Chapter 5. Monitoring Strategy

Introduction

The purpose of monitoring and evaluation is to evaluate, document, and report how the land management plan is applied, how well it works, and if its purpose and direction remain appropriate. Monitoring determines actual conditions and compares them with desired conditions. Evaluation of monitoring results may identify that desired conditions are not met and propose alternative management strategies. Monitoring and evaluation also considers how land management activities on National Forest System lands affect nearby lands of other ownership and vice versa.

Adaptive management allows the use of alternative solutions to meet desired conditions. It includes defining measurable objectives, monitoring, learning and making changes, and recognizing the uncertainties of outcomes. This "Land Management Plan for the Apache-Sitgreaves National Forests" (the plan) is an integral part of the adaptive management cycle that includes management decisions and actions. Monitoring and evaluating the effects of plan implementation is critical to adaptive management.

The monitoring strategy outlines the general framework for achieving plan monitoring and includes the monitoring questions and select monitoring methods listed in the following section. Monitoring questions focus on key plan decisions where carrying out projects and activities are likely to cause a change over time. It does not address project level implementation monitoring nor is it intended for research purposes. The adaptive management cycle also includes an approach for responding to changing conditions or public desires and to new information, including research and scientific papers.

The forest supervisor evaluates the monitoring information displayed in the evaluation reports through a management review and determines if any changes are needed in management actions or the plan itself. In general, biennial evaluations of the monitoring information consider the following questions:

- What are the effects of resource management activities on the productivity of the land?
- To what degree are resource management activities maintaining or making progress toward the desired conditions and objectives identified in the plan? Are costs of implementing programs occurring as predicted?
- What modifications are needed to account for unanticipated changes in conditions?

The plan is revised at least every 15 years and the forest supervisor may amend the plan at any time. All of the monitoring and evaluation timeframes identified in this chapter begin from the date of the record of decision.

The monitoring and evaluation strategy (plan decisions) below is displayed in table 12. The information outside of this table is not a plan decision but is provided for background.

Monitoring Strategy

Table 12 presents the monitoring questions, monitoring methods, and the frequency of measurements needed to address monitoring requirements identified in the provisions of the 1982

Planning Rule[1], as well as other monitoring needed to help evaluate the plan and movement toward key desired conditions. In some cases, the monitoring questions and monitoring methods directly measure the accomplishment of desired conditions. In other cases, they measure objectives or guidelines associated with desired conditions.

This monitoring strategy provides guidance in determining monitoring requirements and accomplishments. Forest managers may need to prioritize what would be monitored in any given year and would schedule monitoring and evaluation through the annual budget process. Actual budget levels, funding emphasis, and emergence of new issues may affect accomplishment. Partnerships may be developed to accomplish monitoring and evaluation.

Table 12. Apache-Sitgreaves NFs land management plan monitoring questions, monitoring methods, and frequency of measurements

Monitoring Questions	Monitoring Method	Frequency of Measurement
Maintenance and Improvement of Ecosystem Health		
Are long-term soil health and productivity desired conditions being maintained or met?	Review a sample of soil-disturbing activities for compliance with best management practices (BMPs) by project and allotment operating instruction implementation.	Annually
How well are management activities contributing to desired conditions or maintaining watersheds in a healthy state and meeting Arizona water quality standards?	Review a sample of soil-disturbing activities for compliance with BMPs by project; allotment operating instruction implementation; Section 18 reviews of allotment National Environmental Policy Act (NEPA); burn area emergency response (BAER) assessments; and Arizona Department of Environmental Quality water quality data.	Every 5 years
How are management activities contributing to desired conditions or affecting riparian habitats, including wetlands, on the forests? Are riparian areas attaining and/or moving toward proper functioning condition? Are identified ecological indicators (e.g., aspen, riparian) present and fulfilling their ecological function?	Review a sample of ground-disturbing activities for compliance with BMPs by project; allotment operating instruction implementation; prescribed fire burn plan implementation; proper functioning data or other approved Forest Service methodologies; and Section 18 reviews of allotment NEPA. Monitor riparian habitats for changes in ground cover, species composition, bank stability, and water quality.	Every 5 years
Are management activities contributing to desired conditions or improving air quality across the forests in Class 1 (Mount Baldy Wilderness) and Class II airsheds?	Review interagency monitoring of protected visual environments' data.	Annually

[1] The transition provision, 36 CFR § 219.17(b)(3), of the 2012 Planning Rule (77 FR 21162-21276) allows use of the provisions of the planning rule, commonly called the 1982 Planning Rule, to amend or revise plans.

