United States Department of Agriculture

Preliminary Draft Land Management Plan for the Gila National Forest

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

U.S. Forest Service Southwestern Region March 2018

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for the
Gila National Forest

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List of Commonly Used Acronyms

AML	appropriate management level
AOI	annual operation instructions
ATV	all-terrain vehicles
BASI	best available scientific information
BLM	Bureau of Land Management
BMP	best management practice
CAA	Clean Air Act
CCC	Civilian Conservation Corps
CCF	hundred cubic feet
CCVA	Climate Change Vulnerability Assessment
CDNST	Continental Divide National Scenic Trail
CDT	Continental Divide Trail
CEQ	Council on Environmental Quality
CFF	cubic Feet
CFR	Code of Federal Regulations
CFRP	Collaborative Forest Restoration Program
CPM	coarse particulate matter
CWD	coarse woody debris
CWPP	Community Wildfire Protection Plan
DEIS	draft environmental impact statement
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of Interior
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
EPA	Environmental Protection Agency
ERU	ecological response unit
ESA	Endangered Species Act
FEIS	final environmental impact statement
FIA	Forest Inventory and Analysis
FP	Functioning Properly
FRCC	fire regime condition class
FRI	fire rotation interval
FSH	Forest Service Handbook
FSM	Forest Service Manual
FVS	Forest Vegetation Simulator
FWS	Fish Wildlife Service
FY	fiscal year
GIS	geographical information system
GMU	game management unit
GNF	Gila National Forest
HUC	Hydrologic Unit Code
IF	Impaired Function
IRA	inventoried roadless area
LS	local scale
LSRS	Land Status Records System
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
NFSR	National Forest System road
NFST	National Forest System trail
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NM	New Mexico
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
NMED-AQB	New Mexico Environment Department, Air Quality Bureau
NMOCD	New Mexico Oil Conservation Division
NMOSE	New Mexico Office of the State Engineer
NMRPTC	New Mexico Rare Plants Technical Council
NOA	notice of availability
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRHP	National Register of Historic Places
NRV	natural range of variation
NVUM	national visitor use monitoring
NWI	National Wetland Inventory
OHV	off-highway vehicle
OML	operational maintenance level
ONRW	outstanding natural resource water
ORV	off-road vehicle
PFC	proper functioning condition
PILT	payment in lieu of taxes
P.L.	Public Law
PM	particulate matter
RMP	Resource Management Plan (Bureau of Land Management document)
RNA	research natural area
ROD	record of decision
ROS	Recreation Opportunity Spectrum
SCC	species of conservation concern
SHPO	State Historic Preservation Office
SMS	Scenic Management System
SRS	Secure Rural Schools
SYFMA	Sustained Yield Forest Management Act
TCP	traditional cultural properties
TES	Terrestrial Ecosystem Survey
TEU	terrestrial ecological unit
TMR	Travel Management Rule
U.S.C.	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	US Geological Survey
UTV	utility terrain vehicle
VDDT	Vegetation Dynamics Development Tool
WPA	Works Program Administration
WQCC	Water Quality Control Commission
WSA	wilderness study area
WUI	wildland-urban interface
YCC	Youth Conservation Corps

Chapter 1: Introduction

Purpose of this Document

This document is the preliminary draft of a revised land and resource 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.

As a preliminary draft forest plan, this document has been compiled by an interdisciplinary team of Gila staff using stakeholder input. 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 preliminary draft plan and define plan alternatives. Gila staff also intend for this dialogue to promote understanding and strengthen relationships. Feedback received on this preliminary draft forest plan will be used as Gila staff revise the forest plan and analyze alternatives under the National Environmental Policy Act process.

Limitations of this Document

As a preliminary draft forest plan, this document is incomplete. Gila staff have included placeholders to indicate where information or sections have yet to be completed. Changes, sometimes significant ones, will occur throughout the document prior to being released as the official Draft Plan later in the year.

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.

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 to inform decisions.

Collaboration and Public Involvement

Gila staff have hosted four formal rounds of public engagement around plan revision, described below:

1. The first round, which took place 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, which occurred in summer 2015, provided opportunities for stakeholders to share knowledge, plans and data for the assessment.
3. The third round, which took place in fall 2016, involved assessment of key findings, identification of current plan needs-for-change, and continued the dialogue between Gila staff and nearby residents, users and interested individuals.
4. The fourth round, which occurred 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.

Five extended technical meetings were held in summer and fall 2017 to allow more in depth discussion by interested local governments, State and Federal agencies, non-governmental organizations and the public on stakeholder-suggested topics. 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 upcoming plan and environmental impact statement development.

Chapter 2: Background

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 Apache National Forest lands east of the Arizona-New Mexico state line and 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).

The Gila is known for several other features and characteristics, which include:

Recreation. The Gila's magnificent mountain scenery, cool summer temperatures and relatively warm winters permit a wide range of recreational opportunities year-round. With vast undeveloped areas extending across the Black, Mogollon, Diablo and Blue mountain ranges, Gila provides backcountry opportunities including hiking, camping, cabins, horseback riding, hunting and fishing. Specific facilities and areas include campgrounds, picnic areas, the Catwalk Recreation Area's elevated trail system and "star parties" at the Cosmic Campground International Dark Sky Sanctuary.

History and culture. The Gila has a rich cultural history, with interpretive trails and archaeological resources reflecting thousands of years of local human presence, including ranches, mines and cliff dwellings. The Mogollon and Apache tribes, as well as Spaniards, Mexicans, ranchers, prospectors and miners, all contributed to the story of the Gila, while individuals such as Mangas Coloradas, Geronimo, Aldo Leopold and Ben Lilly all left their mark in the Gila.

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

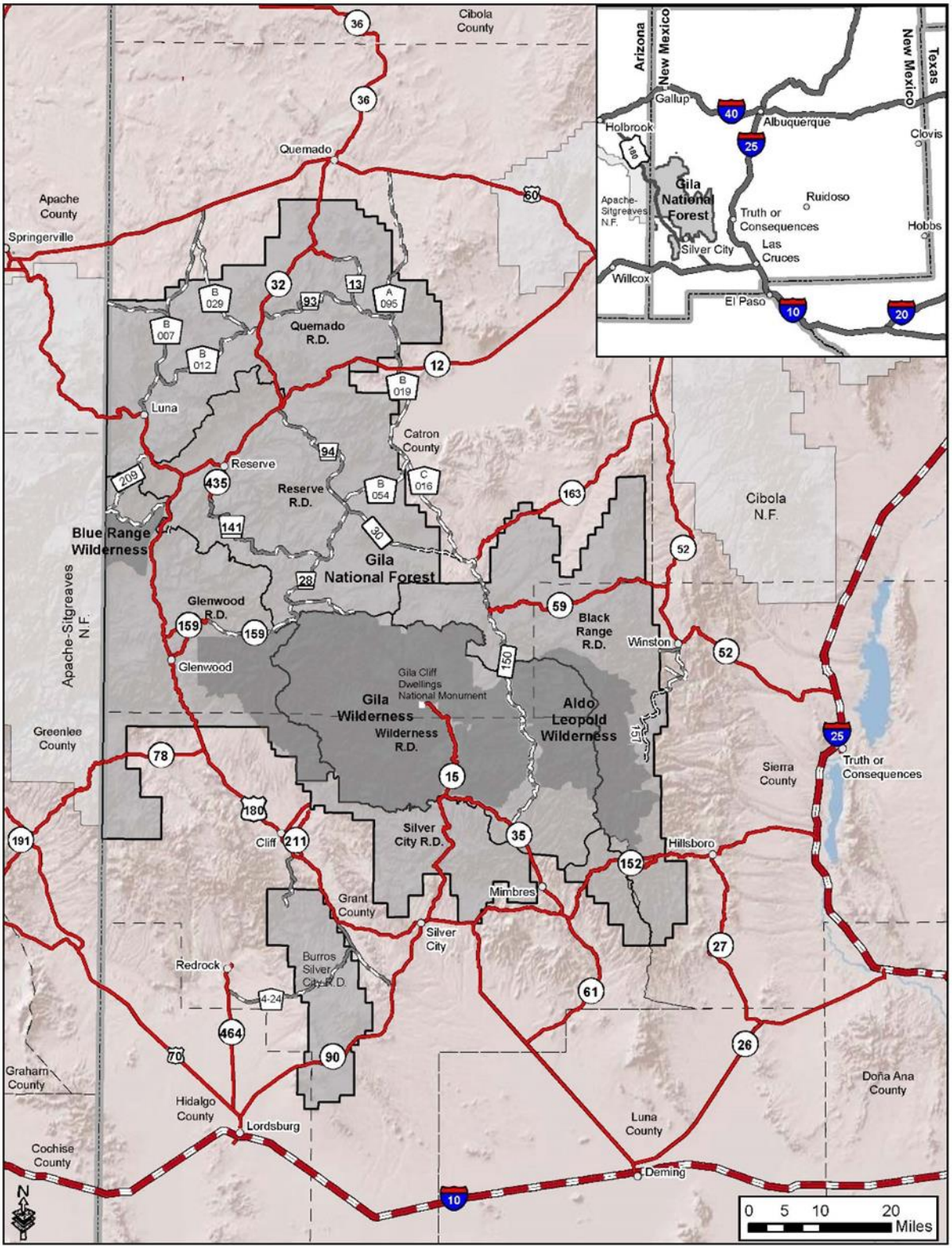

Figure 1. Location of the Gila National Forest

Distinctive Roles and Contributions

The Gila has distinctive ecological characteristics that frame its role and contributions to the local area, State, region and Nation. These characteristics include landscape, geologic, climatic and ecological transition zones that 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. Specific roles and contributions are described below.

Culture. 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. Catron, Grant, Hidalgo and Sierra Counties are home to more than 50,000 people, many of who rely on the Gila to varying degrees as a source of sustenance. For example, New Mexico has deeply rooted ranching cultures and traditions, and while the Forest Service began administering grazing on National Forest System lands in 1899, local rangelands were grazed long before then.

Multiple Uses. The Forest Service is a multiple-use and sustained yield agency as mandated by the Multiple-use Sustained Yield Act of 1960 and the National Forest Management Act of 1976. In other words, the Forest Service is required to sustainably manage multiple resources such as recreation, timber, water, range, wildlife and fish so they contribute to human quality of life while maintaining cultural uses and human connection with the land today and into the future. These requirements apply to all multiple uses for which the national forests and grasslands are administered. It's also important to remember that not every use is viable on every acre of Gila National Forest land.

Plant products. Plant products, including firewood, timber, other building materials and special forest products such as Christmas trees and transplants are important resources. Firewood is an important heat source for many local homes.

Recreation. Because of its size, remoteness, light visitation and the relatively sparse population of surrounding areas, the Gila provides for an unusually rustic recreation experience with ample opportunities for solitude and a range of recreation opportunities, including access to vast expanses of backcountry. The Gila is home to the country's first designated wilderness area, which was first envisioned and championed by conservationist Aldo Leopold. These factors make the Gila a national and international destination for visitors who seek a primitive natural experience. Popular activities within the Gila's dispersed recreation and wilderness areas include hiking, backpacking, horseback riding, camping, hunting, fishing and wildlife viewing. 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.

Upland vegetation. With elevations ranging from 4,160 to 10,770 feet above sea level and varied but often rugged, complex terrain, the Gila supports 14 distinct upland vegetation types, ranging from spruce-fir forests and montane-subalpine grasslands at the highest elevations to savannah woodlands and semi-desert grasslands at the lower elevations. Riparian types range from woody to herbaceous, and are not always associated with permanent surface water. The nearby Sonoran and Chihuahuan desert regions influence precipitation patterns across the southern portion of the Gila, contribute to species diversity, and increase variability in plant community composition and disturbance response.

Water. In the arid and semi-arid Southwestern United States, water is precious. The Gila includes parts of 12 mountain ranges that have been recognized as regionally important groundwater recharge areas. These mountain ranges also form the headwaters of more than 1,000 miles of perennial and intermittent streams, which support riparian and aquatic habitats, overall biodiversity and other beneficial uses designated by the State of New Mexico.

Wildlife, fish and plants. The Gila 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. Many species are rare or endemic. Culturally, 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. Many hunters return to the Gila annually. The Gila is also known for its high quality hunts, especially elk, which attract hunters from all over the country. The popularity of hunting has given rise to a community of commercial outfitters and guides that contribute to local and state economies. Birdwatching is another popular recreational activity.

Assessment and Needs for Change 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 and inactions 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 has identified several risks to ecological integrity and sustainability, which 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. The Gila's ability to contribute to social and economic benefits of recreation and tourism, ranching, hunting, timber, firewood and other forest products desired by local communities, families and the visiting public is determined by the ability of Gila management to balance these and other multiple uses in a changing economic environment, within the capacity of the Gila ecosystems and watersheds to sustain yields in a changing climate.

The final assessment report also served as the basis for identification of fifty-four individual needs for change in management direction (found in the final Need for Change document), upon which this preliminary draft plan is based.

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

This preliminary draft plan includes "plan components" and "other content" as described in the 2012 planning rule. Forest plan components are displayed in text boxes to distinguish them from other sections of the plan. 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. Administrative corrections are used to make changes such as updates to data and maps, management approaches and relevant background information, and to fix typographical errors. The public is notified of all administrative corrections.

Plan Components

Forest plan components should provide a strategic and practical framework for managing the Gila, should be applicable to the resources and issues of the Gila, and should reflect the Gila's distinctive roles and contributions. Forest plan components 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. Each plan component is described below.

Desired conditions are descriptions of specific social, economic and/or ecological 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: This preliminary draft plan does not contain objectives, but it is expected that the official draft plan will.

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.

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.

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.

Management Areas and Geographic Areas

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

Management areas describe how plan components apply to specific parcels of the Gila, 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

management areas. Direction pertaining to management areas is included in Chapter 4: Management Areas.

Geographic areas also describe how plan components apply to specific parcels of the Gila, 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*.

Suitability of Lands

Suitability of lands 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 not suitable for timber production. Suitability is discussed further in Chapter 5: Suitability.

Other Plan Content

In addition to plan components, the 2012 planning rule includes other plan content, some of which is required and some of which is optional. The required content includes a description of the distinctive roles and contributions of the forest plan area, a plan monitoring program, and proposed and possible actions. Optional plan content includes background information, existing conditions, management approaches and contextual information. Management approaches help clarify how plan direction may be applied.

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.

Ecological Response Units are essentially vegetation types based on groupings of terrestrial ecological units with similar potential natural vegetation. 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 variability references past conditions and processes that provide important context and guidance relevant to the environments and habitats in which native ecosystems and species evolved. Disturbance-driven variability across time and space is vital to ecological systems. Ecologically appropriate disturbances provide for heterogeneous conditions and diversity. Conversely, uncharacteristic disturbance can reduce diversity and increase homogeneity. Examples of uncharacteristic disturbance include frequent fire in ecosystems that historically have had an infrequent fire regime, or stand-replacing fire in ecosystems that historically have had a frequent, low-intensity fire regime.

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 recreationists 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.

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 (*Forest Service Manual* 2020.5).

Terrestrial ecological units are conceptual representations and map-unit constructs of the relationships between climate, soil and vegetation. Map unit concepts and map unit delineations are based on systematic field data collection, description, classification and mapping. See the Gila assessment report for more information on terrestrial ecological units, the Gila Terrestrial Ecological Unit Inventory (p. 158) and the relationship between terrestrial ecological units and Ecological Response Units (p. 14).

Plan Consistency

As required by the National Forest Management Act and the 2012 planning rule, all authorized Gila 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. See Appendix A: Consistency with Plan Components for more details.

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.

A Holistic Approach

This forest plan is not an assemblage of program plans that have 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 utilize 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.

In order 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 also should consider any potential conflicts with other authorized projects and activities. Project design should be consistent with the direction contained in Chapter 3: Forest-Wide Plan Direction, except if superseded by more specific direction in Chapter 4: 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 6: Monitoring Plan of this document, in conjunction with project-level monitoring, will provide the framework for enabling adaptive management on the Gila.

Chapter 3: 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 programs 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/or 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 does 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.

Ecosystems and Watersheds

Background and Description

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

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) is derived from a combination of Terrestrial Ecological Unit Inventory map unit delineations (TEUs) 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/or 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 comprised of ten or more mid-scale units (Figure 2). Likewise, the mid-scale is composed of assemblages 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 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. The reason the mid- and fine scales are defined differently between forests and woodland, and grasslands and shrublands is because there is more structural diversity across smaller distances in forest and woodland settings than there is in grasslands and shrublands. The following figure excerpted from work by Reynolds and others[1] provides an illustrated example for forests and woodlands.

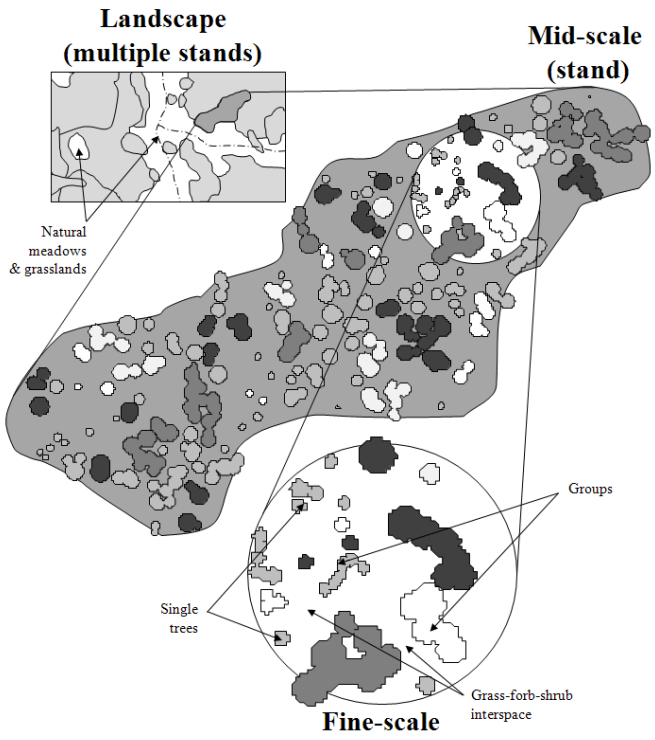

Figure 2. Desired conditions at three spatial scales

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 HUC8), watershed (5th level or HUC10) and subwatershed (6th level or HUC12)[2]. The word "watershed" is therefore both a general term, and a specific categorical term depending on the context it is used in. 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 with 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. An illustrated example of the watershed and fine-scale units is provided in Figure 3 below.

