or other imminent threats to public health and safety in inventoried roadless areas.
- Timber cutting, sale, or removal in inventoried roadless areas incidental to the implementation of an existing special-use authorization. Road construction or reconstruction is not authorized through this re-delegation without further project-specific review.

Desired Conditions

1. The roadless characteristics of all inventoried roadless areas identified by the 2001 Roadless Area Conservation Rule are maintained or enhanced.
2. Inventoried roadless areas are large, relatively undisturbed landscapes that contribute to biological diversity and the long-term survival of at-risk species. They serve as safeguards against the spread of invasive plant species and provide reference areas for study and research.
3. Inventoried roadless areas appear natural, have high scenic quality, and provide opportunities for dispersed recreation.

Standards

1. All management activities conducted within inventoried roadless areas shall maintain or improve roadless characteristics.
2. Roads shall not be constructed or reconstructed in inventoried roadless areas unless the responsible official determines that a road is needed according to the circumstances allowed for in the Roadless Rule, section 294.12. Review authorities shall be followed.

3. Timber shall not be cut, sold, or removed in inventoried roadless areas, unless the responsible official determines that activities meet the circumstances provided in the Roadless Rule, section 6 294.13. Review authorities shall be followed.

Guidelines

1. Inventoried roadless areas should be managed for primitive, semi-primitive non-motorized, and semi-primitive motorized recreation opportunity settings.
2. Management activities conducted within inventoried roadless areas should be consistent with the scenic integrity objective of high.

Management Approaches

Road Management

When developing the proposed action for a NEPA project, consider incorporating any decommissioning of roads within the project area, which occur within inventoried roadless areas that negatively affect roadless character, while involving affected stakeholders.

Corrections to Minor Cartographic Errors

By direction of the 2012 Planning Rule, existing inventoried roadless area boundaries may not be reconsidered in the plan revision process, and any changes to inventoried roadless area boundaries not directed through congressional legislation must be part of a statewide process involving state and local governments. However, the forest will exercise the granted legal authority to correct minor cartographic errors when the opportunity to make such corrections is made available.

Research Natural Areas

Background Information

Forest Service research natural areas are designated for the purpose of permanently protecting and maintaining natural conditions for the conservation of biological diversity, conducting non-manipulative research and monitoring, and fostering education. They are designated to "maintain a wide spectrum of high quality representative areas that represent the major forms of variability found in forest, shrub land, grassland, alpine, and natural situations that have scientific interest and importance that, in combination, form a national network of ecological areas for research, education, and maintenance of biological diversity" (FSM 4063.02). Included in this research natural areas network are:

- High-quality examples of widespread ecosystems
- Unique ecosystems or ecological features
- Rare or sensitive species of plants and animals and their habitat (USDA FS RMRS 2016)

Research natural areas are managed to maintain the natural features for which they were established and to maintain natural processes. Because of the emphasis on natural conditions, they are excellent areas for studying ecosystems or their component parts and for monitoring succession and other long-term ecological change. The Gila NF has one designated research natural area, the Gila River Research Natural Area, which appears on the map showing both designated and proposed research natural areas in appendix C.

Gila River Research Natural Area

The Gila River Research Natural Area was established in 1972. It covers 402 acres near the Gila River Bird Area in the northern Burro Mountains in the Silver City Ranger District. The area provides a well-developed example of the riparian ecosystem in New Mexico, and provides habitat for rich and unique birdlife. In the Gila River Bird Area, 231 species of birds (43 percent of the bird species verified in New Mexico) have been detected (Shook 2015). Some of these species are at the northern edge of their natural range in southwestern New Mexico. Federal or State threatened or endangered species using the area include bald eagle, common blackhawk, peregrine falcon, Gila woodpecker, southwestern willow flycatcher, Bell's vireo, and Abert's towhee (Shook 2015). The Gila River in the Cliff-Gila Valley (including the Gila River Research Natural Area) is an important habitat area for native fish, including endangered loach minnow and spikedace.

Desired Conditions

1. The ecological features and values for which the research natural area was established are protected. Genetic diversity in established research natural areas is preserved and maintained.
2. Research natural areas serve as areas for the observation and study of ecosystems and ecological processes, including succession, and as baseline areas for measuring ecological change due to disturbances or stressors, such as climate change.
3. Research natural area lands are generally natural-appearing. Ecological processes such as plant succession and fire, insect, and disease activity function with limited human influences. Visitor access and use retains the natural features of the research natural area.

Standards

1. Research natural areas shall be withdrawn from mineral entry and mineral leasing, and mineral materials and locatable minerals extraction shall not be allowed within research natural areas.
2. Removal of special forest products for commercial purposes and personal use (including firewood) shall not be permitted or authorized in the research natural area, unless it meets the research natural area desired conditions and management objectives described in the establishment record.
3. To minimize impacts to ecological values, authorization of special-use permits (for example, commercial tours or outfitter guides) except those in support of approved research or education shall not be authorized or permitted.

Guidelines

1. All management activities should be consistent with the scenic integrity objective of very high within the research natural area.
2. Management measures and controls should be used (such as fencing and controls to prohibit unauthorized cross-country travel) to protect unique features of the research natural area.
3. Research special-use authorizations should include mitigation measures to protect sensitive resources, unique features, and species within the research natural area.
4. Vegetation management activities should be allowed only when necessary to achieve or maintain the ecological conditions for which the area was designated
5. Providing first for human safety, naturally ignited wildfires occurring under fuel moisture and weather conditions that promote characteristic severity should not be suppressed. Those that occur under unfavorable fuel moisture and weather conditions should be suppressed.
6. In established and proposed research natural areas, fire management activities should be designed and implemented to mimic natural fire processes and should be compatible with ongoing research. When conditions near a research natural area do not support natural fire spread through the research natural area, prescribed fire may be conducted within prescription windows that promote characteristic severity.
7. Fire management activities should protect the resources for which the research natural areas was established.
8. Collection of rocks should be only for approved scientific purposes and carried out under the appropriate authorization (such as a permit or agreement) to preserve any unique geological formations and to maintain the values for which the area was designated.

Management Approaches

Relationships and Outreach/Education

Coordinate with site stewards, appropriate agencies, partners, and universities regarding scientific opportunities in research natural areas, and to help educate the public about their designated purposes and uses. Signage will be provided educating the public about the research natural area purpose, its boundaries, and permitted and prohibited activities.

Continental Divide National Scenic Trail

Background Information

The National Trails System Act of 1968, as amended, established a system of congressionally designated, long-distance trails located to provide for maximum outdoor recreation potential and to promote the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the lands through which such trails may pass. Congress designated the Continental Divide National Scenic Trail (CDNST or Trail) in 1978.

The CDNST is a 3,100-mile continuous path that follows the spine of the Rocky Mountains from Mexico to Canada, traversing some of the most scenic terrain in the country and areas rich in the heritage and life of the Rocky Mountain West. The CDNST is the highest and most rugged of the national scenic trails, reaching the 14,270-foot summit of Grays Peak in Colorado, and connects a diversity of landscapes—from desert to glacier, and remote wilderness to working lands—across portions of New Mexico, Colorado, Wyoming, Idaho, and Montana.

The nature and purposes of the CDNST are to provide for high-quality, scenic and primitive hiking and horseback riding opportunities and to conserve the natural, historic, and cultural resources along the CDNST corridor (CDNST Comprehensive Plan, approved September 28, 2009, by Chief Tom Tidwell). The trail is to be managed to provide for its nature and purposes. Activities that would substantially interfere with the purposes for which the trail was designated should be avoided to the extent practicable (16 U.S.C. 1246). The overarching management direction for the CDNST is outlined in the CDNST Comprehensive Plan (2009 or most current version).

New motorized vehicle use by the general public is prohibited on the CDNST, unless such use is consistent with the applicable policy set forth in the comprehensive plan. In general, established motorized uses, both summer and winter, are allowed to continue, but new motorized uses will not be designated on the Trail.

The Gila NF manages 254 miles of the CDNST in alignment with direction provided in the 2009 CDNST Comprehensive Plan. The comprehensive plan addresses development of land and resource management prescriptions, and specific direction for consistency is provided by the Recommended Forest Plan Components approved in August 2016, by the regional foresters of the four Forest Service regions the trail passes through. For the Gila NF, the CDNST corridor is defined as within 0.5 mile on either side of the CDNST.

Desired Conditions

1. The CDNST is a well-defined trail that provides for high-quality, primitive hiking and horseback riding opportunities, and other compatible non-motorized trail activities, in a highly scenic setting along the Continental Divide. The significant scenic, natural, historic, and cultural resources along the trail's corridor are conserved. Where possible, the trail provides visitors with expansive views of the natural landscapes along the Divide.
2. Visitors are aware of the CDNST and the nature and purpose of the trail designation
3. Viewsheds from the CDNST have high scenic values. The foreground of the trail (up to 0.5 mile 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.
4. The CDNST can be accessed from multiple locations, allowing visitors to select the type of terrain, scenery and trail length (such as ranging from long-distance to day use) that best accommodate their desired outdoor recreation experience(s).
    a. Wild and remote backcountry segments 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.
5. Use conflicts among trail users are infrequent.
6. The trail is well-maintained, signed, and passable. Alternate routes are made available in the case of temporary closures resulting from natural events, such as fire or flood, or land management activities.

Objectives

1. Restore or relocate 5 miles or more of the CDNST by 2025, to better align with law, regulation, and policy; improve access to safe water sources; improve scenic viewing opportunities; and provide for better quality non-motorized recreation experiences.

Standards

1. No surface occupancy for geothermal energy leasing activities shall occur within the CDNST corridor.
2. No common variety mineral extraction shall occur within the CDNST corridor.
3. Motorized events and motorized special-use permits shall not be permitted or authorized on the CDNST. Existing motorized use may continue on the CDNST. New motorized events shall not be permitted on the CDNST. Motorized use shall not be allowed on newly constructed segments of the CDNST.

Guidelines

1. To retain or promote the character for which the trail was designated, new or relocated trail segments should be located primarily within settings consistent with or complementing primitive or semi-primitive non-motorized recreation opportunity spectrum classes. Road and motorized trail crossings and other signs of modern development should be avoided to the extent possible.
2. To protect or enhance the scenic qualities of the CDNST, management activities should be consistent with scenic integrity objectives of high or very high within the visible foreground of the trail (up to 0.5 mile either side).
3. If management activities result in short-term impacts to the scenic integrity of the trail, mitigation measures should be included, such as screening, feathering, and other scenery management techniques to minimize visual impacts within and adjacent to the trail corridor (within visible foreground of the CDNST at a minimum).
4. To promote a non-motorized setting, the CDNST should not be permanently re-located onto routes open to motor vehicle use.
5. The minimum trail facilities necessary to safely accommodate the amount and types of use anticipated on any given segment should be provided.
6. To protect the CDNST's scenic values, special-use authorizations for new communication sites, utility corridors, and renewable energy sites should not be allowed within foreground (up to 0.5 mile) and should not be visually dominant in the middle-ground viewshed (up to 4 miles).
7. Linear utilities and rights-of-way should be avoided. Where unavoidable, these should be limited to a single crossing of the trail per special-use authorization to maintain the integrity of the trail corridor and values for which the CDNST was designated.
8. To promote a natural-appearing, non-motorized setting, constructing temporary or permanent roads or motorized trails across or adjacent to the trail should be avoided unless needed for resource protection, private lands access, or to protect public health and safety.
9. To promote a natural-appearing setting and avoid visual, aural and resource impacts, using the CDNST for timber pile landings or as a temporary road for any purpose should not be allowed.
10. Hauling or skidding along the CDNST itself should be allowed only where the CDNST is currently located on an open road or no other reasonable options are available.
11. Unplanned fires in the foreground (up to 0.5 mile) of the CDNST should be managed using minimum impact suppression tactics or other tactics appropriate for protecting CDNST values. Prescribed fires in the foreground of the CDNST should be managed to incorporate the values of the CDNST. Heavy equipment fire line construction within the CDNST corridor should not be allowed, unless necessary for emergency protection of life and property.

Management Approaches

Relationships

Encourage trail partners and volunteers to assist in the planning, development, maintenance, and management of the trail, where appropriate and as consistent with the CDNST Comprehensive Plan. Consider coordinating trail management and activities across unit and jurisdictional boundaries with the Bureau of Land Management. Provide consistent signage along the trail corridor at road and trail crossings to adequately identify the trail, and provide interpretive signs at key trail entry points and limited historic and/or cultural sites to orient visitors and enhance the visitor experience.

CDNST management

Within 5 years of revised plan implementation, develop a Continental Divide National Scenic Trail Forest Master Plan to guide management and development associated with the trail within forest boundaries and according to local, regional, and national policy.

Evaluate proposed trail relocations or new trail segment locations using CDNST optimal location criteria. Consider minor realignments of the trail, or identify minor route diversions, to provide user access to known, reliable water sources. Coordinate with grazing permittees and wildlife program staff to identify opportunities to develop water sources within or near the CDNST corridor that might also serve CDNST users and pack or riding stock.

Identify and pursue opportunities to acquire lands or rights-of-way within or adjacent to the CDNST corridor. Considering how activities outside the visible foreground may affect CDNST viewsheds and user experiences, and mitigating potential impacts to the extent possible.

Ensure incident commanders are aware of the CDNST as a resource to be protected during wildfire suppression activities. Clearly identify fire suppression rehabilitation and long-term recovery of the CDNST corridor as high priorities for incident management teams, BAER Teams, and post-fire rehabilitation interdisciplinary teams.

Establish appropriate carrying capacities for specific segments of the CDNST, monitor use and conditions, and take appropriate management actions to maintain or restore the nature and purposes of the CDNST if the results of monitoring or other information indicate a trend away from the desired condition.

National Recreation Trails

Background Information

National recreation trails are authorized under the National Trails System Act of 1968 (Public Law 90-543). These trails provide for increasing recreation needs for an expanding population and promote public access, travel, and enjoyment of the Nation's outdoor areas. Trails are established near urban areas and within scenic areas in more remote locations. The Gila NF administers three national recreation trails: Catwalk National Recreation Trail, Sawmill Wagon Road National Recreation Trail, and Woodhaul Wagon Road National Recreation Trail, which are all non-motorized.

Desired Conditions

1. National recreation trails provide a variety of opportunities for recreation as well as a diversity of experiences with different levels of solitude, remoteness, and development.
2. Designated national recreation trails are well-maintained, signed, and passable. Alternate routes are made available in the case of temporary closures resulting from natural events (for example, fire or flood) or land management activities.
3. Conflicts among trail users are infrequent and visitors can experience the scenic qualities of the area.
4. Scenic integrity and broad views of the surrounding landscapes are retained within areas that contain national recreation trails.
5. The integrity of cultural and natural resources, scenery, and recreational experiences is maintained along designated national recreation trails.
6. National recreation trails may be more accessible and highly developed near towns and developed recreation facilities. Connector trails provide access to amenities.
7. Signs, while unobtrusive, are present to help travelers find nearby developed sites, trailheads, recreation facilities, drinking water sources, and other points of interest.
8. The historic routes, features, and associated values along national recreation trails are preserved.

Guidelines

1. National recreation trails should be avoided for use as fireline.
2. Recreational facilities on or adjacent to national trails should be designed to interpret and highlight associated points of interest.
3. Management activities within foreground views (up to 0.5 mile) from the trail should meet a scenic integrity objective of at least high.
4. Management activities in the middle ground (up to 4 miles) and background (from middle ground to horizon) should meet or exceed a scenic integrity objective of at least moderate.

5. Special-use permits that affect national recreation trails should include requirements intended to protect scenery management objectives associated with the values for which the trail was designated.
6. Management activities should maintain safe public access to national recreation trails.
7. Management of national recreation trails should be consistent with management direction in the trail establishment reports as well as the maintenance standards for trail class and use.
8. Heavy equipment fire line construction along the national recreation trails should be avoided, unless necessary for emergency protection of life and property.

Management Approaches

Relationships

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

National Scenic Byways

Background Information

A national scenic byway is a road designated by the United States Department of Transportation for one or more of six "intrinsic qualities": archeological, cultural, historic, natural, recreational, and scenic. The program was established by Congress in 1991, to preserve and protect the Nation's scenic, but often less-traveled roads, and promote tourism and economic development.

Two scenic byways travel through the forest; the Trail of the Mountain Spirits traces a loop in the southern half of the forest, while the Geronimo Trail creates a longer tour encompassing portions of the eastern edge of the forest along with large tracts of land outside the forest boundary. The primary uses along the scenic byway routes are driving for pleasure, cycling, sightseeing, birdwatching, and developed recreation sites. The New Mexico Department of Transportation manages most of the roads that are national scenic byways in the Gila NF.

Desired Conditions

1. The intrinsic qualities identified for each national scenic byway remain intact, and viewsheds along national scenic byways provide natural-appearing landscapes and enhance recreation tourism that supports local communities.
2. National scenic byways provide roaded, natural recreation opportunities.
3. Viewsheds from scenic byways are consistent with desired conditions for scenery. The immediate foreground (300 feet on either side) of these travelways is natural-appearing, and generally appears unaltered by human activities.
4. Structures on or along scenic byways harmonize with the surrounding features to the extent possible without compromising safety standards for the type of travel route.

Guidelines

1. Visual impacts from vegetation treatments, recreation uses, range developments, and other structures should blend with the overall scenic character along scenic byways.
2. To maintain and protect the scenic quality of scenic byways, management activities planned and implemented within the foreground (up to 0.5 mile on either side) should be consistent with the scenic integrity objective of "high."
3. Features along scenic byways such as signs, guardrails, and landscaping should be designed to maintain the desired scenic character along the route.

Management Approaches

Outreach and Education

Signs, kiosks, exhibits, and other educational tools (such as brochures, websites, and social media) may provide interpretive, educational, and safety information along scenic byways, in adjacent recreation sites, and at visitor contact points such as ranger stations. Refer to the national scenic byway corridor management plan for guidance and direction for the conservation and enhancement of the byway's intrinsic qualities, as well as promotion of roadside interpretive services and other amenities along scenic byways. Assist with efforts to promote regional tourism and economic development.

Relationships

Work closely with the Federal Highway Administration, New Mexico Department of Transportation, local communities, scenic byway advisory committees, and other interested groups to promote and improve services and interpretive opportunities along scenic byways. Work closely with New Mexico Department of Transportation and county highway departments to manage hazard trees within the immediate foreground (up to 0.5 mile on either side) of scenic byways.

Management Areas

Wildland-urban Interface

Background Information

The wildland-urban interface is the area or zone where structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels. Generally, the wildland-urban interface is a buffer around communities, private lands, or other infrastructure, though the buffer size may vary based on topography, fuels, and values at risk. Although WUI areas are physically delineated places (see figure 5), it may be helpful to think of the wildland-urban interface not as a place, but rather as a set of conditions that can exist in and around nearly every community and surrounding many other types of infrastructure. These conditions are defined by the amount, type, and distribution of vegetation; the flammability of the structures (homes, businesses, outbuildings, decks, fences) in the area and their proximity to fire-prone vegetation and other combustible structures; weather patterns and general climate conditions; topography, hydrology, road construction, and more.

Desired Conditions

1. Wildland fires in the wildland-urban interface result in reduced risk of fire moving across ownerships and no loss of life and property. The near absence of ladder fuels results in low-intensity surface fires and provides the opportunity for firefighters to safely and efficiently suppress wildfires.
2. In forest and woodland ERUs, the area occupied by grass/forb/shrub interspaces is on the upper end of, or above the range given in the relevant ERU desired conditions. Trees within groups are more widely spaced with less interlocking of crowns than desirable outside of wildland-urban interface, and tree basal area is on the lower end or below the desired range (see Chapter 2: General Forest individual ERU desired conditions).
3. In shrubland ERUs, the live and dead fuel loading is on the lower end or below the desired range (see Chapter 2: General Forest individual ERU desired conditions).
4. Snags and coarse woody debris may be present, but at the lower end or below the range given in the relevant ERU desired conditions.
5. Access, including easements, provides the ability to implement fuel treatments, including removal of material.

Objectives

1. Treat between 16,480 and 249,000 acres per decade using any combination of mechanical and prescribed fire methods.

Standard

1. Ecosystem function will be a secondary consideration in the wildland-urban interface. Desired conditions for wildland-urban interface are the primary consideration.

Management Approaches

Fuel Reduction and Relationships

The forest continues to work with its partners and stakeholders involved in the community wildfire protection plans to meet the broad intent and goals of those plans. At least 10 percent of the WUI is monitored and evaluated annually. Fuel reduction projects in the wildland-urban interface are designed in collaboration with the community wildfire protection plans and affected property owners. The wildland-urban interface is the hazardous fuel treatment priority (see also Wildland Fire and Fuels Management).

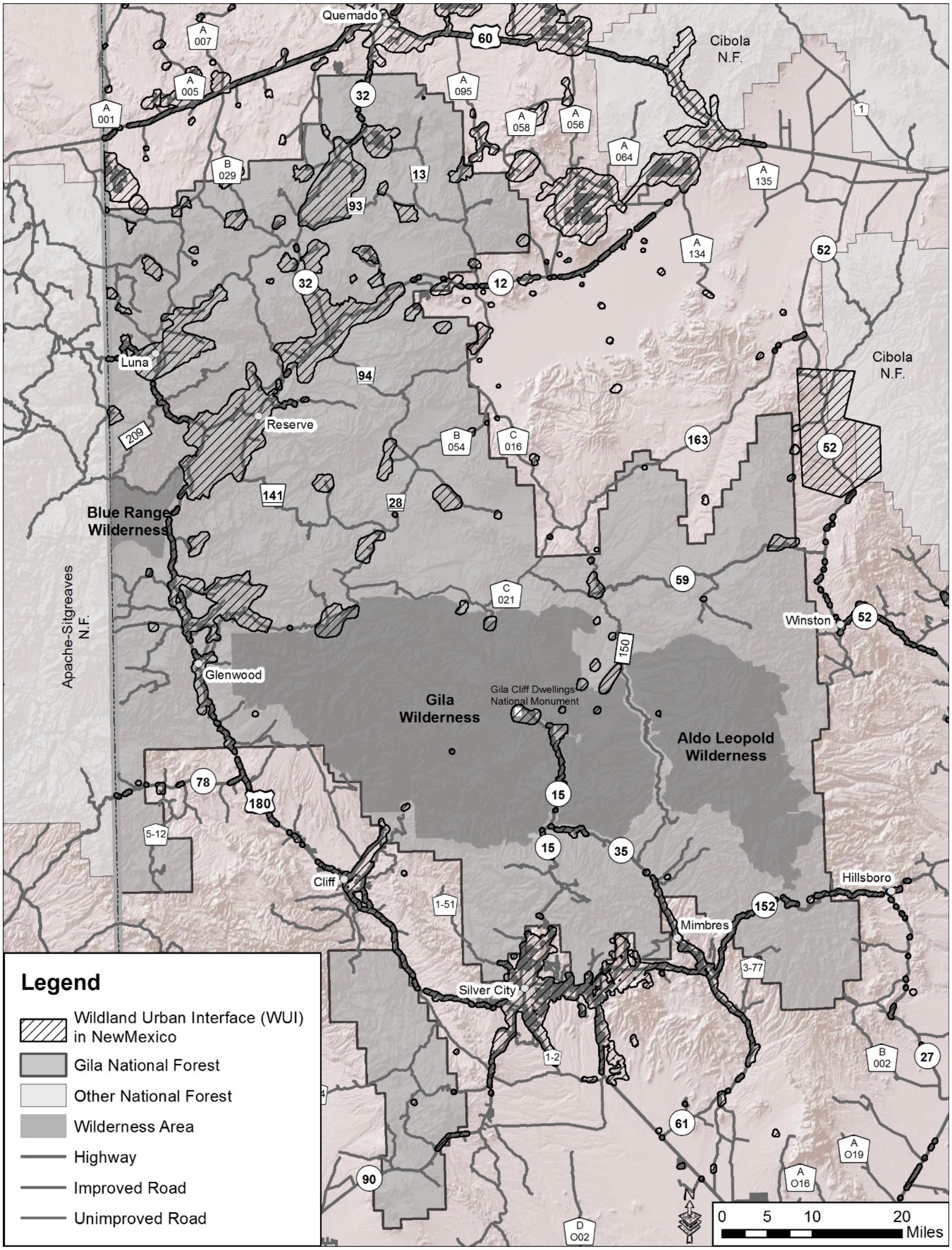

Figure 5. Wildland-urban interface areas in southwestern New Mexico

Recommended Wilderness

Background Information

Each national forest undertaking forest plan revision under the 2012 Planning Rule must complete a process of identifying and evaluating lands that may be suitable for inclusion in the National Wilderness Preservation System, and then determine whether to recommend any of the evaluated lands to Congress for wilderness designation. Congress reserves the authority to designate wilderness through legislation. Forest Service Handbook 1909.12 Chapter 70 provides direction and guidance for a four-step process that the Gila NF will have completed as one part of the larger plan revision effort. More information on the forest plan revision process may be found in Gila plan revision draft environmental impact statement, volume 2, appendix F.