Monitoring Questions	Monitoring Method	Frequency of Measurement
Are habitats for threatened, endangered, sensitive, and other species for the forests being maintained or enhanced; meeting recovery objectives; moving toward desired conditions; and contributing to species viability?	Review implementation of biological opinion terms and conditions and aquatic habitat and population surveys using current approved methodologies. Review implementation and evaluate effectiveness of project mitigation measures affecting habitat.	Annually, on selected newly implemented and ongoing activities
Are PNVTs and habitat needs being provided for and contributing to desired conditions? What percent of grasslands have more than 10 percent of encroachment of woody species?	Review mid-scale vegetation assessment and percent change; stand exam data; post-prescribed fire monitoring plots; forest inventory analysis (FIA) plots; change in species composition and soil condition (range data); and acres of restored grassland.	Every 5 years
What is the effect of management upon habitat and population trends of management indicator species (Mexican spotted owl, northern goshawk, pronghorn antelope) across the forests?	Conduct project and nonproject area monitoring of Mexican spotted owl protected activity centers and northern goshawk post-fledging areas in accordance to species' specific protocols. Obtain AZGFD monitoring data on pronghorn antelope populations. Interdisciplinary team review of annual management indicator species monitoring reports to determine trend.	Annually Annually Every 5 years
What is the effect of management upon habitat trends of ecological indicators (aspen, riparian) across the forests?	Conduct aspen/riparian monitoring in accordance with species' specific protocols in both treated and untreated areas and in burned (within large wildfire burns) and unburned areas. Interdisciplinary team review the annual aspen/riparian ecological indicator species monitoring reports to determine trend.	Annually Every 5 years
How are management activities affecting late successional forest structure in relation to desired conditions?	Review amount and type of restoration treatments and the mid-scale vegetation assessment and percent change; FIA plots; post-prescribed fire monitoring plots; BAER assessments; and percent departure from desired condition by PNVT.	Every 5 years
Are management activities moving vegetation communities and habitats closer to the desired condition identified at the appropriate scales?	Review mid-scale vegetation assessment/percent change in developmental structural states, range analyses (transect data, photo plots, inspections), production and utilization surveys; Section 18 reviews of allotment NEPA; BAER assessments; fuels inventory; acres of aspen dominated and codominated forested PNVTs; and percent departure from desired condition by PNVT.	Every 5 years
Are insect and disease populations within reference conditions? Are invasive plant species' populations changing substantially? Are their population levels compatible with achieving vegetation desired conditions and management approaches?	Review forest health surveys and report, stand exams, project inspections and reviews, and noxious weeds and nonnative invasive species surveys and treatment reports.	Annually, forestwide

Monitoring Questions	Monitoring Method	Frequency of Measurement
Has timber suitability classification changed on any forests' lands?	Reapply timber suitability criteria and process.	Every 10 years
Are forest and woodland stands adequately restocked within 5 years of final harvest treatment or after fire-created regeneration openings?	Review annual reforestation needs report, stocking certifications, silvicultural prescriptions, timber/silvilculture tracking database.	Every 5 years
How is harvest unit size affecting landscape patterns across the forests?	Review mid-scale vegetation assessment and percent change.	Every 5 years
Managed Recreation		
Do recreational opportunities respond to forest users' desires, needs, and expectations?	Review recreation use surveys and acres by recreation opportunity spectrum (ROS).	Every 5 years
How are recreational activities (including off-highway vehicle use) affecting the physical and biological resources of the forests?	Review law enforcement warnings and citations regarding resource damage; amount of soil surface cover on routes or areas closed to motor vehicle travel; acres of noxious weeds and invasive nonnative species treated in developed campgrounds and dispersed camping areas; and trail condition surveys.	Annually
How are projects and programs affecting scenic integrity?	Conduct management reviews.	Annually
Are the forests' infrastructure (e.g., recreation facilities, roads, trails) and their ability to facilitate administrative needs and attainment of desired conditions for administrative uses and recreational opportunities, including access, sustainable?	Estimate amount of deferred maintenance (recreation and transportation).	Every 5 years
Are eligible and suitable wild and scenic rivers being managed to protect and enhance the identified outstandingly remarkable values?	Conduct management reviews of projects and ongoing activites within river corridors.	Every 2 years
Are designated wilderness and the primitive area being managed to maintain the wilderness values and character?	Conduct management reviews of projects and ongoing activities within designated wilderness and the primitive area.	Every 2 years
Are recommended wilderness being managed to protect the wilderness values and character?	Conduct management reviews of projects and ongoing activities within recommended wilderness.	Every 2 years
Community-Forest Interaction		
How well are the forests interacting and planning in cooperation with communities?	Conduct management reviews and review number of tribal agreements and acres of community wildfire protection plan treated. Review number of grants, agreements, and volunteers and type of resource benefit.	Every 5 years