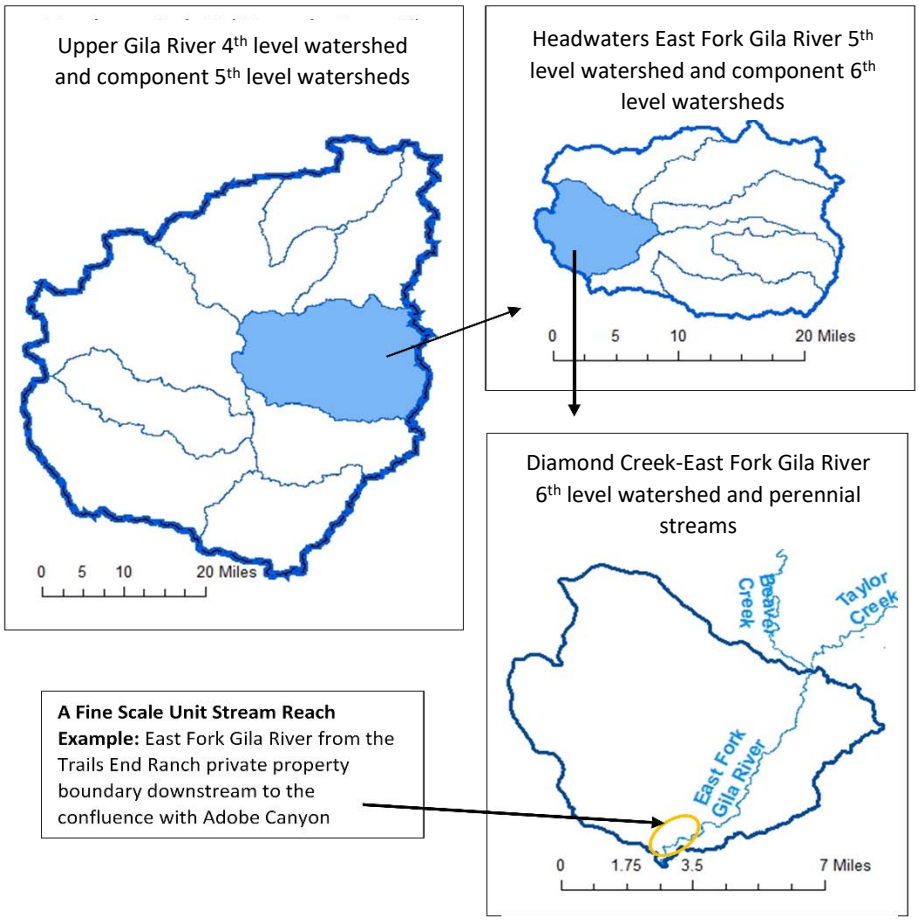

Figure 3. Watershed and fine-scale units

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.

References

[1] 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.

[2] USGS (U. S. Geological Survey). 1999. Hydrologic Units. Information Sheet. http://pubs.usgs.gov/gip/hydrologic_units/pdf/hydrologic_units.pdf.

All Upland Ecological Response Units

Background Information

The Gila NF contains five forest, five 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 biodiversity provides for resilience through adaptive vegetation responses to an ever-changing environment, including long-term climatic variability.

Vegetation is the most 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 (1,000-10,000+ 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 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% 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% similar to the reference proportions as described in the most recent Region 3 Seral State Proportion Supplement.

3) 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.

4) 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.

5) Above and below ground carbon stocks represent 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.

6) Ecological conditions support habitat quality, distribution, abundance and connectivity to self-sustaining populations of all native and desirable nonnative 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.

7) 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.

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.

Guidelines

1) Management should provide for the presence of all seral states in a given ERU and strive toward reference proportions. The distribution of seral states across the Forest should support landscape heterogeneity and habitat connectivity.

2) If overstory or understory plant species composition in a given ERU are less than 66% similar to site potential, management should evaluate the potential cause(s) and implement adaptive responses that address the cause(s).

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.

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 the Forest Service Southwestern Regional Office[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]. In a few cases, the Gila NF has adjusted values from the Regional summary[3] based on data and information specific to the Forest.

While average or median values, or ranges of average values may be useful for coarse assessments or broad-scale reporting purposes, these values must not be interpreted as explicit or implicit management targets[7]. They are not the management goal. Average conditions were historically rare in active-fire landscapes due to variable fuels, topography and fire behavior interactions[8]. Instead, the management approach is to provide for the full range of historic variability within a vegetation type[9] using topographic characteristics, soils (including parent material) and fire behavior as a guide[8, 10, 11, 12, 13, 14, 15, 16, 17]. 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 4: 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 is 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. **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 seral 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/or brown algae, and microfungi, mosses and lichens. Bacteria, liverworts and fungi can also be components.

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.

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

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.

References

[1] 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.

[2]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.

[3]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.

[4] 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.

[5] Brown, J.K., E.D. Reinhardt and K.A. Kramer. 2003. Coarse Woody Debris: Managing Benefits and Fire Hazard in the Recovering Forest. United States Department of Agriculture, Forest Service, Rocky Mountain Research Station. General Technical Report RMRS-GTR-105.

[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] Safford, H.D., G.D. Hayward, N.E. Heller and J.A. Wiens. 2012. Historical Ecology, Climate Change, and Resource Management: Can the Past Still Inform the Future? in Historical Environmental Variation in Conservation and Natural Resource Management, eds. Wiens, J.A., G.D. Hayward, H.D. Safford, and C.M Giffen. Chapter 4 pp. 46-62.

[8] 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).

[9] Weins, J.A., H.D. Safford, K. McGarigal, W.H. Romme, and M. Manning. 2012. What is the Scope of "History" in Historical Ecology? Issues of Scale in Management and Conservation. in Historical Environmental Variation in Conservation and Natural Resource Management, eds. Wiens, J.A., G.D. Hayward, H.D. Safford, and C.M Giffen. Chapter 5 pp. 63-75.

[10] North, M. ed. 2012. Managing Sierra Nevada forests. United States Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany CA. General Technical Report PSW-GTR-237.

[11] Agee, J.K. 1993. Fire ecology of Pacific Northwest forests. Island Press. Washington, DC. 490 pp.

[12] Schoennagel, T., T.T. Veblen, and W.H. Romme. 2004. The Interaction of Fire, Fuels and Climate across Rocky Mountain Forests. BioScience 54:7 pp. 661-676.

[13] Korb, J.E., P.Z. Fulé and R. Wu. 2013. Variability of warm/dry mixed conifer forests in southwestern Colorado USA: Implications for ecological restoration. Forest Ecology and Management 301:182-191.

[14] 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.

[15] Swanson, F.J., T.K. Kratz, N. Caine and R.G. Woodmansee. 1988. Landform Effects on Ecosystem Patterns and Processes. BioScience 38:2(Feb. 1988), pp. 92-98.

[16] Lynderson J. and M. North. 2012. Topographic Variation in Structure of Mixed-Conifer Forests Under an Active-Fire Regime. Ecosystems 15:7 pp. 1134-1146.

[17] Kane, V.R., J.A. Lutz, A. Cansler, N.A. Povak, D.J. Churchill, D.F. Smith, J.T. Kane and M. North. 2015. Water balance and topography predict fire and forest structure patterns. Forest Ecology and Management. 338 pp 1-13.

Forested Ecological Response Units

Spruce-Fir Forest

Background Information

The Spruce-Fir Forest occurs on the coldest, wettest and highest elevation sites on 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 (~79%) and Aldo Leopold (~3%) 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 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 one percent of the Forest[a]. Although it is rare, both on the Forest and in the broader landscape[b], it has significant ecological value in terms of the overall biodiversity and provides habitat for several rare, endemic and/or at-risk species. Because relatively more of it is located on the Forest as opposed to the broader landscape, the Forest has a greater influence on ecological integrity and sustainability.

Landscape Scale Desired Conditions (1,000 acres-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/or structural diversity. The location of old growth shifts on the landscape over time as a result of natural growth, death and disturbance.

4) The Spruce-Fir Forest is composed predominantly of vigorous trees, but declining trees provide snags; 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

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

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

distributed. The number of snags and amount of coarse woody debris vary by seral state and disturbance history.

5) An understory of native grasses, forbs and/or 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 (10-1,000 acres)

1) The size and number of tree groups and patches vary depending on disturbance history, topographic characteristics and soil properties (see TEU). 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) Snags greater than 18 inches diameter at breast height (DBH) have an average range between 5 to greater than 30 per acre. Snags 8-18 inches DBH average 20 per acre with an average range of 13 to 30.

4) 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.

5) 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.

6) 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) 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 as a result of localized disturbances such as wind throw, insects or disease.

Management Approaches

Seral State Proportion, Re-burn and Vulnerability

The Spruce-Fir Forest is the most vulnerable upland ERU to long-term trends in temperature and precipitation[1]. Although there is evidence to suggest that the 2012 Whitewater Baldy Complex and 2013 Silver Fires that resulted in a near total loss of Spruce-Fir Forest late seral states was actually not

uncharacteristic, its vulnerability 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-seral states, and potential impacts of re-burn in what are now early seral states. The vast majority of this ERU is located in remote and rugged terrain in 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 (see Appendix X. Proposed and Possible Actions – still under development). This plan could include: identification of some areas that might be protected from fire for a period of time; areas that would not be protected from fire; areas that could serve as refugia, with or without protection actions; and a monitoring plan.

Related Plan Content

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 and climate among other factors[2]. 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, 4]. FIA data from the Gila and Aldo Leopold wildernesses suggest a basal area maximum (not average maximum) of 418 square feet per acre[5]. While FIA data documents basal areas of zero[5] in areas of stand replacement fire, having residual trees to act as a seed source is desirable.

At-Risk Species for Spruce-Fir Forest

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 is a term referring to areas where a population of organisms can survive through a period of unfavorable environmental conditions.

References

[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] Smith, E. 2006a. Historical Range of Variation and State and Transition Modeling of Historical and Current Landscape Conditions for Spruce-Fir of the Southwestern U.S. Prepared for the U.S.D.A. Forest Service, Southwestern Region by The Nature Conservancy, Tucson, AZ. 37 pp.

[3] 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.

[4] Schoennagel, T., T.T. Veblen, and W.H. Romme. 2004. The Interaction of Fire, Fuels and Climate across Rocky Mountain Forests. BioScience 54:7 pp. 661-676.

[5] FIADB (Forest Inventory and Analysis Database). 2015. Gila Wilderness Area and Aldo Leopold Wilderness Area on the Gila National Forest. Access database query obtained from the Rocky Mountain Research Station, Forestry Sciences Laboratory, Ogden UT December, 2017 with supporting documentation for the query process. On file at the Gila National Forest.

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/or 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.

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

Landscape Scale Desired Conditions (1,000 acres-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. 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 400 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/or structural diversity. The location of old growth shifts on the landscape over time as a result of natural growth, death and disturbance.

4) The Mixed Conifer with Aspen is composed predominantly of vigorous trees, but declining trees provide snags; 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 seral state.

5) An understory of native grasses, forbs and/or shrubs is typically present, with basal area, canopy cover and species composition varying with seral state, degree of canopy closure and TEU.

6) 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 at the higher elevations this type. Patches created by stand replacement fire typically do not exceed 1,000 acres.

Mid-scale Desired Conditions (10-1,000 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. 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. Species composition also varies within and between patches. 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) Snags 18 inches or greater diameter at breast height (DBH) have an average range between 1 to greater than 5 per acre. Snag density in general (greater than 8 inches DBH) averages 20 per acre with an average range of 13 to 30.

4) 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.

5) 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.

6) 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 as a result of disturbances.

Management Approaches

Seral State Proportion, Re-burn and Vulnerability

The Forest has similar concerns in the Mixed Conifer with Aspen as it does 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

Application of Tree Density Ranges of Values

Very few studies reconstructing forest structure have been conducted in the mixed conifer[1,2]. Of those studies that have been conducted, most have focused on frequent fire, dry mixed conifer sites where ponderosa pine and/or Southwestern white pine 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

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, New Mexico groundsel, Porsild's starwort, Yellow lady's-slipper

References

[1] Smith, E. 2006b. Historical Range of Variation and State and Transition Modeling of Historical and Current Landscape Conditions for Mixed Conifer of the Southwestern U.S. Prepared for the U.S.D.A. Forest Service, Southwestern Region by The Nature Conservancy, Tucson, AZ. 31 pp.

[2] Smith, E. 2006c. Historical Range of Variation for Aspen of the Southwestern U.S. Prepared for the U.S.D.A. Forest Service, Southwestern Region by The Nature Conservancy, Tucson, AZ. 21 pp.

[3] 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.

[4] 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.

[5] Schoennagel, T., T.T. Veblen, and W.H. Romme. 2004. The Interaction of Fire, Fuels and Climate across Rocky Mountain Forests. BioScience 54:7 pp. 661-676.

[6] FIADB (Forest Inventory and Analysis Database). 2015. Gila Wilderness Area and Aldo Leopold Wilderness Area on the Gila National Forest. Access database query obtained from the Rocky Mountain Research Station, Forestry

Sciences Laboratory, Ogden UT December, 2017 with supporting documentation for the query process. On file at the Gila National Forest.

Mixed Conifer-Frequent Fire (Dry Mixed Conifer)

Background Information

The Mixed Conifer-Frequent Fire ERU is transitional between the Ponderosa Pine Forest and/or the Ponderosa Pine-Evergreen Oak ERUs and the Mixed Conifer with Aspen. On the Forest, it typically occurs between 6,000 and 9,300 feet on steep slopes (40-120 percent rise). 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 NF[a]. It is more common on the Forest than it is within the broader landscape[b] providing a greater opportunity for the Forest to contribute to ecological integrity and sustainability.

Landscape Scale Desired Conditions (1,000 acres-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 grass/forb/shrub vegetation. 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/or structural diversity. The location of old growth shifts on the landscape over time as a result of natural growth, death and disturbance.

4) The Mixed Conifer-Frequent Fire is composed predominantly of vigorous trees, but declining trees provide snags; 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 seral state.

5) Dwarf mistletoes occur 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. Infrequent mixed-severity fire (Fire Regime Group III) is characteristic of higher elevations where this type transitions with Mixed Conifer with Aspen.

Mid-scale Desired Conditions (10-1,000 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 10 percent in more productive sites to 50 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 10s of acres. The mosaic of tree groups is generally comprised 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 50 acres.

4) Snags 18 inches or greater diameter at breast height (DBH) average 3 per acre. Snag density in general (greater than 8 inches DBH) averages 7 or 8 per acre.

5) Average coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre 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% 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/or 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 comprised of a grass/forb/shrub mix. Some natural openings contain individual trees or snags.

Related Plan Content

Application of Tree Density Ranges of Values

Very few studies reconstructing forest structure have been conducted in the mixed conifer[1,2]. Of those studies that have been conducted, most have focused on frequent fire, dry mixed conifer sites where ponderosa pine and/or 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 over simplified 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 on trees or stems per acre. Reconstruction studies also demonstrate a strong bias toward basalt and limestone derived soils[3]. Whether or not there is a bias to slopes under 40% remains speculative as most of the publications summarized by Reynolds and others provide very little, if any discussion about this particular physical site characteristic.

Recent work by Rodman and others[5] have 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 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, toeslopes, 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 carry 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 are not restrictive to tree growth[12]. Higher densities where local topography includes swales or concave pockets may also provide important fine scale habitat elements for some species[12].

At-Risk Species for Mixed-Conifer-Frequent Fire

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, New Mexico groundsel, Porsild's starwort, Yellow lady's-slipper

References

[1] Smith, E. 2006b. Historical Range of Variation and State and Transition Modeling of Historical and Current Landscape Conditions for Mixed Conifer of the Southwestern U.S. Prepared for the U.S.D.A. Forest Service, Southwestern Region by The Nature Conservancy, Tucson, AZ. 31 pp.

[2] Smith, E. 2006c. Historical Range of Variation for Aspen of the Southwestern U.S. Prepared for the U.S.D.A. Forest Service, Southwestern Region by The Nature Conservancy, Tucson, AZ. 21 pp.

[3] 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.

[4] 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.

[5] 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.

[6] Korb, J.E., P.Z. Fulé and R. Wu. 2013. Variability of warm/dry mixed conifer forests in southwestern Colorado USA: Implications for ecological restoration. Forest Ecology and Management 301:182-191.

[7] Moritz, M.A., M.D. Hurteau, K.N. Suding, and C.M. D'Antonio. 2013. Bounded ranges of variation as a framework for future conservation and fire management. Annals of the New York Academy of Sciences 1296 (2013):92-107.

[8] Keppel G., K.P. Van Niel, G.W. Wardell-Johnson, C.J. Yates, M. Byrne, L. Mucina, A.G.T. Schutt, S.D. Hopper and S.E. Franklin. 2012. Refugia: identifying and understanding safe havens for biodiversity under climate change. Global Ecology and Biogeography, 21:393-404. doi:10.1111/j.1466-8238.2011.00686.x.

[9] Ackerly, D.D., S.R. Loarie, W.K. Cornwell, S.B. Weiss, H. Hamilton, R. Branciforte and N.J.B. Kraft. 2010. The geography of climate change: implications for conservation biogeography. Diversity and Distributions 16:476-487.