In the signed record of decision, the forest supervisor will make recommendations for some of the lands analyzed through the process to be designated by Congress for inclusion in National Wilderness Preservation System. This is a preliminary administrative recommendation that is subject to further review and possible modification by the Chief of the Forest Service, the Secretary of Agriculture, and the President of the United States before being formally submitted for consideration by Congress. Refer to table 2 for areas and acres, as well as total acres recommended, in the forest supervisor's signed record of decision.

Table 2. Areas recommended to Congress for wilderness designation as part of the Gila forest plan revision process

Recommended Area	Acres
B10-ALDO LEOPOLD ADDITION NORTHEAST	8,381
B11-ALDO LEOPOLD ADDITION SOUTHEAST	944
B14-ALDO LEOPOLD ADDITION CARBONATE CREEK	2,819
B1a-ALDO LEOPOLD SECO ADDITION	4,724
B1c-ALDO LEOPOLD SECO ADDITION	48
G12-GILA WHITEWATER ADDITION	1,960
G1-MINERAL CREEK	16,538
QG1-NOLAN NORTH	6,718
RG1-ASPEN MOUNTAIN	19,053
W3-ALDO LEOPOLD ADDITION WEST	1,110
W4-ALDO LEOPOLD ADDITION MCKNIGHT CANYON	11,094
WB1-TAYLOR CREEK	10,012
WSB1-RABB PARK	27,002
Alternative Total Acres	**110,402**

The Forest Service Planning Handbook 1909.12 Chapter 70 requires that the revised plan must include components that provide for managing any such recommended wilderness areas to protect and maintain the wilderness characteristics that were the basis for each area's suitability for wilderness recommendation. These wilderness characteristics are identified by the handbook as:

- Apparently natural - generally appears to be affected primarily by the forces of nature, with the imprints of human work substantially unnoticeable

- Outstanding opportunities for solitude or primitive and unconfined recreation
- Special features and values, or ecological, geological, or other features of scientific, educational, scenic, or historical value, where they occur
- Sufficient size, meaning the area is at least 5,000 acres or of a size practicable to be managed as wilderness
- Manageability, the area may be managed to protect the wilderness characteristics it possesses

Recommended wilderness areas will use the interim direction provided below until they are considered for designation by Congress. If an area is designated by Congress, the direction in this section no longer applies and the area is managed according to the Wilderness Act, agency policy, and direction for designated wilderness in this forest plan.

Desired Conditions

1. The wilderness characteristics of each recommended wilderness remain intact or are improved in condition until such time that a determination for or against wilderness designation has been made by Congress through passage of legislation.
2. Wilderness characteristics that existed at the time of the recommendation are protected and enhanced within all recommended wilderness areas.

Standards

1. Wilderness characteristics of all recommended wilderness areas shall be maintained to a minimum at the level they existed upon the time of recommendation, and improved by management actions where those opportunities exist, until such time as Congress acts on the recommendation, either designating the area as wilderness or releasing it for other management purposes.
2. Recommended wilderness areas shall be managed to preserve or enhance a very high scenic integrity objective to protect the wilderness characteristics of apparent naturalness and other features of value for scenery, where they exist.
3. Recommended wilderness areas shall be managed to promote primitive or semi-primitive, non-motorized recreation opportunity spectrum classes to protect the wilderness characteristics of opportunities for solitude and primitive and unconfined recreation.
4. To protect the wilderness characteristic of apparent naturalness, no new roads shall be constructed, and no existing roads shall be maintained or improved in recommended wilderness areas, subject to valid existing rights.
5. To protect the wilderness characteristic of apparent naturalness, no timber harvests or mechanical vegetation treatments shall occur within recommended wilderness. Limited mechanical preparation work in support of prescribed fire, completed within 2 years of planned project implementation shall be permitted on a case-by-case basis (see Guideline 13 for direction on prescribed fire in recommended wilderness).

6. To protect the wilderness characteristic of apparent naturalness, no new structures, improvements, or developments shall be constructed within recommended wilderness except those improvements necessary for compliance with law, policy, and regulation, associated with valid existing rights, infrastructure necessary for the management of permitted grazing and native fish, and at the discretion of the forest supervisor or designated agent.
7. Wheelchairs shall be permitted in recommended wilderness for those individuals whose disability requires their use. A wheelchair shall be defined according to the Americans with Disabilities Act, Title V Section 508 (c) as “a device designed solely for use by a mobility impaired person for locomotion that is suitable for use in an indoor pedestrian area.”
8. The allowance of wheelchairs for individuals whose disability requires their use shall not be interpreted to additionally require the Gila NF to provide any form of special treatment or accommodation, or be required to construct any facilities or to modify any conditions of lands within a recommended wilderness area to facilitate wheelchair use.
9. To protect the wilderness characteristic of opportunities for solitude or primitive and unconfined recreation, the forest shall establish and enforce group size limits. The default group size limit shall be 15 persons and 25 head of pack and saddle stock. Exceptions to group size limits may only be granted by written permission of the frest supervisor or designated agent, including when approved as terms and conditions of special-use permits on a case-by-case basis, groups that agree to mitigation terms and demonstrate a high proficiency for Leave No Trace Ethics, for fire management activities, and all emergencies involving health and safety.Changes shall be made to the default group size limits for any individual recommended wilderness area when approved by the forest supervisor, and informed by recommendations from analysis of effects to wilderness characteristics completed by an interdisciplinary team.
10. To protect the wilderness characteristic of opportunities for solitude or primitive and unconfined recreation, length of stay limits shall be established for all recommended wilderness areas. The default length of stay limit for any individual recommended wilderness shall be the established forest-wide length of stay limit of 14 cumulative days within a 30-day period. Exceptions may only be granted by written permission of the forest supervisor or designated agent including when approved as terms and conditions for special-use permits on a case-by-case basis and groups or individuals that agree to mitigation terms and demonstrate a high proficiency for Leave No Trace Ethics. Changes shall be made to the default length of stay limits for any individual recommended wilderness when approved by the forest supervisor and informed by recommendations from analysis of effects to wilderness character completed by an interdisciplinary team.
11. When monitoring of conditions within recommended wilderness indicates that wilderness characteristics are being negatively affected by recreation impacts, affected sites within recommended wilderness shall be rehabilitated to as natural condition as possible, making use of native vegetation or other natural materials.
12. Where management conflicts occur, the legally mandated protection of the wilderness characteristics shall take precedence over recreation uses within recommended wilderness.

Guidelines

1. Uses should not be allowed within recommended wilderness that have negative effects to the legal mandate of protecting or enhancing the wilderness characteristics identified when the area was recommended, including characteristics of: manageability to protect wilderness characteristics, apparent naturalness, opportunities for solitude or primitive and unconfined recreation, or other features of (ecological, geological, or other features of scientific, educational, scenic, or historical) value, where they occur.
2. For commercial livestock grazing activities in recommended wilderness areas, annual operation instructions should encourage protection of wilderness characteristics, but still allow for all motorized uses and maintenance or replacement of range management improvements that existed prior to recommendation.
3. Outfitter-guide activities in recommended wilderness should include appropriate practices to protect or enhance wilderness characteristics, including (but not limited to, at the forest supervisor's discretion) Leave No Trace principles, with all interactions with clients and other visitors.
4. Prior to approval, all research activities proposed for recommended wilderness should be evaluated to determine the necessity of the activities occurringwithin a recommended wilderness or if the research may be accomplished in another location. If confirmed that the research must take place in recommended wilderness, it should also be determined by analysis that the research will not negatively affect the area's wilderness characteristics.
5. All trail maintenance within recommended wilderness should be conducted in a manner to protect and enhance wilderness characteristics, and should be consistent with the recreation opportunity spectrum setting of the area.
6. Non-motorized, traditional tools and skills should be used for administrative activities to maintain the wilderness characteristics that provided for the recommendation of these lands. Activities that do not alter these wilderness characteristics or Congress's ability to designate these lands may be authorized on a case-by-case basis by the forest supervisor or authorized agent.
7. To protect the wilderness characteristic of apparent naturalness, unauthorized, user-created trails, roads, or structures should be dismantled, rehabilitated, and/or removed from recommended wilderness when opportunites occur. The exception is for appropriately located and constructed user-created fire rings and established campsites for encouragement of Leave No Trace principles and for wildfire prevention.
8. To protect the wilderness characteristic of opportunities for solitude or primitive and unconfined recreation, use of motorized equipment and mechanized transportation should be avoided in recommended wilderness except for emergencies involving human health and safety, fire management, and prescribed fire for vegeation management purposes that has been determined not to permanently affect wilderness characteristics or Congress's ability to designate these lands, or by written permission of the forest supervisor or designated agent.

9. Non-native, invasive species should be treated using methods consistent with protecting the wilderness characteristic of apparent naturalness within recommended wilderness.
10. In recommended wilderness areas, new trails should only be constructed, and existing trails should only be realigned, for the purpose of protecting wilderness characteristics. Existing trails designed for wilderness non-conforming uses (such as mechanized or motorized vehicle use) should be rehabilitated and maintained to meet trail standards for non-motorized, non-mechanized travel.
11. Competitive and group recreation events should not be permitted in recommended wilderness areas to protect the wilderness characteristics of solitude and primitive and unconfined recreation.
12. To protect the wilderness characteristic of apparent naturalness, the gathering and sale of forest products, including but not limited to fuelwood and Christmas tree cutting, should not be permitted in recommended wilderness areas.
13. Agency-ignited, prescribed fire should be used as a management tool to reduce the risks and consequences of uncharacteristic wildfire, and should not be used to enhance wilderness characteristics within recommended wilderness.
14. Naturally occurring wildfires should be allowed to perform, when possible, their natural ecological role in recommended wilderness. Fire camps, helispots, and other temporary facilities associated with fire management activity should be located outside of recommended wilderness, when possible, to protect wilderness characteristics.

Management Approaches

Recommended Wilderness Management

Management of recommended wilderness in the Gila NF will be guided by the legal mandate that the forest protect and enhance the wilderness characteristics that the area possessed at the time of recommendation:

- Manageability to protect wilderness characteristics
- Apparent Naturalness
- Opportunities for Solitude or Primitive and Unconfined Recreation
- Only where they occur, Other Features of (ecological, geological, scientific, educational, scenic, or historical) value

To assist in the analysis process for identifying threats to wilderness characteristics, complete and use non-native invasive species inventories, comprehensive vegetation inventories, and use capacity studies. Where encroachments are likely to occur or management actions conflict with protection of wilderness characteristics, recommended wilderness boundary management will be prioritized. If designation by Congress occurs, the forest will promptly develop an implementation plan to bring newly designated areas into compliance to be managed as wilderness according to law, policy, regulations, and forest plan direction.

When considering non-emergency authorization of any uses or actions that may affect the legally mandated requirement to protect or enhance wilderness characteristics within a recommended wilderness area, the forest may consider conducting an analysis to first determine if the use or action must occur within recommended wilderness, and if so, what the minimum necessary tool or action is necessary to accomplish the use or action.

Relationships

Pursue opportunities to partner with other Federal agencies to ensure management is as consistent as possible for contiguous areas managed for similar purposes to those for recommended wilderness, including, but not limited to primitive areas, wilderness study areas, and designated wilderness. Coordinate with the New Mexico Department of Game and Fish on management of native species within recommended wilderness to protect and enhance wilderness characteristics during project implementation.

Outreach and Education

Interpretation and education will be used to encourage visitors to adopt techniques, equipment, and ethics specific to wilderness characteristics within recommended wilderness. News releases, postings, and individual visitor contacts will be used to inform visitors of and encourage them to avoid areas of concentrated resource damage and use restrictions. Expand partnerships to increase awareness of wilderness values and etiquette. Provide residents who live near recommended wilderness with information that will increase their awareness and understanding of wilderness.

Recreation

Clearly identify recommended wilderness boundaries at commonly used entry points by use of signage and trail maps. Where violations of group size or length of stay limits are commonly observed, the forest will consider increased staffing presence to enhance education or enforcement and address threats to wilderness characteristics. Adaptive management and corrective measures will be considered if overuse causes unacceptable resource damage. Overuse can be determined from, but are not limited to, limits of acceptable change studies, solitude monitoring, other resource analyses, and professional judgment.

Base priorities for trail reconstruction on potential for impacts to wilderness characteristics and recreation opportunities, and the trails that receive the greatest use. Motorized and mechanized intrusions into recommended wilderness areas will be addressed through methods such as ranger patrols, placement of bike racks near area boundaries, signs, trail design, and expanded opportunities to pursue these activities outside of the recommended wilderness. Coordinate regular patrols to provide interpretation, education, resource management projects, visitor assistance, and when necessary, enforcement to help preserve wilderness characteristics. Collaborate with stakeholders to build a volunteer base for stewardship actions and volunteer ranger patrols to protect wilderness characteristics within recommended wilderness.

Overflights

Collaborate with the Federal Aviation Administration, airport administrations, air tour operators, military and government agencies, and other aircraft operators to minimize disturbances caused by aircraft over recommended wilderness areas of the Gila NF. Aircraft disturbances include, but are not limited to, diminishing solitude and primitive recreation opportunities and disrupting key wildlife areas during important times of their life cycle. Examples could include peregrine falcon nesting sites and big game wintering habitat.

Recreation Special Uses

Conduct outfitter-guide needs or capacity studies that will be used to inform decision making regarding issuing outfitter-guide special-use permits within each recommended wilderness. This may be accomplished in coordination with existing wilderness when the recommended area would become an addition to the wilderness if designated by Congress.

On a case-by-case basis, consideration will be given to provide outfitter-guides with written permission to exceed group size limits and length of stay limits in recommended wilderness (in the form of terms and conditions within a special-use permit and accompanying plan of operations) by the forest supervisor or authorized agent when the following conditions are met:

a. The outfitter-guide and their employed staff demonstrate sufficient knowledge and proficiency in the elements of Leave No Trace Outdoor Ethics to travel and camp with large groups or over extended periods of time with minimal impacts to wilderness characteristics.
b. The outfitter-guide agrees to follow all applicable mitigations stipulated or recommended by and included in the special-use permit and plan of operations, to minimize impacts to wilderness characteristics and experiences of other visitors.
c. The permission is acknowledged by the outfitter-guide to be only for the specific circumstances as described within the permit and plan of operations, and is not a blanket authorization beyond those specifics, any use beyond what is specified in the plan will require additional authorization.

Mitigations as terms and conditions in special-use permits and plans of operation granting permission to exceed group size limits will be applied on a case-by-case basis, and will be specific to individual circumstances. Suggested mitigations could include the following, but are not necessarily limited to nor are applicable to all circumstances:

- Where possible, use existing, hardened campsites that are appropriate to the size of the group; if no campsites are available, care should be taken to locate campsites on durable surfaces to prevent impacts, and care should be taken so the area is left as it was prior to its use as a temporary campsite.
- If a campsite cannot be located that is both remote from other visitors and of and appropriate to accommodate the size of the group, consider breaking into smaller groups, and locating existing, or temporary campsites on durable surfaces, as far as possible from occupied areas to minimize impacts to other visitors.
- Where possible, locate campsites for larger groups in areas as distant as possible from occupied areas to not impact solitude experiences of other visitors.
- When exceeding length of stay, when possible and in keeping with the purpose of the trip, travel over large distances and throughout infrequently visited areas, not remaining for long in locations, and relocating campsites frequently. This may not be applicable when chosen locations and length of stay facilitate stewardship projects dependent upon being in a few, or one, location.
- Break large groups into smaller groups to travel, and if possible, take different routes to reach common destinations.
- Perform service projects that will benefit the overall wilderness characteristics of the area during the trip, such as stewardship enhancement projects and trail maintenance, with approval and under the guidance of appropriate Forest Service staff.

Eligible Wild and Scenic Rivers

Background Information

In 1968, Congress passed the Wild and Scenic Rivers Act to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. 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. None of the eligible streams or rivers in the Gila NF are currently designated as wild and scenic rivers.

As part of the forest plan revision, the Gila undertook a process for identifying and determining the eligibility of potential additions to the National Wild and Scenic Rivers System on National Forest System lands. Rivers required to be studied for eligibility include all rivers named on a standard U. S. Geological Survey 7.5 minute USGS quadrangle map, but could also include rivers identified in the Nationwide Rivers Inventory and by other sources.

The Gila NF completed a previous inventory of eligible wild and scenic rivers in 2002 that determined the following eight rivers are eligible: Whitewater Creek, Spruce Creek, Middle Fork Gila River, West Fork Gila River, Diamond Creek, South Diamond Creek, Holden Prong, and Las Animas Creek. Any river segments included in this previous study that are found to be affected by changed circumstances will be reevaluated to determine if the changed circumstances affected previous findings of ineligibility or eligibility.

Changed circumstances are any changes that have occurred to the river or the river corridor that have affected the outstandingly remarkable values. Examples of changes include the listing of a species within the river, broad recognition of the river for certain recreational opportunities, or changes that now make the river’s values more unique.

For more information on the process undertaken during the plan revision process to determine wild and scenic rivers eligibility, please refer to the Gila NF plan revision draft environmental impact statement, Volume 2, Appendix G. Documentation of the Wild and Scenic River Eligibility Study.

The Gila NF is required by law, policy, and regulation to manage all eligible wild and scenic rivers under interim protection measures until a congressional decision is made on the future use of the river and adjacent lands—unless a suitability study concludes that the river is not suitable.

See table 3 for a list of all rivers currently determined to be eligible wild and scenic, as well as the miles for each river segment, and interim classification as wild, scenic, or recreational assigned to each.

Table 3. Updated plan revision study identified eligible Wild and Scenic Rivers on the Gila NF with classifications and segment lengths

River Name	Outstanding Remarkable Values	Total Miles	Classification (# of miles)
Diamond Creek	Fish, Historic	23.80	Wild (22.12) Scenic (1.68)
Middle Box of the Gila River	Wildlife, Scenic, Recreation, Fish, Historic	8.90	Recreational (1.34) Wild (7.56)
Middle Fork Gila River	Scenic	35.54	Wild (35.54)
West Fork Gila River	Scenic, Historic	30.01	Wild (30.01)
Wilderness Run of the Gila River	Geologic, Scenic, Recreation, Historic, Wildlife	40.39	Wild (33.67) Recreational (6.72)
Holden Prong	Fish	7.27	Wild (7.27)
Iron Creek	Fish	3.53	Wild (3.53)
Las Animas Creek	Fish, Historic	7.35	Wild (2.53) Scenic (4.82)
Mineral Creek	Fish, Recreation	8.71	Wild (8.71)
Mule Creek	Geologic	4.33	Scenic (4.33)
Lower Box of the San Francisco River	Scenic, Recreation, Wildlife	17.02	Scenic (2.43) Wild (14.59)
Upper Box of the San Francisco River	Scenic, Recreation	5.70	Scenic (3.78) Wild (1.92)
South Diamond Creek	Fish	8.05	Wild (8.05)
Spruce Creek:	Fish	3.74	Wild (3.74)
Whitewater Creek	Recreation, Historic	14.73	Wild (11.79) Recreational (2.94)
Willow Creek	Recreation	4.95	Recreational (4.95)
Total Eligible River Miles:		**224.11**	

Desired Conditions

1. The outstandingly remarkable values, free-flowing condition, and classifications of eligible wild and scenic river corridors are preserved until they are congressionally designated as a wild and scenic river, or are released from consideration though a suitability study determination or by direction of Congress.
2. Roads and trails provide access consistent with the river segment classifications, while protecting and enhancing the river’s outstandingly remarkable values.
3. Activities in eligible wild and scenic rivers and associated corridors are primarily nature-based, are consistent with the river’s classification, and maintain the outstandingly remarkable values.

Standards

1. All eligible wild and scenic rivers shall be managed to protect and enhance their free-flowing condition and the outstandingly remarkable values that qualified them as eligible until a suitability study is completed determining if it is suitable to be recommended to Congress for designation or that it shall be released from further consideration and returned to other forest uses.
2. When management activities are proposed that may compromise the outstandingly remarkable values, potential classification, or free-flowing character of an eligible wild and scenic river segment, a suitability study shall be completed for that eligible river segment prior to initiating activities.
3. All proposed water resources projects within eligible wild and scenic rivers corridors, including activities within the bed and banks and below the ordinary high water mark of the river, shall require a free-flow analysis and protection of the segment’s free-flowing nature and outstandingly remarkable values.
4. Where eligible wild and scenic rivers corridors occur within other management areas, the most restrictive management direction shall apply.
5. Rivers found unsuitable for inclusion in the National Wild and Scenic River System by a suitability study or by congressional direction shall be released from further consideration and restrictions of this section.
6. In eligible rivers with “wild” classifications, cutting of trees and other vegetation shall not be allowed except when needed in association with a primitive recreation experience, to protect users (including hazard tree removal or trail maintenance), or to protect identified outstandingly remarkable values.
7. No temporary or permanent facilities shall be constructed within river corridors of river segments with an initial classification of “wild.” Facilities constructed within eligible “scenic” or “recreational” segments must be located and designed to protect river values, be screened from view to the extent possible, and compliment scenic values.
8. Locatable minerals are subject to valid existing rights; existing or new mining activity on an identified eligible river are subject to regulations in 36 CFR Part 228 and must be conducted in a manner that mitigates surface disturbance, sedimentation, pollution, and visual impairment. Leasable minerals must include conditions necessary to protect the values of the river corridor that make it eligible for inclusion in the National Wild and Scenic River System. Disposal of saleable mineral materials is prohibited for “wild” classification, and allowed for “scenic” and “recreational” classifications, if the values of the river corridor that make it eligible for inclusion in the National Wild and Scenic River System are protected.
9. Any portion of a utility proposal that has the potential to affect an eligible wild and scenic river segment’s free-flowing character must be evaluated as a water resources project.

Guidelines

1. Recreation and other activities at eligible rivers and associated corridors should be managed to occur at appropriate locations and intensities consistent with the classification to protect and enhance the free-flowing condition, and the outstandingly remarkable values.
2. Within eligible wild and scenic river corridors classified as “recreational” or “scenic,” vegetative treatments, including timber harvest, should be allowed to maintain or restore the values for which the eligible river was identified.
3. Management activities should be consistent with the scenic integrity objective of “very high” in eligible wild and scenic rivers classified as “wild”; “high” in eligible rivers classified as “scenic”; and “moderate” in eligible rivers classified as “recreational.”
4. Management activities should be consistent with the recreation opportunity spectrum class of “primitive” or “semi-primitive non-motorized” in eligible wild and scenic rivers classified as “wild”; “semi-primitive non-motorized” to “semi-primitive motorized” in eligible rivers classified as “scenic”; and “semi-primitive non-motorized” to “roaded natural” in eligible rivers classified as “recreational.”
5. New roads or motorized trails should not be constructed within ¼ mile of an eligible river segment classified as “wild.”
6. When motorized use is necessary in any eligible segments, conditions for that use should be carefully defined and impacts mitigated.
7. Domestic livestock grazing within eligible wild and scenic rivers segments should be managed to protect outstandingly remarkable values.
8. All management activities within an eligible wild and scenic river corridor should consider opportunities for enhancing outstandingly remarkable values.