Monitoring Questions	Monitoring Method	Frequency of Measurement
Do the forests provide interpretive opportunities that describe natural resources and the Forest Service mission?	Review number and type of interpretive programs conducted.	Every 5 years
Are outputs of goods and services being produced at a rate consistent with projections?	Review allowable sale quantity (ASQ) compared to actual sale quantity; number of firewood permits issued; number of cords of firewood sold; tons of biomass sold; number of Christmas tree permits sold; number of livestock permitted and actual use records; and number of forest products permits issued.	Every 5 years
Other		
Are there changes that have resulted in unforeseen issues requiring plan amendments?	Review the number of forest plan amendments and conduct a content analysis on those amendments.	Every 5 years
Are plan objectives being achieved?	Report completed accomplishments toward meeting plan objectives.	Annually
Are the standards and guidelines prescribed being incorporated in NEPA documents and implemented in projects and activities?	Review the number of forest plan amendments and NEPA decision documents that deviate from forest plan standards and guidelines. Conduct management reviews of selected projects and activities.	Annually

List of Preparers

The following individuals significantly contributed to development of the "Land Management Plan for the Apache-Sitgreaves National Forests" as members of the interdisciplinary plan revision team.

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In addition, numerous individuals and groups provided input into the development of this plan. Some of these include the following:

- Members of the public; tribes; county, State, Federal, and local agencies; and nongovernmental organizations provided review and input.
- The forests' leadership team, especially three deputy forest supervisors Tom Osen, Bill Pell, and Christine Dawe, and four forest supervisors—Tom Osen, James Zornes, Chris Knopp, and Elaine Zieroth—provided direction and oversight.
- The employees of the Apache-Sitgreaves NFs provided review and input, especially the staffs of Alpine, Black Mesa, Clifton, Lakeside, and Springerville Ranger Districts.
- The Southwestern Region Plan Revision Team provided oversight and guidance.

Glossary

Adequate access – A route and method of access to non-Federal land that provides for reasonable use and enjoyment of the non-Federal land consistent with similarly situated non-Federal land and that minimizes damage or disturbance to NFS lands and resources (36 CFR § 251.111).

Adjudication – The legal process by which an arbiter or judge reviews evidence and argumentation, including legal reasoning, set forth by opposing parties or litigants to come to a decision which determines water rights and obligations between the parties involved.

Administrative use – Use by the Forest Service.

Aquatic habitat – A specific type of area with environmental (i.e., biological, chemical, or physical) characteristics needed and used by an aquatic organism, population, or community.

Air quality related value – A scenic, cultural, physical, biological, ecological, or recreational resource which may be affected by a change in air quality as defined by the Federal land manager for Federal lands.

Age class – Trees or plants that originated within a relatively distinct range of years. Typically the range of years is considered to fall within 20 percent of the average natural maturity of a particular species (e.g., if 100 years is required to reach maturity, then there would be five 20-year age classes).

Allowable sale quantity (ASQ) – The quantity of timber that may be sold from the area of suitable land covered by the land management plan for a time period specified by the plan. This allowable sale quantity (ASQ) is usually expressed on an annual basis as the "average annual allowable sale quantity." For timber resource planning purposes, the allowable sale quantity applies to each decade over the planning horizon and includes only chargeable volume. Consistent with the definition of timber production, do not include firewood or other nonindustrial wood in the allowable sale quantity.

Aquatic management zones – An area of vegetation or forest litter located adjacent to stream courses and/or riparian areas for the purpose of filtering sediment, providing bank stability, and providing shade for fisheries habitat in tree/shrub ecosystems.

Aspen clone – A genetically identical set of aspen trees all connected by the same root system, such that they can be vegetatively propagated. A clone may be a distinct aspen stand, or it may be a smaller inclusion within a conifer stand, or it may cover an entire mountainside as a large stand or patch.

Available forage – That amount of growth of a vigorous and healthy plant that can be utilized as feed (regardless of what animal is using it) without impairing the plant's long term health and productivity or other uses such as riparian filtering. The amount of available forage may be less where there is a need to restore health and vigor of forage plants. That amount may also depend on time of year and plant physiological stage or other conditions such as drought.

Basal area – The cross-sectional area of the stem or the stems of the plant or all plants in a stand. Herbaceous and small woody plants are measured at diameter at root collar (DRC) or near ground level; larger woody plants are measured at diameter at breast height (DBH) or other appropriate height. Basal area is a way to measure how much of a site is occupied by plants; it is expressed in square feet per acre for woody species.