[10] Ashcroft, M.B., L.A. Chisholm and K.O. French. 2009. Climate change at the landscape scale: predicting fine-grained spatial heterogeneity in warming and potential refugia for vegetation. Global Change Biology, 15 (3):656-667.

[11] 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.

[12] 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).

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. Both subtypes are dominated by ponderosa pine and often include Gambel oak and/or evergreen oak species, 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 Apache pine, rather than ponderosa pine, is dominant. These areas are generally limited to rhyolite/tuff TEUs within the Gila Wilderness and Aldo Leopold Wildernesses. Ponderosa Pine Forest is relatively common, representing 19% of the Forest[a]. There is also more of it on the Forest than in the broader landscape[b], providing a greater opportunity for the Forest to contribute to ecological sustainability.

Landscape Scale Desired Conditions (1,000 acres-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 grass/forb/shrub vegetation similar to historic patterns. 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/or structural diversity. The location of old growth shifts on the landscape over time as a result 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 (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 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 (10-1,000 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 78-90%.

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 acres. The mosaic of tree groups is generally comprised of uneven-aged forest with all age classes and structural stages. Occasionally, small patches of even-aged forest structure are present.

4) Snags are typically 18 inches or greater diameter at breast height and average 1 to 2 per acre. In the Gambel oak subtype, large oak snags (greater 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 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% 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/or 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 one acre, but average 0.5 acres. 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 comprised of a grass/forb/shrub mix. Some natural opening contain individual trees or snags.

Related Plan Content

Application of Tree Density Ranges of Values

Most of the studies reconstructing forest structure have been done in ponderosa pine and pine-oak systems on basalt or limestone parent materials[1]. 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. 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 there are many that 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[1]. Both of these studies were done in pine-oak systems where Gambel oak was the dominant oak species. The published literature suggests lower basal area ranges might be applicable to the perennial bunchgrass subtype[1] although the science is not without limitations. The existing science describes northern Arizona ponderosa pine systems on basalt and limestone soils well[1], but may not reflect the full range of historic variability for the rest of the Southwest[2, 3].

Applying desired conditions, HRV and landscape heterogeneity goals to this ERU will benefit from TEUI applications (see Abella and others for an example[4]) and site specific, field based development of project level desired conditions. In general, values at the low end of the range might be expected to in areas of low topographic relief and on southerly aspects. Conversely, higher tree densities might be expected in drainage bottoms, on toeslopes and northerly aspects, transition zones with PJ Woodland and PJ Evergreen Shrub, 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 carry 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 are not restrictive to tree growth[6]. Higher densities where local topography includes swales or concave pockets may also provide important fine scale habitat elements for some species[6].

At-Risk Species for Ponderosa Pine Forest

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, New Mexico groundsel, Porsild’s starwort, Yellow lady’s-slipper

References

[1] 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.

[2] Smith, E. 2006d. Historical Range of Variation and State and Transition Modeling of Historical and Current Landscape Conditions for Ponderosa Pine 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] 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.

[4] 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.

[5] 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.

[6] 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).

Ponderosa Pine-Evergreen Oak

Background Information

Ponderosa Pine-Evergreen Oak is a transition zone between the Ponderosa Pine Forest and 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 oak, silverleaf oak, grey oak, turbinella oak or Arizona white 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 grama, sideoats grama, 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% of the Forest[a]. There is also more of it on the Forest than in the broader landscape[b], providing a greater opportunity for the Forest to contribute to ecological integrity and sustainability.

Landscape Scale Desired Conditions (1,000 acres-10,000+ 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 of grass/forb/shrub associations. 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/age classes occurring as dominant individuals and small groups occurring typically within openings. In the perennial grasses subtype, shrubs occur at low densities, typically averaging less than 30% canopy cover. In the evergreen shrub subtype, shrub canopy cover averages greater than 30%.

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/or structural diversity. The location of old growth shifts on the landscape over time as a result of natural growth, death and disturbance.

5) The Ponderosa Pine-Evergreen Oak is composed predominantly of vigorous trees, but declining trees provide snags and coarse woody debris; 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 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 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 (10-1,000 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 10s of acres. The mosaic of tree groups is generally comprised of uneven-aged forest with all age classes and structural stages, though tree groups and patches may be relatively even-aged. Small patches of even-aged forest structure are present.

3) Tree density generally ranges from an average of 20 to an average of 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, and toe slopes, and in canyon bottoms.

4) Snags 18 inches or greater diameter at breast height (DBH) average 1-2 per acre; snags 8-18 inches DBH average 5 snags per acre.

5) Average coarse woody debris, including downed logs varies with seral state and ranges from 5 to 15 tons per acre; downed logs average 3 per acre.

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%, 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 native grass/forb/shrub mix reflective of each subtype. Some natural opening include large open-grown oaks.

Related Plan Content

Application of Tree Density Ranges of Values

The Madrean influenced Ponderosa Pine-Evergreen Oak ERU[1] has very limited information on which to base an understanding of stand or age structure as most studies have focused on fire history reconstructions; a single study near Durango, Mexico provides tree density reconstructions[2]. Because it is not stated in the Forest Service Regional Office's science summary and desired conditions document[3], 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[4] adapted for this ERU 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, HRV and landscape heterogeneity goals to this ERU will benefit from TEUI applications (see Abella and others for an example[5]) 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, and maintenance requirements and available tools should be provided during project development and implementation. Best efforts should be 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[6].

In general, values at the low end of the range might be expected to in areas of low topographic relief in the perennial grasses subtype (see TEU). Conversely, higher tree densities might be expected in drainage bottoms, on toeslopes 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 carry 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[7] given soil depth and physical properties are not restrictive to tree growth[8]. Higher densities where local topography includes swales or concave pockets may also provide important fine scale habitat elements for some species[8].

At-Risk Species for Ponderosa Pine-Evergreen Oak

Arizona Toad, Lewis's Woodpecker, Iron Creek Woodlandsnail, Marsh Slug Snail, Morgan Creek Mountainsnail, Western Bumble Bee, Mexican gray wolf, Cliff brittlebrush, Mimbres figwort, Pinos Altos flame flower

References

[1] 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.

[2] 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.

[3] 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.

[4] 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.

[5] 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.

[6] 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.

[7] 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.

[8] 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 near Mule Creek and Glenwood, portions of the Big Burro Mountains, and the western limits of the Mogollon Mountains, it is not strongly expressed.

Some areas on 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 the Madrean Piñon-Oak concepts.

On the Gila NF, in the "true" Madrean Piñon-Oak Woodland, two-needle piñon is the dominant pine, with border piñon codominant to subordinate. Other pines are incidental or absent. 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 Madrean Piñon-Oak Woodland on the Forest deviates somewhat from the central tendency in that the potential for a grassy understory is limited. This ERU is mapped on one TEU which is characterized by shallow, weakly developed soils on rhyolite/tuff with relatively low moisture holding capacity and fertility, and a significant bedrock outcrop component (25%). 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 bring to bear some of the PJ Evergreen Shrub and/or 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.

Landscape Scale Desired Conditions (1,000 acres-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) 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 greater average 1 per acre; snags 8-18 inches diameter at breast height average 4 per acre; large oak snags (greater than 10 inches DBH) are also a well distributed component
b. Coarse woody debris varies with seral state but averages 2-5 tons per acre

3) Infrequent mixed-severity fire (Fire Regime Group III) is characteristic, with high severity fire occurring very infrequently (Fire Regime group IV).

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

1) The majority of the woodland is in a moderately open condition with overstory tree cover averaging between 10 and 50% or more depending disturbance history, topographic characteristics and soil properties (see TEU). Higher overstory tree cover values typically occur on northerly facing slopes, toeslopes, drainage bottoms and areas where local topography includes concave pockets.

2) Tree groups vary in size 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 10s of acres.

3) All structural stages of oak are present with old trees occurring as dominant individuals and small groups.

4) Basal vegetation values vary from less than one to 5 percent depending on disturbance history, seral state, degree of tree canopy closure, soil properties and shrub species (see TEU).

5) The amount of shrub canopy cover varies between less than one to more than 30% 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 of grass/forbs/shrub vegetation associations.

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.

Related Plan Content

HRV and the State of the Science

See Schussman[1], Gori and Bate[2], and Wahlberg and others[3] for science summaries relevant to this ERU.

At-Risk Species for Madrean Piñon-Oak Woodland

Arizona Toad, Cockerell Holospira Snail, Iron Creek Woodlandsnail, Western Bumble Bee, Lesser long-nosed bat, Mexican gray wolf, Pinos Altos flame flower

References

[1] 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.

[2] 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.

[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.

PJ Evergreen Shrub

Background Information

The PJ Evergreen Shrub ERU is typically found on lower slopes in transition zones, often between Mountain Mahogany Mixed Shrubland and montane forest, and may be interspersed with other woodland types. Regionally, this ERU is a broad grouping of different plant associations for descriptive purposes, with variable species composition. It represents roughly 1% of the Forest[a]. Tree cover is greater than 10% in mid- to late seral states with piñon pine, alligator juniper, or oneseed juniper. Piñon is occasionally absent, but one or more juniper species is always present. Oak species are subordinate to piñon and juniper species, but are reliably present. On the Forest, ponderosa pine may also occasionally be present as individuals or small groups. Their establishment and persistence in this woodland setting is dependent on the timing and duration of wet and dry climatic periods. Shrub species may include mountain mahogany, silktassel, sumac, yucca, agave and beargrass. A diverse understory of native perennial grasses, forbs, and cacti are also present. Lichens and non-vascular plants such as mosses and liverworts are also important components.

Due to its relative rarity, both on the Forest and across the broader landscape[b], the Forest has a limited, but important responsibility to restore and maintain ecological integrity and contribute to sustainability.

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

1) PJ Evergreen Shrub is a mix of trees and shrubs that occurs as a series of vegetation states that move from herbaceous-dominated to shrub-dominated to tree-dominated over time. Piñon trees are occasionally absent, but one or more juniper species is always 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/or structural diversity. The location of old growth shifts on the landscape over time as a result of natural growth, death and disturbance.

3) Snags and old trees with dead limbs and/or tops are scattered across the landscape
    a. Snags 8-18 inches in diameter at root crown average 3 per acre
    b. Snags 18 inches and above average 1 per acre.
    c. Coarse woody debris, including downed logs averages 2-5 tons per acre.

4) Infrequent mixed-severity fire (Fire Regime Group III) is characteristic, with high severity fire occurring very infrequently (Fire Regime group IV).

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

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

2) The understory is dominated by a low to moderate density, well distributed shrub component ranging from less than 1 percent canopy cover to more than 30% and consisting of one or more shrub species depending on disturbance history, elevation, aspect, topography and soil properties (see TEU).

3) Native perennial grasses and annual and perennial forbs are present in the interspaces. Overall understory basal area values range from, 5 to 20 percent depending on soil properties (see TEU) and seral state.

Fine-scale Desired Conditions (less than 10 acres)

1) Trees occur as individuals or in smaller groups ranging from young to old. Typically groups are even-aged in structure.

Related Plan Content

HRV and the State of the Science

See Gori and Bate[1] and Wahlberg and others[2] for a science summaries relevant to this ERU.

At-Risk Species for PJ Evergreen Shrub

Arizona Toad, Iron Creek Woodlandsnail, Western Bumble Bee, Lesser long-nosed bat, Mexican gray wolf, Pinos Altos flame flower

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 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 (fire, insects, disease, etc.) 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.

PJ Woodland is the most common ERU on the Forest at approximately 26% of its lands[a]. There is a higher percentage of it on the Forest than in the broader landscape[b], providing a greater opportunity for the Forest 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/or structural diversity. The location of old growth shifts on the landscape over time as a result of natural growth, death and disturbance.

3) Very old trees (greater than 300 years old) are present, while snags and older trees with dead limbs and/or tops are scattered across the landscape.
    a. Snags 18 inches diameter at root crown and above average 1 per acre
    b. Snags 8-18 inches at root crown average 5 snags per acre
    c. Coarse woody debris increases from early successional states through later successional states and averages 2-5 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 (10-1,000 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 10s to 100s of acres.

3) Understory basal vegetation values (shrubs, grasses and forbs) typically ranges from less than 5% to 25%, depending on soil properties (see TEU) and seral state.

Management Approach

Restoration and Verification of the ERU Map

While working with the ERU map[a] 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 indicates 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.

Related Plan Content

HRV and the State of the Science

See Gori and Bate[1] and Wahlberg and others[2] for science summaries relevant to this ERU.

At-Risk Species for PJ Woodland

Arizona Toad, Iron Creek Woodlandsnail, Western Bumble Bee, Lesser long-nosed bat, Mexican gray wolf, Davidson's cliff carrot, Mimbres figwort, Pinos 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 (fire, insect, disease, etc.) 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 Forest (~9 and 4% respectively)[a]. There is a higher representation of PJ Grass, but a lower representation of Juniper Grass as compared to the broader landscape[b]. Opportunities for the Forest 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-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/or structural diversity. The location of old growth shifts on the landscape over time as a result of natural growth, death and disturbance.

3) 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 8-18 inches diameter at root crown average 5 per acre
    c. Coarse woody debris increases from early seral states through late seral states and averages 1-3 tons per acre.

4) Fires are typically frequent and low-severity (Fire Regime I).

Mid-scale Desired Conditions (10-1,000 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.

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% and understory vegetation basal area values averaging between about 10 and 30% depending on 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.

Management Approach

Restoration and Verification of the ERU Map

See PJ Woodland Management Approach.

Related Plan Content

HRV and the State of the Science

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

Arizona Toad, Western Bumble Bee, 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 skunkbush sumac.

This general description fits most of the Mountain Mahogany Mixed Shrubland on the Forest, much of which occurs in the Gila Wilderness. However, in the Big Burro Mountains, this shrubland is mapped in gentle sloping terrain where oak species, predominantly gray oak as a shrub lifeform, is dominant. Mountain mahogany, desert buckbrush, catclaw, silktassel, sumac and beargrass are typically subordinate. In this area, the existing vegetation is strongly influenced by historic overgrazing and granitic soils, and may represent an altered grassland state.

Mountain Mahogany Mixed Shrubland is relatively common on the Forest, representing 5% of its land area[a], but is rare within the broader landscape[b] making Gila NF management of this ERU important to ecological integrity and sustainability.

Landscape Scale Desired Conditions (1,000-10,000+ 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%, 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 (100-1,000 acres)

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

Related Plan Content

HRV and the State of the Science

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

Arizona Toad, Western Bumble Bee, 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% of the Forest[a]. The Forest is an important contributor to the sustainability of grasslands, especially the Montane Subalpine Grassland which is more common on the Forest than it is within the broader landscape[b].

Background Information

Colorado Plateau-Great Basin Grassland

This grassland ERU is typically found along elevation and temperature gradients above the Semi-Desert Grasslands and below the Montane-Subalpine Grasslands and is typically associated with woodland and/or 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, mountain muhley, Arizona fescue, pine dropseed, wolftail, and threeawn species. Historically, this ERU may have had more than 10 percent shrub cover, but had less than 10 percent tree cover.

Montane/Subalpine Grasslands

Typically found above 8,000 feet, Montane/Subalpine Grasslands often harbor several distinct plant associations with varying dominant herbaceous species. Such dominant species may include Arizona fescue, mountain, screwleaf and/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, Douglas, and/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% each.

Semidesert Grassland

The Semidesert Grassland is the warmest and driest of the grassland ERUs on the Forest and is typically associated with shrubland and/or woodland ERUs. Historically, this ERU may have had more than 10 percent shrub cover, but had less than 10 percent tree cover. Of the four Semidesert Grassland subtypes, the Foothill Grassland is the best fit for most of this system on 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 diagnostic shrubs are sotol, beargrass, and yucca, although other shrub and sub-shrub species may include yerba de pasmo, Wright's beebrush, turbinella and/or 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 and/or disruptions in the natural disturbance regimes.

All Grasslands

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

1) Vegetation is dominated by native herbaceous plants. 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%. There are inclusions of tree and/or shrub cover 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 as a result of natural growth/mortality, drought and fire.

2) Fire plays its natural role on the landscape. Vegetation height and density carry frequent, low severity fire, thereby limiting conifer encroachment.

3) There is regeneration, seed head production, and 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 (100-1,000 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 native perennial grasses and fewer forbs. Native plant species are present in all age classes and are healthy, vigorous and reproducing.

2) Biological diversity is high. In mid- to late seral states, species composition is at least 66% similar to site potential (see TEU).

3) Vegetation conditions provide hiding, nesting and thermal cover in contiguous blocks for wildlife, including small mammals and songbird nesting.

Fine-scale Desired Conditions (less than 100 acres)

1) 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.

Related Plan Content

HRV and the State of the Science

See Robbie[1], Smith and Schussman[2], Schussman[3] and Wahlberg and others[4] for science summaries relevant to grasslands.

At-Risk Species for Grasslands

Arizona Toad, Western Bumble Bee, Gunnison's prairie dog, Mexican gray wolf, Greene's milkweed, Lesser long-nosed bat

References

[1] Robbie, W.A. 2004. Grassland assessment categories and extent. 2004. In: D.M. Finch (ed.); 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. 2006b. 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 of crucial importance 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.

However, 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 300-1,000 years to form an inch of soil[2].

At an ecosystem level, soil condition assessments are conducted using the most recent Regional 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. On the Gila NF, and in the Southwest generally, soils are naturally well buffered against such changes in pH.

Desired Conditions (All Scales)

1) The ability of the soil to perform essential functions, and sustain biological productivity, overall ecosystem and watershed health and contributes 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% 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 also All Upland ERU Landscape Scale Desired Conditions).

Standards

1) Activities impacting vegetative canopy cover, groundcover and soil stability (i.e. fire activities and vegetation treatments) will be minimized on high-risk soils (see also Timber, Forest and Botanical Products and Wildland Fire and Fuels Management).

2) Best management practices (BMPs) will be followed to limit soil loss and compaction (see Appendix X: Potential Best Management Practices - still under development).