Management Approaches

Outreach and Education

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.

Relationships

Collaborate with neighboring forests and agencies on the management of eligible wild and scenic rivers.

Wild and Scenic Rivers Suitability Studies Undertaken to Resolve Resource Management Conflicts

A wild and scenic rivers suitability study is undertaken to determine if eligible wild and scenic rivers are suitable to be recommended to Congress as potential additions to the National Wild and Scenic Rivers System. It is not a requirement that forests must conduct suitability studies during the Plan Revision

Process, but a suitability study may be undertaken at any time following the outcome of the eligibility study undertaken as part of the forest plan revision process.

If a resource management conflict should arise due to any river's eligible status mandate to preserve or enhance free-flowing conditions and outstandingly remarkable values, it may be resolved by conducting a suitability study to determine if the segment, or a portion thereof, is suitable for recommendation to Congress for designation as a National Wild and Scenic River. If the river is not found to be suitable, the conflict may be resolved by releasing the river corridor to other forest uses. However, if the river is found suitable, it may be resolved in favor of preserving its free-flowing condition and outstandingly remarkable values until such time that Congress designates the river, or provides other management direction within legislation.

Rare and Endemic Vegetation Management Areas

Background Information

The rare and endemic vegetation management areas have concentrations of plants identified as rare and/or endemic to the Gila NF (DEIS volume II, appendix I). The management areas provide opportunities for educational outreach on the area plants, promotion of conservation practices, and partnership opportunities for increased survey and knowledge of plant location, distribution, and life history.

The three management areas are located in the following areas:

- Mogollon Mountains
- Piños Altos
- Emory Pass

Desired Condition

1. Where there are concentrations of rare and endemic plant populations, these species are promoted, and provide opportunities for stakeholder engagement and education. See also the Rare and Endemic Plant and Animal Species and Habitats section.

Standards

1. New motorized routes will not be constructed, except for temporary routes. These routes will be closed when no longer needed.
2. The use of non-selective herbicides or herbicides that may have activity on rare and endemic plant species will not occur unless it is to control or eradicate noxious weed species, and other integrated pest management efforts have failed or are unlikely to succeed.

Guidelines

1. Maintenance of existing motorized routes should avoid ground disturbance outside of the existing road prism and associated drainage features.
2. Trailheads and other gathering areas (i.e., parking areas, campsites) should include educational and interpretive signage.
3. See also the Livestock and Non-native Invasive Species sections for certified weed-free materials plan direction

Management Approaches

Outreach and Education

Work with partners to promote public education and appreciation of rare and narrow endemic species.

Seek to strengthen and develop programs to survey, monitor, and collect data on rare and endemic species, especially when basic distribution and species status information is lacking.

Support information sharing, education, and research related to non-native invasive and noxious species through interpretive signage at trailheads and other forest access points alerting users about relevant invasive species and noxious weeds, encouraging public use of weed-free hay and/or pelletized feed and decontamination procedures, and encouraging research.

Identify, document, and correct any management conflicts to the species or their habitat that may be impacting endemic plant species. If herbicide use is necessary, mitigation plans to minimize impacts to rare and endemic species populations will be developed and implemented.

Relationships

Coordinate and collaborate with the New Mexico State Forestry Division, Gila Native Plant Society, botanists and other interested stakeholders in support of the New Mexico Rare Plant Conservation Strategy’s goals and objectives.

Collaborate with universities, state and federal agencies (for example, Western New Mexico University, Forest Service Research and Development, US Geological Survey, New Mexico State Forestry), and other organizations (for example, Natural Heritage New Mexico, Native Plant Society of New Mexico), to obtain, manage, and disseminate data and encourage research on rare and endemic species.

Proposed Research Natural Areas

Background Information

Forest Service research natural areas are designated to permanently protect and maintain natural conditions for the conservation of biological diversity, conducting non-manipulative research and monitoring, and fostering education. They are designated to “maintain a wide spectrum of high quality representative areas that represent the major forms of variability found in forest, shrub land, grassland, alpine, and natural situations that have scientific interest and importance that, in combination, form a national network of ecological areas for research, education, and maintenance of biological diversity” (FSM 4063.02). Included in this RNA network are:

- High-quality examples of widespread ecosystems
- Unique ecosystems or ecological features
- Rare or sensitive species of plants and animals and their habitat (USDA FS RMRS 2016)

Proposals for designation of new or previously proposed RNAs may be made during the forest plan revision process at the forest supervisor’s discretion. The Southwestern Region’s RNA Work Group’s Research Natural Area Process for Forest Plan Revision under the 2012 Planning Rule Provisions (2015) was used by an interdisciplinary team of Gila NF staff to complete this evaluation (see Appendix H in the draft environmental impact statement). The forest supervisor reviewed the evaluation to develop his proposal(s) to the regional forester. Formal RNA establishment is undertaken as a separate site-specific establishment report and NEPA process. The regional forester is the responsible official for coordinating with a research station director on final RNA designation (FSM 4063.04b).

Of the RNAs proposed in the last planning cycle, the forest supervisor proposes to retain the designated Gila River RNA and carry forward existing proposals for RNA designations for Turkey Creek and Rabbit Trap. There is also earlier documented support from station directors and others for these candidate RNAs.

Turkey Creek

The proposed Turkey Creek RNA consists of 1,200 acres within the Gila Wilderness near its southwestern boundary, south of the Turkey Creek hot springs. The area was originally proposed for its geologic features, and to protect riparian and aquatic habitat associated with the Turkey Creek and Skeleton Canyon drainages. Intentions for the establishment record were to exclude the area from livestock grazing and withdraw it from mineral entry. Turkey Creek also fills regionally identified needs for upland vegetation types.

Rabbit Trap

The proposed Rabbit Trap RNA consists of 300 acres in the northeastern Burro Mountains near Saddle Rock. The area has been excluded from livestock grazing since the 1940s. It was originally proposed during the last planning cycle as an example of ecological status and watershed recovery in a landscape that was historically overgrazed and continues to experience grazing impacts. Rabbit Trap proposed RNA fills identified needs for upland vegetation, may serve as an excellent control, and supports Davidson’s cliff carrot, an at-risk species.

A map including both designated and proposed RNAs is included in appendix C of the plan.

Desired Conditions

1. The ecological features and values for which the RNA was recommended are protected and managed. Genetic diversity in recommended research natural areas is preserved and maintained.
2. Recommended research natural areas are maintained in a condition that they are suitable upon any future designation for the observation and study of ecosystems and ecological processes, including succession, and as baseline areas for measuring ecological change due to disturbances or stressors, such as climate change.
3. Recommended research natural area lands are generally natural-appearing. Ecological processes such as plant succession and fire, insect, and disease activity function with limited human influences. Visitor access, use, and management activities maintain the natural features of the recommended research natural area.

Standards

1. Recommended research natural areas shall be withdrawn from mineral entry and mineral leasing upon designation, and mineral materials and locatable minerals extraction shall not be allowed within research natural areas.
2. Removal of special forest products for commercial purposes and personal use (including firewood) shall not be permitted or authorized in the recommended research natural area, unless it meets the research natural area desired conditions and management objectives.
3. To minimize impacts to ecological values, authorization of special-use permits (for example, commercial tours or outfitter-guides) except those in support of approved research or education shall not be authorized or permitted.

Guidelines

1. All management activities should be consistent with the scenic integrity objective of very high within the recommended research natural area.
2. Management measures and controls should be used (such as fencing and controls to prohibit unauthorized cross-country travel) to protect unique features of the recommended research natural area.
3. Research special-use authorizations should limit harm to sensitive resources, unique features, and species within the recommended research natural area.
4. Vegetation management activities should be allowed only when necessary to achieve or maintain the ecological conditions for which the area is recommended for designation as a research natural area.
5. Providing first for human safety, naturally ignited wildfires occurring under fuel moisture and weather conditions that promote characteristic severity should not be suppressed. Those that occur under unfavorable fuel moisture and weather conditions should be suppressed.

6. In proposed research natural areas, fire management activities should be designed and implemented to mimic natural fire processes. When conditions in the vicinity of a research natural area do not support natural fire spread through the recommended research natural area, prescribed fire may be conducted within prescription windows that promote characteristic severity.
7. Fire management activities should protect the resources for which the area was recommended.
8. Collection of rocks should be only for approved scientific purposes and carried out under the appropriate authorization (such as a permit or agreement) to preserve any unique geological formations and to maintain the values for which the area was recommended.

Management Approach

Relationships and Outreach/Education

Coordinate with site stewards, appropriate agencies, partners, and universities regarding scientific opportunities in recommended research natural areas, and to help educate the public about their designated purposes and uses. Signage will be provided to educate the public about the recommended research natural area's purpose, its boundaries, and permitted and prohibited activities.

Utilities Management Area

Background Information

The utilities management area includes special-use authorizations for linear corridors that provide for those private uses of forest lands that are necessary to serve a local, regional, or national public benefit such as reliable electric, natural gas, water, and communication networks. Generation of power from solar and wind energy may also be included in the future. See appendix C for a map that illustrates known utility lines.

Desired Conditions

1. Utility corridors accommodate existing utility facilities and related access for maintenance and repair, and accommodate co-location of new utilities.
2. Utility corridors retain low-growing vegetation, which conforms to the evolving safe operating requirements of the utility and can deviate from the desired range for the individual ERU desired conditions given in chapter 2. Taller-growing vegetation that could interfere with utility clearances does not exist to reduce fire and electrical hazard.

Standard

1. A special-use permit or easement shall authorize uses and corridor width within the utilities management area.

Guidelines

1. Each utility corridor should be developed and used to its greatest potential to reduce the need to develop additional corridors. Where possible, existing corridors should expanded as needed, rather than creating additional corridors.
2. Proper erosion controls should be in place and maintained during repair and maintenance, to minimize soil loss.
3. Any non-native, invasive plant species within these corridors for vegetation should be controlled.

Management Approaches

Existing linear special-use authorizations for transmission lines and pipelines for water and natural gas occur within this management area. Compatible multiple uses are encouraged, including co-location of new communication uses on existing electric transmission structures.

The linear areas within the management area can be up to approximately 1,000 feet wide although local distribution lines may be included in this management area at a lesser corridor width.

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Chapter 4 – Suitability and Estimated Vegetation Management Practices

This chapter describes the suitability of lands for timber production in the Gila NF, estimated vegetation management practices expected to occur over the next two decades, and the corresponding projected timber sale program.

Timber Suitability

National Forest System lands were reserved with the intent of providing goods and services to satisfy public needs over the long term, which includes a sustainable supply of forest products. The National Forest Management Act of 1976 (NFMA) requires the agency to determine the suitability of national forest system lands for timber production. NFMA has specific requirements for timber production suitability analyses in land management plans. These requirements are supported by the 2012 Planning Rule and associated Forest Service directives, which add additional analysis requirements and considerations. Under the 2012 Planning Rule and directives, land management plans now focus on desired conditions (outcomes) rather than the production of goods and services (outputs) to better provide for multiple use on a sustained yield basis, in perpetuity.

Timber harvest may be considered a resource use (timber production) or a tool (an activity to improve or restore healthy forest conditions). As a resource use, the timber production objective is defined as growing, tending, harvesting, and regenerating crops of trees on a regulated basis to produce logs or other products for industrial or consumer use. Under the timber production objective, regular, periodic timber harvest is predictable and supports the achievement and maintenance of non-timber-related desired conditions; it does not require or imply that timber yields be maximized.

Lands may be identified as suited for timber production based on the following criteria:

1. Congress, the Secretary, or the Chief of the Forest Service has not withdrawn it from timber production.
2. The technology to harvest timber without causing irreversible damage is available.
3. There is reasonable assurance that lands can be adequately restocked within five years after final regeneration harvest.
4. The land is a forest (timber) vegetation type.
5. Timber production is compatible with desired conditions or objectives for the land.

Table 4 displays the results of the timber suitability analysis for the Gila NF. The analysis process is described in more detail in the timber, forest and botanical products section of the draft environmental impact statement and appendix C of the same document.

Table 4. Timber production suitability classifications for the Gila National Forest

Land Classification Category	Acres
A. Total area within the administrative boundary of the Gila National Forest	3,392,112*
Area within the administrative boundary that is not National Forest System land (private property or other ownership)	119,972
B. Lands not suited for timber production due to legal or technical reasons	2,589,050
B1. Lands not suited for timber production because it is prohibited	822,995
B2. Lands not suited for timber production because the technology to harvest timber without causing irreversible damage is not available	0
B3. Lands not suited for timber production because there is no reasonable assurance of adequate restocking within 5 years of final regeneration harvest	338,694
B4. Lands not suited for timber production because they are not forested	1,427,361
C. Lands that *may* be suited for timber production (A–B)	683,090
D. Total lands suited for timber production because timber production is compatible with the desired conditions and objectives established by the plan	352,922
E. Lands not suited for timber production because timber production is not compatible with the desired conditions and objectives established by the plan (C – D)	330,168
F. Total lands not suited for timber production (B+E)	2,919,218

*Acreages of National Forest System lands may vary slightly over time due to factors such as resurvey, improved mapping technology and updates to corporate geospatial information systems (GIS) data.

Figure 6 displays this information spatially.

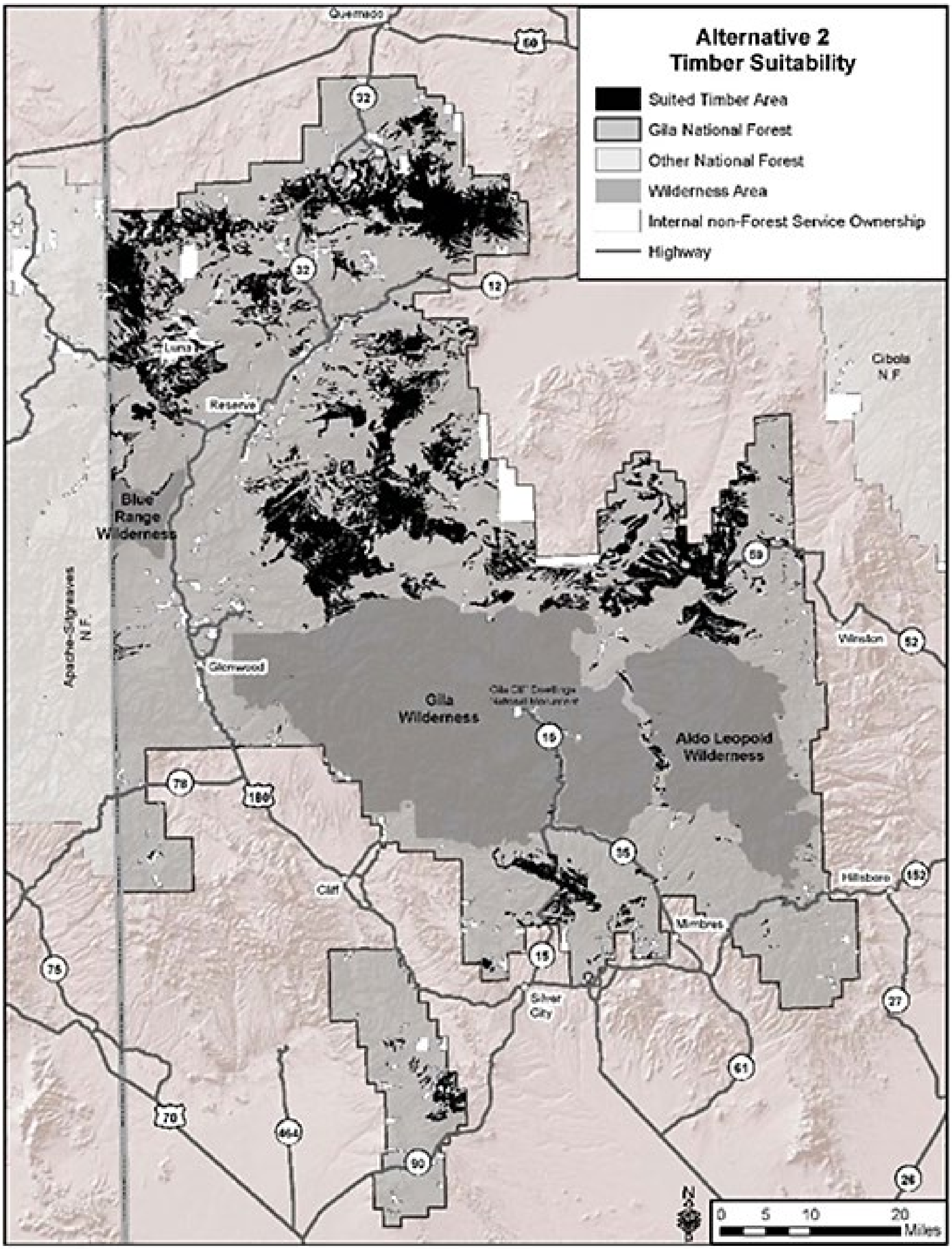

Figure 6. Map of suitable timber base

Estimated Vegetation Management Practices

The estimated vegetation management practices displayed in table 5 were derived from the analysis supporting the draft environmental impact statement. The analysis process is described in more detail in the timber, forest, and botanical products section of the draft environmental impact statement and appendix C of the same document. Acres are estimates based solely on what could be accomplished by the forest using congressionally designated dollars only and recent costs per acre. If budgeted dollars change substantially from the 2007 to 2017 time period, or the agency priorities shift to other program areas, these acre values could change. If partnerships and associated funding make additional treatment possible, acre values will change. Changes are also likely depending on project locations, site-specific conditions, and correspondingly appropriate silvicultural prescriptions.

Table 5. Summary of estimated forest-wide vegetation management practices (in acres) for the Gila NF, annual average per decade

Forest Cover Types/ Vegetation Management Practices	1st Decade	2nd Decade
Ponderosa Pine Treatments		
Regeneration* (Even-aged harvest)	579	327
Thinning (Even-aged intermediate harvest)	1,676	1,726
Selection (Uneven-aged harvest)	6,702	6,905
Wet mixed conifer/spruce-fir Treatments		
Regeneration* (Even-aged harvest)	24	66
Thinning (Even-aged intermediate harvest)	66	57
Selection (Uneven-aged harvest)	263	230
Dry mixed conifer Treatments		
Regeneration* (Even-aged harvest)	529	593
Thinning (Even-aged intermediate harvest)	1,325	1,312
Selection (Uneven-aged harvest)	5,298	5,247
Total Treatments		
Regeneration* (Even-aged harvest)	1,133	986
Thinning (Even-aged Intermediate harvest)	3,067	3,095
Selection (Uneven-aged harvest)	12,263	12,382

Projected Harvest Levels

The sustained yield limit displayed in table 6 is an estimate of the amount of timber that could be sustainably harvested from lands suited for timber production in perpetuity. It represents the maximum volume of timber that could be sold, except under certain circumstances defined by NFMA (16 USC 1600, 36 CFR 219.11(d)(6)). The projected timber sale quantity (PTSQ) and projected wood sale quantity (PWSQ) also displayed in table 6 were calculated based on plan objectives, which are based on what could be accomplished by the forest using congressionally designated dollars only and recent costs per acre. The analysis process is described in more detail in the timber, forest, and botanical products section of the draft environmental impact statement and appendix C of the same document.

If budgeted dollars change substantially from the 2007 to 2017 time period, or agency priorities shift to other programs, these volumes could change. If partnerships and associated funding make additional treatment possible, volumes will change. Changes are also likely depending on project locations, site-specific conditions, and correspondingly appropriate silvicultural prescriptions. Volumes projected here do not include wood products removed by personal use permit. Between 2005 and 2017, permitted personal use volumes of post, poles and stays, dead and down fuelwood, and green fuelwood have averaged 14.4 million cubic feet per decade. This volume is projected to remain relatively stable, but may vary in the future based on the permits purchased by the public. Supply of these products is projected to exceed demand under any reasonably foreseeable scenario.

Table 6. Sustained yield limit, projected timber sale quantity and projected wood sale quantity for the Gila NF

Sustained Yield Limit (SYL)	**583 MMBF, 130 MMCF per decade**					
Timber Products	First Decade			Second Decade		
	MMCF	MMBF	Tons	MMCF	MMBF	Tons
	Volumes other than salvage or sanitation that meet timber product utilization standards					
Lands suitable for timber production						
A1. Sawtimber (industrial softwoods, 9"+)	8	35	115,153	5	24	78,972
A2. Other Products (industrial softwood, 5-9" - roundwood, commonly pulpwood, mostly in the form of fuelwood)	3		22,497	1		15,093
Lands not suitable for timber production						
B1. Sawtimber (9"+)	0.4	2	6,061	0.3	1	4,156
B2. Other Products (5-9")	0.1		1,184	0.1		794
C. **Projected Timber Sale Quantity (PTSQ)** (A1+A2+B1+B2)	11	37	144,894	7	25	99,016
Other Estimated Wood Products	Fuelwood, biomass, and other volumes that do not meet timber product utilization standards					
	MMCF		Tons	MMCF		Tons
D1. Non-industrial softwood fuelwood (5"+)	1		0.3	1		0.2
D2. Hardwood fuelwood (5"+)	0.4		0.2	0.2		0.1
D3. Aspen (5"+)	1		0.1	0.3		0.1
E. **Projected Wood Sale Quantity (PWSQ)** (C+D1+D2+D3)	13		144,895	8		99,016

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Chapter 5 – Monitoring Plan

Introduction

- Plan-level monitoring is composed of two parts: (1) the national forest monitoring plan; and (2) the Regional Forester's Broad-scale Monitoring Strategy. The Regional Forester's Broad-scale Monitoring Strategy will evaluate all the national forest plans in Arizona and New Mexico, and is currently being developed. This chapter describes the Gila NF plan-level monitoring program, which only evaluates the Gila NF plan, but may contribute to the Regional Forester's Broad-scale Monitoring Strategy. Subsections include:
  - **Program Purpose** – explains the intent of plan-level monitoring.
  - **Requirements** – identifies monitoring program content requirements under the 2012 Planning Rule.
  - **Types of Monitoring** – describes types of monitoring that will be used.
  - **Guiding Principles** – identifies the foundational concepts of monitoring program development.
  - **Coordination, Collaboration and Capacity Building** – provides both vision and guidance to promote multiparty monitoring and citizen science.
  - **Prioritization** – identifies monitoring priorities and explains the prioritization process that addresses uncertainties related to budget, collaboration and coordination.
  - **Reporting** – outlines reporting process and timeframes, data management and access.
  - **Monitoring Program** – identifies plan components to be monitored and links those components to monitoring questions and indicators.

Program Purpose

This monitoring program serves two primary purposes: accountability and adaptive management. The desired conditions, objectives, standards and guidelines contained in the plan are commitments forest management makes with stakeholders. The monitoring program provides one mechanism by which management can demonstrate accountability to those commitments, as they are the drivers of plan-level monitoring.

Adaptive management allows management to adjust to changing conditions, and incorporate new science and technology. It is a learning process enabled by monitoring. Without it, the adaptive management process breaks down. This monitoring program must provide enough information for the forest supervisor to determine whether change is needed. The sooner a need for change is identified, the more often a wider suite of management options is available.

In keeping with adaptive management principles, the 2012 Planning Rule establishes plan-level monitoring programs as "other plan content," rather than "plan components." This means that changes to this monitoring program do not require a plan amendment, but can be done with an administrative change. This allows for a more streamlined National Environmental Policy Act (NEPA) process.

Requirements

2012 Planning Rule requires, at a minimum, at least one monitoring question and associated indicator to address the status of:

1. Select watershed conditions;
2. Select ecological conditions;
3. Focal species to assess ecological conditions;
4. Select ecological conditions that contribute to the recovery of at-risk species;
5. Visitor use, visitor satisfaction, and progress toward meeting recreation objectives;
6. Measurable changes related to climate and other stressors;
7. Progress toward desired conditions and objectives, specifically those pertaining to social and economic sustainability and multiple use management; and
8. Effects of management systems so that they do not substantially and permanently impair the productivity of the land.