Beneficial uses of water – Beneficial use of water from rivers and streams is allocated by prior appropriation, meaning the first user to divert water and put it to a "beneficial use" obtains a priority right, and that right is to be satisfied before any other user has access to the water. The definition of what constitutes a "beneficial use" has evolved. Although the Arizona Legislature added habitat for wildlife and fish as one of the beneficial uses in 1941, it wasn't until 1976 that the court ruled this included a right for instream flow, and the first instream flow permit was not issued until 1990. Obtaining a permit for instream flow allows users to leave their allocation of water in the river rather than diverting, consuming, or losing it for nonuse.

Best management practices (BMPs) – Methods, measures, or practices selected by an agency to meet its nonpoint source control needs. BMPs include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR § 130.2(m)).

Biological diversity – The variety of the Apache-Sitgreaves NFs' organisms, the ecological complexes in which they occur, and the processes and life support services they facilitate.

Browser – Animals that eat twigs and leaves of woody plants. An example of a browser is deer.

Candidate species – Plant and animal taxa considered for possible addition to the list of endangered and threatened species. These are taxa for which the U.S. Fish and Wildlife Service has sufficient information on biological vulnerability and threat(s) on file to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions.

Cave – Any naturally occurring void, cavity, recess or system of interconnected passes beneath the surface of the earth or within a cliff or ledge which is large enough to allow an individual to enter. This includes shallow alcoves in rock faces or on steep slopes of that size.

Class I airshed – An airshed classification where areas require the highest level of protection under the Clean Air Act of 1963.

Class II airshed – An airshed classification representing National Forest System land that is not classified as a Class I airshed. These areas may receive a greater amount of human-caused pollution than Class I areas.

Clear-cutting regeneration method – The cutting of essentially all trees, producing a fully exposed microclimate for the development of a new age class. This includes coppice cutting.

Climate change – Refers to long-term (decades or longer) trends in climate averages, such as the global warming that has been observed over the past century, and long term changes in variability (e.g., frequency, severity, and duration of extreme events).

Climate variability – Refers to shorter term (daily, seasonal, annual, interannual, several years) variations in climate, including the fluctuations associated with El Niño (wet) or La Niña (dry) events.

Clump – A tight cluster of two to five trees of similar age and size originating from a common rooting zone that typically lean away from each other when mature. A clump is relatively isolated

from other clumps or trees within a group of trees, but a stand-alone clump of trees can function as a tree group.

Coarse woody debris – Woody material, including logs, on the ground greater than 3 inches in diameter—a component of litter. Large coarse woody debris is often considered to be downed logs at least 12 inches in diameter and 8 feet in length.

Common variety minerals – Common variety minerals/salable mineral materials are synonymous terms for the same class of minerals that can be sold under a mineral material contract and are common. These minerals are relatively low value per volume such as sand, gravel, cinders, common building stone, and flagstone. Many of the materials are used for road surfacing, boulders, and engineering construction or may be specialty resources such as soil amendments or decorative stone, including flagstone. These minerals are typically sold unless used internally, by another government agency, or for ceremonial uses. In these cases they may be provided free of charge.

Communications site – An area of National Forest System land used for telecommunications services. A communications site may be limited to a single communications facility, but most often encompasses more than one facility. Existing Apache-Sitgreaves NFs communications sites are listed in appendix C.

Communities-at-risk – As identified in the Federal Register, high risk urban communities within the wildland-urban interface.

Community wildfire protection plans (CWPPs) – Plans for at-risk communities that identify and prioritize areas for hazardous fuels treatments. The CWPPs that cover the Apache-Sitgreaves NFs include CWPP for the At-Risk-Communities in Apache County, CWPP for the At-Risk-Communities in Greenlee County, and the Sitgreaves CWPP (includes Apache, Coconino, and Navajo Counties).

Condition class – The Forest Service Manual (FSM 2521.1) uses three classes to describe watershed condition:

- **Class 1** watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are functioning properly.
- **Class 2** watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are functioning at risk.
- **Class 3** watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and their function is impaired.

Connectivity – The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation; the opposite of fragmentation.

Coppice regeneration method – An even-aged method of regenerating a stand in which the trees in the previous stand are cut and the majority of regeneration is from sprouts or root suckers, such as used in regenerating aspen stands.

Critical area – A critical area for grazing management is an area which should be treated with special consideration because of inherent site factors, size, location, condition, values, or

significant potential conflicts among uses. Critical areas are evaluated separately from the remainder of a management unit because they contain special or unique values such as riparian areas (Bureau of Land Management, 1999).