Guidelines

1) Projects and activities should incorporate the applicable management capabilities, limitations and/or relevant 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 or high-risk soils, or those with severe erosion hazards should be avoided.

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 1) proactively engages stakeholders with diverse perspectives; and 2) utilizes TEUI information during project development and implementation, wildland fire incidents and post-fire Burned Area Emergency Response (BAER) processes.

Restoration and Relationships

The Forest looks for opportunities to work collaboratively with soil and water conservation agencies and groups, permittees and other interested stakeholders to maintain and/or restore soil condition.

Related Plan Content

High-Risk Soils

High-risk soils include soils that naturally unstable and/or those that are associated with a high mass wasting hazard, or fragility class of fragile, very fragile or extremely fragile. It is a term used to here in an attempt to consolidate terminology. Upon receiving the final manuscript containing the management interpretations for the final TEUI map, the Forest intends to create a separate geospatial data layer for these soils for use in the wildland fire decision support process and projects. This would provide information to decision makers about the potential for post-fire watershed effects that might be associated any given course of action. Appendix X: Potential Best Management Practices (still under development) identifies BMPs specific to these high-risk soils that have been used successfully on the Gila NF.

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, which are 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 was removed. This interpretation is based on slope steepness; all soils on slopes greater than 40% are given a severe erosion hazard rating.

Fragility is a relatively new soil survey management interpretation that indicates the relatively vulnerability of a soil to degradation. Fragile soils have low resistance and resilience to disturbance.

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, and/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.

Naturally unstable soils are soils that experience natural soil loss rates greater than the rate of soil formation even without any disturbance. They are considered high risk soils.

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.

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

a. can be renewed as quickly as they are used up and can, in theory, last indefinitely

b. are naturally replenished within a human life-time.

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). 2005. 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 which 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 three 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's Surface Water Quality Bureau (NMED SWQB) 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 two 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). Only those perennial rivers, streams and wetlands within wilderness areas currently 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 (NMAC). 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, including fire suppression activities that may impact an ONRW have an associated reporting requirement.

The primary source of water pollution in the State of New Mexico and on the Gila NF are nonpoint source pollutants[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), sediment, metals, bacteria and nutrients. Activities potentially generating nonpoint source pollutants on the Forest 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 impact water quality on Forest (see Air Quality).

The interrelationships between watershed condition, water quality and aquatic ecosystems has 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 (NPS) Management Plan[c] 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).

[c] 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, Watershed, 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 Forest's stakeholders[2, 3]. Site and project specific best management practices (BMPs) are the primary mechanism to protect water quality (see Appendix X: Potential Best Management Practices - still under development).

Outstanding National Resource Waters (ONRWs) and Wildland Fire Management

ONRWs are protected from human activities that could negatively impact their water quality status. Fire management is the primary activity with the potential to impact ONRWs because they are all currently within designated wilderness. State regulations require fire management to limit potential degradation through the use of 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

The Forest looks for opportunities to align its priority watersheds with those identified as priorities by NMED SWQB. Coordination and partnership with NMED SWQB 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 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.

Watershed

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 forest supports many uses in southwestern New Mexico, and further 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 important to sustainability. Wildlife is more concentrated near water sources than in the surrounding landscape, and aquatic and semiaquatic species on the Gila NF 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.

The Forest is also a very 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 fractured nature of the bedrock. Alluvial recharge occurs as a result of high flow events, originating from Forest streams. The importance 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 on the Forest. Groundwater is used on NFS and 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 state designated beneficial water uses, and reduces 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)[d] 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 using 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 all 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 improvements to watershed condition at the 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. The Forest 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; (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 NF 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.

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.
    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

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

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.
    - Vegetation structure supports fire frequencies, severities and extents that are characteristic of the watershed's component ERUs (see also All Upland Ecological Response Units).
    - 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 nonnative plant composition (at least 66% 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 Nonnative 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 nonnative 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.
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.
3) Groundwater provides habitat for aquatic and riparian wildlife species and water sources for cultural uses within the forest boundary.

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 non-point source pollutants to protect beneficial uses and riparian and aquatic ecosystem values (see Appendix X: Potential Best Management Practices-still under development).

2) Landscape scale restoration activities will incorporate projects identified in watershed restoration action plans, other watershed based plans and/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 12 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) utilizes TEUI information during project development and implementation, wildland fire incidents and post-fire Burned Area Emergency Response (BAER) processes.

Restoration and Relationships

The Forest continues to link landscape and watershed scale restoration efforts. It seeks to address the root cause of watershed related issues, rather than just the symptoms, wherever and whenever possible. In this process, the Forest looks for opportunities to work collaboratively with diverse agencies and groups, permittees, volunteers and other stakeholders to maintain and/or restore watershed condition.

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.

References

[1] Conover, C.S. and P.D. Akin. 1942. Progress Report on the Ground-Water Supply of Mimbres Valley, New Mexico 1934-1941. Fourteenth and Fifteenth Biennial Reports of the State Engineer of New Mexico.

[2] 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.

[3] Potyondy, J.P. and T.W. Geier. 2011. Watershed Condition Classification Technical Guide. United States Department of Agriculture, Forest Service, Washington DC. FS-978. 49 pp.

[4] 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.

[5] 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.

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. Aquatic habitats and fish productivity are directly related to the health and function of riparian systems[1]. Therefore, riparian and aquatic ecosystem management have a strong and direct relationship.

Healthy riparian areas slow water movement that raises the water table and saturation zone and recharge aquifers. They dissipate stream energy which can reduce flood damage. Riparian zones protect streams from excessive sedimentation, erosion, and pollution, and provide shade that is important for water temperature regulation, thus playing a role in water quality. They influence patterns of available water and nutrients, and provide shelter and food for aquatic and semiaquatic animals. They are a source of large woody debris recruitment. Soils in riparian ecosystems play a key role in nutrient and water storage and distribution.

Riparian areas also 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 U.S., including important breeding habitat[2]. This and other riparian areas on 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.

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 depend 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 and/or subsequent to the disturbance.

Natural disturbances in stream ecosystems include animals (for example, beavers), flooding, and changing climatic conditions (for example, extended drought). The seasonality and quantity of water in floods are key factors in the germination and establishment of riparian vegetation. Fire is an infrequent disturbance.

In general, current scientific understanding is that natural fire frequency and severity in riparian areas is typically less than surrounding uplands[3]. Fires typically occur less often because of higher fuel moisture, soil moisture and relative humidity. Topographic characteristics of the watershed, and watershed position are also important factors[4, 3]. Fire severity can be less than, higher than, or similar to adjacent upland ecosystems depending on local topography, fire weather, fuel loading and fuel moisture[3].

Timing, as it relates to pre- and post-fire climate conditions, is an important determiner of ecological effects. Fires that occur early in annual dry periods tend to be lower in terms of severity and ecological impact as fuel and soil moisture remain relatively high. Fires that occur late in annual dry periods tend to occur at higher severity and ecological impact, as fuel and soil moistures are at their lowest. Periods of

drought magnify both fire risk and severity when it does occur. It can also reduce the ability of species to recover from fire disturbance[4, 3].

While narrowleaf cottonwood, willow, alder, sycamore may re-sprout after fire (and flood) in some regions and circumstances, willows are the only species that have been observed to re-sprout after fire with any reliability on the Gila NF. Although this has not been documented quantitatively, it has been widely observed that cottonwood, sycamore and alder do not typically re-sprout after fire, particularly along the Forest's smaller and/or non-perennial stream systems. This is of particular concern in alder communities as their thin bark makes them highly susceptible to mortality, even at low severity, and are generally composed of a single age-class. On the other hand, saltcedar is fire adapted, re-sprouts readily and can therefore displace native riparian vegetation more efficiently in the post-fire environment[3].

Riparian areas also have been, are, and will continue to be influenced by water developments and withdrawal on and off Forest, roads and motor vehicle activity, recreation pressure, and animal grazing, which can all impact riparian ecosystem function and increase risks associated with invasive species introduction, establishment and spread. Riparian areas in good initial condition are more resilient to disturbances and more resistant to invasive species establishment and spread.

Riparian condition is currently assessed and described using the interdisciplinary Proper Functioning Condition (PFC) field protocols[e], and is a dataset used in the Watershed Condition Classification described in the section on watersheds. The PFC protocol provides for the assessment of both streamside riparian and wetland areas, as well as those riparian/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, may require substantial changes in management and investments in restoration to regain function.

Riparian Management Zones (RMZs)

The following plan direction and other related content apply to riparian management zones. 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;
- Ecological or water body type;

[e] 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.

- Hydrologic and habitat connectivity;
- Width and slope of the riparian vegetation zone, soil type and/or 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 nonnative 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) 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 (see also Watershed).
    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. 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, input of leaf and organic matter, 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.
    e. Within their type and capability, riparian vegetation communities are comprised 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.
    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 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 sustains 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.
    a. Frequent flood flows (~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/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 (that is, 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 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 and/or severity.
    e. Upland and riparian plant communities are an adequate source of large woody debris, which is recruited into stream system at near natural levels.
    f. The area occupied by riparian/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.

Standards

1) Management activities and permitted uses will maintain RMZs in, or trending toward proper functioning condition (or equivalent condition class).

2) Activities in and around surface waters will follow decontamination procedures that prevent the spread of non-desirable fungus, disease, nonnative and/or invasive organisms[f].

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 non-point source pollutants to protect beneficial uses and riparian and aquatic ecosystem values (see Appendix X: Potential Best Management Practices- still under development).

4) Preferential consideration will be given to riparian and aquatic resources. Resource uses and activities will occur to the extent that they support or do not adversely affect sustainability.

5) When new groundwater wells or improvements to existing groundwater wells are proposed, either on or off-Forest, potential adverse impacts to riparian and aquatic ecosystems on Forest will be evaluated. If it is determined that adverse impacts would occur as a result of activities on Forest, special use permits will not be issued. If it is determined that adverse impacts would occur as a result of activities off-Forest, the Forest will communicate concerns to the State Engineer.

6) When new surface water diversions or changes in point of diversion are proposed, either on or off-Forest, potential adverse impacts to riparian and aquatic ecosystems on Forest will be evaluated. If it is determined that adverse impacts would occur as a result of activities on Forest, special use permits will not be issued. If it is determined that adverse impacts would occur as a result of activities off-Forest, the Forest 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 necessary to minimize potential long-term investments in maintenance and/or adverse impacts 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 where appropriate.

[f] 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.

3) When disturbance results in degraded riparian conditions, an interdisciplinary team and vested 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 and/or safety concern.

5) Projects and activities in RMZs should be designed and implemented to retain or restore natural streambank stability, native vegetation, riparian and soil function and/or prevent the introduction or spread of disease, invasive or noxious species.

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/or 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[5, 6]. 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. With limited staff and financial resources to conduct a field-based inventory and monitoring, most of the inventory work that has been completed has been associated with project level work. The Forest looks for opportunities to engage partners and volunteers to increase its ability to do this important work.

Restoration and Relationships

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 while favoring passive restoration over active restoration as appropriate. Passive restoration simply allows for recovery time. If active restoration is needed, riparian plantings and loose rock structures are preferred over other structural methods as they require minimal investment and maintenance, and are least likely to cause unintended damage in the event of structural failure. Where structural methods other than loose rock are needed, professional design expertise and demonstrated methods are preferred. As with other restoration efforts, the Forest 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, Gooding's onion, Metcalfe's penstemon, Mimbres figwort, Mogollon clover, New Mexico groundsel, Wooton's hawthorn, Yellow lady's-slipper, Gila Springsnail, NM 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, 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.

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

Geomorphic is a term describing 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 and/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.

References

[1] Knutson, K.L.; and V.L Naef. 1997. Management recommendations for Washington's priority habitats: riparian. Washington Department of Fish and Wildlife. Olympia, WA. 181 pp.

[2] Gori, D., M.S. Cooper, E.S. Soles, M. Stone, R. Morrison, T.F. Turner, D.L. Propst, G. Garfin, M. Switanek, H. Chang, S. Bassett, J. Haney, D. Lyons, M. Horner, C.N. Dahm, J.K. Frey, K. Kindscher, H.A. Walker, M.T. Bogan. 2014. Gila River Flow Needs Assessment. A report by the Nature Conservancy.

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

[4] Pettit, N.E. and R.J. Naiman. 2007. Fire in the Riparian Zone: Characteristics and Ecological Consequences. Ecosystems 10:673-687.

[5] 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.

[6] 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.

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. On 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 free from excessive 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 or minimize the alteration of naturally occurring rocky outcroppings or cliff faces.

3) Through permitted uses, 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) Through permitted uses, installation of permanent rock climbing hardware and use of motorized drills should be prohibited or restricted, 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 surface of the Earth. This definition includes any fissure (large crack), lava tube, natural pit, sinkhole, karst feature or other opening which is an extension of a cave entrance or which is an integral part of the cave. Cave resources include any material or substance occurring naturally in caves such as plant and animal life, 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). 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 on the Gila National Forest that have either been evaluated for significance, or currently are being evaluated, but at this time 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 within natural levels.

3) Cave resources, are not significantly disturbed by human activities (for example, visitor access and use). The cultural, archaeological, geological, hydrological, paleontological, biological, and scenic resources associated these features are maintained.

4) Features, characteristics, values, or opportunities for which caves have been designated or nominated as "significant" are maintained.

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 to use the cave. If gates are used, a lock and/or removable bar should be installed to allow future access for authorized personnel.

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 to use the cave. If gates are used, a lock and/or removable bar 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 (WNS) 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 of a response plan for WNS through continued collaboration with the US Fish and Wildlife Service (USFWS), Bat Conservation International, NM 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 WNS and other pathogens at local and regional levels that includes a focus on best management practices for the prevention of 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 engage 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 on the Gila NF. All of the native big game species in the state occur on 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 on the Gila NF. Wildlife, aspen, and wildflower viewing, as well as nature photography are a popular recreational activities on 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 on 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 utilize 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/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 on 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 garter snakes. 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 on 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 on the Forest and thus, comply with the National Forest Management Act diversity requirement.

The Forest Service has the ultimate responsibility for managing habitat within 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) Sustainable populations of native plant and animal species are distributed throughout a majority of their historic range and supported by healthy ecosystems and watersheds.

2) Maintenance or restoration of habitats maintains species richness and diversity through the maintenance of natural processes.

3) Life history, distribution and natural population fluctuations of species are provided for by the diversity, quantity, quality and site potential of natural habitats on the Forest.

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 by conserving and restoring habitat linkages within and, where possible, between the national forests and other public and privately conserved lands.

5) 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.

6) 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.

7) 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, stream bank and channel features provide fish habitat, regulate stream temperatures and maintain soil moisture in riparian management zones (RMZs).

8) Clean gravels for fish spawning, woody debris for hiding cover, and sites for germination and establishment of riparian vegetation are provided by stream substrates. Silt, sand, gravel, cobble, boulders and bedrock provide habitat for a diversity of aquatic, semi-aquatic and riparian species.

9) Habitat and movement corridors for species are provided for by RMZs. Barriers to movement may exist to protect native species and prevent movement of nonnative species (for example, fish barrier structures to protect Gila trout populations from nonnative fish).

10) Desirable nonnative fish species provide recreational fishing in reservoirs and other artificial waters where those opportunities are not in conflict with the recovery of native species.

11) 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.

Standards

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 6 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 generally be 25 to 30 acres in size.
   b. Goshawk Post-fledgling Family Areas (PFA's) of approximately 420 acres in size should be designated surrounding the nest sites.
   c. In goshawk foraging areas and post-fledgling 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. Deviation from recovery plans may occur at the project level through consultation with USFWS.

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 adequate 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.

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 nonnative 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 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, U.S. Fish and Wildlife Service), and other nongovernmental organizations.

Coordinate with the NMDGF and their State Wildlife Action Plans 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 on 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, 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 provide for their sustainability.

Management Approaches

Rare Plant 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 on the Forest. Identify, document, and correct any management conflicts to the species or their habitat. Such efforts could include collaboration and agreements with local universities, community colleges, state and federal agencies (for example, New Mexico Game and Fish Department, U.S. Fish and Wildlife Service), and other 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, US 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 on the forests.

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

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.

Nonnative Invasive Species

Background Information

Executive Order 13112 defines an invasive species as any plant or animal species that is nonnative (or alien) to the ecosystem under consideration, and which introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species generally possess one or more of the following characteristics: aggressive and difficult to manage; poisonous, toxic; parasitic; and/or a carrier or host of a serious insect or pathogen. Not all introduced species are invasive, and some, considered desirable. For example, the triploid rainbow trout is not native but 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 Noxious Weeds Management Act directs the state Department of Agriculture to develop a noxious weed list for the state, identify methods of control for designated species, and educated the public about noxious weeds. The New Mexico Department of Agriculture (NMDA) coordinates weed management among local, state, and federal land managers, as well as private landowners. 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[g].

Species designated as Class A and B noxious weed 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 wide-spread[1]. Class C species, are wide-spread 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 on the Gila NF. These animals are managed by other agencies such as the USDA Animal and Plant Health Inspection Service (APHIS). While there are not documented feral hogs on 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 to be unprotected and are 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.

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

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

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 world-wide, while 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 US 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 U.S. is outside areas generally known to be infested by the gypsy moth, the Forest has a long-standing (effective since 1989) Memorandum of Understanding (MOU) with APHIS to conduct detection monitoring on 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. Nonnative 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 triploid rainbow trout stocked in lakes or reservoirs.

2) Collaborative information and education programs build awareness of nonnative invasive and noxious species and the threats they pose at all levels and across all jurisdictions.

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[f] (see also Wildlife, Fish and Plants, Wildland Fire and Fuels Management).

2) 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 prior to transport and use elsewhere.

3) The Forest's livestock program and special uses must use certified weed-free hay or pelletized feed. Pastures utilized by Forest stock will be surveyed for noxious weed species annually.

4) 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.

5) Domestic goats and sheep will not be used to control invasive plants in bighorn sheep occupied range.