One or more questions must also be created that address the social, economic, and cultural sustainability of communities. This must be addressed because sustainability is an inherent part of several of the required monitoring items (Sec 32.13f of 1909.12 Planning Handbook).

Monitoring questions are based on one or more plan components, but not every plan component is required to have a corresponding monitoring question. Indicators are variables that can be measured or described periodically to assess trends in conditions relevant to a monitoring question.

Types of Monitoring

This monitoring program recognizes three distinct, interrelated types of monitoring as described by Derr and others[1] and Egan[2]: (1) implementation; (2) effectiveness; and (3) validation monitoring.

Implementation

This type of monitoring addresses accountability by answering the question "**Did we do what we said we would do?"** It tracks project and activity compliance with standards and guidelines, as well as progress toward and achievement of objectives.

Effectiveness

Effectiveness monitoring provides the information that fuels the adaptive management process. It seeks to answer questions like: **"Did our actions have the outcomes we intended or expected?" "Are we moving toward desired conditions?"** Effectiveness monitoring information and data can also be used for compliance and validation monitoring.

Validation

Validation monitoring serves to test our understanding and application of the science the plan is based on. It seeks to answer questions like: "**Why did our actions have the outcomes they did?" "Did our assumptions prove to be valid?"** This type of monitoring helps determine whether our basic thinking about relationships between desired conditions and management is sound. Often the forest relies on research institution partners for this type of monitoring.

Guiding Principles

The forest supervisor has provided the following principles to guide the development and implementation of this monitoring program.

- **Relevancy** – there must be a compelling reason to ask each monitoring question. The answer must speak directly to whether there is a need to change the plan, and help discern the difference between an issue with plan direction and an issue with plan implementation. This is important because there is not the capacity to chase questions and answers that will not substantially inform decision making.
- **Capacity** – given the reality that the Forest Service is continually being asked to do more with less faster, the monitoring program should not create additional, unnecessary burdens on the workforce; nor should it create public expectations, or the appearance of commitments to do work that the forest staff cannot keep.
- **Efficiency** – if monitoring data collected for other reasons or purposes can be used to answer plan-level monitoring questions, or if plan-level monitoring data can inform monitoring required for other reasons or purposes, it should. The monitoring program capitalizes on opportunities to avoid duplication of efforts. However, plan-level monitoring questions should not be engineered around existing data sources. First and foremost, the question needs to be relevant.

Coordination, Collaboration and Capacity Building

Working together across professional disciplines, walks of life, differences in perspectives, and jurisdictional boundaries can create efficiencies, promote shared learning, leverage expertise, build trust and increase capacity. Collaboration and coordination in the development and implementation of this monitoring program is a prerequisite for success.

Reporting

There is a reporting requirement associated with plan-level monitoring programs that facilitates adaptive management, accountability, and transparency. Handbook direction requires the forest to prepare a formal monitoring report using the data collected as part of this monitoring program every two years following the record of decision. However, not every monitoring item need be in every biennial report. The entire report may be postponed for one year if there are urgent, extenuating circumstances that require a delay. The report must indicate whether a change to the plan, management activities, or the monitoring program are warranted, or if a new assessment is warranted, based on new information. This report will be available to the public.

Monitoring and Evaluation Program

This section identifies the plan components to be monitored, associated monitoring questions and indicators, monitoring type, priority ranking, reporting frequency, and what 2012 Planning Rule requirements each question addresses. All of the monitoring questions identified in this chapter are important, which is why they are included. However, to address the "capacity" guiding principle, a small subset of questions are identified as the "minimum required monitoring" with the remaining questions being addressed when and if time, funding, priority of work, and stakeholder support allow.

The questions and indicators established to meet the minimum requirements of the 2012 Planning Rule are presented in table 7 followed by a brief rationale describing why these questions and indicators were selected. Data sources, analysis methodologies and other information can be found in the Monitoring and Evaluation Program Implementation Guide. The implementation guide is a stand-alone document that is not part of the draft revised forest plan so that it can be updated easily as science and technology change. It is currently under development.

Some abbreviations are necessary in the table. For desired conditions where scale is applicable, the first letter of the scale name followed by the letter S is used. For example, the watershed-scale would be abbreviated as “WS” and the fine-scale would be “FS.” This is followed by a similar abbreviation of component type, followed by corresponding number. For example, LS-DC1a refers to the landscape-scale desired condition number 1a. Planning rule requirements are identified by using the numbering system presented in the requirements section of this document.

References

[1] Derr, T., A. Moote, M. Savage, M. Schumann, J. Abrams, L. McCarthy, and K. Lowe. 2005. Developing a multiparty monitoring plan. Collaborative Forest Restoration Program handbook series. Ecological Restoration Institute. Northern Arizona University, Flagstaff, AZ.

[2] Egan, D. 2013. Monitoring: Organizing a Landscape-Scale Forest Restoration Multi-Party Monitoring Program. Ecological Restoration Institute. Northern Arizona University, Flagstaff, AZ.

Minimum Required Monitoring

Table 7. Minimum required monitoring

Question Identifier	Resource Area or Activity	Plan Component(s)	Question	Indicator(s)	Planning Rule Requirement(s)	Reporting Frequency (years)
1	Watersheds	DC1a-g, S2, G1	How are watershed condition indicators and the overall condition score changing over time?	From the Watershed Condition Classification: Indicator scores Watershed scores	1	2–6 years depending on data availability relative to reporting cycles
2	All Upland ERUs	LS-DC1-3 and 6-8, G1	How is seral state diversity changing over time?	Seral state proportion	2,4	2–6 years depending on data availability
	Wildlife, Fish, and Plants	DC1-5 and 11				
	Rare and Endemic Plant and Animal Species and Habitats	DC2				
3	Riparian and Aquatic Ecosystems	Watershed scale DC 1, 2, 3a, b, & e	What is the status of the focal species common black hawk within riparian cottonwood or sycamore galleries?	Occupancy and Distribution of Common Black Hawk	3	2–6 years depending on data availability relative to reporting cycles
	All Upland ERUs	Landscape scale DC 1,2,4,6, & 8	What is the status of the focal species Mexican spotted owl in Ponderosa Pine Forest, Mixed Conifer with Aspen, and Mixed Conifer-Frequent Fire ERUs?	Protected Activity Center (PAC) occupancy status of Mexican Spotted Owl		
4	Wildlife, Fish, and Plants	DC1-4 and 7-9	What is the status of native fish populations?	Native fish density (for select stream reaches) Native vs. Non-native ratio per select stream reach	4	2 years
	Rare and Endemic Plant and Animal Species and Habitats	DC2				
5	Sustainable Recreation	DC2	The Gila NF receives how many annual visitors and what types of recreational use are they engaging in?	Survey Responses Visitation numbers Amount and types of use at trails and facilities	5	1–5 years depending upon survey method

Question Identifier	Resource Area or Activity	Plan Component(s)	Question	Indicator(s)	Planning Rule Requirement(s)	Reporting Frequency (years)
6	Sustainable Recreation	DC1, DC2	How satisfied are visitors with available trails, facilities and access to recreation opportunities?	Survey Responses	5	1–5 years, depending upon survey methods
7	Sustainable Recreation	DC1, DC2	Is satisfactory progress being made toward attaining recreation program objectives from the Forest Plan?		5	
8	All Upland ERUs	LS-DC7	How are precipitation and temperature patterns changing over time?	Monthly precipitation and temperature Seasonal precipitation and temperature Annual precipitation and temperature	6	2 years
	Soils	DC1a				
	Watersheds	DC1b				
	Riparian and Aquatic Ecosystems	DC3a				
9	All Upland ERUs	LS-DC7	How is the frequency, duration and severity of drought changing over time?	Drought indices	6	2 years
	Soils	DC1a				
	Watersheds	DC1b				
	Riparian and Aquatic Ecosystems	DC3a				
	Livestock Grazing	DC1				
10	Watersheds	DC1b	How is streamflow changing over time?	Median monthly streamflow Median annual streamflow Low flow periods (base flow) Flood Frequency	4, 6	2 years
	Riparian and Aquatic Ecosystems	WS-DC3a, d and g				
	Water Uses	DC1				
	Wildlife, Fish and Plants	DC4,5,7, and 9				
	Rare and Endemic Plant and Animal Species and Habitats	DC2				
11	All Upland ERUs	LS-DC number varies by ERU	How is the probability of high severity fire changing across the forest over time?	Forest-wide probability distribution Probability distribution by watershed	6	2 years
	Wildland Fire and Fuels Management	DC5a-c				

Question Identifier	Resource Area or Activity	Plan Component(s)	Question	Indicator(s)	Planning Rule Requirement(s)	Reporting Frequency (years)
	Watersheds	WS-DC1c		Probability distribution in wildland-urban interface		
	Wildland-urban interface	DC1				
12	Timber, Forest and Botanical Products	DC2a-f, G2	What economic contributions are forest-based recreation, wood and botanical products, grazing, wildlife, and fisheries making to local communities and how are they changing over time?	Program outputs/contributions	5, 7*	2–6 years
	Livestock Grazing	DC1		Dollars per program area		
	Recreation	DC2		Inflation adjusted gross receipts by source		
	Wildlife, Fish, and Plants	DC5, 10		Number of user days related to hunting, fishing, and wildlife viewing, and economic contribution to local counties		
	Community Relationships	DC2				
13	All Upland ERUs	LS-DC4	How is the extent of bare soil changing over time?	Percent	8	2–6 years depending on data availability
	Soils	DC1c-d, S1, S3		Patch size		
	Watersheds	DC1a-b and g, DC2		Fetch		
14	All	All	What are the opportunities and challenges presented by the design criteria included in the Forest Plan?	Narrative of annual “after-action” or “lessons learned” review(s) of select projects/activities with new NEPA for compliance with plan	NA	2

* This also fulfills the requirement for monitoring social and economic resources not specifically identified as required plan monitoring in the 2012 Planning Rule.

Rationale for Minimum Required Monitoring Questions and Indicators

Question 1 and associated indicators were selected to meet the 2012 Planning Rule requirement for select watershed conditions because the watershed condition classification is already revisited periodically as part of other forest management business. It has the advantage of utilizing all available information and allows the field experience and professional judgement of specialists to substitute for quantitative data where it is lacking, thus eliminating the requirement for additional data collection and processing.

Question 2 and its associated indicator was selected to meet the 2012 Planning Rule requirement for select ecological conditions for three reasons: (1) it inherently includes several important ecological conditions that support both at-risk species and common species; (2) it uses a regionally supported monitoring indicator; and (3) it supports risk-based management. The ecological characteristics it includes for forests and woodlands are dominant life form, such as grass/forb, shrub or tree; tree canopy cover class; tree size class. Most financial advisors will tell their clients that diversity distributes risk. Using a similar analogy, seral state diversity can be viewed as ecological "insurance." This indicator can be evaluated with regionally provided datasets that are updated periodically and might also be supported by project-level data collected as part of contract administration.

Question 3 and its associated indicators were selected to meet the 2012 Planning Rule requirement for focal species. The rationale and supporting information for choosing common black hawk and Mexican spotted owl as focal species is provided in appendix D.

Question 4 and its associated indicators were selected to meet the 2012 Planning Rule requirement for select ecological conditions that contribute to the recovery of at-risk species pertaining mainly to native fish species, because there are existing permanent monitoring sites along several streams or rivers that are already tracking the indicators, as well as a multitude of research and fisheries work that captures this across the forest. The advantage being, there is a long temporal dataset that can continue giving us trend data that will continue to be monitored with little to no additional data collection or processing.

Questions 5–7 and their associated indicators were selected to meet the 2012 Planning Rule requirement for visitor use, visitor satisfaction, and progress toward meeting recreation objectives. This work is already conducted as part of other Forest Service business and requires no additional data collection or processing.

Questions 8–10 and their associated indicators were selected to meet the 2012 Planning Rule requirements for climate change and other stressors. Climate, including drought cycles, defines what is sustainable in terms of the forest's ecology and its contributions to the socioeconomic conditions. Given that climate change is hydrologic change, and temperature is expected to facilitate those changes, these questions are critical for understanding where forest management is in relationship to what the climate will sustain. Data requirements are fulfilled by other entities and although somewhat limited in spatial coverage, data are readily available and require relatively minimal processing.

Question 11 and its associated indicators were also selected to meet the 2012 Planning Rule requirements for climate change and other stressors because stand-replacement fire is currently the most immediate threat to some ecosystems, many watersheds, and the wildland-urban interface. Products are already available from the Rocky Mountain Research Station; annual or biennial updates are relatively inexpensive and can be produced by the research station or the Fire Modeling Institute. This will also help management better understand the effectiveness and longevity of treatments.

Question 12 and its associated indicators were selected to meet the 2012 Planning Rule requirements for progress toward desired conditions and objectives for socioeconomic contributions and multiple uses. Data are collected by other entities and are readily available. Some data processing and interpretation are involved, but many stakeholders, including county governments have expressed the importance of monitoring trends in economic contributions provided by the Gila NF.

Question 13 and its associated indicators were selected to meet the 2012 Planning Rule requirements related to the effects of management systems so that they do not substantially and permanently impair the productivity of the land. The extent of bare soil is a powerful indicator of ecologic and hydrologic function, the sustainability of ecosystem service delivery, and the long-term productivity of the land. It is a regionally approved monitoring indicator. While soil quality monitoring is a more comprehensive and holistic approach to assessing the productivity of the land, it is time consuming and requires a substantial amount of specialized expertise. Remote sensing technologies with the power to provide information on the extent of bare soil at scales relevant to plan-level monitoring have not yet been put into practice; the Gila NF—in partnership with others—is actively pursuing such technologies. Until such time those technologies are available, on-the-ground monitoring will be required.

Question 14 is intended to identify opportunities and challenges presented by the design criteria included in the Forest Plan, and ensure that the Forest Plan is being implemented consistently across the forest. This process would include an annual review of new NEPA analysis for select projects for compliance with the plan. The format would be an “after-action” or “lessons learned” review with the narrative or summary included in the biennial monitoring report.

Potential Additional Monitoring As Capacity Allows

Table 8, table 9, and table 10 contain additional monitoring that would be undertaken when and if time, funding, priority of work, and stakeholder support allow. These questions are organized in three tables around three themes. These themes are:

Relationships and collaboration monitoring questions and indicators are specific to plan direction for inclusive stakeholder engagement, and collaborative education or information sharing. It also includes plan direction related to management issues for which forest staff have identified social license as an important variable. Social license refers to the public's acceptance of management practices. These questions and indicators are included in this section because relationships and trust are viewed as critical to the long-term sustainability of these practices.

Social, cultural and economic sustainability monitoring questions and indicators are specific to plan direction regarding the benefits people derive from the forest. However, there are implications or inferences for social, cultural, and economic sustainability that may be obtained from ecological validation monitoring.

Ecological sustainability monitoring questions and indicators are specific to plan direction for vegetation communities, watersheds, wildlife, fish, and plants.

The rationale driving questions and indicators, data sources, analysis methodologies and other information can be found in the Monitoring and Evaluation Program Implementation Guide. The implementation guide is a stand-alone document that is not part of the Forest Plan so that it can be updated easily as science and technology change. Again, some abbreviations are necessary in the tables. For desired conditions where scale is applicable, the first letter of the scale name followed by the letter S is used. For example, the watershed-scale would be abbreviated as "WS" and the fine-scale would be "FS." This is followed by a similar abbreviation of component type, followed by corresponding number. For example, LS-DC1a refers to the landscape-scale desired condition number 1a. Planning rule requirements are identified by using the numbering system presented in the requirements section of this document.

Prioritization

Also included in the tables is a priority ranking. All of the potential additional monitoring questions were run through a prioritization process designed to address the "capacity" guiding principle. Capacity it likely to fluctuate from year to year given budget, staffing, and partner and stakeholder interest. A prioritization process, with will-defined criteria enable management to ask all the questions that should be asked—not all that could be asked—and be transparent about what is likely to the focus with limited resources. This transparency also communicates to potential partners, volunteers, and the research community where the gaps might be and how their interest and expertise might align, or not, with the monitoring need. It is important to note that this prioritization process is not intended to be inflexible. It is expected that the process and ranking scores can and will be re-evaluated periodically to reflect new science or other information, and changing conditions.

Priority rank for each question is based on the total score for each question using the following criteria. Higher scores correspond to higher priority ranking.

1. **Legal or regulatory compliance**: the question will provide information required by law or regulation. This includes the regulatory requirements of the 2012 Planning Rule.

   a. Ranking terms: question provides information relevant to more than one legal or regulatory requirement (value = 10); question provides information relevant to a legal or regulatory requirement (8); question does not provide information relevant to any legal or regulatory requirements (value = 0).

2. **Regional monitoring indicators:** the question uses monitoring indicators approved by the Regional Leadership Team. These indicators include regional technical support for implementation.

   a. Ranking terms: yes (value = 6); no (value = 0).

3. **Stakeholder input:** the question reflects stakeholder input.

   a. Ranking terms: yes (value = 6); no (value=0).

4. **Difficulty:** the question can be answered with little time investment in data collection and analysis.

   a. Ranking terms: data or information already acquired by others or as part of other forest business (value=6); data collection and analysis require relatively little time investment (value=3); data collection and analysis require substantial time investment (value=0).

5. **Multiple benefits:** the question informs the management of more than one resource or topic area.

   a. Ranking terms: one point assigned for each resource or topic area.

6. **Vulnerability of the resource:** the question may provide detection of climate-facilitated vegetation shifts and impacts to sensitive resource uses. Vulnerability is determined by science-based vulnerability assessments such as the one provided by Triepke[1] or Hand and others[2]. The information gap criteria below applies to those resources not specifically addressed in a science-based vulnerability assessment.

   a. Ranking terms: The question provides information directly relevant to vegetation shifts or vulnerable resource uses (value = 6); Indirect (value = 3); the question does not provide information directly tied to vegetation shifts and vulnerable resource uses (value = 0).

7. **Information gap:** the question provides information about resources where information gaps identified in scientific literature, or Forest Service or other agencies' publications, may compromise management's ability to provide for the sustainability of those resources.

   a. Ranking terms: high (value = 6); moderate (value=3); no (value = 0).

[1] Triepke, F.J. 2016. Assessing the climate change vulnerability of ecosystem types of the southwestern U.S. Dissertation, University of New Mexico. Albuquerque, NM. 166 pp.

[2] Hand, M.S., H. Eichman, F.J. Triepke, and D. Jaworski. 2018. Socioeconomic vulnerability to ecological changes to national forests and grasslands in the Southwest. General Technical Report RMRS-GTR-383. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 100 pp.

Table 8. Relationships and collaboration (potential additional monitoring as capacity allows)

Question No.	Resource Area or Activity	Plan Component(s)	Question	Indicator(s)	Prioritization Points
14	Community Relationships	DC1, DC4-6, G1	What efforts has the forest made to engage the public, including youth and historically under-represented communities in project activity planning, implementation and monitoring?	Engagement type by project phase Method to reach youth and under-represented communities Percent of projects per year	10
		G1	How has stakeholder input helped shape project planning and design?	Narrative including: Modifications to draft proposed actions Response to comments summary	
		DC1, DC4-6, G1	What is the public response to engagement opportunities? Are youth and members of under-represented communities engaging?	Number of participants per project Demographics	
15	Community Relationships	DC4	How have partners and volunteers added to capacity?	Number of volunteers and partners Dollars per year Hours per year	13
16	Community Relationships	DC1, DC5	What efforts has the forest made to support collaborative education programs?	Number of events per year by topic Hours per year by topic	15
	Air Quality	DC3			
	Wildland Fire and Fuels Management	DC4a-c			
	Non-native Invasive Species	DC2			

Question No.	Resource Area or Activity	Plan Component(s)	Question	Indicator(s)	Prioritization Points
16 (cont.)	Sustainable Recreation	DC4-5			
	Cultural Resources	DC4-5			
	Community Relationships	DC1, DC5	What has the public response been to collaborative education opportunities? Are youth and under-represented communities engaging?	Number of participants per event Demographics	
	Air Quality	DC3			
	Wildland Fire and Fuels Management	DC4a-c			
	Non-native Invasive Species	DC2			
	Sustainable Recreation	DC4-5			
	Cultural Resources	DC4-5			
17	All of the previous	All of the previous	How have interactions during project planning, implementation, monitoring, collaborative education, partnerships and volunteerism impacted stakeholder's views of their relationships with forest staff?	Survey responses	
18	All Upland ERUs	S5	When a project involves the use of herbicide, are all plan standards being followed, including public notification and disclosure?	Brief narrative and supporting documentation demonstrating compliance	16
	Non-native Invasive Species	S5, S7-14, S17			
19	Wildland-urban interface	O1	What progress has been made toward wildland-urban interface objectives?	Acres	21

Question No.	Resource Area or Activity	Plan Component(s)	Question	Indicator(s)	Prioritization Points
20	Wildland-urban interface	DC1-4, G1	What progress had been made toward desired conditions for the wildland-urban interface?	Modeled fire behavior Narrative from wildland-urban interface work reporting % fuels reduction from Brown's transects	10
21	Air Quality	DC1, DC2	How is ambient air quality in the Catron, Luna, Grant, and Sierra airsheds changing over time?	Time meeting regulatory requirements per year	21
	Air Quality	DC1, DC4	How are visibility conditions in Class I and Class II areas on the forest changing over time?	Annual haze index	
22	Air Quality	DC1-2, DC4, S1, G1-3	What is the relationship between fire management in the Gila NF, and the trends identified in questions 6 and 7?	Time meeting regulatory requirements Haze Index Acres burned by fire type per year	8
	Wildland Fire and Fuels Management	DC5a-c, G1			
24	Livestock Grazing	O1			31

Table 9. Social, cultural and economic sustainability (potential additional monitoring as capacity allows)

Question No.	Resource Area or Activity	Plan Component(s)	Question	Indicator(s)	Prioritization Points
23	Timber, Forest and Botanical Products	DC2a-f, G2	Have wood and other botanical products been made available to people?	Amount and type of product by opportunity type	21
24	Roads	DC1	What is the status and trend of roads in terms of access and condition?	Miles of roads open Miles of roads built and decommissioned Miles of roads maintained by maintenance level	13
25	Trails Motorized Trails	DC1 DC1	What is the status and trend of trails in terms of access and condition?	Number of miles of trail maintained to standard Number of miles of trail improved to standard	20
26	Wilderness	DC1, DC2, DC3, DC4, DC5,DC6,DC7	Is the forest managing congressionally designated wilderness to standard for preservation or improvement of wilderness character?	Trend in wilderness character from established baseline	18
27	Recommended Wilderness	DC1, DC2	Is the forest managing recommended wilderness for the preservation or improvement of wilderness characteristics?	Trend in wilderness characteristics from the level possessed at the time of recommendation	15
28	Eligible, Suitable or Designated Wild and Scenic Rivers	DC1, DC2, DC3	Is the forest managing eligible, suitable, and designated wild and scenic rivers to protect their free-flowing nature and their identified outstandingly remarkable values?	Rivers continue to be free-flowing Outstandingly remarkable values continue to be present at the levels when identified	15
29	Livestock Grazing	DC1, S6	What are the economic impacts of drought on livestock grazing?	Dollars per year	7
30	Livestock Grazing	DC1, S6	How is the availability of water for livestock changing over time?	Percent of water sources dry Duration of dry period	10
31	Livestock Grazing	DC1, S6	How is rangeland productivity changing over time?	Pounds per acre	10
32	Watershed Water Uses	DC2-3 DC1	What is the trend in groundwater availability?	Number of wells requiring deepening Change in duration of spring discharge	14

Question No.	Resource Area or Activity	Plan Component(s)	Question	Indicator(s)	Prioritization Points
33	Cultural Resources	DC3	Are cultural resources evaluated for their eligibility to the National Register?	Number of previously unevaluated sites that have been evaluated or nominated to the National Register	21
34	Cultural Resources	DC4	Does the public have opportunities to learn about and appreciate cultural resources?	Number of interpretive/scientific research efforts	4
35	Cultural Resources	DC5	Does the public have opportunities to participate in the identification, protection, and preservation of cultural resources?	Number of hours of volunteer service within the Heritage Program stewardship opportunities	4
36	Cultural Resources	DC6	Are historic and prehistoric sites preserved and managed for their cultural importance?	Number of direct physical protection measures	21