Critical habitat – When a species is listed as endangered or threatened under the Endangered Species Act (ESA), it is protected which includes protection of the habitat it occupies. In addition, specific areas may be designated as particularly necessary for the species' recovery whether the species is present or not; these areas are called "critical habitat." Besides requiring Federal agencies to ensure that their actions will not jeopardize the survival of an endangered or threatened species itself, the ESA also requires that their actions not destroy or adversely modify designated critical habitat. ESA requirements have no implications on non-Federal lands unless activities thereon are undertaken with Federal funding or require a Federal permit.

Culmination of mean annual increment – The age in the growth cycle of an even-aged stand at which the average annual rate of wood volume growth has peaked and is beginning to steadily decline.

Cultural affiliation – A relationship of shared group identity which can be reasonably traced historically or prehistorically between a present day Indian tribe or Native Hawaiian organization and an identifiable earlier group (25 USC 3001 (2)).

Declining – The senescent (aging) period in the lifespan of plants that includes the presence of dead and/or dying limbs, snag tops, and other characteristics that indicate the later life stages of vegetation.

Defensible space – An area either natural or manmade where material capable of allowing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and property or resources. In practice, "defensible space" is defined as an area a minimum of 30 feet around a structure that is cleared of flammable brush or vegetation.

Departure (departed) – The relative difference between existing and desired conditions or reference conditions.

Developed recreation site – A distinctly defined area where facilities are provided by the Forest Service for concentrated public use (e.g., campgrounds, picnic areas, swimming areas).

Diameter – The diameter of a tree species, usually measured by two primary methods:

- **Diameter at breast height (DBH)** – The diameter of a forest tree species at the bole (or trunk), typically measured at 4.5 feet above ground level.
- **Diameter at root collar (DRC)** – The diameter of a woodland tree species, typically measured at the root collar (the part of a tree where the main roots join the trunk, usually at or near ground level) or at the natural ground line, whichever is higher.

Dispersed recreation – Outdoor recreation in which visitors are spread over relatively large areas. Where facilities or developments are provided, they are more for access and protection of the environment than for the comfort or convenience of the visitors.

Ecological disturbance – An event or force that brings about mortality to organisms and changes in their spatial patterning in the ecosystems they inhabit. Disturbance plays a significant role in shaping the structure of individual populations and the character of whole ecosystems.

Ecological process – The four fundamental ecological processes of ecosystems are the water cycle, nutrient cycle, energy cycle, and community dynamics or succession (i.e., how the composition and structure of an ecosystem changes following a disturbance).

Ecological restoration – The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. Ecological restoration focuses on establishing the composition, structure, pattern, and ecological processes necessary to facilitate terrestrial and aquatic ecosystem sustainability, resilience, and health under current and future conditions. In the Southwestern Region, achievement of desired conditions means that the ecosystem has been restored. Restoration treatments are those that move ecosystem components toward desired conditions.

Ecological status – Ecological status is the degree of similarity between the existing vegetation (all components and their characteristics) and existing soil conditions compared to the potential natural plant community and the desired soil condition on a site. The present state of a TES map unit stated in terms of specific values or potentials with respect to species composition, ground cover, and soil characteristics. Ecological status is often evaluated on the basis of similarity indices between current conditions and the potential natural vegetation community (Forest Service, 1999). Ecological status ratings are: high, moderately-high, moderate-low, and low (FSH 2209.21, Southwestern Region). The relationship between ecological status and range condition are: excellent and good range condition represents high ecological status, signifying no and low departure from desired conditions; fair range condition represents moderately-high ecological status, signifying moderate departure from desired conditions; poor range condition represents moderately-low ecological status, signifying high departure from desired conditions; and very-poor range condition represent low ecological status, signifying severe departure from desired conditions.

Ecosystem – A spatially explicit, relatively homogeneous unit of the earth that includes all interacting organisms and components of the abiotic (nonliving) environment within its boundaries. An ecosystem is commonly described in terms of its: (1) composition: major vegetation types, rare communities, aquatic systems, and riparian systems; (2) structure: successional stages, water quality, wetlands, and floodplains; and (3) function: ecological processes such as streamflows and natural disturbance regimes.

Ecosystem diversity – The variety of ecosystems present on the Apache-Sitgreaves NFs, as represented by the 14 potential natural vegetation types and the variety of species (both plant and animal), their habitats, and ecological processes that occur in their different physical settings.

Ecosystem services – Benefits obtained from ecosystems, including (1) provisioning services such as food, fresh water, fuel, and fiber; (2) regulating services such as climate, water, pollination, and disease regulation; (3) supporting services such as soil formation and nutrient cycling; and (4) cultural services such as educational, aesthetic, and cultural values as well as recreation and tourism opportunities.