6) If chemical application is necessary near sensitive habitat (for example, at-risk plants or riparian areas) or developed sites, techniques (for example, buffers, type of chemical, type of application, application rate or frequency) must be applied to minimize effects.

7) Treatment of invasive plant species will be prioritized according to the NMDA noxious weed classification.

8) If feral hogs are found on the Forest, efforts to eradicate them will be made in coordination and cooperation with the NMDA consistent with the National Feral Swine Damage Management Program.[h]

9) Non-native, invasive species shall be treated using methods and in a manner consistent with wilderness character in order to allow natural processes to predominate in designated wilderness.

Guidelines

1) Integrated pest management (IPM) should 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 should be used only when physical or cultural methods are unlikely to be successful.

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 minimize the potential for the spread of noxious and invasive species.

3) Burned Area Emergency Response recommendations should include early detection rapid response actions (EDDR).

4) Desirable nonnative 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)[f].

6) Measures should be incorporated into authorized activities, project planning, and implementation to prevent, control, contain, and/or eradicate priority infestations or populations of invasive species to ensure the integrity of native species populations and their habitats is maintained.

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

7) Habitat improvement and aquatic restoration projects within or adjacent to water sources occupied by Chiricahua leopard frogs, Northern Mexican or Narrowheaded Gartersnakes, or native fish should include provisions to remove nonnative invasive animals.

Management Approaches

Early Detection Rapid Response

Although noxious and invasive species are generally not as large of a problem on the Gila NF as they are elsewhere in the nation, additional survey is needed to fully understand the status of these species. The Forest also recognizes that simply because they are generally not as large of a problem on the Forest 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 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 National Environmental Policy Act (NEPA) analysis and Clean Water Act permitting processes, required for chemical use. In particular, the Forest intends to expand upon the herbicide NEPA it currently has in order to facilitate rapid response actions in the future.

Integrated Pest Management and Relationships

The Forest seeks opportunities to develop and/or improve relationships with other agencies, organizations, volunteers and other stakeholders, including Cooperative Weed Management Areas (CWMAs)[g]. CWMAs represent partnerships between federal, state and local governmental agencies, tribes, individuals and non-governmental agencies to manage noxious and/or 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 Forest are located in the established Southwestern New Mexico, Sierra and Socorro/Catron CWMAs. As with EDDR, collaboration and coordination amongst stakeholders contribute to the success of integrated pest management approaches to nonnative invasive and noxious species management.

Survey and Documentation Strategy

During project level work, Forest personnel 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 and/or disturbance second (for example, material pits, trailheads, campgrounds, corrals, roads, boat ramps and bridges).

Geographic Information Systems (GIS) is the preferred database of record.

Plant Identification

Whether by Forest personnel, 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. The Forest seeks verification of correct identification from professional botanists prior to investing in treatment.

Information, Education and Research

The Forest supports information sharing, education and research related to nonnative 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. The Forest looks for opportunities to invest in conservation education that includes a nonnative invasive and noxious species component and to participate in collaborative education programs with NMDA and the Cooperative Extension Service through New Mexico State University.

Glossary

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 p

[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 p.

[3] National Invasive Species Council. Management Plan: 2016-2018. 2016. Washington D.C., 42 p.

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

Air Quality

Background Information

Air resources on national forests are an important 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 that national forests can 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 (NAAQS) set by the Environmental Protection Agency (EPA) for seven pollutants considered harmful to public health: carbon monoxide, lead, nitrogen dioxide, particulate matter 10 microns in size or smaller (PM_{10}), particulate matter 2.5 microns in size or smaller ($PM_{2.5}$), ozone, and sulfur dioxide[i]. 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. 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)[1] 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.

The EPA defines nuisance smoke as the amount of smoke in the ambient air that interferes with a right or privilege common to members of the public, including the use or enjoyment of public or private resources. Complaints of the odor or soiling effects of smoke, poor visibility, and impaired ability to breath or other health-related effects are common examples. While no laws or regulations govern nuisance smoke, it effectively limits the opportunities of land managers to use fire to manage resources. Public outcry regarding nuisance smoke often occurs long before smoke exposures reach levels that violate NAAQS.

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/or climatic patterns, whereas surface water does not naturally move between watersheds. This means that the Forest and surrounding communities may be impacted by air quality issues that Forest managers has little or no influence over. Examples include 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 off-Forest emissions and atmospheric deposition of mercury into local reservoirs also occur.

The primary air quality issue the Forest has the most influence on is particulate matter associated with smoke and dust generated on Forest. The NAAQS 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

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

air and penetrates deeply into the lungs. Ozone is also a NAAQS 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.

The Gila NF complies 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[j] 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 NMAC 20.2.65, the prescribed fire must be postponed. Prescribed fire can also be postponed on the order of NMED Air Quality Bureau for other reasons. Wildfires must be registered at 100 acres or greater.

The Forest 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[k]. 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 on the landscape.

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 has the potential to be carried for many kilometers. These impacts can be reduced or mitigated with 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 utilizing 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 on and off Forest, is timely, wide-reaching and comprehensive.

[j] https://www.env.nm.gov/air-quality/smp/.
[k] https://app.airsis.com/USFS/Units/Details?custId=2&unitId=1035.

4) Air quality related values, including high quality visibility conditions are maintained or improved over the long-term in sensitive Class I and Class II areas on 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.

Standards

1) Air quality will be taken into consideration in all activities to meet regulatory requirements and maximize positive outcomes.

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.

3) If an entity in the vicinity of the Forest proposes an increase or change in emissions, the Forest will evaluate and comment on that proposal with external expert assistance as appropriate.

Guidelines

1) Project design for prescribed fires should incorporate identification of smoke sensitive areas and incorporate as many emission reduction techniques as feasible, subject to economic, technical, and safety criteria (see also Appendix X: Potential Emission Reduction Techniques - still under development).

2) Strategies for managing wildfires may incorporate emission reduction techniques as feasible, subject to economic, technical, and safety criteria.

3) Dust abatement should occur during project implementation where dust impacts are a concern.

Management Approaches

Smoke

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 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 the Forest holds itself 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 on the Forest supports the agency's efforts to 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 provide information to the public and aid fire managers in decision making. Wildfire incidents occurring on the Forest 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 and it is important that land managers be responsive to the public's tolerance. Burn plans are developed for prescribed fires and contain measures to limit nuisance smoke in relation to the predicted weather and ventilation conditions. Appendix X: Potential Emission Reduction Techniques (still under development) provides examples of measures that could be implemented if they are appropriate to the specific situation and likely to be effective. Coordinating the timing and duration of prescribed fires across the Forest and across other jurisdictions contributes to minimizing impacts to regional air quality.

The Forest welcomes opportunities to partner with local governments to bring an air quality/smoke workshop to local communities in the future, and is soliciting comment on level of interest and potential workshop content.

Atmospheric Deposition

The Forest seeks 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] NMED (New Mexico Environment Department). 2011. Revision to the New Mexico state implementation plan for regional haze.

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. The 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 NF'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 unique 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 an important consideration 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 essential 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 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 impact the success of how the Forest Plan is implemented. With the challenges faced by the Forest today, strong working relationships with all stakeholders, partners and volunteer groups are necessary to increase capacity and help meet desired conditions in order to care for the land and serve the people.

Desired Conditions

1) The Gila National Forest 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 Gila National 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 lands and resources is understood and appreciated.

Desired Conditions (continued)

4) The Gila NF has a network of dependable partners and volunteers who provide additional capacity to effectively and efficiently meet 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 and connect people with public lands and foster a sense of stewardship.

6) Historically unrepresented communities and partners are represented and 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. Utilize 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 corridors, span multiple administrative boundaries.

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.

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 on the Gila NF through websites, brochures, conferences and other educational/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 utilization 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 National Forest 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 National Forest 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 valued and used by the tribes for a variety of purposes have been identified on every district of the Gila National Forest. Areas can possess traditional cultural or religious significance for a number of reasons. Some of these reasons include locations with long-standing cultural use, locations of buried human remains repatriated under NAGPRA, locations where ceremonial objects have been retired, locations of contemporary ceremonies, and locations where specific 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 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 (TCPs), 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 (TCPs), 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 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, in order 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 TCPs (and other sacred sites) collaboratively with associated communities. Educate the public where appropriate on the importance of sacred sites and TCPs and issues related to their management, while protecting confidential and/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 the locations of numerous Historic Properties and Traditional Cultural Properties.

Archeological site densities vary from 5 or fewer to over 25 sites per square mile with only about 12% 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, a total of 6,168 archaeological sites had been recorded on the Gila National Forest. Based on current data, roughly 84 percent of the archaeological sites within the Gila National Forest are associated with its prehistoric occupation (ca. 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 on the Gila NF have been formally listed on the National Register of Historic Places (NRHP). Roughly 33 percent of all cultural resources in the Gila National Forest have been recommended as being eligible for inclusion in the NRHP, and only seven percent of all resources have been recommended as being not eligible for inclusion in the NRHP. The eligibility of the remaining 59 percent of known cultural resources for inclusion in the NRHP is currently undetermined. While the data should be treated as anecdotal, disturbances brought about by bioturbation, wind and water erosion, construction/land development, and vandalism have increased through time on all districts comprising the plan area. Cultural sites on 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 impacted cultural resources. Damage from vandalism (for example, pilfering) 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 and/or avoiding negative impacts to cultural resources.

Desired Conditions

1) Historic Properties and other cultural resources that may be eligible to the National Register of Historic Places are stable and retain site integrity.
2) Impacts to cultural resources from vandalism, looting, and other human impacts are minimal.
3) Cultural resources are evaluated for their eligibility to the National Register.
4) The public has opportunities to learn about, appreciate, and understand cultural resources.
5) The public has opportunities to participate in the identification, protection, and preservation of cultural resources.
6) Historic and prehistoric sites, including known American Indian sacred places and traditional cultural properties, are preserved and managed for their cultural importance.

Guidelines

1) Building and infrastructure listed on or eligible to the National Register of Historic Places should be maintained to preserve their historic integrity, while also fulfilling their roles as administrative and recreational facilities, and other infrastructure functions.
2) Cultural artifacts should be preserved in place, except when endangered, then they should be curated following current professional standards.
3) When adverse effects to cultural resources occur, known communities to whom the resources are important should have the opportunity to be involved in the resolution of adverse effects.
4) 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.
5) Heritage-based interpretive sites should be managed to enhance the public's understanding of the resource, protect and preserve the resource, and be consistent with tribal interests to protect the cultural setting of the site and visitor experience.

Management Approaches

Interaction with other Program Areas

Early involvement of staff from all program areas during project development helps ensure that diverse resource concerns are taken into consideration 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 on-going 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; (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.

Maximize opportunities for partnerships and volunteerism in all heritage program elements. 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 process of the National Historic Preservation Act. 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 on the Forest. 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 uncharacteristic fire. The most important value is human life and safety.

Wildland fire and fuels management implements a coordinated risk management approach to build 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 (NIFC) Guidance for the Implementation of Federal Wildland Fire Management Policy[l] 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 NIFC guidance.

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. 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 NEPA 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 positive, or negative ways. For example, watershed impacts and recovery time increase when two high severity fires occurs on the same piece of ground with insufficient recovery time in between. On the other hand, multiple fires within an area over time can limit fire size, intensity and undesirable 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, hazardous 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, duration and/or mitigate rate of fire spread, thereby restoring or maintaining natural fire regimes and reducing negative 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 as described in plan direction for each ERU.

[l] 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/or the 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), rather 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 4: 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 wildfires, an interdisciplinary analysis is performed using a tool like the Wildland Fire Decision Support System (WFDSS)[m], and signed by the decision maker.

Desired Conditions

1) Firefighter, other agency personnel and public safety 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, damage to property, and/or ecosystem and watershed function.

2) Fire management uses an all lands, landscape approach which 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 are 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 crosses on to other ownerships, or moves from other ownership on to the Forest (see Chapter 4: Management Areas Wildland Urban Interface (WUI)).

[m] 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 natural process integral to sustainability and 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 on and off Forest; 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 and/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, uncharacteristic patch sizes rarely occur.

6) Nonnative 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 on 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 Nonnative 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.

6) Annual landscape risk assessments will address all resource concerns including high risk soils (see also Soils Related Plan Content High-Risk Soils).

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 suppression actions (rather than the fire itself), relevant soil and geologic information should be considered (see also Soils Related Plan Content High-Risk Soils).

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 4: 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].

The Gila 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 other programs. The more locally relevant the information about historic variability in fire regime characteristics, the greater consideration it should be 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 on 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. The Forest looks for opportunities to balance maintenance with forward progress.

Annual Pre-Season Landscape Risk Assessment

Every year before fire season begins, the Forest brings together resource specialists from all disciplines 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. The Forest then engages 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. The Forest continues to hold these annual pre-season landscape risk assessments and carries concerns identified through this process 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 result of any suppression action from any wildland fire, the Incident Management Team and Forest personnel representing the affected program area identify needs for immediate repair or reconstruction and prepare and emergency repair or reconstruction plan. The Incident Commander communicates with the Agency Administrator who holds the decision authority for approving the 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. Applying this management approach improves relationships, builds support for restoring fire to the landscape, and helps maintain the Forest's ability to support existing multiple uses.

Hazardous Fuels and Relationships

Relationships play a pivotal role in the success of the Forest's hazardous fuels program. From identifying and setting priorities, designing projects, funding implementation, to implementation itself, the Forest can only be successful if existing relationships are strengthened and new relationships are developed. The Forest continues to work with its partners and stakeholders involved in the Community Wildfire Protection Plans (CWPPs), Joint Power's Agreement, Cohesive Strategy and Collaborative Forest Restoration Program (CFPR) to meet the broad intent and goals of those plans and provide products to people. The WUI is the hazardous fuel treatment priority.

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[13,14] 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.

References

[1] Agee, J.K. 1993. Fire ecology of Pacific Northwest forests. Island Press. Washington, DC. 490 p.

[2] Moritz, M.A., M.D. Hurteau, K.N. Suding, and C.M. D'Antonio. 2013. Bounded ranges of variation as a framework for future conservation and fire management. Annals of the New York Academy of Sciences 1296 (2013):92-107.

[3] Weins, J.A., H.D. Safford, K. McGarigal, W.H. Romme, and M. Manning. 2012. What is the Scope of "History" in Historical Ecology? Issues of Scale in Management and Conservation. in Historical Environmental Variation in Conservation and Natural Resource Management, eds. Wiens, J.A., G.D. Hayward, H.D. Safford, and C.M Giffen. Chapter 5 pp. 63-75.

[4] Baisan, C.H.; and T.W. Swetnam. 1990. Fire history of a desert mountain range: Rincon Mountain Wilderness, Arizona, U.S.A. *Canadian Journal of Forest Research* 20(10): 1559-1569.

[5] Schoennagel, T., T.T. Veblen, and W.H. Romme. 2004. The Interaction of Fire, Fuels and Climate across Rocky Mountain Forests. BioScience 54:7 pp. 661-676.

[6] Touchan, R.A.; C.D. Allen; and T.W. Swetnam. 1996. Fire history and climatic patterns in ponderosa pine and mixed-conifer forests of the Jemez Mountains, northern New Mexico. Pp. 33-49. In: Allen, C.D., (ed.), Proceedings of the second La Mesa fire symposium: fire effects in southwestern forests. March 29-31, 1994; Los Alamos, NM. General Technical Report RMRS-GTR-286. USDA Forest Service, Rocky Mountain Research Station. Fort Collins, CO. 216 pp.

[7] Abolt, R.A.P. 1997. Fire Histories of Upper Elevation Forests in the Gila Wilderness, New Mexico Via Fire Scar and Stand Age Structure Analyses. Master's thesis submitted to the faculty of the School of Renewable Natural Resources, University of Arizona.

[8] Parks, S. A., L.M. Holsinger, C. Miller and C.R. Nelson. 2015a. Wildland fire as a self-regulating mechanism: the role of previous burns and weather in limiting fire progression. Ecological Applications, 25(6), pp. 1478-1492.

[9] Rollins, M., Swetnam, T. and P. Morgan. 2000. Twentieth-Century Fire Patterns in the Selway-Bitterrot Wilderness Area, Idaho/Montana, and the Gila/Aldo Leopold Wilderness Complex, New Mexico. In: Cole, David, N, S.F. McCool, W.T. Borrie and J. O'Loughlin, comps. 2000. Wilderness science in a time of change conference - Volume 5: Wilderness ecosystems, threats, and management; 1999 May 23-27, Missoula, MT. USDA Forest Service Rocky Mountain Research Station, Proceedings RMRS-P-15-Vol-5.

[10] Baisan, C.H., and T.W. Swetnam. 1995. Historical landscape patterns of fire occurrence in remote mountains of Southwestern New Mexico and northern Mexico: a cross-border comparison. Pp. 153-156. In: Brown, J.K. (ed.), Symposium on Fire in Wilderness and Park Management, Mar 3-Apr 1, 1993; Missoula MT. General Technical Report INT-GTR-320. USDA Forest Service, Rocky Mountain Research Station. Ogden UT. 283 pp.

[11] Margolis, E.Q.; T.W. Swetnam; and C.D. Allen. 2011. Historical stand-replacing fire in upper montane forests of the Madrean Sky Islands and Mogollon Plateau, southwestern USA. Fire Ecology 7(3): 88-107.

[12] Krofcheck, D.J., M.D. Hurteau, R.M. Scheller, and E. L. Loudermilk. 2017. Prioritizing forest fuels treatments based on the probability of high-severity fire restores adaptive capacity in Sierran forests. Global Change Biology. DOI: 10.111/gcb.1393.

[13] Scott, J.H., M.P. Thompson, and D.E. Calkin. 2013. A Wildfire Risk Assessment Framework for Land and Resource Management. General Technical Report RMRS-GTR-315. United Stated Department of Agriculture, Forest Service, Rocky Mountain Research Station. 83 p.