Table 10. Ecological sustainability (potential additional monitoring as capacity allows)

Question No.	Resource Area or Activity	Plan Component(s)	Question(s)	Indicator(s)	Prioritization Points
37	Identified Upland ERUs	O1	What progress has been made toward accomplishing objectives?	Acres Number of projects	18
	Soils				
	Watersheds				
	Riparian and Aquatic Ecosystems				
38	All	All Guidelines	If the letter of the guideline is not followed, why and what was done to meet the intent?	Narrative including Supporting documentation Alternative design criteria	15
39	All Upland ERUs		How often are the specific conditions for which exceptions to the standard(s) are provided present? How were those conditions demonstrated? What, if any, additional design criteria were deemed necessary to mitigate potential negative environmental consequences?	Number of instances per year Analysis method(s) used to identify presence/absence of excepted conditions Description of additional design criteria	15
40	Soil	DC1c, S2	Have recommended BMPs been implemented? Are recommended BMPs effective?	For select projects/activities: Percent compliance Percent effective	21
	Water Quality	DC1			
	Watershed	DC1a, S1			
	Riparian and Aquatic Ecosystems	S3			
	Livestock Grazing	S1a			
	Timber, Forest and Botanical Products	S3, S5			
	Wildland Fire and Fuels Management	S2, S5			
	Developed Recreation	S3			
	Roads	S2			
	Facilities	S1			
	Trails (all)	S1			

Question No.	Resource Area or Activity	Plan Component(s)	Question(s)	Indicator(s)	Prioritization Points
41	Water Quality	DC1	What is the trend in water quality?	Miles of 303(d) listing by impairment	24
	Soils	DC1c			
	Watersheds	DC1a			
	Riparian and Aquatic Ecosystems	WS-DC1, WS-DC3a, WS-DC4		Other standard, accepted quantitative assessments based on parameter being measured.	
42	All Upland ERUs	LS-DC1-3 and 6-8, G1	How is the distribution of seral states changing over time?	Fetch	8
	Wildlife, Fish, and Plants	DC1-5 and 11			
43	All Upland ERUs	LS-DC number varies by ERU	How is patch size and distribution changing over time?	Mean patch size Median patch size	8
	Wildlife, Fish, and Plants	DC1-5 and 11		Patch size range Fetch	
44	All Upland ERUs	LS DC1-3 and 6-8	How is the species composition of vegetation communities changing over time?	Similarity to site potential at select sites	22
	Soils	DC1a			
	Wildlife, Fish, and Plants	DC1-5 and 11			
	Rare and Endemic Plant and Animal Species and Habitats	DC2			
45	All Upland ERUs	LS-DC1 and 7-8	What is the status of functional group representation within vegetation communities and how is it changing over time?	Functional group representation at select sites	9
	Soils	DC1			
	Wildlife, Fish, and Plants	DC1-5 and 11			
46	Riparian and Aquatic Ecosystems	FS-DC3	What progress has been made to inventory, characterize and assess the condition of riparian areas, including those associated with springs and seeps?	Narrative	7

Question No.	Resource Area or Activity	Plan Component(s)	Question(s)	Indicator(s)	Prioritization Points
47	Riparian and Aquatic Ecosystems	WS-DCe-f, FS-DC1c-d	How is riparian vegetation community composition changing over time?	For select RMZs: Similarity to site potential	27
	Wildlife, Fish, and Plants	DC4 and 7-9		Species richness Age class diversity (woody species)	
	Rare and Endemic Plant and Animal Species and Habitats	DC2		Functional group representation	
48	Riparian and Aquatic Ecosystems	FS-DC1a-f, S1, G5	Are riparian areas in, or trending toward proper functioning condition?	For select RMZs: Qualitative assessments Quantitative assessments	25
	Watersheds	WS-DC1e			
	Wildlife, Fish, and Plants	DC4 and 7-9			
	Rare and Endemic Plant and Animal Species and Habitats	DC2			
49	All Upland ERUs	LS-DC5	How are carbon stocks changing over time?	Tons per acre by ERU	8
	Soils	DC1e			

Question No.	Resource Area or Activity	Plan Component(s)	Question(s)	Indicator(s)	Prioritization Points
50	All Upland ERUs	Scale and DC number vary by ERU	How is coarse woody debris changing over time?	Tons per acre by ERU (Forest-wide)	22
	Soils	DC1c		Tons per acre pre- and post-treatment	
	Wildland Fire and Fuels Management	DC5, G3		Tons per acre for select RMZs	
	Timber, Forest and Botanical Products	DC1a-c, G3			
	Riparian and Aquatic Ecosystems	WS-DC3a and e, FS-DC1e			
	Wildlife, Fish, and Plants	DC6-8			
	Rare and Endemic Plant and Animal Species and Habitats	DC2			
51	All Upland ERUS	Scale and DC number vary by ERU	How is snag density changing over time?	Snag density by ERU Snag density for select RMZs	13
	Riparian and Aquatic Ecosystems	WS-DC3a and e, FS-DC1e			
	Wildlife, Fish, and Plants	DC1-6			
	Rare and Endemic Plant and Animal Species and Habitats	DC2			

Question No.	Resource Area or Activity	Plan Component(s)	Question(s)	Indicator(s)	Prioritization Points
52	Spruce-Fir Forest, Mixed Conifer with Aspen, Mixed Conifer-Frequent Fire, Ponderosa Pine Forest and Ponderosa Pine-Evergreen Oak ERUs	Landscape-scale DCs for old growth, DC number varies by ERU	What is the status and trend of large trees in timber types?	Number of trees in large to very large size classes	18
	Wildlife, Fish, and Plants	DC1-6			
	Rare and Endemic Plant and Animal Species and Habitats	DC2			
53	Soils	DC1, O1	How is soil quality changing over time in response to management?	For select projects: Soil quality monitoring	9
	Watershed	DC1g			
	Riparian and Aquatic Ecosystems	DC2			
54	Upland Ecological Response Units	DC2	How are soil temperature patterns changing over time?	At select sites	11
	Soils	DC1		Monthly or seasonal soil temperature	
55	Upland Ecological Response Units	DC2	How are soil moisture patterns changing over time?	At select sites	8
	Soils	DC1		Monthly or seasonal soil moisture	

Question No.	Resource Area or Activity	Plan Component(s)	Question(s)	Indicator(s)	Prioritization Points
56	Grassland ERUS	LS-DC2 and 3	How is the productivity of grasslands changing over time?	Pounds per acre	12
	Wildlife, Fish, and Plants	DC1-6 and 11			
	Rare and Endemic Plant and Animal Species and Habitats	DC2			
57	Watersheds	DC1b, DC2-3	How is natural groundwater discharge to springs, seeps and wetlands changing?	Change in duration of groundwater discharge to springs, seeps and wetlands	16
	Riparian and Aquatic Ecosystems	WS-DC1-2, WS-DC3a-b and f-g, WS-DC4, FS-DC2			
	Wildlife, Fish, and Plants	DC4,5, and 7			
	Rare and Endemic Plant and Animal Species and Habitats	DC2			
58	All Upland ERUs	LS-DC1, LS-DC7	How are insect infections and disease outbreaks changing over time?	Aerial detection survey	26
	Watersheds	DC1c			
59	All Upland ERUs	LS-DC1, LS-DC7	What is the trend in tree mortality?	Percent mortality all causes	18
	Watersheds	DC1c			
	Wildlife, Fish and Plants	DC6			
60	All Upland ERUs	LS-DC1, LS-DC7	What is the status and trend in natural tree regeneration?	Number of trees in seedling/sapling size classes	10
61	All Upland ERUs	LS-DC number varies by ERU	What is the trend in fire rotation?	Median fire rotation Mean fire rotation Rotation distribution	6
	Wildland Fire and Fuels Management	DC5			
	Watersheds	DC1c			

Question No.	Resource Area or Activity	Plan Component(s)	Question(s)	Indicator(s)	Prioritization Points
62	All Upland ERUs	LS-DC number varies by ERU	What is the trend in fire frequency?	Median fire frequency Mean fire frequency Frequency distribution	12
	Wildland Fire and Fuels Management	DC5			
	Watersheds	WS-DC1c			
63	All Upland ERUs	LS-DC number varies by ERU	What is the trend in fire severity?	Percent severity by ERU	18
	Wildland Fire and Fuels Management	DC5a-c			
	Watersheds	WS-DC1c			
64	Wildland Fire and Fuels Management	DC3, DC5a-c	What is the trend in fire weather conditions?	Trend in 97.5 percentile fire weather conditions	5
	Wildland-urban interface	DC1-5			
65	Wildland Fire and Fuels Management	DC5	What is the trend of natural ignitions?	Number of natural ignitions detected per year	4
66	Wildland Fire and Fuels Management	DC1-3, DC5a-c	What is the trend in natural ignitions managed under a protection objective (suppression)?	Percent of natural ignitions	5
	Wildland-urban interface	DC1-5			
67	Wildland Fire and Fuels Management	DC6, S4	What measures are being taken during fire incidents to prevent the introduction or spread of invasive, noxious species, and diseases?	Measures taken Percent of incidents	6
	Non-native Invasive Species	DC1, S1			
	Wildlife, Fish and Plants	G6			

Question No.	Resource Area or Activity	Plan Component(s)	Question(s)	Indicator(s)	Prioritization Points
68	Non-native Invasive Species	DC1, S5, S16	What is the status and trend of invasive and noxious plant species?	Species present Abundance Distribution	14
	All Upland ERUs	DC1			
	Watersheds	DC1c			
	Riparian and Aquatic Ecosystems	DC2			
	Wildlife, Fish and Plants	DC1, DC7			
69	All Upland ERUs	LS-DC7-8	How are monitored conditions different in identified refugial areas compared to the forest as a whole?	Depends on other ecological sustainability monitoring questions	15
	Wildlife, Fish and Plants	DC4			
	Rare and Endemic Plant and Animal Species	DC2			
70	Rare and Endemic Plant and Animal Species	DC1-2	What is the status and trend of rare plants across the forest?	Species abundance and distribution Habitat and life history requirements Responses to management	13
71	Wildlife, Fish and Plants	DC5	What is the status and trend of listed species populations across the forest?	Recovery plan monitoring Section 7 monitoring	21

Appendix A – Consistency with Plan Components

As required by the National Forest Management Act, all projects and activities authorized by the Forest Service must be consistent with the plan (16 U.S.C. 1604(i)). Projects and activities cover all actions under 16 U.S.C. 1604(i). A project or activity must be consistent with the plan by being consistent with applicable plan components.

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

Ensuring Project or Activity Consistency with the Plan—where a proposed project or activity would not be consistent with a plan component the responsible official has the following options per the 2012 Planning Rule (36 CFR 219.15(c)):

1. To modify the proposed project or activity to make it consistent with the applicable plan components;
2. To reject the proposal or terminate the project or activity;
3. To amend the plan so that the project or activity will be consistent with the plan as amended; or
4. To 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

The following paragraphs describe how a project or activity is consistent with plan components per the 2012 Planning Rule (36 CFR 219.15(d)), and the requirements for documenting consistency.

<u>Determining Consistency with Desired Conditions, Objectives, and Goals</u>

A project is consistent with plan desired conditions, objectives, or goals if the project:

1. Maintains or makes progress toward attaining one or more plan desired conditions, objectives, or goals applicable to the project;
2. Has no effect or only a negligible adverse effect on the maintenance or attainment of applicable desired conditions, objectives, or goals;
3. Does not foreclose the opportunity to maintain or achieve any of the applicable desired conditions, objectives, or goals 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
4. Maintains or makes progress toward attaining one or more of the plan's desired conditions, objectives, or goals, 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, objectives, or goals, 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 NEPA documentation applies and there is no project decision document, the finding and explanation should be in the project record.

Determining Project Consistency with 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[1]. The line officer can make a single finding of consistency with all applicable standards, rather than there needing to be individual findings.

Determining Project Consistency with 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:

1. The project or activity is designed exactly in accord with the guideline, or
2. 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).

Determining Project Consistency with Suitability of Land Determinations

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:

1. The project or activity is a use for which the area is specifically identified in the plan as suitable, or
2. 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 with bullets 1 or 2 above.

[1] For timber projects, there should positive findings for meeting the timber standards and guidelines because the 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 NEPA analysis describes the effects to soils, watershed, etc., there must be a finding that these resources will not be "irreversibly damaged."

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Appendix B – Proposed and Possible Management Practices

Introduction

This appendix describes proposed and possible management practices that may take place in the Gila National Forest at the project or activity level during the plan implementation period to help maintain, achieve or move toward the desired conditions described in the plan. These practices are not intended to be all-inclusive, nor should they be viewed as decisions or commitments. They are simply projections of what actions may take place in the future. A plan amendment is not required to change or modify any of these proposed practices; instead, they can be updated at any time through an administrative correction of the plan.

Relationships

The plan revision process has brought new energy and possibilities for strengthening existing and forging new productive relationships with other Federal and State agency personnel, State and local government, non-governmental organizations, the research community and local communities and individuals. These relationships are important to Gila NF decision makers and staff and contribute significantly to the well-being of the forest and its resources. The following are practices for growing relationships and building trust:

- Continue the forest plan revision model for public engagement and collaboration
- Look for opportunities to work collaboratively with diverse partners to move toward desired conditions and mutual objectives.
- Engage in collaborative conservation education programs
- Encourage and support scientific research on the forest
- Provide meaningful opportunities for volunteers

Restoration

Integrated ecological and watershed restoration activities are a management emphasis. Plan objectives serve to communicate where, in general, restoration projects are likely to occur. Estimated vegetation management practices also provide general information about the products that are likely to be made available to people as part of restoration efforts.

Mechanical thinning treatments to move toward desired conditions for vegetation communities, fire regimes and watersheds. Methods include timber harvest, mastication, and plucking. A variety of silvicultural prescriptions may be employed depending on site-specific stand conditions.

Prescribed fire will continue to be a primary restoration tool. It includes burning of activity-generated slash.

Naturally ignited wildfires will be managed to move toward desired conditions when weather and fuel conditions allow and the necessary resources are available to do so. Naturally ignited wildfires that are not likely to facilitate movement toward desired conditions will be suppressed. All human-caused wildfires will be suppressed.

Air quality information will be provided to the public in a timely manner using a variety of methods. Smoke sensitive communities, or those likely to be impacted by a particular fire, are identified during the decision making and documentation process for both prescribed and wildfires. The forest welcomes opportunities to partner with local governments to bring an air quality/smoke workshop to local communities in the future.

Science integration into forest-level restoration project planning and prioritization will be an ongoing process. Many new and emerging analytical methodologies and products are available and may provide decision makers with valuable information that can aid in their prioritization of resources. Providing a science basis that can demonstrate the most effective and efficient use of limited funding may also provide a competitive edge for funding sources. Some of this science may have substantial funding requirements of its own and developing grant proposals to fund such work is likely part of the process.

Refugia mapping and integration into the monitoring plan is another science-integration effort the forest is likely to pursue. Based on stakeholder comment and interest, this work is anticipated to be collaborative in nature and include youth engagement.

Spruce-Fir and Mixed Conifer with Aspen vulnerability strategy development, as described in management approaches for these ERUs, will include both geospatial analysis and interdisciplinary field verification. National Environmental Policy Act (NEPA) analysis may be required should prescribed fire be included in that strategy.

Emergency watershed stabilization assessments and treatments will continue to occur based on individual fire-incident needs.

Watershed restoration projects and activities addressing riparian and aquatic habitat conditions, water quality, soil condition, motorized roads and trails, probability of stand-replacement fire, negative fire effects, poor range conditions and invasive species will be accomplished using a variety of methods, depending on the specific issues needing to be addressed.

Riparian and aquatic ecosystem restoration projects will be part of watershed restoration projects and activities, as well as being integrated into landscape-scale restoration and other projects. Methods used will be based on the site and the specific issues needing to be addressed. If they involve stream channel restoration and/or aquatic passage(s), professional expertise will be sought with natural channel design experience being preferred.

Invasive species inventory, treatment and monitoring activities are expected to be ongoing, with emphasis on Early Detection Rapid Response (EDRR). Seek opportunities to develop and/or improve relationships with other agencies, organizations, volunteers and other stakeholders engaged in this work, including Cooperative Weed Management Areas, New Mexico Department of Agriculture, and Cooperative Extension Service through New Mexico State University. Support information sharing, education and research related to non-native invasive and noxious species through interpretive signage at trailheads and other forest access points to alert uses about relevant invasive species and noxious weeds, encouraging public use of weed-free hay and/or pelletized feed and decontamination procedures and encouraging research.

Herbicide applications are expected to occur as part of invasive species management and to move toward desired conditions for the urban interface, vegetation, and watersheds. In the restoration and urban interface context, herbicide will be used as a tool to manage re-sprouting evergreen oak and alligator juniper, reducing costly, labor-intensive maintenance needs

Reforestation program development and implementation is ongoing. Phasing from development to implementation is expected to occur within the first decade following plan approval.

Wildland-urban Interface

The mechanical thinning, prescribed fire and herbicide activities described under the previous Restoration section are also proposed and probable actions in the urban interface. The particular tool or tools utilized will depend on the specific urban interface context, including human values, fuels and topographic considerations. The forest continues to work with its partners and stakeholders involved in the community wildfire protection plans, to meet the broad intent and goals of those plans and provide products to people.

Wildlife, Fish, Plants

- Coordinate with the New Mexico Department of Game and Fish (NMDGF) and their State Wildlife Action Plans or other plans, U.S. Fish and Wildlife Service (USFWS), sportsman groups, the scientific community, and other stakeholders regarding information, education, and knowledge gaps as they relate to promoting and improving wildlife, fish, and plant resources and management. Maintain strong partnerships between the Forest Service, State and Federal agencies, county and local governments, and nongovernmental organizations to accomplish conservation planning and management toward achieving desired conditions.
- Coordinate with the NMDGF and USFWS regarding listed and native species, reintroductions, introductions, or transplants of listed or native species, control or eradication of non-native species, and the management of sport and native fishes, including the identification of refugia for native fish (that is, native only stream reaches). Work with the USFWS, NMDGF, and other partners to develop conservation measures (for example, public education to reduce human impacts) to prevent listing and to aid to in the recovery and delisting of federally listed species
- Seek to strengthen and develop programs to survey, monitor, and collect data on at-risk, rare, and endemic species, especially when basic distribution and species status information is lacking on the forest. Identify, document, and correct any management conflicts to the species or their habitat. Such efforts could include collaboration and agreements with local universities, State and Federal agencies (for example, New Mexico Game and Fish Department, New Mexico State Forestry Division, U.S. Fish and Wildlife Service), and other nongovernmental organizations.
- Collaborate with other adjacent land ownership to encourage improved landscape connectivity across mixed ownerships where natural systems span multiple administrative boundaries.

Timber and Forest Products

The following activities will continue on the forest. Estimated vegetation management practices included in chapter 4 provide an indication of the amount of timber and fuelwood the forest anticipates providing over the next 20 years.

- Offer wood products for sale
- Provide opportunities for commercial and personal firewood collection. Green and dead firewood areas are designated through the permit guide, which is updated as, needed.
- Sell permits for Christmas trees and botanical products.
- Provide forest products for traditional cultural uses
- The forest continues to improve existing relationships, and build new ones with other federal, state, and local agencies, tribes, private organization and individuals to accomplish restoration work and promote the utilization of forest products that result from restoration activities.

Livestock Grazing

- Grazing of cattle and horses consistent with other desired conditions will be ongoing, as will related monitoring and adaptive management.
- The forest continues to use the streamlined grazing process and follow the guidance criteria.
- Grazing permittees are often delegated responsibility for the maintenance, reconstruction or construction of structural improvements, including costs. The forest continues to provide what assistance it can with its limited Range Betterment monies. The forest seeks opportunities to partner with permittees, the Natural Resource Conservation Service and others to leverage resources and improve management flexibility.
- The forest continues to work with grazing permittees and other interested stakeholders to minimize challenges and maximize opportunities to the extent possible. This includes addressing fire damage to range infrastructure within existing authorities and evaluating grazing permits that are waived back to the forest for opportunities to increase management flexibility. If these allotments can be used as a tool to help increase the options available to permittees during drought years, before or after fire, and when there are conflicts between livestock and wildlife, they may be considered for conversion to forage reserves.
- The forest continues to address unauthorized and excess livestock use within the constraints of law, regulation and policy, while looking for opportunities to engage the New Mexico livestock board to develop and employ more effective methods to address “wild cows.”

Cultural Resources

- Project- and non-project-related cultural resource surveys will continue. The forest is also likely to support archaeological research, provide interpretive programs or other cultural resource events and projects, and monitor priority heritage asset sites.
- Cooperate with local, State, and private agencies, institutions, and local tribes in accomplishing program goals and objectives.
- Consider providing orientation and learning opportunities for Forest Service personnel, permittees, and contractors that instill buy-in around the Section 106 and 110 processes of the National Historic

Preservation Act. Find teaching opportunities to educate personnel on the identification, management, and protection of significant cultural resources.

- Consider developing a database of fire sensitive cultural sites, structures, and other resources and making it available for fire management purposes to facilitate resource protection.
- Seek opportunities to develop, in collaboration with tribes and other interested stakeholders, interpretive and educational exhibits or other media that focuses on the history of the lands managed by the Gila NF, to provide the public with a greater understanding and appreciation of shared history, culture, and traditions.

Tribal Relations

- Develop collaborative proposals and partnerships with Native American tribes to implement projects of mutual benefit and economic development.
- Consider developing and maintaining memoranda of understanding or other agreements to formalize work with American Indian tribes to understand community needs and build respectful, collaborative relationships, to achieve mutually desired conditions.
- Provide training opportunities for Forest Service employees to gain a broader understanding of the unique legal relationship between the federal government and federally recognized tribes and pueblos, American Indian law, customs, traditions, and values.

Recreation

- Develop the Sustainable Recreation Strategy, and implement all of the actions and objectives outlined in strategy.
- Develop partnerships and collaboration with agencies, groups, communities, volunteers, permit holders, and other individuals to increase forest stewardship, ecological awareness, volunteerism, user satisfaction, to promote a sustainable recreation program, and to provide support for local recreation-based economic development. Recognize partners for their roles in providing recreational opportunities when possible.
- Develop interpretive materials to address educational, interpretive, and informational needs of each District, and identify key messages for the Gila NF's diverse ecological, social, and economic resources, the multiple-use sustained yield philosophy, public laws and regulations, shared use ethics, and management strategies.
- Promote established programs and develop new conservation education programs at schools, youth activities, fairs, and volunteer events that help connect people to nature and their public lands, reach underserved populations, and encourage responsible use of natural resources.
- Provide multilingual interpretation in recreation areas popular with non-English-speaking visitors.
- Implement a fee program at some developed campgrounds that do not currently charge a fee, but have been identified by a recreation site and market analysis to warrant, and have been approved by the Forest Leadership Team as a fee site.
- Develop public education opportunities and information about the importance and impacts of scenery. Cooperate with other entities, such as the New Mexico Department of Transportation, tribal and local governments, and commercial and private entities to manage for scenic integrity on and adjacent to the National Forest, including along scenic byways.

- Collaborate with climbing organizations in seasonal surveys and targeted monitoring, closures and collaborative education programs that provide public information on how to minimize impacts to at-risk species (for example, not installing permanent hardware or disrupting life functions of various species).

Trails

- Signing, enforcement, public information, seasonal and special closures, maintenance, construction, and restoration of trails take place as appropriate.
- Trail management priorities are based on providing user safety, preventing erosion, providing appropriate and meaningful recreation opportunities, and accommodating administrative needs.
- Explore options for improving off-highway vehicle opportunities by developing or connecting motorized trails and providing loop opportunities.
- The forest works with partners, user groups, and volunteers to maintain trails, including the Adopt-A-Trail Program.
- Educational techniques (for example, brochures, signs, websites, and social media) should be used to enhance visitor knowledge of proper non-motorized and motorized trail use etiquette.
- Through public education and outreach efforts, the Gila NF will encourage trail users 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.