Ecotone – A transition area of vegetation between two communities, having characteristics of both kinds of neighboring vegetation, as well as characteristics of its own. Varies in width depending on site and climatic factors.

Escaped prescribed fire – A prescribed fire that has exceeded or is expected to exceed prescription parameters or otherwise meets the criteria for conversion to wildfire. Criteria are specified in Interagency Prescribed Fire – Planning and Implementation Procedures Reference Guide.

Emergent vegetation – Erect plants rooted under water that grow above (emerge from) the surface of the water (e.g., cattail, bulrush).

Encumbrance – Any right or interest in land, held by someone other than the owner, that may or may not be consistent with the owner's use. Among other things, encumbrances may consist of mortgages, deeds of trust, agreements for support, life estates, leases, tax liens, outstanding mineral rights, reservations, restrictions, and rights of reverter.

Endemic – (1) Describes a population that has unique genetic characteristics and likely exists in a very limited geographic area. (2) Describes a population of native insects, diseases, plants, or animals which perform a functional role in the ecosystem when they are present at low levels, or constantly attack just a few hosts throughout an area but can become potentially injurious when they increase or spread to reach outbreak (epidemic) levels.

Energy corridor – A linear strip of land identified for the present or future location of utility right-of-way (e.g., above or below ground electric transmission line, gas pipeline).

Ephemeral wetlands – Wetlands that exist for a short period following precipitation or snowmelt; they are temporary and not the same as intermittent or seasonal wetlands, which exist for longer periods but not yearlong.

Equine – Horses, mules, and asses. [adapted from Arizona Revised Statue, Title 3 – Agriculture, Chapter 11 (Ownership, Control and Regulation of Livestock), Article 1, 3-1201 (Definitions)].

Even-aged stands – Stands that are composed of one or two distinct age classes of trees.

Even-aged management – The application of a combination of actions that result in the creation of stands in which trees are essentially the same age. Managed even-aged forests are characterized by a distribution of stands of varying ages (and, therefore, tree size) throughout the forest area. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

Federally listed species (listed species) – Any species of fish, wildlife, or plant which has been determined to be endangered or threatened under section 4 of the Endangered Species Act.

Federal reserved water rights (reserved rights) – When Congress designates Federal lands for a specific purpose, it also reserves sufficient water to serve the purposes of that designation. These water rights are known as "Federal reserved water rights" or simply, reserved rights. Reserved rights are implied rights, meaning that Congress need not expressly state in a bill that it intends to reserve Federal water right. The right exists whether or not Congress explicitly mentions it.

Feral equine – Animals, including horses and burros, without ownership, that have reverted to the wild from a domestic state (50 CFR 30). Feral horses and burros are animals that do not meet the definition of a wild free-roaming horse in accordance with 36 CFR 222.20(b).

Fire intensity – The product of the available heat of combustion per unit of ground and the rate of spread of the fire, interpreted as the heat released per unit of time for each unit length of fire edge. The primary unit is British thermal unit per second per foot (Btu/sec/ft.) of fire front. See also fire severity.

Fire regime – The patterns, frequency, and severity of fire that occur over a long period of time across a landscape and its immediate effects on the ecosystem in which it occurs. There are five fire regimes which are classified based on frequency (average number of years between fires) and severity (amount of replacement of the dominant overstory vegetation) of the fire.

- **Fire regime I** – 0 to 35-year frequency and low (surface fires most common) to mixed severity (less than 75 percent of dominant overstory vegetation replaced)
- **Fire regime II** – 0 to 35-year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced)
- **Fire regime III** – 35 to 100+ year frequency and mixed severity (less than 75 percent of the dominant overstory vegetation replaced)
- **Fire regime IV** – 35 to 100+ year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced)
- **Fire regime V** – 200+ year frequency and high (stand replacement) severity.

Fire risk – The chance of fire starting, as determined by the presence and activity of causative agents.

Fire severity – Degree to which a site has been altered or disrupted by fire; also used to describe the product of fire intensity and residence time; usually defined by the degree of soil heating or mortality of vegetation.

Fireline – The part of a containment or control line that is scraped or dug to mineral soil.

Fire management plan – A plan that identifies and integrates all wildland fire management and related activities within the context of approved land management plans. It defines a program to manage wildland fires (wildfire and prescribed fire). The plan is supplemented by operational plans, including but not limited to, preparedness plans, preplanned dispatch plans, prescribed fire burn plans, and prevention plans. Fire management plans assure that wildland fire management goals and components are coordinated.

Free-flowing – Existing or flowing in natural conditions without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway.