[14] USDA FS (United States Department of Agriculture – Forest Service). 2017. Southwestern Wildfire Risk Assessment: 2017 Regional Wildfire Risk Assessment Results. Unpublished paper. Southwestern Region, Fire and Aviation Management. Albuquerque, NM. 41 p.

Water Uses

Background Information

Water is considered an ecological resource and an important 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 National Forest. 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 below. The Gila NF has 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. The four basic rules that govern New Mexico water law are as follows:

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 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, changes in point of diversion, or enlargements. Stream systems and underground basins as outlined by the State Engineer determine which rules and regulations each water right claim will fall under. Spring developments and stock tanks fall under surface waters which are regulated by stream system, while wells fall under groundwater, which is regulated by declared groundwater basin. Approximately 75% of the Gila NF lies within the Gila-San Francisco stream system and its associated groundwater basin. The remainder of the Forest lies within the Little Colorado, Rio Grande, Lordsburg, Animas and Mimbres stream systems and their associated groundwater basins. Maps of the New Mexico stream systems and groundwater basins can be found on the State Engineer's website[n].

[n] http://www.ose.state.nm.us/HydroSurvey/index.php and http://www.ose.state.nm.us/GIS/maps.php.

While similar in many cases, the map boundaries are not the same as the National Hydrography Dataset watershed currently used by the Gila NF and coordination is always necessary to ensure that State Engineer maps are used for water rights claims.

The Gila-San Francisco stream system has 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 the Forest constructed in this stream system after July 3, 1978, where the Gila NF 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), the Forest 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, including surface water for livestock.

There are 29 declared groundwater 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 Forest 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 (A) continuous supply of timber, including water for such things as administrative sites, road construction for timber, forest fires, etc. and (B) 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 utilize 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 on 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 on the Silver City Ranger District over a 10-year period.
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 on 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). Acequias that existed on unreserved public lands for use in connection with a valid water right, prior to the withdrawal of public lands to create the national forests, are afforded valid rights and status under National Forest System management. Much of the water diverted by acequias comes off of NFS lands and can be affected by forest management activities upstream. Acequias are still relevant and vital water delivery and community organizing systems today. There are currently 30 acequias or community ditches that depend on water that flows from the Forest. 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 on 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 on Forest.
4) Water uses on the Forest support state water conservation and the public welfare.
5) Acequia and community ditch systems on NFS lands are accessible for operation, maintenance, repair, and improvement.

Guidelines

1) Acequia and community ditch associations should be provided access to operate, repair, maintain, and improve acequia infrastructure located on NFS lands.

Management Approaches

Reserved and Permitted Water Rights

The Forest 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 on the Forest.

Conservation and Relationships

The Forest seeks to make the most efficient use of existing water sources to benefit the public and multiple uses on the Forest. As opportunities arise, the Forest seeks 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 on 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, enabling managers 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, inconvenience, and additional costs.

Some range infrastructure is in poor condition or is non-functional due to age, lack of maintenance and/or poor design features or locations, or damage associated with recent fires. Permittees and the Forest 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 down 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 help to preserve the rural landscape, cultural heritage and long-standing tradition.

2) Livestock use provides for conditions that support natural fire regimes.

3) Livestock use is compatible with the desired conditions for ecosystems, soils, watersheds, species and other activities and resources.

4) Range infrastructure facilitates livestock management, allows wildlife safe and reliable access to water, provides for habitat connectivity and wildlife movement, and does not negatively impact the safety of forest users or Forest Service personnel.

Standards

1) Livestock numbers will be compatible with capacity and management addresses any relevant resource concerns (for example, forage production, invasive plants, wildlife habitat needs, soils, water quality, and/or riparian and aquatic ecosystem health).
    a. Recommended project specific Best Management Practices (BMPs) will be followed to protect, maintain, or enhance soil, water, riparian, and aquatic resources.

2) 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).

3) New livestock handling facilities designed to hold and/or concentrate livestock (for example, corrals, traps, water developments) will be located outside of RMZs, known archeological sites and known occupied sites of at-risk species.

4) Permit conversions to domestic sheep or goats will not be allowed to minimize the risk of disease transfer to bighorn sheep.

5) As part of all management activities range infrastructure and associated materials (including barbed and smooth wire, storage tanks, pipeline, etc.) that are non-functional, no longer needed, or in excess of what was needed for maintenance, reconstruction or construction, will be removed to provide for the safety of forest visitors, wildlife, recreational and permitted livestock, and aesthetics. "Pack it in-pack it out" requirements will be incorporated into contracts, permits, and agreements. Forest personnel will resolve any such safety hazards identified during project or incident activities.

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 without impeding 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 or known archaeological sites soils (see also Soils).

3) Mineral (for example, salt) or vitamin supplements should not be allowed within 0.25 miles of water unless special circumstances dictate a short-term management need and prior written approval from appropriate line officer is issued and on file.

4) Restocking and management of grazing allotments following wildfire, mechanical vegetation treatment or other disturbance should be evaluated by an interdisciplinary team and vested parties to evaluate readiness. Livestock use of recovering riparian vegetation should be managed to maintain or improve canopy cover of native riparian and/or wetland species, including regeneration of woody riparian species.

5) Vacant allotments should be considered for use by holders of a current permit during times or events when their allotment(s) require growing season recovery time as a result of wildfire or other disturbance, or to minimize livestock and wildlife conflicts.

6) The Forest should follow the most current version of the Southwestern Regional drought plan.

Management Approaches

Livestock and Wildlife Conflicts

Management for threatened and endangered species, species of conservation concern and/or rare or endemic species also present challenges. 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 U.S. Fish and Wildlife Service. 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 utilize the streamlined grazing process and follow the guidance criteria. See also Restoration and Relationships below.

Restoration and Relationships

Restoration presents both opportunities and challenges for grazing permit holders and the Forest. 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. 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 (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 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 wolves, they may be considered for conversion to forage reserves.

Range Infrastructure and Partnerships

Grazing permittees are 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 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 and others to leverage resources and improve management flexibility.

Unauthorized and Excess Livestock

Unauthorized and excess livestock use is an ongoing challenge. Although livestock grazing is allowed within wilderness areas, unauthorized and/or excess livestock use is prohibited by law, regulation, and policy regardless of where it occurs. Such use may also detract from ecological sustainability and negatively impact those permittees who may be affected by such use.

On the Gila NF, the bulk of the issue involves unauthorized, unclaimed cattle in unalloted 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 employ more effective methods to address unauthorized, unclaimed livestock.

Glossary

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 administer 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 laces other than permitted under Part 1 of the grazing permit or authorized on the annual Bill for Collection.

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, and/or does not detract from it. There are areas on 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 uncharacteristic 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). The Forest is currently working on part of that analysis and will share progress with stakeholders in the near future. Most, but not all of the standards and guidelines contained in this preliminary draft plan direction serve to meet those requirements.

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 and/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 uncharacteristic 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 provides 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 uncharacteristic 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, have an irregular, unscheduled timber harvest program. 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 5: Suitability).

3) No timber harvest for any purpose shall occur where soil, slope or other watershed condition would be irreversibly damaged (see Chapter 5: Suitability).

4) Lands suited for timber production will have a regulated timber harvest schedule.

5) Recommended project specific Best Management Practices (BMPs) will be followed to protect, maintain, or enhance soil, water, riparian, aquatic and air resources.

6) Project planning and implementation must provide for forest health through detection, monitoring and control.

7) 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 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% CMAI as measured by cubic volume) prior to regeneration harvest unless such harvest would assist in reducing fire risk within the WUI, or when such harvest will trend landscapes toward the desired conditions for the relevant ERU(s).

8) When selecting the timber harvesting system, consider cost efficiency, infrastructure and harvest requirements, 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 which can be removed annually in perpetuity on a sustained-yield basis (see Chapter 5: 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 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 and/or 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 and patch size (see All Upland Ecological Response Units and individual Ecological Response Unit desired conditions).

4) Projects and activities should ensure harvested lands are adequately restocked within five years of final regeneration harvest.

5) Where ponderosa and/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.

6) 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. Retain representation of healthy spruce and/or corkbark fir where it occurs.

7) 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 4: Management Areas).

8) Natural reforestation should be the preferred method unless there is an inadequate seed source. 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 undesireable native and/or 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 utilization of forest products that result from restoration activities. The Forest continues to: 1) design projects to accommodate both small and large scale operators; 2) look for opportunities to encourage the utilization of forest products generated by efforts to increase safety and site distance in transportation corridors and; 3) work with tribal members to facilitate collection of forest products needed for traditional, ceremonial and subsistence purposes.

Firewood Program

Firewood harvesting is a long-standing traditional use on the Forest, as it is the sole source of heat for many local residents. Collecting firewood without a permit and/or outside of designated areas is illegal, 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.

Reforestation Program

Reforestation success is unpredictable in the Southwestern climate, in the sense that it can take decades 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 implement 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 silviculturalist that describes the number of seedling, saplings and other size classes that must be established to provide for a sustainable supply of timber into the future.

Artificial reforestation/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 a single age class. 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/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 in order to recover economic value what would otherwise be lost.

Sanitation harvest is timber harvest for the purpose of 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 the purposes of 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.

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, which is administered by the Gila National Forest, is primarily land which was 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 which is located in New Mexico was combined administratively with the Gila National Forest 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, there have been numerous land transactions which 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 access to the Forest. Land adjustments consolidate and improve management efficiency through real estate transactions including sales, purchases, exchanges, conveyances, and rights-of-way 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 respect common property boundaries.
3) All interior and exterior boundaries of NFS administered land have been surveyed, posted, and monumented. 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/encroachments) no longer occur on the Forest.
5) Owners of private inholdings have reasonable and appropriate access across the Forest to reach their property.
6) Documented road and trail easements enable adequate access to areas on 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 structure and may differ from the surrounding vegetation desired conditions.

Standards

1) Reasonable access to privately owned property surrounded by NFS lands shall be provided to interested applicants, subject to reasonable terms and conditions, as required 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 and/or loss of valued NFS land and its resources.
    e. All remaining property lines.
3) Land status records should be maintained and continually updated.
4) Land exchanges should not result in the creation of isolated NFS parcel inholdings surrounded by other ownerships.
5) Land acquisitions and exchanges should evaluate, and possibly include, associated beneficial encumbrances (for example, water rights, mineral rights, easements, etc.).
6) Land exchanges should not result in a net decrease of riparian, wetland, or perennial stream habitat in National Forest ownership.
7) Inholding patented properties (whether individual or multiple ownerships) should have only one ingress and egress access point to the inholding.
8) Acquired easements should include public access in addition to administrative access.
9) 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.
10) All road easements for roads which the maintenance responsibilities are transferred or delegated should be retained by the United States, as these easements have value and the government wants to ensure that the easement is retained in case the road is turned back 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, leases, and easements and their justification to make an opportunity available 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 which 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 for the protection of significant historical or cultural resources when these resources are threatened or when management may be enhanced by public ownership.
- Lands needed for protection and management of 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 or ecological value, and the transfer does not impact public access or resource management objectives.
- Parcels having 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

In order to reduce encroachment and trespass issues along property boundaries, education, partnerships and law enforcement are used. Survey and proper posting of boundaries between NFS lands and other lands is a key objective. Bureau of Land Management 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 uses, 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 rights 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, public users and cost-share cooperators. 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.

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 to provide these services to the public. Special uses are divided into two categories - lands and recreation. Most of the direction for managing special uses is specified in Forest Service directives.

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 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 on 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 are administered in a manner that protects public health and safety, conserve natural resources, and are consistent with National Forest System management plans.
5) Special uses are administered on the basis of sound resource management objectives and business principles.

Standards

Communication Sites

1) Maximize the colocation of new and existing buildings and structures.
2) Site use shall be allocated to users on a facility-need basis.
3) 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).
4) 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).
5) 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.
6) All new and replacement towers must be self-supporting.

Guidelines

1) When possible, all special uses should have expiration dates, to insure that the authorizations are updated on a regular basis.
2) All single purpose uses should be documented and authorized by a permit or other authorization.
3) 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.
4) The color of buildings and towers at communication sites should blend into the landscape where possible. Reflective materials should not be used.
5) 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.

Management Approaches

Special Use Permit Management

Special Uses are evaluated to ensure the need of NFS land is mandatory to accomplish the objective sought and suitable private land is not available. 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.

Minerals

Background Information

It is Forest Service policy to support responsible, environmentally sound energy and mineral development and reclamation. How minerals may be searched for or acquired on the National Forest is prescribed by Federal law and mineral type. 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 on 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/mineral materials/ 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 on the Forest are limited. There are no known commercial quantities of leasable minerals (that is, coal, oil, oil shale or natural gas) on the Gila National Forest. There is currently little to no renewable energy production on the Forest; although, the potential for solar, wind, and geothermal energy sources does exist. Currently, there are two large high voltage transmission lines that cross the Gila National Forest, 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 is an endeavor which has resulted in large quantities of ore having been mined and processed from the area, even prior to the establishment of the National Forest. 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 on the Gila National Forest are carried out to facilitate the development of mineral resources and contribute to local, national, and global markets for valuable commodities. The Gila National 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 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.

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 on 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) The United States of America usually acquires the mineral rights on lands it acquires. For those lands where the mineral estate is owned by the Federal Government, any mineral activity on these lands, if allowed, must be negotiated and approved by the USA prior to any type of mineral assessment and/or entry.

Guidelines

1) Structures and/or occupancy for mining purposes will 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 into its source location for stream stability as soon as possible following its processing.
4) To the extent possible, 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 which 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). 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 land fill 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), if possible. (See also Caves and Abandoned Mine Lands)

Management Approaches

Relationships

Coordination of the Gila National Forest'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 BLM under the current Memorandum of Understanding (MOU) is desirable and advantageous to all agencies. Sharing information regarding mining operations and mineral claimants on the Forest creates opportunities to ensure consistency with operational and closure requirements, and helps to share resources by coordination of 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, in case 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 on the Forest

In the past, the Forest has had numerous mining operators declare that they need 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 used as an excuse for someone to reside for free on the National Forest. Their presence deterred others from even venturing on to the area, as the land area was considered the resident's property. Because of situations like this, the case for any kind of residence on a mining claim on the Forest in support of a mining venture should be shown to be necessary. This necessity should be proven and continued 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 on the Gila National Forest goes hand-in-hand with all mineral activities and operations. Each operation has a reclamation component which 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 posted 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.

If paleontological resources are discovered consult the Forest Handbook for the appropriate actions.

Information for Recreational Prospecting

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

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 caused problems to other resources such as causing erosion, alternation of stream channels, riparian habitat damage, etc. Because of this, quarries and areas where the materials exist need to be studied to ensure that removal of the material will not have adverse effects on other resources.

The demand for these mineral materials from the Gila National Forest is low, though important since 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. The quantities desired usually determines 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, Forest Service use and other governmental use as appropriate with other resources, and subject to applicable laws, regulations, offered locations and availability.
2) Quarries and other areas set up for this extraction are convenient and accessible, and have been analyzed and mitigated for possible effects to other resources.
3) Mineral material mining activities are conducted in a manner which minimizes adverse impacts to other surface and subsurface resources.

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) Mineral material resource sites should be located where economical and the scenic integrity objectives can be met. Adverse visual impacts should be minimized.
2) Existing designated mineral material collection areas and community pits should be fully utilized before new areas are developed. Additional mineral material development should balance private and community needs, while providing for sustainable administrative use.
3) 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.
4) Streambed and floodplain alteration or removal of material should not occur if it prevents attainment of riparian, channel morphology, or streambank desired conditions.
5) 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.
6) 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).
7) Personal use mineral material sites should be monitored to prevent resource damage due to over use.
8) Once a borrow site is depleted of desirable materials, or if resource damage is occurring, the site should be closed and a different site should be used for future permits.
9) 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 on 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

Access to the Gila National Forest is accomplished through a network of federal, state, and county routes. Several different agencies are responsible for keeping these roads open and safe for all users year-round. 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 because they can safely access and experience the Forest on NFS roads. Gaining access to the Forest through roads are important 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 provide a systematic process for Forests to set priorities, plan, budget, schedule, perform, and evaluate maintenance of Forest roads. When roads are scheduled for maintenance, the maintenance performed should meet the maintenance criteria for the road's assigned Maintenance Level (ML). Maintenance Levels range from 1 to 5. A ML 1 road is closed and a ML 5 is associated with roads providing the highest level of service. NFS roads managed as ML 3, 4 or 5 are subject to the Highway Safety Act. These roads see more traffic traveling at higher speeds than ML2 roads and thus, more time and money are directed to the maintenance of these facilities.

The Forest's Motorized Vehicle Use Map (MVUM) shows 3,334 miles of National Forest System roads open for motorized use by the public. There are an additional 329 miles of routes designated for administrative use or by written authorization only and 908 miles of closed National Forest System roads. Approximately 2,932 miles (88%) are ML 2. The remaining designated NFS roads (402 miles or 12%) 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 end result is a transfer of nearly 400 miles of National Forest System roads to Catron and Grant counties.

Roads across the Forest are important for access and fire management, and facilitate multiple-uses, but can have potential 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 the maintenance of 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 the maintenance challenges through 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. Where appropriate, 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 recreation opportunities including varying degrees of difficulty, from motorized trails to paved scenic byways, while limiting resource and user conflicts.
3) Bridges and other roadway features are maintained 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 naturalized to reduce impacts to ecological resources (that is, watersheds, wildlife and fish habitat, and soil erosion).

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.

Guidelines

1) Roads should be located, designed, and maintained considering other uses and resources to achieve the Forest's desired conditions.
2) Road construction and maintenance should incorporate Best Management Practices (FSH 2509.22 - Soil and Water Conservation Practices Handbook, FS-990A) to minimize impacts to water quality.
3) Construction and maintenance of roads and trails should accommodate appropriate terrestrial and aquatic wildlife species movement and habitat connectivity.
4) Construction of new roads should be minimized in riparian areas.
5) 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 in order to develop contiguous road systems across multiple ownerships. 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. 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 ROS 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 having the following factors: redundant routes, cause 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 after 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 a variety of purposes to 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.