Roads

- Cooperate with local and county governments, New Mexico Department of Transportation, and Federal Highway Administration on the planning, design, construction, and maintenance of highway corridors.
- Encourage stakeholders to provide specific feedback on the road system after Travel Management implementation, and look for opportunities to resolve issues in an adaptive management approach.
- Work with the New Mexico Department of Game and Fish and New Mexico Department of Transportation to identify any wildlife habitat needs, potential barriers to wildlife movement, and explore ways to mitigate these issues.
- Relocate roads away from floodplains, perennial stream channels, and riparian areas when opportunities and funding allow reducing resource concerns and reoccurring maintenance.
- When developing the proposed action for a NEPA project, consider incorporating any decommissioning of roads within the project area that meet decommissioning priority factors while involving affected stakeholders.
- Look for opportunities to use technology to assist users and stakeholders reporting road condition issues to the forest.

Facilities

- Develop and implement comprehensive preventive maintenance program for buildings and infrastructure to minimize major unplanned repairs or replacements.

- Match the facility inventory with current management needs, including decommissioning and disposing of those facilities that are no longer required.
- Work with the Heritage Program to administer and maintain facilities according to the facility master plan and any developed preservation maintenance plans (historic property plans) for administrative facilities and infrastructure that are historic resources.
- Consider recreational aviation activities and access to airstrips and Forest Service lands for recreational purposes when developing projects for recreation and infrastructure. Encourage volunteers and partners such as the New Mexico Pilots Association and Recreational Aviation Foundation to assist with the maintenance of backcountry airstrips where appropriate.

Lands

- Encourage the protection of existing public access rights and the acquisition of new public access opportunities to forest lands.
- Use land adjustments (for example, exchanges, purchases, donations, sales) to help enhance public access and use, support resource management objectives, consolidate the NFS land base, and reduce administrative problems and costs. Work with local communities to understand their community expansion needs and retain access to NFS land.
- Reduce encroachment and trespass issues along property boundaries using education, partnerships, and law enforcement.

Mineral and Energy Uses

- Administer active mineral operations in accordance with approved plans of operation, conduct NEPA analysis for the activity and require the posting of an adequate reclamation bond to be able to reclaim the area of the identified disturbance, in case needed.
- Coordinate the mineral program with the Mining and Minerals Division of the New Mexico Energy, Minerals, and Natural Resources Department, Mining Environmental Compliance Section of the New Mexico Environment Department, and the Bureau of Land Management.
- Cooperate with the State and other agencies to inventory, mitigate, and rehabilitate hazardous abandoned mines and mined areas.
- To reduce disturbances from human activities and prevent the spread of disease, construct and install bat gates in priority mine entrances used as habitat and shelter for bats, when there are no conflicts with cultural resources.
- Make information on recreational rock collecting and gold prospecting (panning, sluicing, etc.) available to the public.
- Identify and provide suitable locations for the development of common variety mineral resources.
- Identify and select the location of borrow pits to support the needs of this resource, especially facilitating the road system on the forest. Communicate with other governmental agencies to assist one another in obtaining and using the desired product.

Special Uses

- Review of new proposals for various uses. Environmental analysis of approved proposals and issuance of new permits.

- Maintain existing communications sites and complete site management plans for sites with multiple users for cooperation purposes.
- Collaborate with utility companies to ensure access to rights-of-way and infrastructure.
- Authorization of special-use permits for recreation events and outfitting and guiding services are based upon and adjusted by guidance from the results of any current and future capacity studies and taking into consideration administrative capabilities.

Caves

- Develop response plan for white-nose syndrome through continued collaboration with the U.S. Fish and Wildlife Service, Bat Conservation International, New Mexico Department of Game and Fish, the National Speleological Society, and others with interests in conservation management for bat species. Increase awareness of white-nose syndrome and other pathogens at local and regional levels that includes a focus on best management practices for the prevention of outbreaks.
- Prepare cave management plans for all caves, especially those with important resource, educational or recreational values, hazardous conditions, or heavy use.
- Foster the collaboration and exchange of information between governmental agencies, partners, and other stakeholders to address conservation, interpretation and education for cave resources, grottos, and associated species. This includes engaging caving organizations in cave management activities, such as seasonal surveys, inventory, monitoring, mapping, closures, and wildlife-friendly gate development at specific sites

Designated Areas

- Work closely with the Federal Highway Administration, New Mexico Department of Transportation, local communities, scenic byway advisory committees, and other interested groups to promote and improve services and interpretive opportunities along national scenic byways.
- Encourage partners and volunteers to assist in the planning, development, maintenance, and management of the Continental Divide National Scenic Trail, where appropriate and as consistent with the CDNST Comprehensive Plan.
- Sections of the Continental Divide National Scenic Trail may be restored or realigned to better align with law, regulation, and policy, to improve access to safe water sources, improve scenic viewing opportunities, and provide for better quality non-motorized recreation experiences.
- Work with volunteer groups, partners, local governments, and adjacent landowners to maintain national recreation trail corridors, to maintain the condition and character of the surrounding landscape and reduce use conflicts.
- Coordinate with site stewards, appropriate agencies, partners, and universities regarding scientific opportunities in research natural areas and to help educate the public about their designated purposes
- Undertake stewardship actions and wilderness character monitoring efforts to work toward having all wilderness areas managed to at least a minimum standard as defined by the current wilderness performance reporting measures.

- Wilderness managers will 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.
- Partnerships and collaboration with stakeholders will help to build a volunteer base for wilderness stewardship, including recruiting and training volunteer wilderness rangers.
- Collaborate with the Federal Aviation Administration, airport administrations, air tour operators, military and government agencies, and other aircraft operators to minimize disturbances caused by aircraft over designated wilderness areas of the Gila NF. Encourage aircraft operators to adhere to the Federal Aviation Administration's Notice to Airmen regarding minimum altitudes over wilderness.
- Management of recommended wilderness in the Gila NF will be guided by the legal mandate that the forest protect and enhance the wilderness characteristics that the area possessed at the time of recommendation.
- Eligible wild and scenic rivers will be managed to preserve their free-flowing nature and the outstandingly remarkable values that determined their eligibility until a suitability study is completed to determine if they should be recommended to Congress for designation.
- Correct minor cartographic errors within inventoried roadless areas as opportunities and authorities are available.

Monitoring, Adaptive Management, and Capacity Building

The forest will implement the monitoring plan and fulfill associated reporting requirements. The information generated by the monitoring plan will inform the adaptive management process. As part of implementing the monitoring plan, the forest will engage partners, volunteers and the research community.

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Appendix C – Maps

Designated wilderness and inventoried roadless areas

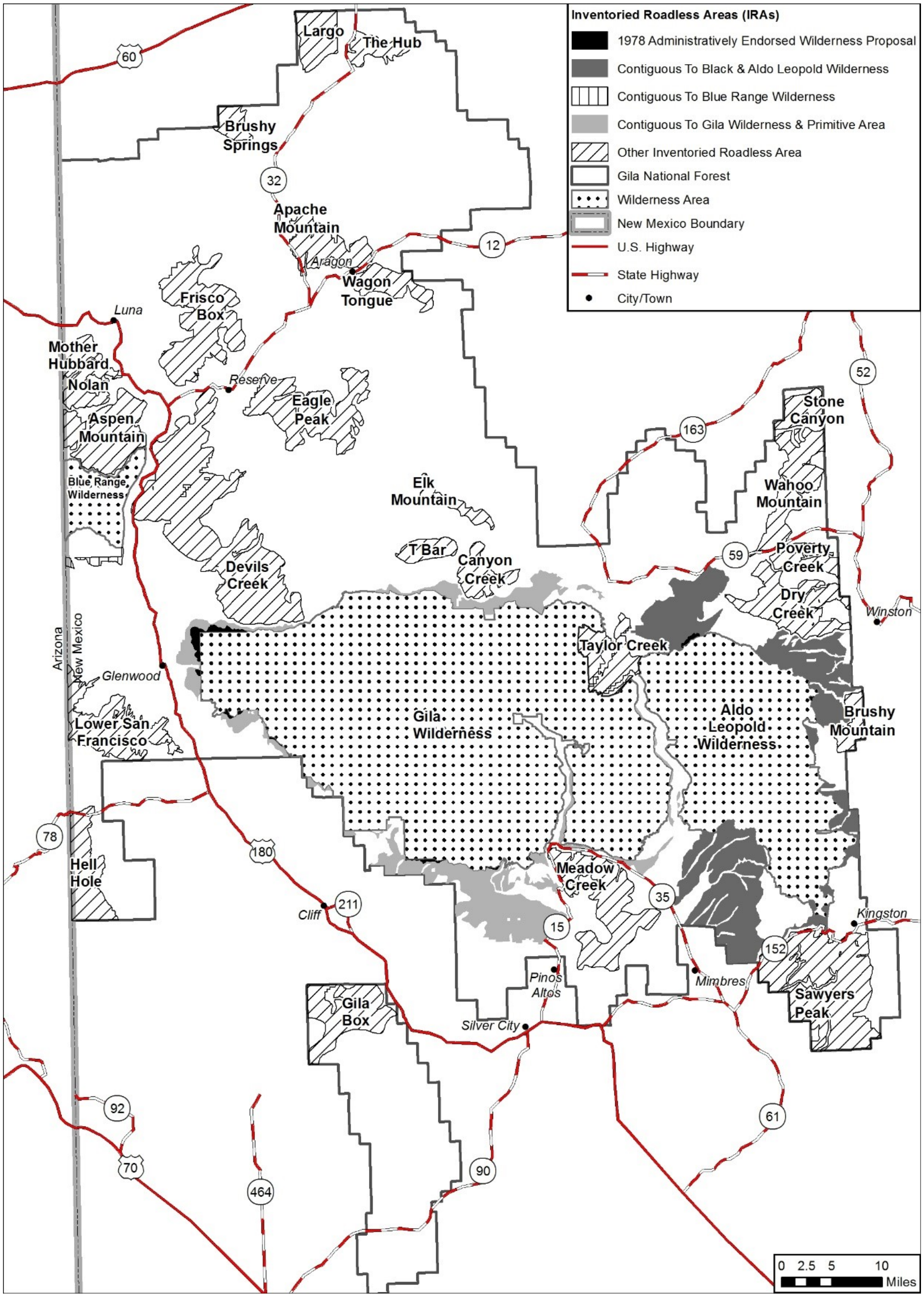

Figure 7. Designated wilderness and inventoried roadless areas, Gila National Forest

Wilderness study areas

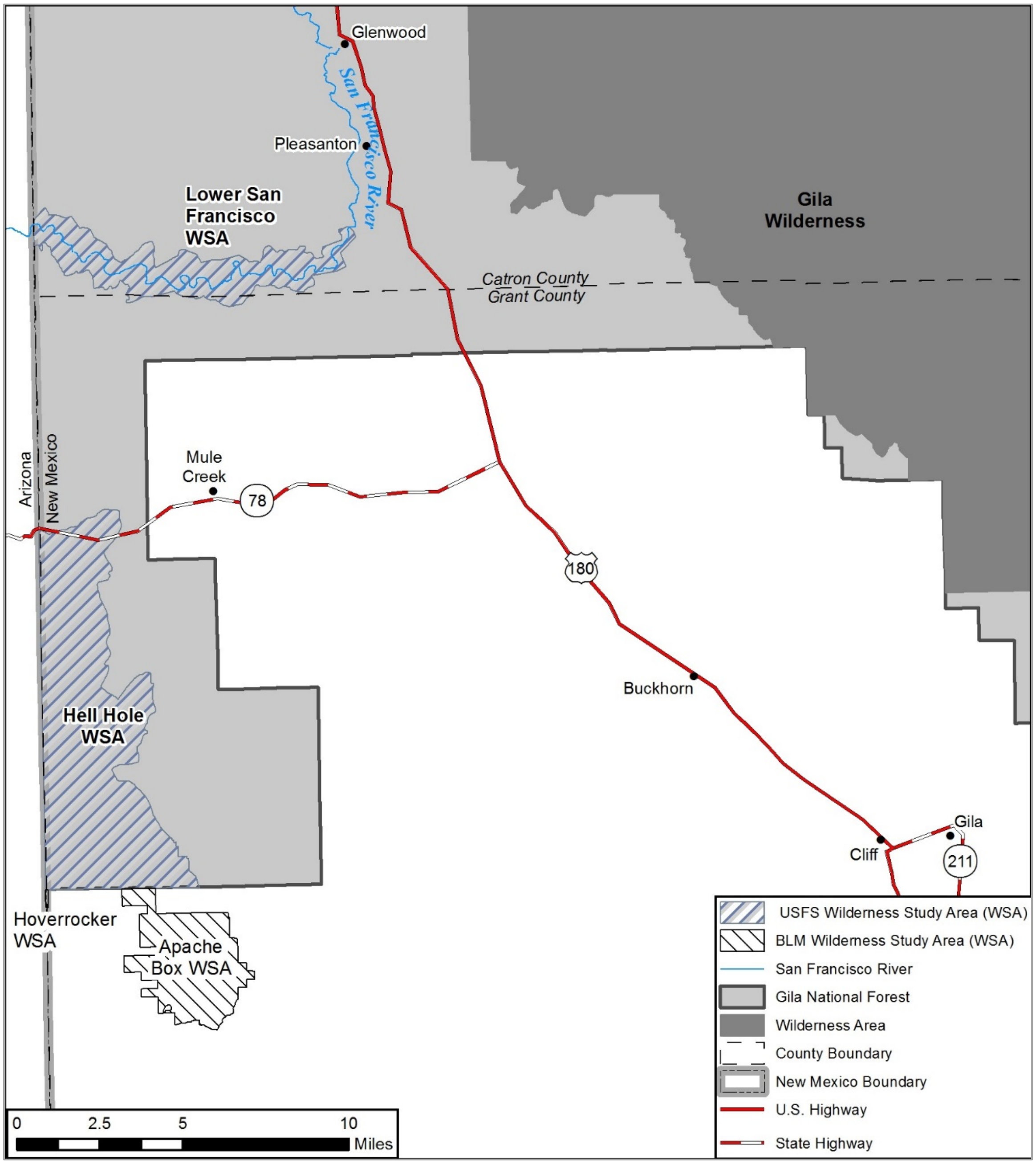

Figure 8. Wilderness study areas, Gila National Forest

Recommended wilderness

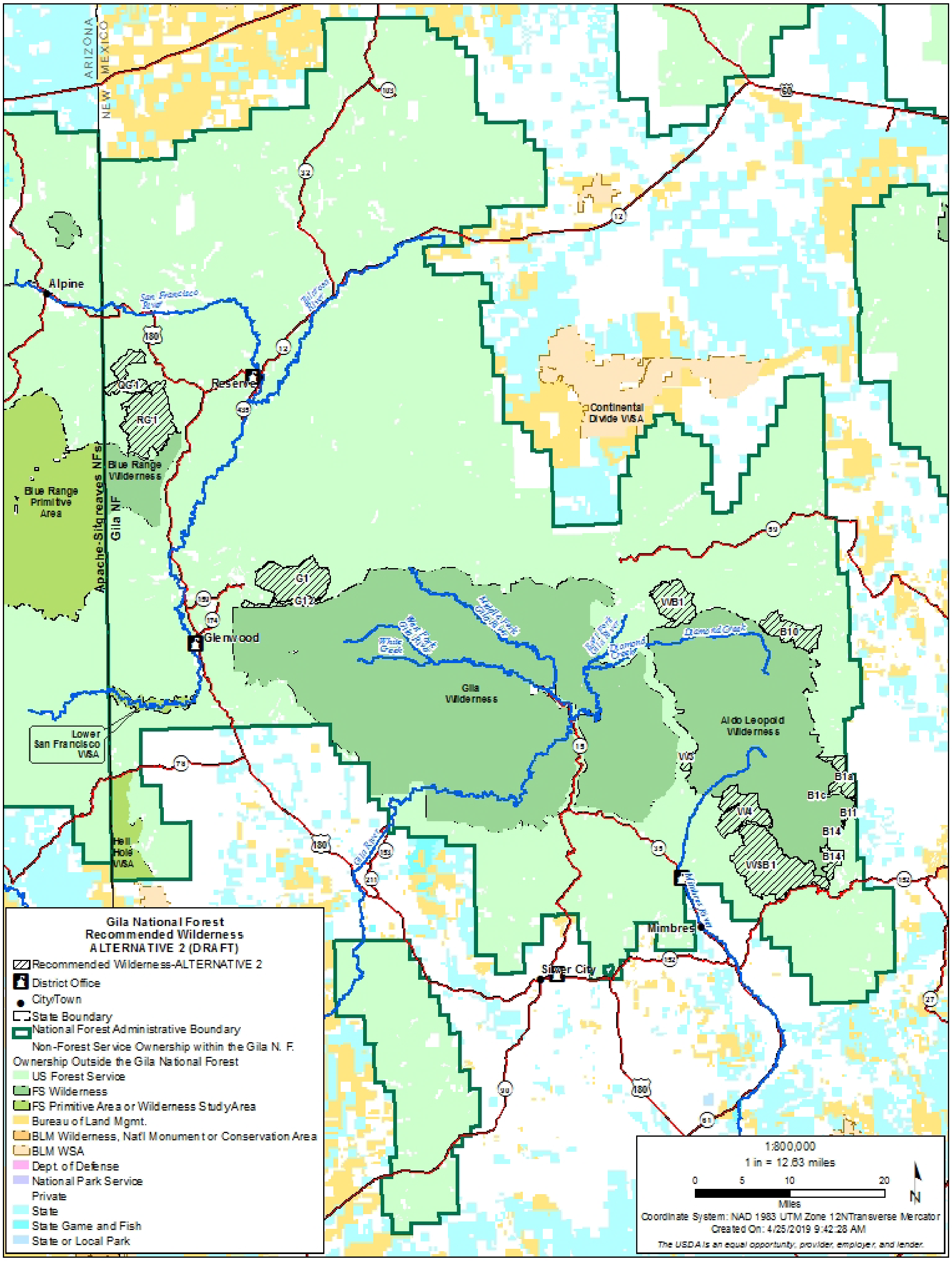

Figure 9. Recommended wilderness, Gila National Forest

Designated and proposed research natural areas

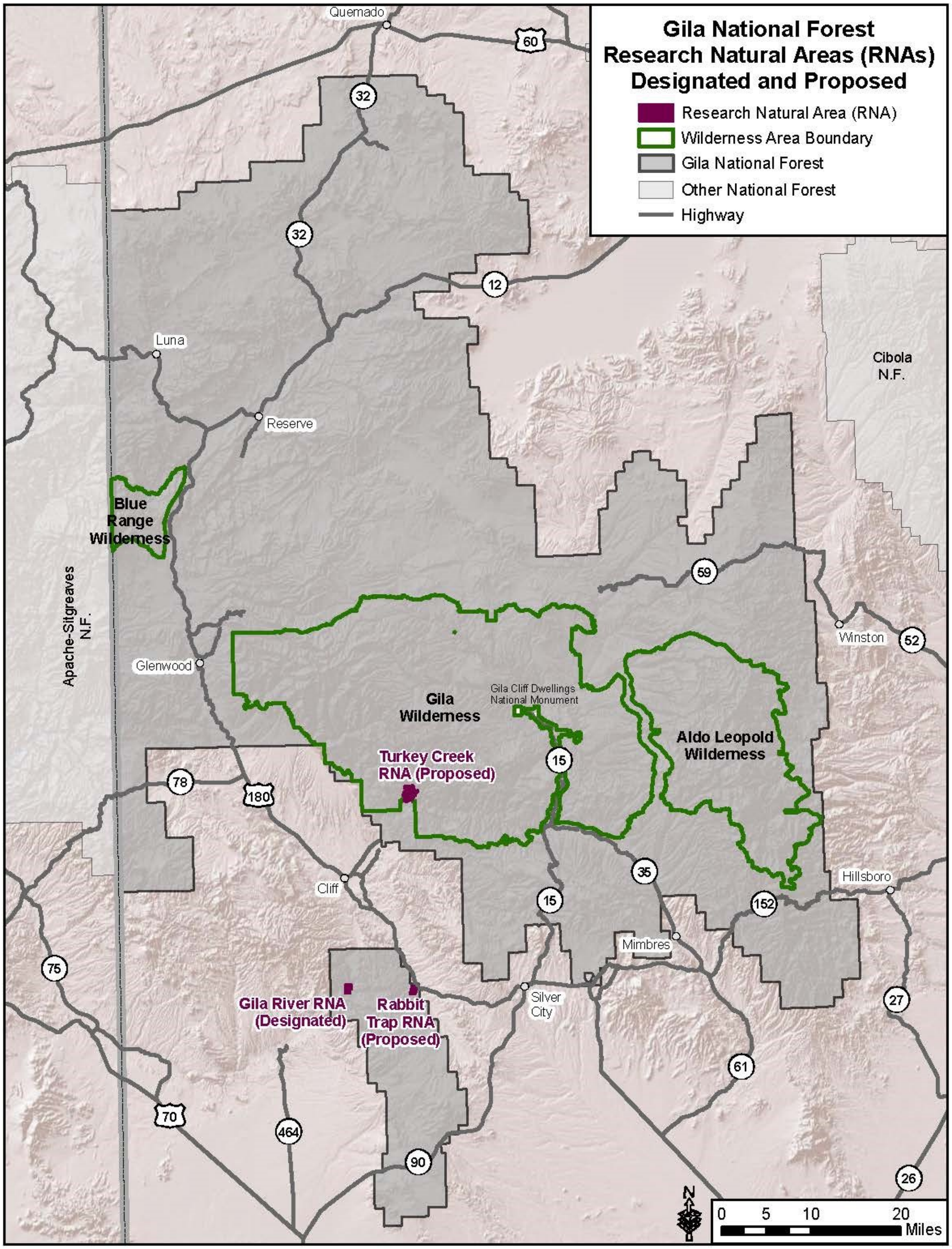

Figure 10. Designated and proposed research natural areas, Gila National Forest

Continental Divide National Scenic Trail and national recreation trails

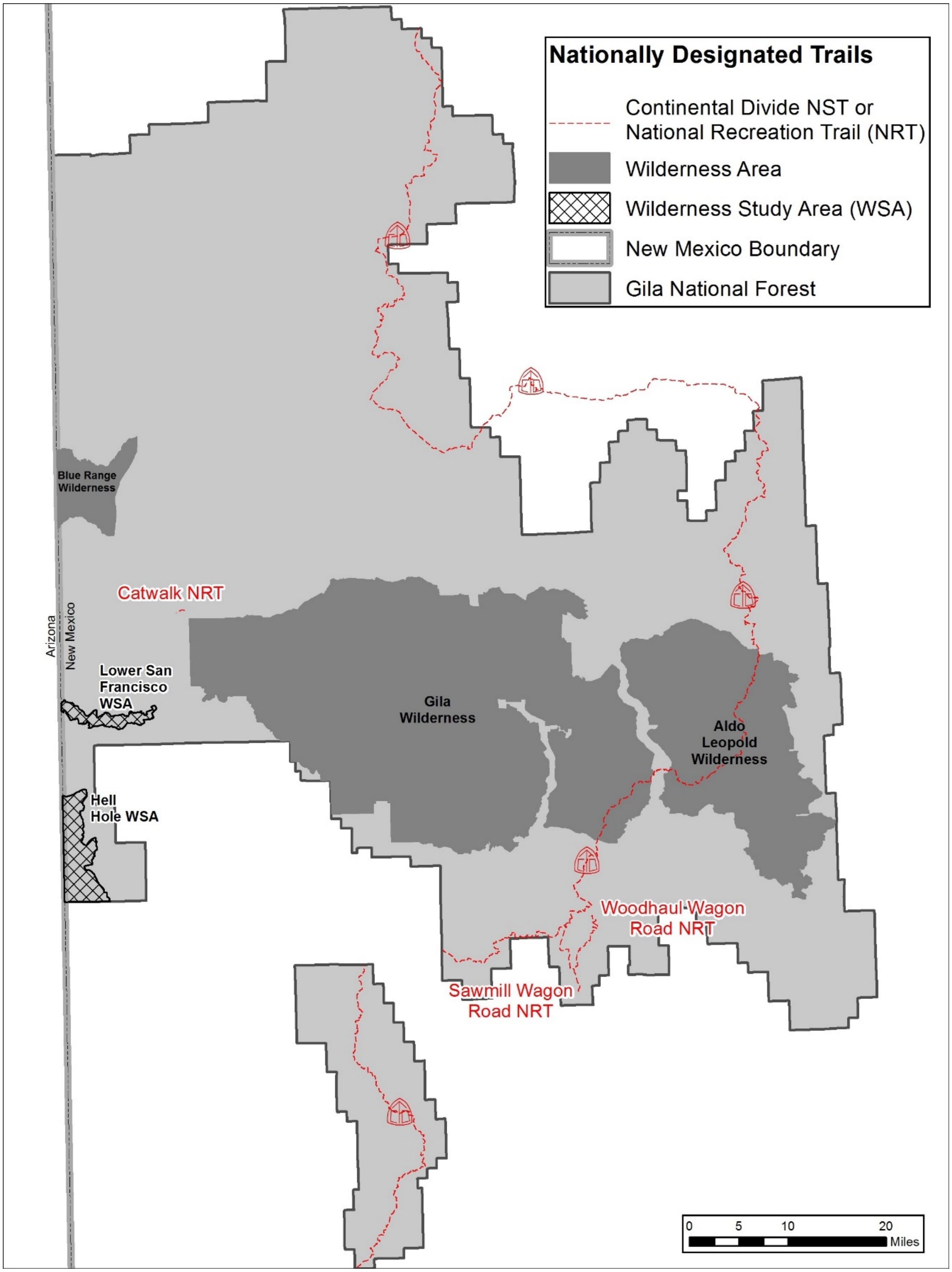

Figure 11. Continental Divide National Scenic Trail and national recreation trails, Gila National Forest