Fugitive dust – Fine particulate matter from windblown soil and dust which becomes airborne.

Firewood – Wood grown or used for fuel.

Functioning ecosystem – An ecosystem that contains all components and processes necessary to maintain resilience over time.

Genetic exchange – The exchange of genetic material between individuals and/or populations through sexual reproduction.

Genotype – The genetic makeup of an organism or group of organisms.

Geomorphic – Refers to the process of erosion and sediment transport and deposition.

Goshawk foraging areas – Areas that surround goshawk PFAs (post-fledging family areas) that northern goshawks use to hunt for prey. They are approximately 5,400 acres in size (not including the PFA or nesting area acres).

Goshawk nest areas – Areas immediately around a nest that are used by northern goshawks in relation to courtship and breeding activities. They are approximately 30 acres in size and contain multiple groups or patches of large, old trees with interlocking crowns.

Goshawk post-fledging family areas (PFAs) – Areas that surround nest areas. They represent an area of concentrated use by the northern goshawk family until the time the young are no longer dependent on adults for food. PFAs are approximately 420 acres in size (not including the nest area acres).

Groundwater-dependent ecosystems – Communities of plants, animals, and other organisms whose extent and life processes are dependent on access to or discharge of groundwater. (USDA FS 2012c).

Group – A cluster of two or more trees with interlocking or nearly interlocking crowns at maturity surrounded by an opening. Size of tree groups is typically variable depending on forested PNVT and site conditions and can range from fractions of an acre (a two-tree group) (i.e., ponderosa pine, dry mixed conifer) to many acres (i.e., wet mixed conifer, spruce-fir). Trees within groups are typically non-uniformly spaced, some of which may be tightly clumped.

Group selection – An uneven-aged management method in which trees are removed and new age classes are established in groups, adjacent to other groups of different age classes. Group cut size is determined by the reproduction requirements of the species desired and by the number or total acreage of different age classes desired across the stand.

Habitat – The physical location or type of environment in which an organism or biological population lives or occurs.

Half-shrub – Half-shrubs have a woody base and lower stems but the top growth remains herbaceous during the growing season.

Herbaceous – Grass, grass-like, and/or forb vegetation.

Herbivory – Loss of vegetation due to consumption by another organism.

Highly interactive species – A species that has a disproportionate effect on its ecosystem. The virtual or effective absence of a highly interactive species leads to significant changes in some feature of its ecosystem. Such changes include structural or compositional modifications, alterations in the import or export of nutrients, loss of resilience to disturbance, and decreases in native species diversity. The type of interactions these species have with their surrounding environment is critical to the persistence of certain ecosystem features through time. Examples of

strong interactions include mutualisms (e.g., pollinators such as butterflies and spore and seed dispersers such as birds), consumers (e.g., large predators such as mountain lions), and ecosystem engineers (e.g., prairie dogs, beavers).

Hydraulic – Refers to the mechanical properties of water.

Hydrologic – Refers to the movement, distribution, and quality of water.

Hydrologic function – The behavioral characteristics of a watershed described in terms of ability to sustain favorable conditions of water flow. Favorable conditions of water flow are defined in terms of water quality, quantity, and timing**.**

Hydrologic Unit Code (HUC) – The United States is divided and subdivided into successively smaller hydrologic units which are identified by unique hydrologic unit codes (HUCs). The Apache-Sitgreaves NFs is contained within three 3rd level (basin) HUC watersheds: Little Colorado, Gila, and Salt Rivers. The Apache-Sitgreaves NFs intersect thirteen 4th level (subbasin) HUC watersheds, thirty-two 5th level (watershed) HUC watersheds, and two hundred and fifteen 6th level (subwatershed) HUC watersheds. The average size of a 4th level HUC watershed is 1 million acres, 5th level HUC watersheds are around 165,000 acres, and 6th level HUC watersheds are about 21,000 acres.

Individual tree selection – An uneven-aged management method where individual trees of all size classes are removed more or less uniformly throughout the stand, to promote growth of remaining trees and to provide space for regeneration.

Instream flow – Seasonal streamflows needed for maintaining aquatic and riparian ecosystems, wildlife, fisheries, and recreation opportunities at an acceptable level.

Interspaces – As defined by RMRS-GTR-310 (Reynolds et al., 2013), interspaces are areas within a stand that are not currently under the vertical projection of the outermost perimeter of tree canopies (drip-line). They are generally composed of grass-forb-shrub cover but could also be areas with scattered rock or exposed mineral soil. As spaces between trees, tree groups and tree clumps, interspaces contribute to the "open canopy" character of frequent-fire forests. They often connect with other interspaces and thus are variably shaped and sized. See "openings."