The 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 deterioration of performance, increased costs to repair, and a decrease in 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 provide 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. Previously developed systems that no longer serve the current needs are appropriately decommissioned and the site is returned to its natural state.
5) Facilities are in compliance with applicable accessibility guidelines and current building or occupancy standards.

Guidelines

1) Emerging technologies and sustainable concepts consistent with the Built Environment Image Guide[1] should be incorporated in facility design, maintenance, and renovation in order to improve energy efficiency, conserve water and other natural resources, improve functionality and ensure consistency with the scenic character of the Gila National Forest.
2) Construction of new facilities in floodplains, wetlands, and other environmentally sensitive areas should be avoided. When a practical alternative does not exist, the amount and area of disturbance should be minimized.
3) Facilities and structures should be designed and maintained to consider the needs of physically challenged persons and to prevent or mitigate impacts to terrestrial and aquatic species.
4) Facilities no longer utilized as intended should be repurposed to accommodate a new use or be decommissioned in order to minimize maintenance backlog and infrastructure deterioration, and to protect public safety and health.
5) Adaptive reuse of historic properties should be pursued when appropriate; maintenances and renovations should respect and 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 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 which 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 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 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.

References

[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 southwest United States. Twenty-four percent of the Forest's land mass consists of congressionally designated wilderness to be managed for primitive and semi-primitive non-motorized use. The Gila NF 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/walking, hunting, viewing natural features, driving for pleasure, relaxing, fishing, picnicking, viewing wildlife, horseback riding, and OHV 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 on the Gila NF. Local communities' quality of life and economic opportunities are interwoven with the Forest's future. This is best summarized in the Gila National Forest Recreation Facility Analysis (USDA FS Gila NF 2007), which identified the Gila NF's niche and desired condition as follows:

> *"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 Forest welcomes a diverse group of visitors, including those that may have been considered underserved in the past, by providing a variety of recreation opportunities that are appropriate for each recreation setting while protecting resources and minimizing conflict between uses.
2) The Forest maintains a robust, sustainable recreation program that contributes significantly to local economies, provides a diverse range of quality recreation settings, uses, activities, and opportunities that is "right sized", or attainable with available and projected future resources, and 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.
3) Effects to recreation resources are considered in all forest resource management decisions and activities, and effects to scenic character and Recreation Opportunity Spectrum desired conditions are considered and mitigated in all forest planning efforts.

4) The unique cultural, historical, and ecological resources of the Gila National Forest 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.
5) Quality conservation education, visitor information, and interpretation opportunities are provided to inform and connect visitors and local communities to the Gila National Forest's unique recreation setting and cultural, historical, and ecological resources.

Standards

1) The Recreation Opportunity Spectrum (ROS) Desired Conditions shall be used to analyze and minimize negative effects to recreation opportunities when conducting all project planning across all Forest program areas.
2) The Scenery Management System (SMS) shall be used to analyze and minimize negative effects to scenic character desired conditions when conducting project planning across all Forest program areas.
3) Issue closure orders and implement appropriate rehabilitation activities to mitigate excessive resource damage related to excessive or inappropriate recreation use.

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) Consideration should be made for avoiding potential conflicts between incompatible uses 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 minimize 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 on the Gila National Forest.
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 Strategy, 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 a sustainable recreation program, 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 a sustainable recreation program, including planning, design, implementation, and operations and maintenance. Recognize partners for their roles in providing recreational opportunities when possible.

Outreach and Education

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. 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 programs within administrative capabilities, through visitor centers, ranger stations, developed recreation sites, and by the development of education 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 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.

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 National Forest currently has 33 developed campgrounds (including 2 group sites), 6 picnic sites (including 3 group sites), 98 developed trailheads, 3 public target shooting ranges on 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 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.
3) Recreation fees are implemented where it is determined to be essential to the sustainability of the recreation program, and are consistent across the Forest and based on the amenities provided.

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 to be a priority for decommissioning and/or replacement to a safer location.

Guidelines

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 where possible.

Management Approaches

Developed Recreation and Sustainability

Continually assess the developed recreation program and prioritize sites identified as unsustainable for decommissioning, closing, or repurposing of facilities and shift limited program resources to prioritized sites. Implement a developed recreation fee program to help facilitate a sustainable developed recreation program in 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 program opportunities.

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, OHV driving, scenic driving, and car camping. Most dispersed motorized recreation use occurs on existing Forest 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. Forest visitors engaging in these forms of dispersed recreation experiences often make use of the Gila NF's extensive single-track developed trail system. According to the most recent National Visitor Use Monitoring (NVUM) surveys, hiking/walking is most popular primary recreation activity of Gila National Forest visitors. Hunting while dispersed camping on-forest is a very popular recreation activity on the Gila National Forest. There are many popular user-developed dispersed campsites distributed throughout the Forest.

Equestrian use (horseback riding and backcountry stock-packing) are also popular forms of non-motorized recreation on the Forest. This type of use primarily occurs within wilderness and less-developed Forest areas adjacent to communities. Many of these backcountry trips are multiple days 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 these popular trails located nearby to population centers.

Rock climbing and spelunking (cave exploration) do occur to some degree at some locations on the Gila. One limiting factor to the popularity of rock climbing has been the poor quality of the rock at many locations within the Forest boundaries, compared to better quality locations nearby but outside of the Forest boundary. Similarly, cave exploration is also known to occur on the Gila, primarily in locations of the Black Range District, but is not a significantly popular activity.

Although the Gila National Forest 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 on 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 impact the quality of natural habitats, including riparian areas, streams, lakes, and wetlands.

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) 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.
2) When closing or mitigating adverse effects to dispersed recreation areas, native vegetation and natural barriers should be used.
3) 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 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; and/or unacceptable environmental damage is occurring. 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 periodically no more than every five years 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 back-country river floating.

Special Uses (Recreation)

Background Information

Recreation 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. The Gila NF recreation program manages a variety of 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) on the Gila NF currently occurs within designated wilderness areas, and these uses are expected to grow, particularly the demand for hunting for trophy elk.

Issuing recreation 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. These permitted uses also promote economic sustainability in local communities through fee retention. Permit fees from many, though not all, recreation service providers are returned to the Forest and used to improve services and facilities for those permit holders, their clients, and the public.

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 special use permit program administration will follow Handbook and policy direction and balance consideration of special uses requests with impacts to natural and cultural resources, wilderness character, and other forest users.
3) Permits for isolated cabins will not be renewed when expired.
4) Recreation residences located in 100-year floodplains will not be rebuilt if destroyed by fire, flooding, or natural disaster.
5) Authorized commercial use of domestic sheep or goats (for example, outfitter/guide and filming) in bighorn sheep ranges is prohibited.

Guidelines

1) Issued Outfitter/Guide permits for 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) Organized group events should occur in designated group sites, unless authorized by special use permit.

Management Approaches

Special Uses Management

Authorization of special use permits for recreation events and outfitting and guiding services should be based upon and adjusted by guidance from the results of any current and future capacity studies and taking into consideration administrative capabilities.

Operations and maintenance plans for recreation residence special uses 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.

Periodic Outfitter/Guide capacity studies will be conducted within designated Wilderness, in alignment with current Forest Service Handbook and policy direction, at a minimum of once every five years, and shall be used as a tool to help determine the number of current Outfitter/Guide permits that are to be issued for each Wilderness.

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 National Forest 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 on 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 enhances scenic opportunities within the Gila NF.

Forest Service 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 on 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 (VMS) provided the framework for inventorying the visual resource and providing measurable standards for managing it. The Forest Service replaced the VMS in 1995 with the Scenery Management System (SMS) for the inventory and analysis of the aesthetic values of National Forest System lands. The Gila National Forest is in the process of updating the scenery inventory using the SMS 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).

Standards

1) The Scenery Management System (SMS) shall be used to analyze and minimize negative effects to Scenic Character when conducting all planning projects across all Forest 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 towards 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, completely repeat 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 best environmental design practices to advance environmentally sustainable design solutions. Use the Built Environment Image Guide 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

The Gila NF manages a total of 1,927 miles of trails. There is a total of 179 miles of motorized trails, 861 miles of trails within wilderness areas, and 891 miles of non-wilderness / non-motorized trails. Trails on the Gila NF are a vital contribution to recreation and infrastructure on the Forest since they provide access to the wilderness areas, range or wildlife improvements, livestock management, lookout towers, and for fire management. Many 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 OHV recreational use has shown an increase 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/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 NVUM 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 nearby to population centers.

Desired Conditions

1) 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.
2) Motorized and non-motorized trail systems consist of interconnecting loops and trails that connect other NF destinations. Motorized and non-motorized opportunities are generally separated.
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. Trails that are found to adversely impact natural and cultural resources are evaluated for closure and alternative travel routes or locations are developed where feasible.
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 impact 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) Visitors and citizens make use of motorized trail system and user-created trails are not evident.
9) An adequate sign system provides for traveler safety, location information, and compliance rules and regulations.

Guidelines

1) All Forest system trails should be designed, constructed, rerouted, or maintained utilizing current best management practices to promote sustainable design while providing desired recreation opportunities and other resource needs.
2) Forest System trails should not be used for management activities that negatively impact trail conditions, unless alternatives entail greater resource damage. Adverse impacts to system trails should be mitigated upon project completion.
3) When Forest system trails intersect fences, accessible, activity-specific pass-through areas should be provided when practicable to allow for easier passage.
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; and/or;
    c. Unacceptable environmental damage is occurring
    d. It has become evident that the trail recieves little use, and may no longer be needed
5) 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.
6) 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 purpose is to provide for resource protection.
7) 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

Educational techniques (for example, brochures, signs, websites, and social media) are used to enhance visitor knowledge of proper non-motorized and motorized trail use etiquette. Utilize 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.

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 NFS trails and dispersed campsites, and prioritize work needed to address resource issues and conflicts in use. Trail management objectives are prepared for new trails added to the National Forest System

and are updated as needed for existing National Forest System Trails. Trail management priorities are based on providing user safety, preventing erosion, providing appropriate and meaningful recreation opportunities, and accommodating administrative needs.

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) OHV trailheads provide a relatively dust-free environment that prevents erosion. Trailheads efficiently provide parking and access to trails where they are most critically needed.
3) Motorized use is consistent with existing regulations. Control systems, such as law enforcement activity or citizen interactions, ensure resource impacts are minimized as population and visitor use increase.
4) Tread Lightly!® principles are commonly practiced.
5) Unneeded trails are closed to motor vehicle use and naturalized to reduce impacts to ecological resources.

Standards

1) Motor vehicle use off the designated system of roads, trails, and areas is prohibited except as identified on the MVUMs 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 NFS roads and motorized trails and designated motorized areas.
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 ROS settings must be rehabilitated to a natural state as it existed prior to disturbance.

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 greater than 10% in surface grade in efforts 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 location 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 ROS 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 ROS 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 trails 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) Nonmotorized 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 nonmotorized 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 nonmotorized trail network is in place, providing for user safety and access to locations of interest for a variety of uses.
5) Nonmotorized trails are defined and marked appropriate to the setting.
6) Destination and loop trails exist for nonmotorized 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 where such access is currently unavailable (for example, constructing new trails or improving existing trails).

Management Approaches

Relationships

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

Outreach and Education

Signing, enforcement, public information, seasonal and special closures, maintenance, construction, and restoration take place as appropriate. Educational techniques (for example, brochures, signs) enhance visitor knowledge of proper nonmotorized 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.

Trail Priorities

Trail maintenance priorities are based on providing user safety, minimizing erosion, providing appropriate recreation opportunities, and accommodating administrative needs. Reconstruct or add nonmotorized trails near population centers or developed recreation sites to provide additional or enhanced nonmotorized recreational opportunities.

Managing in the Face of 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 that we are likely facing may prove to be unprecedented within the context of the last two million years[1]. Still, there remains uncertainty as to what the future holds for landscapes, species and species assemblages, the ecosystem services they provide, and thereby the multiple uses they sustain.

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. However, the actions taken within the life of this plan may influence their trajectory. The following subsections outline how the Gila NF's draft approach change and uncertainty, and address vulnerabilities[2] and weather related threats[3], as well as mitigation measures. Mitigation measures are those things the Forest can do to stabilize its carbon emissions.

Landscape

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

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[4, 5, 6, 7], biodiversity conservation[8, 9, 10], and ecosystem function and service delivery[11].

   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 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[12, 7].

2) Managing ecosystems toward desired conditions should provide conditions that maintain habitat connectivity and species biodiversity across the Plan Area. The content of this section is still being developed.

3) While 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[13, 14, 15, 16, 11]. 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 preliminary draft plan. The previous discussion about landscape scale spatial diversity and plan content for vegetation and fire management can support resilient watersheds, although careful consideration of disturbance type, frequency,

magnitude and intensity or severity 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. However, the need for strategic course correction is 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 interested stakeholders will be essential and the Forest looks forward to engaging more specifically on the topic of monitoring in the near future.

Species-Specific

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 is species specific, individualistic management 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 vulnerable: 1) the ecosystem vulnerability assessment[2]; 2) at-risk species status[17]; 3) rare and endemic status[18, 19]; 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 preliminary draft plan contains plan 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, Forest staff and stakeholders have identified several items that could increase the Forest's ability to manage for species persistence in an uncertain future. These include: 1) vegetation refugia mapping[8, 9, 10]; 2) a monitoring and seed collection strategy for vulnerable rare and endemic plants[18], regardless of whether they are on the species of conservation concern list or not; 3) establish "trigger points" that may signal a need for species-specific adaptation measures. 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 amount, timing and distribution of water itself, which is largely beyond the control of Forest management[15]. 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 most

current regional drought plan (guideline under Livestock Grazing heading) is one mechanism of anticipating and responding to reductions in upland water supplies, but establishing plan objectives for maintenance of upland water sources and construction of additional upland water sources (complying with state law), would strengthen the Forest's ability to continue providing water related ecosystem services.

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/or system components 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. It is addressed in the next subsection.

Infrastructure

The resources available to maintain existing infrastructure to existing standards is insufficient[20]. Which means the ability of the Forest to implement adaptation measures for roads, bridges and facilities is limited.

- Identify high-risk watersheds and infrastructure sites and develop a range of design and treatment options based on climate-aware risk assessment and priority setting.
- 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 and decommissioning to restore natural flow patterns, reduce erosion and increase system durability.

Mitigation

This section is under construction.

[1] IPCC. (Intergovernmental Panel on Climate Change). 2007. Climate Change 2007: The Physical Science Basis. Cambridge University Press. Cambridge., U.K. In Safford, H.D., G.D. Hayward, N.E. Heller and J.A. Wiens. 2012. Historical Ecology, Climate Change, and Resource Management: Can the Past Still Inform the Future? in Historical Environmental Variation in Conservation and Natural Resource Management, eds. Wiens, J.A., G.D. Hayward, H.D. Safford, and C.M Giffen. Chapter 4 pp. 46-62.

[2] 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.

[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.

[4] Stephens, S.L., J.J. Moghaddas, C. Edminster, C.E. Fiedler, S. Haase, M. Harrington, J.E. Keeley, E.E. Knapp, J.D. McIver, K. Metlen, C.N. Skinner, and A. Youngblood. 2009. Fire treatment effects on vegetation structure, fuels and potential fire severity in western U.S. Forests. Ecological Applications. 19(2) pp. 305-320.

[5] Virah-Sawmy, M. Gillson, L. and K.J. Willis. 2009. How does spatial heterogeneity influence resilience to climatic changes? Ecological dynamics in southeast Madagascar. Ecological Monographs. 79(4) pp. 557-574.

[6] Moritz, M.A., M.D. Hurteau, K.N. Suding, and C.M. D'Antonio. 2013. Bounded ranges of variation as a framework for future conservation and fire management. Annals of the New York Academy of Sciences 1296 (2013):92-107.

[7] Levine, N.M., K. Zhang, M. Longo, A. Baccini, O.L. Phillips, S.L. Lewis, E. Alvarez-Dávila, A.C. Segalin de Andrade, R.J.W. Brienen, T.L. Erwin, T.R. Feldpausch, A.L.M. Mendoza, P. N. Vargas, A. Prieto, J.E. Silva-Espejo, Y. Malhi and P.R. Moorcroft. 2016. Ecosystem heterogeneity determine the ecological resilience of the Amazon to climate change. Proceedings of the National Academy of Sciences of the United States of America. doi/10.1073/pnas.1511344112.

[8] Ackerly, D.D., S.R. Loarie, W.K. Cornwell, S.B. Weiss, H. Hamilton, R. Branciforte and N.J.B. Kraft. 2010. The geography of climate change: implications for conservation biogeography. Diversity and Distributions 16:476-487.

[9] Ashcroft, M.B., L.A. Chisholm and K.O. French. 2009. Climate change at the landscape scale: predicting fine-grained spatial heterogeneity in warming and potential refugia for vegetation. Global Change Biology, 15 (3):656-667.

[10] Keppel G., K.P. Van Niel, G.W. Wardell-Johnson, C.J. Yates, M. Byrne, L. Mucina, A.G.T. Schutt, S.D. Hopper and S.E. Franklin. 2012. Refugia: identifying and understanding safe havens for biodiversity under climate change. Global Ecology and Biogeography, 21:393-404. doi:10.1111/j.1466-8238.2011.00686.x.

[11] Frainer, A., L.E. Polvi, R. Jansson, and B.G. McKie. 2017. Enhanced ecosystem functioning following stream restoration: The roles of habitat heterogeneity and invertebrate species traits. Journal of Applied Ecology. doi: 10.1111/1365-2664.12932.