National scenic byways

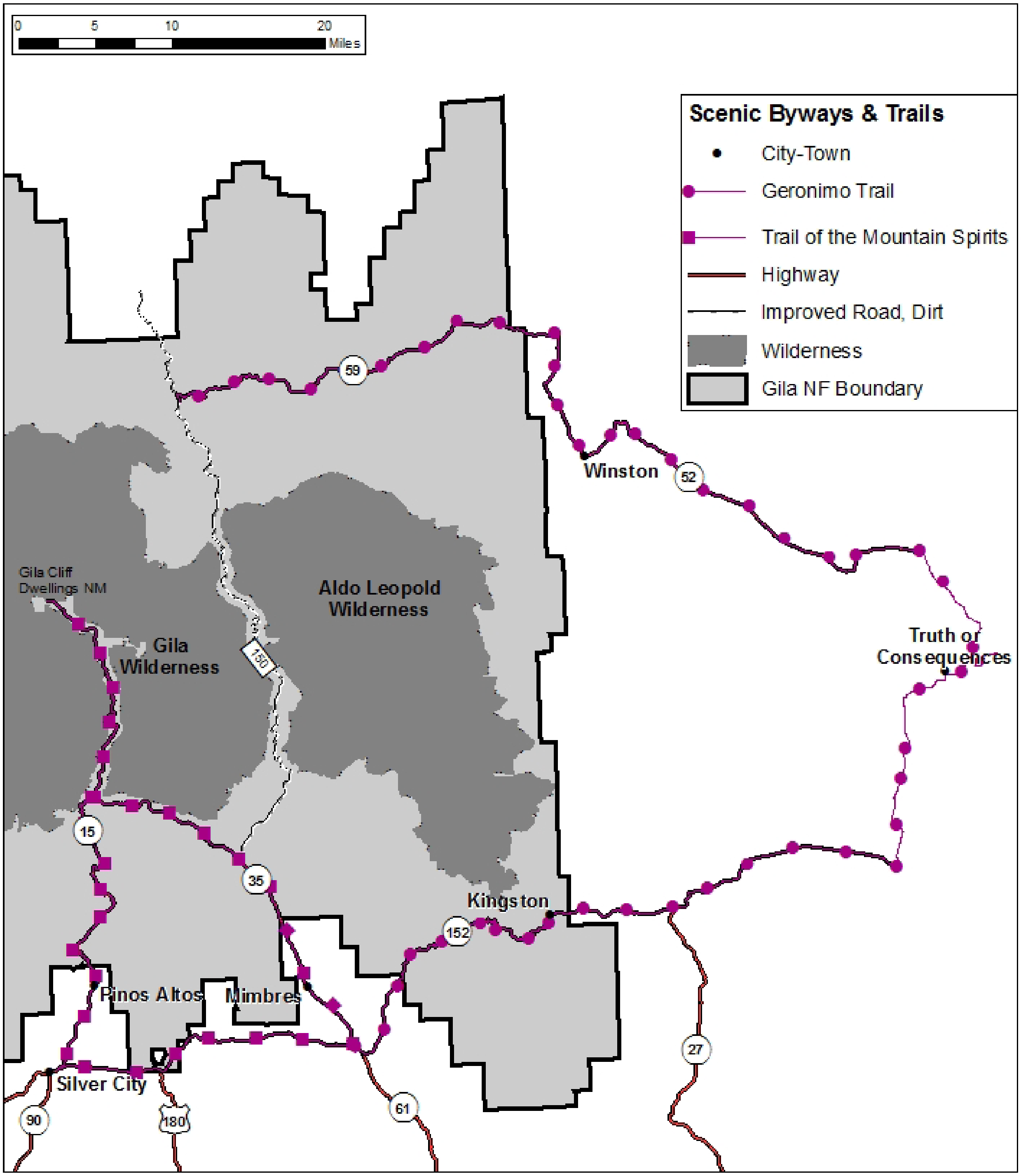

Figure 12. National scenic byways, Gila National Forest and vicinity

Eligible wild and scenic rivers

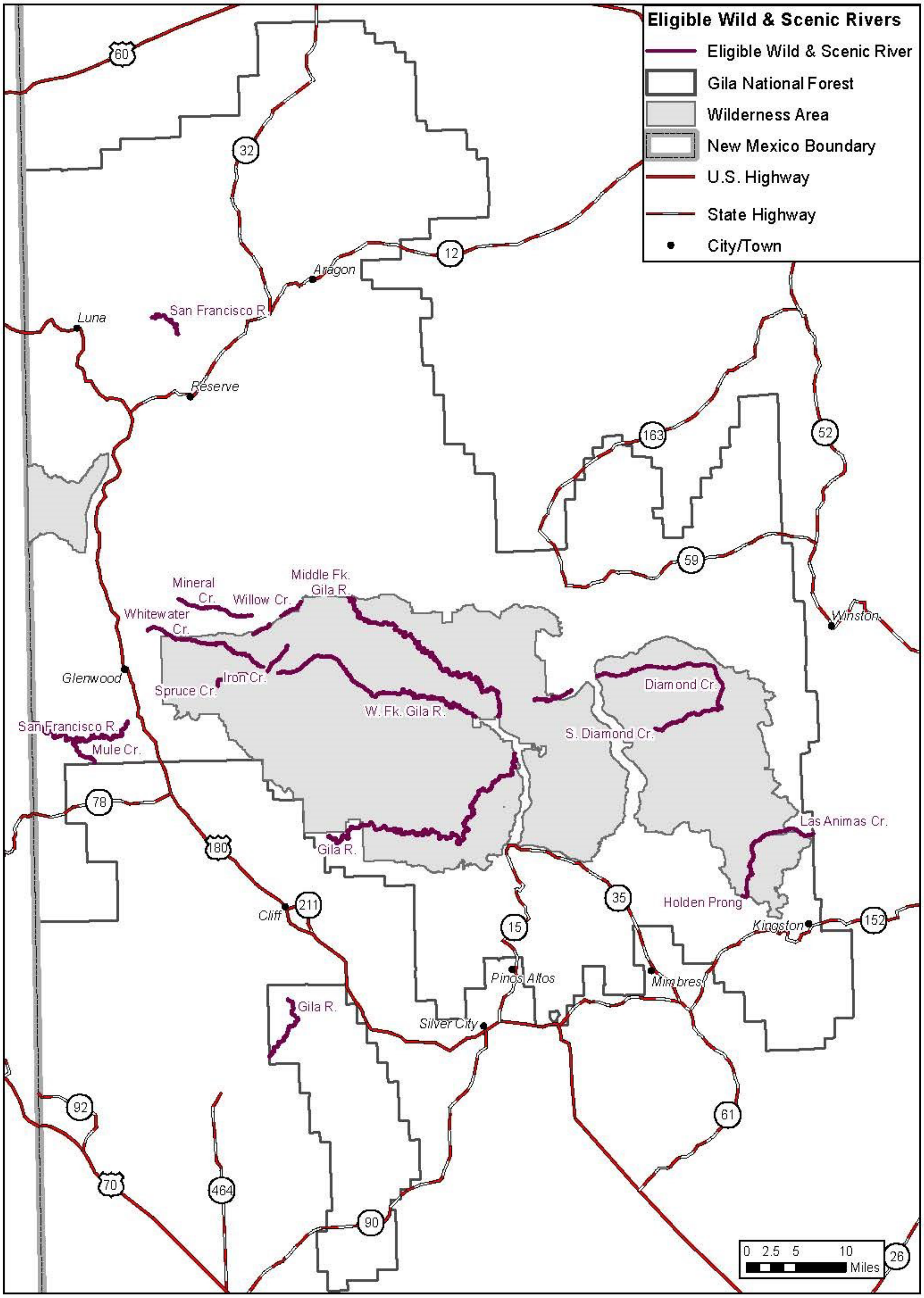

Figure 13. Eligible wild and scenic rivers, Gila National Forest

Rare and endemic plant management areas

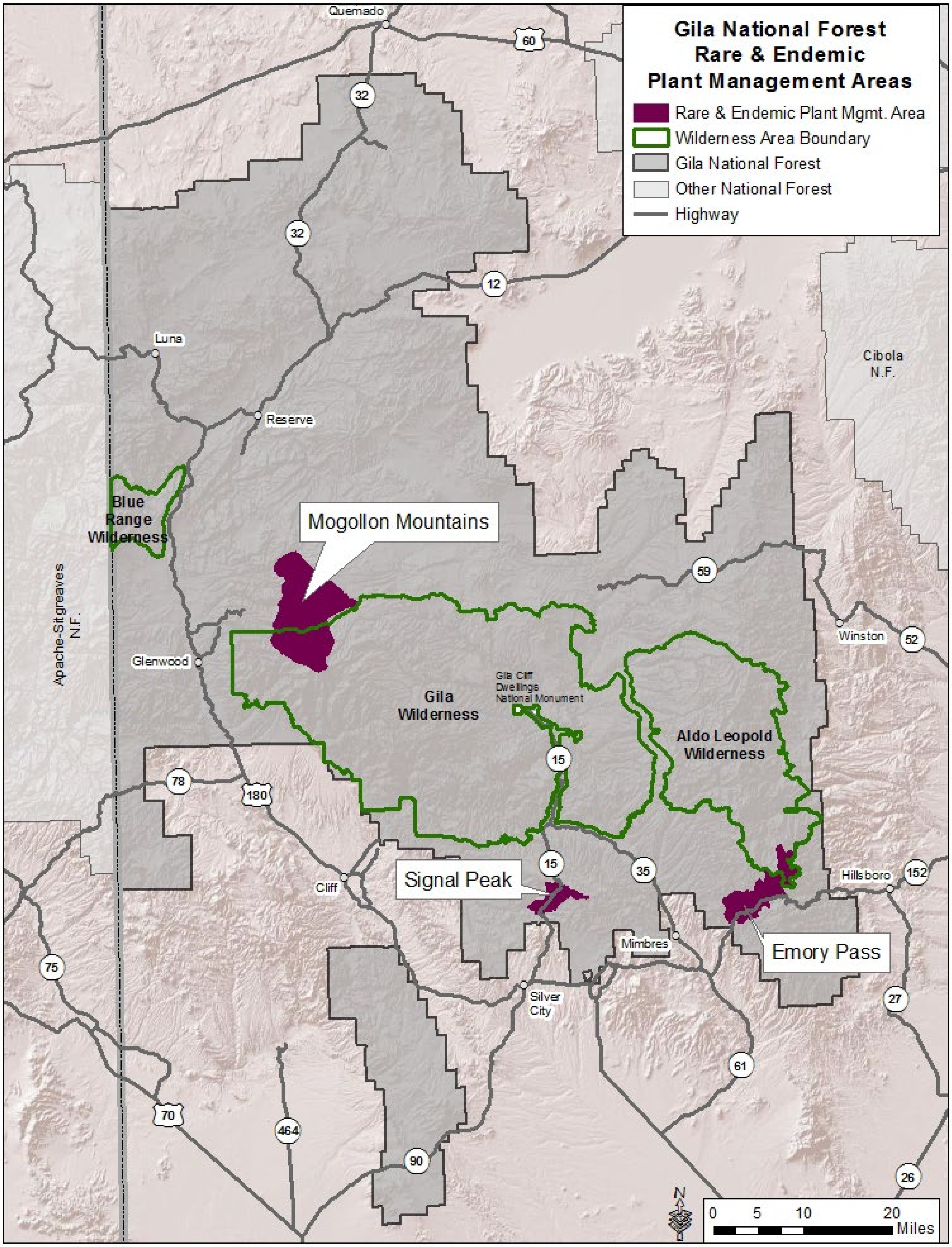

Figure 14. Rare and endemic plant management areas, Gila National Forest

Wildland-urban interface

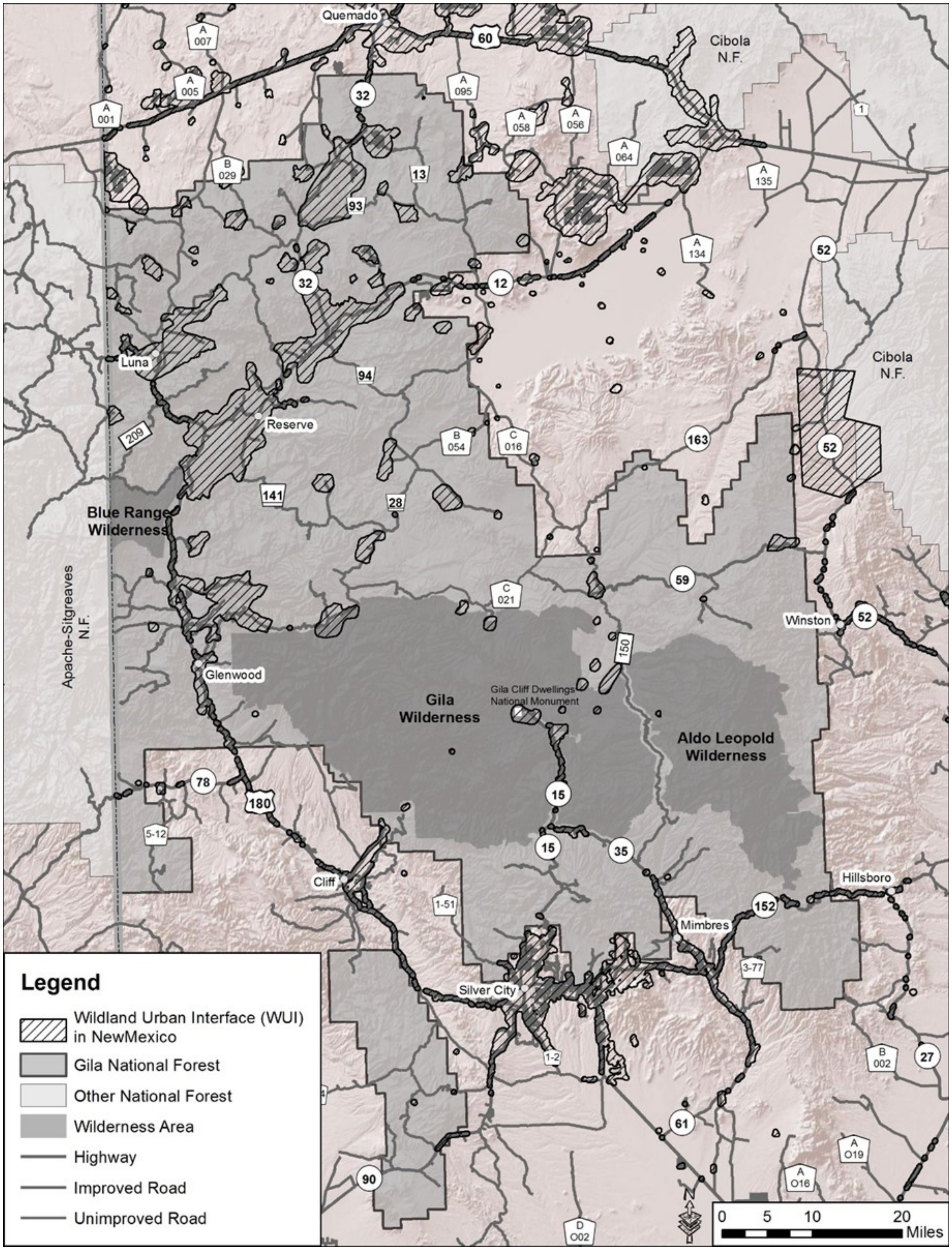

Figure 15. Wildland-urban interface, Gila National Forest and vicinity

Utility corridors

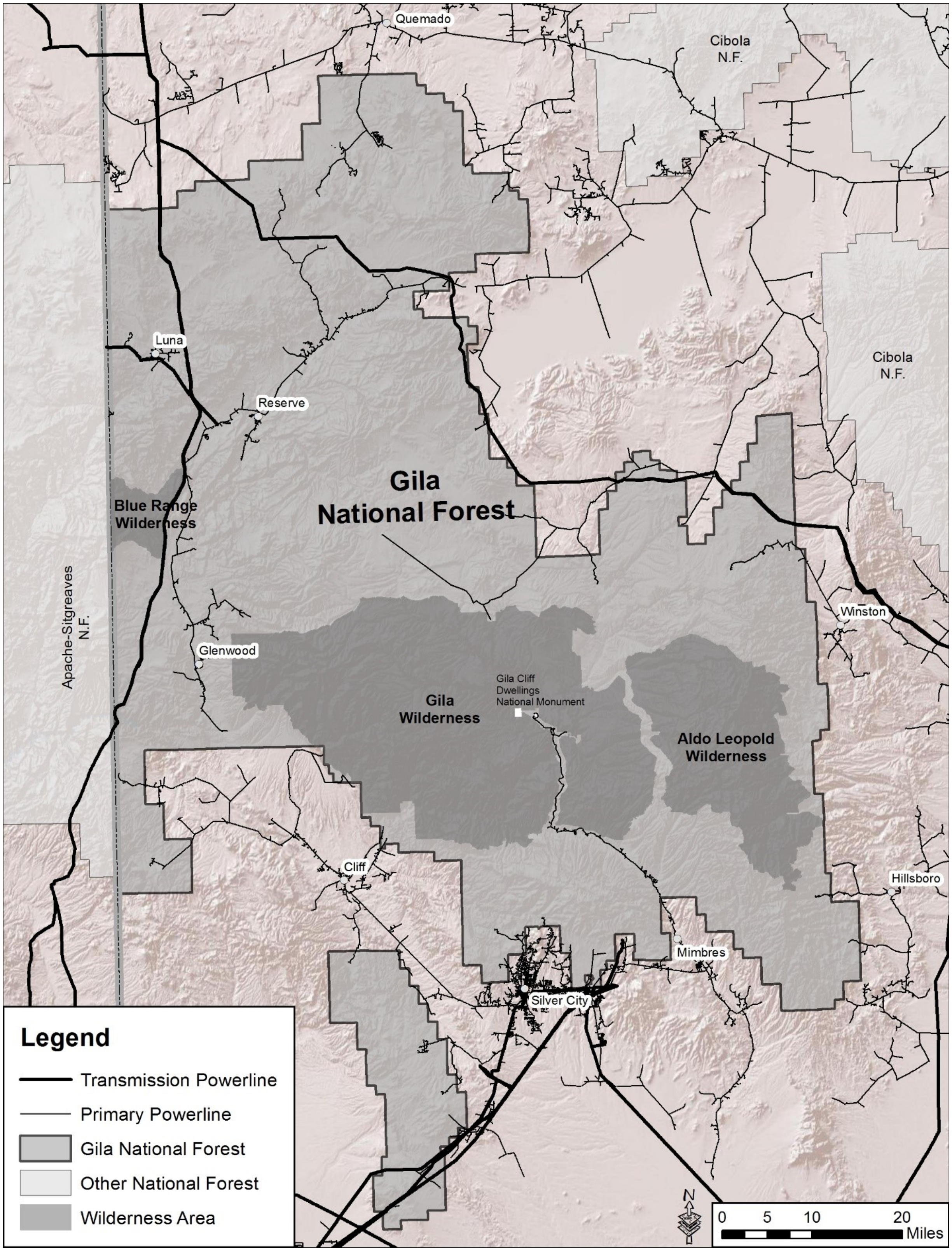

Figure 16. Utility corridors, Gila National Forest

Existing recreation opportunity spectrum

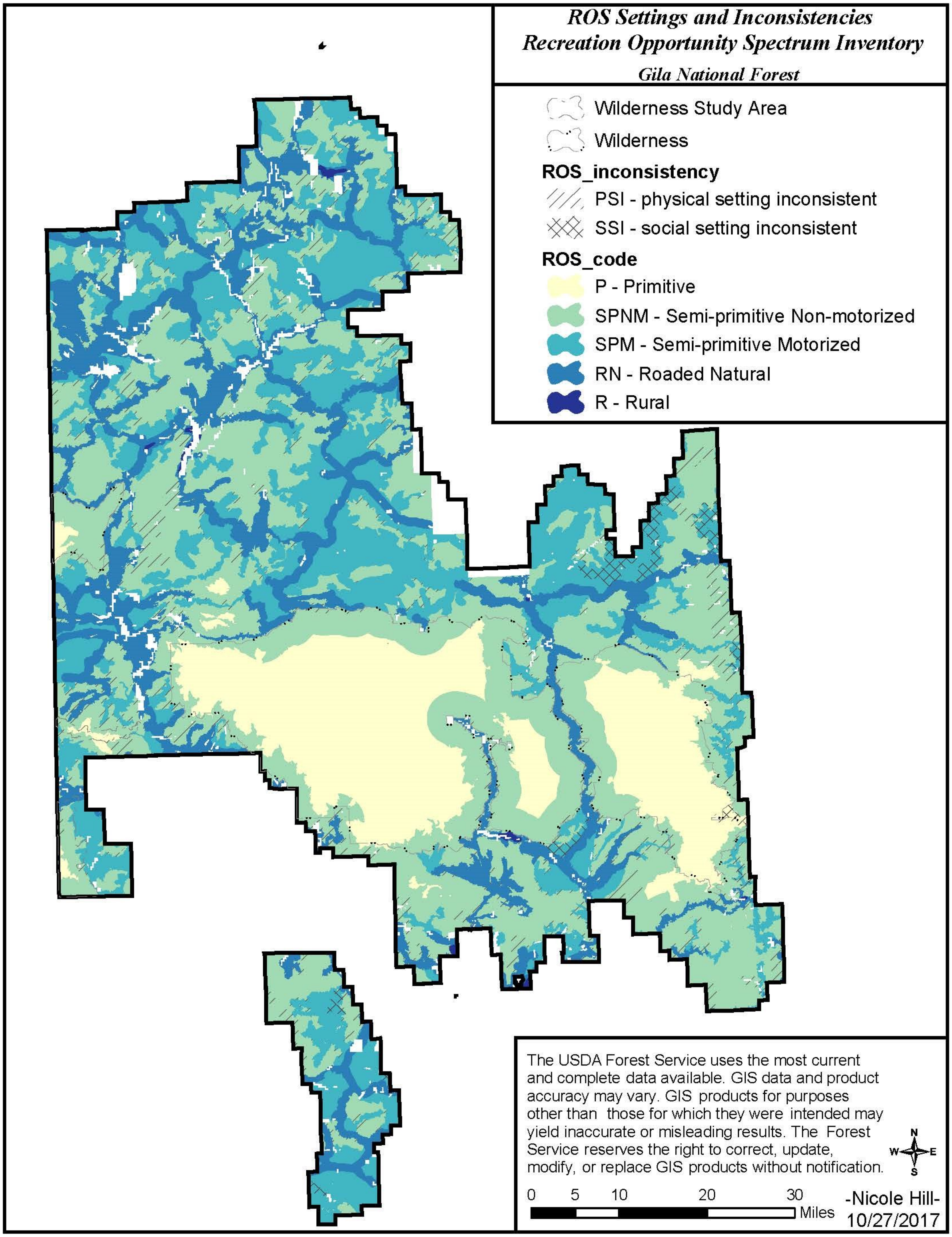

Figure 17. Existing recreation opportunity spectrum, Gila National Forest

Desired recreation opportunity spectrum

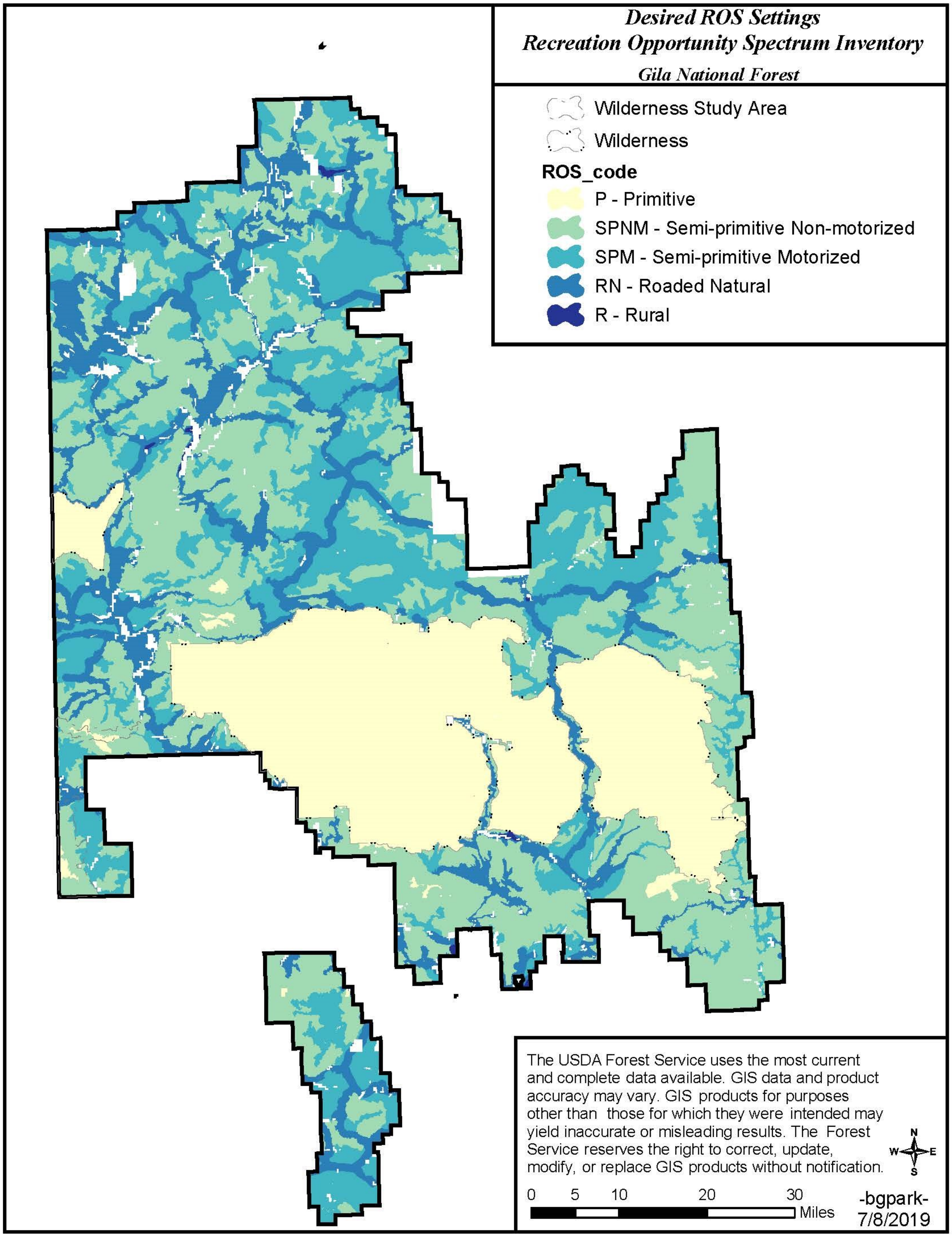

Figure 18. Desired recreation opportunity spectrum, Gila National Forest

Scenery Management System

Scenery Management System maps can be found at https://usfs-public.box.com/s/v72925tu4vruxppogxrpum5tmjmasc9k.

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Appendix D – Focal Species Rationale

Common Black Hawk

The common black hawk (*Buteogallus anthracinus*) is an obligate riparian nester, dependent on mature, relatively undisturbed habitat supported by a permanent flowing stream[1, 2]. The Gila Valley from Mogollon Creek south to the Gila River Bird Habitat Management Unit ("Gila Bird Area") supports the highest known density of common black hawks in New Mexico with most nesting territories documented on the U Bar Ranch upstream from the Highway 180 Gila River Bridge[3]. Owing to a limited distribution in New Mexico, and dependence on riparian habitats, the species has been listed as "threatened" by the New Mexico Department of Game and Fish[4].

Habitat Description

Riparian areas are affected by the presence of surface and subsurface, perennial or intermittent, flowing or standing bodies of water. They are composed of distinctively different vegetative species than adjacent areas where water is more limited. In these systems, terrestrial and aquatic ecological processes are integrated within watersheds. Riparian areas are more productive than other vegetation communities in terms of plant and animal biomass per acre. As a result, they provide some of the most important habitat in the Gila NF and in the Southwest.

Riparian areas provide wildlife habitat, increased biodiversity, and wildlife connectivity, enabling aquatic and riparian-dependent species to move along river systems, and thus, preventing community isolation and fragmentation. In particular, the Gila River supports some of the highest numbers of bird species in the lower 48 states of the United States, including important breeding habitat. This and other riparian areas in the forest provide essential habitat for wildlife and aquatic species, including federally recognized and proposed threatened or endangered, species of conservation concern, and rare or narrow endemic plants.

Plan Desired Conditions

Riparian and aquatic ecosystems are functioning properly (or equivalent condition class), as evaluated at the 6th level watershed. The distribution and health of riparian/wetland and aquatic communities perpetuates ecosystem functions and biological diversity. They are resilient to natural disturbances, human activities and climate variability.

Riparian and aquatic habitat provides for self-sustaining populations of native fish, amphibians, aquatic and semi-aquatic species within their historic distribution. Habitat is resilient to long-term climate variability and extreme events. Streams and rivers provide a variety of habitats for aquatic species, including deep pools and overhanging banks, structure provided by large wood, off-channel areas and protective cover within the potential of each fine-scale unit.

Streams exhibit full connectivity. Ephemeral watercourses provide for dispersal, access to new habitats, and perpetuation of genetic diversity, as well as nesting and foraging for riparian, aquatic and semi-aquatic species.

Within their type and capability, riparian vegetation communities are composed of a diversity of native species and multiple age classes to provide large woody debris and groundcover, protect streambanks and capture sediment, dissipate stream energy, and protect and enrich soils.

Home Range

At Aravaipa Canyon, daily linear hunting distance along nest stream 0.67 km (n = 2); overall linear distance during nestling stage 0.75-1.2 km (n = 3). Distance increases during incubation stage and after fledging (2.6-2.7 km). No information on area utilized; distances traveled away from nest stream not known, probably less than 220 m (Aravaipa Canyon; JHS)[1].

Nest or Territory Density

A reliable supply of riparian-associated vertebrate and invertebrate prey are required for successful nesting by black hawks. Nesting territories are restricted to, and disjunct within, riparian communities[5]. Territories are irregularly spaced along riparian woodland corridors, and borders are usually not in contact. The only documented contact had inter-nest spacing of 355 m (18-year minimum record, Aravaipa Canyon; JHS)[1]. There are no published data for nesting densities in the southern, year-round part of their range[1], but in west-central Arizona, Millsap found mean nest density of 1.3/ km2 (range 0.5-2.1, n = 2 seasons) in cottonwood-willow riparian[5]. Also, an average density 0.4 pairs/km (n = 18 seasons, range 0.32-0.5/km) along 28 km of Aravaipa Canyon riparian (JHS); in Sonora, densities (highest reported in Mexico) were 0.338 pairs/km (n = 2 seasons, range 0.32-0.35/km) of along 65 km of Rio Bavispe, and 0.10 pairs/km (n = 2 seasons) along 80 km of Rio Yaqui[6].

An average linear density of 0.60 pairs/km on the 38 km of Gila River surveyed was calculated. This compares with 0.42 pairs/km[7] and 0.58 pairs/km[3], for the same stretch of river. Further, for the upper 16 km of river from the Highway180 Gila River Bridge, we found an average of 0.75 pairs/km. Skaggs (1996) reported 0.58 pairs/km[7], whereas Egbert estimated 0.81 pairs/km for this same stretch of river[8]. Our calculated density compares favorably with reported densities elsewhere in the northern portion of the species range. Schnell cited an average density of 0.40 pairs/km along 28 km of Aravaipa Canyon in Arizona[1]. A recent study in southeastern New Mexico reported only 0.12 pairs/km along a 57.5 km study area in the Rio Hondo Valley[9].

Ultimately, monitoring of breeding black hawks appears to be the only feasible method of detecting trends in the population. Neal found that statistical power to detect a 50 percent decline (2.8 percent annually) over a 25-year monitoring period exceeded 0.80 for both 5 and 10 plot monitoring programs[10]. These results suggest that monitoring of breeding pairs in as few as five 25-km stretches of suitable habitat may be sufficient to meet the North American Raptor Monitoring Strategy monitoring goals for the species, at least for the migratory components of the population. If such a monitoring program were to be undertaken, plot-specific densities for the areas being monitored would allow more precise modeling of the population.

Analyses in the Gila NF

The combination of 2010 Hawk Watch International pilot survey and 2011 Riparian Raptor Survey data facilitated an initial identification and inspection of 29 common black hawk territories to determine an occupancy rate. Hence, in 2011, 24 of 29 territories were occupied, yielding an initial occupancy rate of 0.83 with a standard deviation of 0.384. Using the constants described above, Neal determined that 31 territories per monitoring season would need to be checked to detect a drop or change of 20 percentage points or more in occupancy from current levels (i.e., 83 percent) with 80 percent power[10]. Similarly, given the 2010-2011 mean rate of nest success of 0.78 and a standard deviation of 0.413, a total of 36 samples or a smaller sample using repeated measures would be required to detect a 20 percent change in nest success[10]. To date, inventory and monitoring efforts in the Gila NF have resulted in the survey of 155 miles of riparian habitat, documentation of 54 common black hawk nest locations and monitoring of 21 breeding pairs of common black hawk throughout the 2011 and 2012 reproductive seasons[11] (Neal 2012).

Mexican Spotted Owl

The Mexican spotted owl inhabits mixed coniferous and pine/oak forests, canyons, desert caves, cliff faces, and riparian areas throughout the Southwest. In the Gila NF, mixed conifer and pine-oak habitat is considered either protected or recovery habitat in the recovery plan for this species. Protected activity centers (PACs) are protected habitat, and unoccupied mixed conifer and pine-oak is considered recovery habitat[12]. Preliminary prey base data being taken on the Lincoln National Forest suggest that the owl uses three main food sources: wood rats, deer mice, and voles. Canopy cover and herbaceous ground story materials are important prey habitat conditions. Foraging habitat occurs throughout several forest types from piñon/juniper to spruce/fir. Mixed conifer forests with old-growth stands are most commonly used, particularly for nesting/roosting. These forests are dominated by Douglas-fir and/or white fir, with understory consisting of coniferous species and broad-leafed species such as Gambel oak, maples, box-elder, and New Mexico locust. These forests are also usually uneven-aged, multi-storied, and have high canopy closure. The Mexican spotted owl nests and roosts primarily in closed canopy forests or rocky canyons.

Habitat Description

Mixed Conifer with Aspen occurs between the Spruce-Fir Forest ERU at its upper elevational limit and the Mixed Conifer-Frequent Fire ERU and its lower elevational limit. It occurs along a variety of slope gradients including gentle to very steep mountain slopes between approximately 7,000 and 10,000 feet. Degree of canopy closure, seral state, topographic characteristics and soil properties are determining factors of tree species composition as they influence site temperature and plant available moisture. Douglas-fir and white fir are typically codominant, with southwestern white pine, maple, aspen, and New Mexico locust sub- or co-dominant. Aspen and New Mexico locust dominance is initiated by stand-replacement fire. Ponderosa pine may be present at the lower elevations, but as a minor component. Engelmann spruce and blue spruce are absent, differentiating it from the lower Spruce-Fir Forest. Scouler's willow, mountain spray, osha, mountain lover, nine-bark, currants, sedges and a variety of other native perennial shrubs, grasses, forbs and ferns are commonly found in the understory. Lichens and non-vascular plants such as mosses and liverworts are also important components.

Mixed Conifer-Frequent Fire ERU is transitional between the Ponderosa Pine Forest and the Ponderosa Pine-Evergreen Oak ERUs and the Mixed Conifer with Aspen. In the Gila NF, it typically occurs between 6,000 and 9,300 feet on steep slopes (40 to 120 percent rise) although sometimes it is found on gentler terrain. Degree of canopy closure, seral state, topographic characteristics and soil properties are determining factors of tree species composition as they influence site temperature and plant-available moisture. Shade-intolerant trees such as ponderosa pine, southwestern white pine, quaking aspen and Gambel oak dominate the forest, with mid-tolerant species such as Douglas-fir being common. Shade-tolerant species such as white fir may occasionally be present. A wide range of native grasses, forbs, shrubs and ferns are present with variable species composition, depending on latitude, elevation, aspect, and soil properties. Some common species include Oregon grape, screwleaf muhley, mountain muhley, Arizona fescue, mountain brome, pine dropseed, fleabane, penstemon, and wood sorrel. Lichens and non-vascular plants, such as mosses and liverworts, are also important components.