[12] Clark, J.S., L. Iverson and C.W. Woodall. 2016. Impacts of Increasing Drought on Forest Dynamics, Structure, Diversity, and Management. Chapter 4 in Effects of Drought on Forests and Rangelands in the United States: A Comprehensive Science Synthesis. Eds. Vose, J.M, J.S. Clark, C.H. Luce and T. Patel-Weynand. United States Department of Agriculture, Forest Service. General Technical Report WO-93b. pp 59-96.

[13] Kershner, J.L. 1997. Setting Riparian/Aquatic Restoration Objectives within a Watershed Context. Restoration Ecology 5:4S, pp. 15-24.

[14] Bohn, B.A. and J.L. Kershner. 2002. Establishing aquatic restoration priorities using a watershed approach. Journal of Environmental Management Vol. 64. pp. 355-363.

[15] Furniss M.J., B.P. Staab, S. Hazelhurst, C.F. Clifton, K.B. Ilhadrt, L. Bonnie, E.B. Larry, A.H. Todd, L.M. Reid, S.J. Hines, K.A. Bennett, C.H. Luce, P.J. Edwards. 2010. Water, climate change and forest: watershed stewardship for a changing climate. United States Department of Agriculture, Forest Service, Pacific Northwest Research Station. General Technical Report PNW-GTR-812.

[16] Richardson, C.J., N.E. Flanagan, M. Ho, and J.W. Pahl. 2011. Integrated stream and wetland restoration: A watershed approach to improved water quality on the landscape. Ecological Engineering. 37(2011) pp. 25-39.

[17] 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.

[18] 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.

[19] Mawdsley, J.R., R. O'Malley, and D.S. Ojima. 2009. Society for Conservation Biology 23:5 pp. 1080-1089.

[20] 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.

Chapter 4: Designated and Management Area Plan Direction

The Gila NF has several areas on the Forest that require different management from the Forest-wide plan components in Chapter 3. These areas are identified as designated areas and management areas.

A management area represents a management emphasis for an area or several similar areas on the landscape. Designated areas on the Gila NF represent identified exceptional areas that have distinct or unique characteristics that previously warranted special designation.

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.

Note: For the purposes of the preliminary draft plan, this chapter provides plan direction for the existing designated areas on the Forest as well as a few newly created management areas for preexisting management activities. A transparent process with stakeholders for other potential designated and management areas is ongoing.

Designated Areas

Designated areas on the Gila NF represent identified exceptional areas that have distinct or unique characteristics that previously warranted special designation. 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 are 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, provide places for research, and contribute to the local tourism industry.

Wilderness

Background Information

The Gila National Forest holds a unique distinction internationally among designated areas, as it is 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 National Forest.

The Wilderness Act prohibits permanent roads and the use 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 insure that it is "unimpaired for the future use and enjoyment as wilderness."

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

- 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 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 associated ties to 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 is New Mexico's largest wilderness, 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 on the Gila NF, the Gila Wilderness receives the majority of recreational use. Most of this use occurs from early spring through late fall. Popular recreation activities within 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, rafting and kayaking do occur on the Gila River from Grapevine Campground to Mogollon Box. The popularity of these areas are due to proximity to water sources and access to the wilderness boundary. The Gila Wilderness is the only class 1 airshed within the Gila National Forest.

Aldo Leopold Wilderness

The Aldo Leopold Wilderness is 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, one thousand 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 scarcity of 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 Forest Service Road 150 separates the Aldo Leopold Wilderness from the even larger Gila Wilderness. Prior to construction of this road, 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 amount of hunters that are able to utilize 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 of 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

While the Blue Range Wilderness is the smallest wilderness area on the Gila NF at 29,099 acres, it is also 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 (ROS) (USDA FS 1986b). There are six trails located in the Wilderness, two of which may only be accessed from the Arizona side of the boundary. All have higher degrees of difficulty to follow, and there are no dependable water sources 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 that are 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 enhancement, primitive recreation opportunities, and protection of other wilderness characteristics. Wilderness character and values as defined by the Wilderness Act of 1964 are enhanced and maintained.
2) 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.
3) Wilderness areas have minimal to no nonnative invasive species, native species that are indigenous to the wilderness area is present and are supported by properly functioning habitat conditions in keeping with the natural quality of wilderness character.
4) 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.
5) In keeping with the undeveloped quality of wilderness character, the environment within wilderness area is essentially unmodified, and naturally occurring scenery dominates the landscape.
6) 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.
7) Unique features and experiences within wilderness are preserved as the other features of value element of wilderness character.
8) Effectively managed and well-marked boundaries result in wilderness areas free of motorized and mechanized intrusions.
9) Special use permits authorizing activities in wilderness facilitate protection, education, and/or the enjoyment of the wilderness character. These permitted activities maintain the challenging and self-reliant experience of other wilderness visitors and do not cause widespread negative impacts to wilderness character.

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 uncharacteristic wildfire within designated wilderness, and shall not be used to enhance wilderness character and values.
4) Naturally occurring wildfires shall be allowed to perform, when possible, their natural ecological role.
5) The Forest shall establish and enforce group size limits. The default group size limit shall be 15 persons and 20 head of livestock. Exceptions to group size limits may only be granted by written permission of the Forest Supervisor or designated agent, or 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 days within a 30 day period. Exceptions may only be granted by written permission of the Forest Supervisor or designated agent. Changes shall be made to the default to 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 that are negatively 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.
9) 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.
10) Any research conducted in wilderness shall first 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.
11) 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.
12) The Congressional Grazing Guidelines for Wilderness shall be applied to all decision making regarding management of commercial grazing in wilderness areas.
13) Where management conflicts occur, the protection of wilderness character and values shall take precedence over recreation uses.
14) 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.

Standards (continued)

15) Historic structures not associated with grazing within wilderness and not under mandate for continued preservation due to cultural or historical value and context 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 mitigated by closure and/or removal rather than repair and improvement for continued administrative use.
16) 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 be within wilderness, and are the minimum 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 that are 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 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) 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.
6) 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.
7) Where 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 cumulative impacts to wilderness character and values.
8) 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.

Guidelines (continued)

9) 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 to provide for public safety or protection of wilderness character and public uses as directed by the Wilderness Act.
10) 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 avoided.
11) 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.
12) 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.
13) Projects and management activities should be designed to prevent motorized and mechanized transport access into adjacent wilderness areas.
14) Wilderness interpretation programs and 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.
15) Where agency or applicant objectives can be met outside of designated wilderness, special use permits should not be issued in wilderness.
16) All wilderness boundaries should be clearly identified by markers and signage appropriate to location and amount of user access.
17) Wilderness boundary posting first priorities should be clearly identified and maintained markers and signage at established entry points in areas where nonconforming use is likely to occur.

Management Approaches

Wilderness Management

Wilderness management on the Gila NF will be guided by a combination of 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 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 program for each wilderness based upon the most recent wilderness character monitoring protocol recognized by agency policy. Complete a map of threats to wilderness character. Wilderness management decision making process will be informed by the results of threats to wilderness character

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

Consider assigning a wilderness resource advisor, or in absence of an available resource advisor a wilderness specialist, to all fires within wilderness areas, fires with the potential to enter wilderness areas, or fires potentially affecting the character of an adjacent wilderness area that are not suppressed during 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/reconstruct needed trails. Priorities for trail reconstruction are to be based on potential for impacts to wilderness character and recreation opportunities, and the trails which receive the greatest use. The Forest will regularly publish up-to-date trail maps for all wildernesses, in a variety of formats, including digital.

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, use of volunteers or seasonal workers employees will be employed 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 to no longer be 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 disruption to 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 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. 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 program, 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/capacity studies that will be used to inform decision making regarding issuing outfitter/guide special use permits within each designated wilderness.

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 (WSAs) for review to determine if they feature wilderness characteristics to make them worthy of designation by Congress 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 such time that Congress acts on this recommendation, the Forest Plan calls for managing these lands to maintain existing wilderness character. However, no baseline monitoring data has been collected for wilderness character within these WSAs.

Hell Hole Wilderness Study Area

The Hell Hole WSA (18,860 acres in size) is located south of Mule Creek, New Mexico with the 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.

The landscape of the southern portion of the WSA is dominated by topographic features including deep, rugged canyons, rocky peaks, and steep cliffs. 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 rather 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, NM 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 system trails located 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 on 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.

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.

Inventoried Roadless Areas

Background Information

Inventoried Roadless Areas (IRAs) 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 National Forest's land mass (733,836 acres) is located within 29 individual Inventoried Roadless Areas.

The Roadless Area Conservation Final 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 roads and motorized trails may be present within IRAs. The Roadless Rule does not prohibit travel on existing roads or motorized trails.

The Chief of the Forest Service reviews all projects involving road construction or reconstruction and the cutting, sale, or removal of timber in IRAs, 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 road 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 road reconstruction is not authorized through this re-delegation without further project specific review.
- 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 the 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.

Desired Conditions

1) The roadless characteristics of all Inventoried Roadless Areas identified by the 2001 Roadless Area Conservation Rule are not altered.
2) Inventoried roadless areas (IRAs) encompass large, relatively undisturbed landscapes that are important 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 (ROS).
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 that occur within inventoried roadless areas that negatively affect roadless character while involving affected stakeholders.

Research Natural Areas

Background Information

Forest Service research natural areas (RNAs) 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 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)

RNAs 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.

Gila River RNA

The Gila River RNA was established in 1972 and consists of 402 acres near the Gila River Bird Area in the northern Burro Mountains on the Silver City District. The area provides a well-developed example of the riparian ecosystem in New Mexico, and provides habitat for rich and unique birdlife. 231 species of birds, 43% of the bird species verified in NM, have been detected in the adjacent Gila River Bird Area (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 RNA) 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 RNA was established are protected and managed in accordance with the establishment records and in consultation the research station. 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, use, and management activities maintain 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.

Standards (continued)

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 meet the research natural area desired conditions and management objectives.
3) To minimize impacts to ecological values, recreational activities (other than use on designated trails) and authorization of special use permits (for example, commercial tours/outfitter guides) except those in support of approved research or education shall not be authorized or permitted in research natural areas.

Guidelines

1) All management activities should be consistent with the scenic integrity objective of 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 limit harm to sensitive resources, unique features, and species within the research natural area.
4) Vegetation management activities should only be allowed when necessary to achieve or maintain the ecological conditions for which the area is being studied in research natural areas.
5) Unplanned fires should be extinguished as soon as possible if they pose a danger to the research natural area, using means that would cause minimal damage to the area (FSM 4063.41). Natural fires should be allowed to burn only within a prescription designed to accomplish objectives of the specific natural area (FSM 4063.2).
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.
7) Fire should be managed using minimal impact suppression tactics or other appropriate suppression tactics to protect the resources for which research natural areas were 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 so located as 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. The Continental Divide National Scenic Trail (CDT or Trail) was designated by Congress in 1978.

The CDT 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 CDT 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 CDT 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 CDT corridor (CDT 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 USC 1246). The overarching management direction for the CDT is outlined in the CDT Comprehensive Plan (2009 or most current version).

New motorized vehicle use by the general public is prohibited on the CDT, 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 Continental Divide National Scenic Trail in alignment with direction provided in the 2009 CDNST Comprehensive Plan. The CDNST 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 CDT corridor is defined as within 0.5 miles on either side of the CDT.

Desired Conditions

1) The CDT 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 CDT have high scenic values. The foreground of the trail (up to 0.5 mile on either side) is naturally-appearing. The potential to view wildlife is high, and evidence of ecological processes such as fire, insects, and diseases exist.

Desired Conditions (continued)

4) The CDT can be accessed from multiple locations, allowing visitors to select the type of terrain, scenery and trail length (for example, 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 amongst 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.

Standards

1) No surface occupancy for geothermal energy leasing activities shall occur within the CDT corridor.
2) No common variety mineral extraction shall occur within the CDT 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 CDT. New motorized events shall not be permitted on the CDT. Motorized use shall not be allowed on newly constructed segments of the CDT.

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 CDT, 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 CDT at a minimum).
4) In order to promote a non-motorized setting, the CDT 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 CDT'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 middleground viewshed (up to four 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 NSHT was designated.

8) In order to promote a naturally 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) In order to promote a naturally appearing setting and avoid visual, aural and resource impacts, using the CDT for timber pile landings or as a temporary road for any purpose should not be allowed.
10) Hauling or skidding along the CDT itself should be allowed only where the CDT 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 CDT should be managed using minimum impact suppression tactics or other tactics appropriate for the protection of CDT values. Prescribed fires in the foreground of the CDT should be managed to incorporate the values of the CDT. Heavy equipment fire line construction within the CDT 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 CDT 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.

CDT management

Evaluate proposed trail relocations or new trail segment locations using CDT optimal location criteria. Identify and pursue opportunities to acquire lands or rights-of-way within or adjacent to the CDT corridor. Considering how activities outside the visible foreground may affect CDT viewsheds and user experiences, and mitigating potential impacts to the extent possible.

Ensure Incident Commanders are aware of the CDT as a resource to be protected during wildfire suppression activities. Clearly identify fire suppression rehabilitation and long-term recovery of the CDT 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 CDT, monitor use and conditions, and take appropriate management actions to maintain or restore the nature and purposes of the CDT 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 outdoor areas of the Nation. 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.

Desired Conditions

1) National Recreation Trails provide a variety of opportunities for non-motorized recreation as well as a diversity of experiences with different levels of solitude, remoteness, and development.
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.
9) Visitor access, use, and management activities maintain the recreational, ecological, cultural, traditional, and wildlife resource values for which the area is designated.

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 four 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 scenery management considerations.
6) Management activities should maintain safe public access to National Recreation trails.

Guidelines (continued)

7) 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 Recreation Trails Located on Roads

Consider realigning national trails when currently located on existing roads or alternatively, consider converting roads to trails.

National Scenic Byways

Background Information

A national scenic byway is a road recognized 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. Most of the roads comprising the national scenic byways on the Gila NF are managed by the New Mexico Department of Transportation.

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 provides 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, education, 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 (WUI)

Background Information

The Wildland Urban Interface (WUI) is the area or zone where structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels. Generally, the WUI 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 Map X – still under development), it may be helpful to think of the WUI 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 WUI 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 WUI, and tree basal area is on the lower end or below the desired range (see Chapter 3: 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 3: 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 as they can pose fire control problems.
5) Access, including easements, provides the ability to implement fuel treatments, including removal of material.

Standards

1) Ecosystem function will be a secondary consideration in the WUI.

Management Approaches

Fuel Reduction and Relationships

The Forest continues to work with its partners and stakeholders involved in the Community Wildfire Protection Plans (CWPPs) to meet the broad intent and goals of those plans. Fuel reduction projects in the WUI are designed in collaboration with the CWPPs and affected property owners. The WUI is the hazardous fuel treatment priority (see also Wildland Fire and Fuels Management).

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 on the Gila National Forest are currently designated as Wild & Scenic Rivers.

As part of the Forest Plan Revision, the Gila NF will undertake a process for identifying and determining the eligibility of potential additions to the National Wild and Scenic Rivers System on National Forest System lands. The rivers that are 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. A previous inventory of eligible rivers was completed in 2002 that determined the following eight rivers 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 that were included in this previous study that are found to be affected by changed circumstances will also be reevaluated to determine if the changed circumstances affected their previous findings of ineligibility or eligibility.

Changed circumstances are any kind of 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.

The Forest is required 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.

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 designated and eligible 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 (ORVs) 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) Upon completion of a suitability study, all previously eligible river segments found suitable for recommendation for inclusion in the National Wild and Scenic Rivers System and not found unsuitable and released for other forest uses shall be managed under plan direction developed for Suitable Wild and Scenic Rivers.
3) 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.
4) 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.
5) Where eligible wild and scenic rivers corridors occur within other management areas, the most restrictive management direction shall apply.
6) 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.
7) 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.
8) No temporary or permanent facilities may 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.
9) Locatable minerals are subject to valid existing rights, existing or new mining activity on an identified eligible river are subject to regulations in 36 CFR Part 228 and must be conducted in a manner that minimizes surface disturbance, sedimentation, pollution, and visual impairment. Leasable minerals must include conditions necessary to protect the values of the river corridor that make it eligible for inclusion in the National System. Disposal of saleable mineral materials is prohibited for "wild" classification, and for "scenic" and "recreational" classifications, allowed if the values of the river corridor that make it eligible for inclusion in the National System are protected.
10) 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 designated and eligible rivers and associated corridors should be managed to occur at appropriate locations and intensities to protect and enhance the free-flowing condition, and the outstandingly remarkable values, consistent with the classification.
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 to high" 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.

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 Map X (still under development) that illustrates known utility corridors.

Desired Conditions

1) The Utilities Management Area features linear areas approximately 1,000 feet wide to accommodate existing utility facilities and related access for maintenance and repair, and to accommodate co-location of new utilities. Local distribution lines may be included in this management area at a lesser corridor width.
2) Existing linear special use authorizations for transmission lines and pipelines for water and natural gas occur within this management area.
3) Utility corridors are managed to 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 growth vegetation that could interfere with utility clearances does not exist in order to reduce fire and electrical hazard.

Standards

1) A special use permit or easement shall authorize uses within the Utilities Management Area.

Guidelines

1) Each utility corridor should be developed and utilized to its greatest potential in order 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 Areas

Compatible multiple uses are encouraged, including co-location of communication uses on existing electric transmission structures.

Glossary

special use permit: A permit issued under established laws and regulations to an individual, organization, or company for occupancy or use of National Forest System lands for some special purpose.

utility corridor: A linear strip of land approximately 1,000 feet in width identified for the present or future location of utility facilities within its boundaries.

Chapter 5: Suitability

[This chapter is still being developed as part of the Forest Plan Revision process.]

Chapter 6: Monitoring Plan

[This chapter is still being developed as part of the Forest Plan Revision process.]

Appendix A: Consistency with Plan Components

As required by NFMA, 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, performance history, performance measures, performance risks, program emphasis, program guidance, program priorities, possible actions, roles and contributions, management challenges, or strategies, but such other content are not matters to which project consistency is required.

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.

Determining Consistency with Desired Conditions, Objectives, and Goals

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.”