Ponderosa Pine Forest vegetation community includes two sub-types: Ponderosa Pine-Bunchgrass and Ponderosa Pine-Gambel Oak, which generally occur at elevations typically ranging from 6,000 to 7,500 feet. Both subtypes are dominated by ponderosa pine and often include Gambel oak and evergreen oak species, or both juniper and piñon pine. Aspen, Douglas fir, and white fir may also be present depending on physical site characteristics. The understory is composed of a wide diversity of native grasses, sedges, forbs, shrubs and ferns. Common grasses include blue grama, mountain muhley, screwleaf muhley, muttongrass, June grass and pine dropseed. Other common species include Fendler's buckbrush, New Mexico locust, lupine, penstemon, fleabane, vetch, and ferns. Lichens and non-vascular plants such as mosses and liverworts are also important components.

Plan Desired Conditions

The Mixed Conifer with Aspen vegetation community is a mosaic of structural and seral stages ranging from young trees through old, and is composed of multiple species. The landscape arrangement is an assemblage of variably sized and aged groups and patches of trees and other vegetation. Tree canopies are typically more closed than in the Mixed Conifer-Frequent Fire ERU. Overstory canopy cover densities range from 20 to 180 square feet of basal area or greater per acre, depending on seral state and time since disturbance, topographic characteristics and soil properties, often approaching complete canopy closure in mid- to late seral states. Old growth occurs over large, continuous areas. Old-growth components include old trees, standing dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time because of natural growth, death and disturbance. It is composed predominantly of vigorous trees, but declining trees provide snags; downed logs (larger than 12 inches diameter at mid-point, over 8 feet long) and coarse woody debris (larger than 3 inches diameter). Snags and coarse woody debris are well distributed. The number of snags and amount of coarse woody debris vary by seral state. The number of snags and amount of coarse woody debris vary by site productivity, seral state, and disturbance history. Snags 18 inches or greater diameter at breast height (DBH) have an average range from 1 to over 5 per acre. Snag density in general (8 inches DBH and larger) averages 20 per acre with a range of 13 to 30. Average coarse woody debris, including downed logs, varies from 10 to 40 tons per acre or more depending on site productivity, disturbance history, and seral state. An understory of native grasses, forbs, and shrubs is typically present, with basal area, canopy cover, and species composition varying with seral state, degree of canopy closure, and TEU.

The Mixed Conifer-Frequent Fire vegetation community is a mosaic of structural and seral stages ranging from young trees through old, and is composed of multiple species. Forest appearance is variable, but is generally uneven-aged and open; occasional patches of even-aged structure are present. The forest arrangement is an assemblage of variably sized openings of grasses, forbs, and shrubs. Size, shape, and number of trees per group, and number of groups per area are variable across the landscape. Where they occur, groups of aspen and all structural stages of oak are present. Average tree densities range from 40 to 125 square foot basal area per acre, depending on disturbance history, topographic characteristics, and soil properties. Denser tree conditions exist on northerly aspects, steep slopes, toe slopes, and in canyon bottoms. Old growth occurs over large, continuous areas. Old-growth components include old trees, standing dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time because of natural growth, death, and disturbance. The Mixed Conifer-Frequent Fire is composed predominantly of vigorous trees, but declining trees provide snags; downed logs (larger than 12 inches diameter at mid-point, more than 8 feet long) and coarse woody debris (larger than 3 inches diameter). Snags and coarse woody debris are well distributed. The number of snags and amount of coarse woody debris vary by site productivity, seral state, and disturbance history. 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.

The Ponderosa Pine Forest vegetation community is a composed of trees from structural stages ranging from young to old. Forest appearance is variable but is 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 intersperse within variably sized opening of grasses, forbs and shrubs similar to historic patterns. The size, shape, number of trees per group, and number of groups per area are variable across the landscape. Tree density generally ranges from an average of 22 to an average of 89 square foot basal area per acre, depending disturbance history, topographic characteristics, and soil properties. Denser tree conditions exist on northerly aspects, steep slopes, toe slopes and in canyon bottoms. In the Gambel oak subtype, all sizes and ages of oak trees are present. Old growth occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Old growth components include old trees, standing dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time because of natural growth, death, and disturbance. The Ponderosa Pine Forest is composed predominantly of vigorous trees, but declining trees provide snags and coarse woody debris; downed logs (larger than 12 inches diameter at mid-point, more than 8 feet long) and coarse woody debris (larger than 3 inches diameter). Snags and coarse woody debris are well distributed. The number of snags and amount of coarse woody debris vary by seral state. 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.

Critical Habitat

On August 31, 2004, the USFWS designated approximately 3.5 million hectares (8.6 million acres) of critical habitat for the Mexican spotted owl on Federal lands in Arizona, Colorado, New Mexico, and Utah (69 FR 53181). Within the critical habitat boundaries, critical habitat includes only protected and restricted habitats as defined in the original Recovery Plan (USDI FWS 1995). Similarly, the primary constituent elements of critical habitat were listed as those habitat features recognized in the 1995 Recovery Plan as associated with Mexican spotted owl occupancy, as follows:

1. Primary Constituent Elements Related to Forest Structure:

- A range of tree species, including mixed-conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 to 45 percent of which are large trees with a trunk diameter of 0.3 meters (12 inches) or larger when measured at 1.4 meters (4.5 feet) from the ground;
- A shaded canopy created by the tree branches and foliage covering 40 percent or more of the ground; and,
- Large, dead trees (snags) with a trunk diameter of at least 0.3 meters (12 inches) when measured at 1.4 meters (4.5 feet) from the ground.

2. Primary Constituent Elements Related to Maintenance of Adequate Prey Species:

- High volumes of fallen trees and other woody debris;
- A wide range of tree and plant species, including hardwoods; and,
- Adequate levels of residual plant cover to maintain fruits and seeds, and to allow plant regeneration.

3. Primary Constituent Elements Related to Canyon Habitat (one or more of the following):

- Presence of water (often providing cooler air temperature and higher humidity than the surrounding areas);

- Clumps or stringers of mixed-conifer, pine-oak, piñon-juniper, and/or riparian vegetation;
- Canyon walls containing crevices, ledges, or caves; and,
- High percentage of ground litter and woody debris.

Home Range

Mexican spotted owls are territorial in the sense that mated pairs defend a breeding territory within a larger home range (or use area). Fidelity to these territories is relatively high in Mexican spotted owls, with most owls remaining in the same territory year after year[13]. Mexican spotted owls use relatively large home ranges, and home-range size appears to vary among geographic areas and habitats[14]. Some of this variation may be due to differences in methods, but some of the observed variation is likely real. However, at this time, the relative influences of biogeographic regions versus local differences in habitat quality on home-range size of Mexican spotted owls remain unclear, although limited information suggests that local differences can be important[15]. Protected activity centers are intended to sustain and enhance areas that are presently, recently, or historically occupied by breeding Mexican spotted owls. Minimum protected activity center area is 243 hectares (600 acres) and is based on the median size of the adaptive kernel contour enclosing 75 percent of the foraging locations for 14 pairs of radio-marked owls (241 hectares [595 acres)][16]). Thus, protected activity centers protect areas used by owls rather than entire home ranges.

Nest/Territory Density

Surveys conducted since the 1995 Recovery Plan continue to locate new owl sites and increase our knowledge of owl distribution, but not necessarily of owl abundance. For example, 758 owl sites were recorded for the period 1990–1993[17]. During a recent review for establishing critical habitat, 1,222 owl sites were recorded for the period 1990–2004[18]. A more recent tally through 2008 indicated 1,301 cumulative sites occupied by one or more Mexican spotted owls. This increase is mainly a product of new surveys being completed within previously un-surveyed areas, however. This tally represents a cumulative tally of all sites where Mexican spotted owls have been located over time, does not provide any information on how many of those sites are occupied at any particular time, and does not account for any known sites lost due to high-severity wildland fire or natural site-extirpation processes. Thus, an increase in abundance cannot be inferred from these data. Likewise, the distribution of owl sites alone cannot indicate population density in various areas and may be more indicative of differences in survey effort than in owl density[12].

Analyses in the Gila NF

In August 2013, the Forest Service Southwestern Region contracted with the Bird Conservancy of the Rockies (formerly the Rocky Mountain Bird Observatory) to refine the site occupancy monitoring protocol recommended in the revised recovery plan, to pilot test the protocol in 2014, and continue monitoring in subsequent years on National Forest System lands in Arizona and New Mexico. As part of this continued monitoring, 198 sites were surveyed in 2018. These sites were a random subset of sites initially surveyed in 2014, and the same sites surveyed in 2015–2017, except for two sites that were inaccessible due to fire. Of the 198 sites, 163 were surveyed twice. These data are sufficient to estimate occupancy and detection probabilities[19].

Data were analyzed under a multi-state occupancy modeling framework. Using this model, we were able to estimate the site occupancy probabilities for Mexican spotted owl in 2014–2018, as well as the probability that an occupied site contained a pair of Mexican spotted owls. The probability of site occupancy increased from 2014 to 2016, and decreased from 2016 to 2018. The conditional probability that an occupied site contained a pair of Mexican spotted owls remained constant across years[19].

In summary, the sampling frame and survey methods used in 2014 provided the framework needed to continue to monitor site occupancy by Mexican spotted owls in the Southwestern Region of the Forest Service in 2015–2018. This framework may be expanded or adapted for monitoring Mexican spotted owls in additional areas of their range. Additional years of data collection will allow us to expand the analysis to answer pertinent questions about what factors drive the occupancy dynamics, which will inform management of this sensitive species[19].

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