Intrinsic qualities – For scenic byways, intrinsic qualities are the features considered representative, unique, irreplaceable, or distinctly characteristic of an area. They include archaeological, cultural, historic, natural, recreational, and scenic.

Invasive species – Species that are not native to the ecosystem being described and that cause, or have the potential to cause, ecological or economic harm.

Karst – A geological landform existing in an area where the predominant shaping process is controlled by soluble bedrock, usually limestone in nature. Karst landscape is characterized by closed depressions, disappearing streams, and solutional shaping. Classical karst drainage is vertical and underground.

Leasable minerals – Leasable minerals include coal, oil, gas, oil shale, sodium, phosphate, potassium, and geothermal. Leasable minerals also include the hardrock minerals, if they are found on lands that have "acquired" status. Leases are obtained through the Bureau of Land Management to extract these mineral resources.

Leave No Trace – Guidelines that help protect the land and lessen the sights and sounds of forest visitors. http://www.lnt.org/

Lentic – A non-flowing or standing body of water (e.g., pond, lake).

Litter – Litter consists of dead, unattached organic material on the soil surface that is effective in protecting the soil surface from raindrop splash, sheet, and rill erosion and is at least ½ inch thick. Litter is composed of leaves, needles, cones, and woody vegetative debris including twigs, branches, and trunks.

Livestock – Cattle, equine, sheep, goats, and swine, except feral hogs [adapted from Arizona Revised Statue, Title 3 – Agriculture, Chapter 11 (Ownership, Control and Regulation of Livestock), Article 1, 3-1201 (Definitions)].

Livestock grazing – Foraging by permitted livestock (domestic foraging animals of any kind).

Locatable minerals – In general, the hardrock minerals mined and processed for metals (e.g., gold, silver, copper, uranium, and some types of nonmetallic minerals such as sandstone). They are called "locatable," meaning subject to mining claim location under the United States mining laws. Locatable minerals are limited to lands with "reserved public domain" status.

Lotic – A flowing body of water (e.g., stream, river).

Management review – One of the primary components of the overall Forest Service management/internal control system (FSM 1400). Management reviews are used to evaluate internal and administrative controls and to identify successful management, management/internal control weaknesses, and needed corrective actions.

Mechanized travel (Mechanical transport) – Movement using any contrivance over land, water, or air, having moving parts, that provides a mechanical advantage to the user and that is powered by a living or nonliving power source. This includes, but is not limited to, sailboats, hang gliders, parachutes, bicycles, game carriers, carts, and wagons. It does not include wheelchairs when used as necessary medical appliances. It does not include skis, snowshoes, rafts, canoes, sleds, travois, or similar primitive devices without moving parts.

Mechanical treatment – For the purposes of this plan, mechanical treatments include most vegetation treatments except fire. They may include mechanized cutting, hand thinning, and other silvicultural treatments.

Metapopulation – A set of partially isolated populations belonging to the same species that can interbreed and recolonize areas where the species has recently become extirpated (i.e., locally extinct).

Mexican spotted owl protected activity center (PAC) – An area established around an occupied Mexican spotted owl site to help ensure successful reproduction and species viability. A PAC is no less than 600 acres in size and includes the best owl nesting and roosting habitat. Management in PACs is focused on forest health and includes retention of key habitat elements such as higher levels of basal area and canopy cover to provide the cool understory conditions owls need and the down woody debris and forage (cover, fungi, seeds) needed by their prey. Management may involve thinning and/or burning to reduce the risk of high intensity wildfire, often with timing

restrictions to prevent disturbance to owls during the breeding season (March 1 through August 31).

Mosaic – Mix of recurring patterns of forested and non-forested areas at the identified scale (e.g., landscape, watershed, mid-scale). Patterns are variable and may change over time.

Motorized travel – Movement using machines that use a motor, engine, or other nonliving power sources other than a vehicle operated on rails or a wheelchair or mobility device , including one that is battery powered, designed solely for the use by a mobility-impaired person for locomotion and that is suitable for use in an indoor pedestrian area.

Motor vehicle use map (MVUM) – The MVUM displays designated roads, trails, and areas on an administrative unit or a ranger district of the National Forest System.

National Forest System (NFS) – As defined in the Forest and Rangeland Renewable Resources Planning Act of 1974 (Public Law 93-378), the "National Forest System" includes all national forest lands reserved or withdrawn from the public domain of the United States, all national forest lands acquired through purchase, exchange, donation, or other means; the national grasslands and land use projects administered under Title III of the Bankhead-Jones Farm Tenant Act (50 Stat. 525, 7 USC 1010-1012); and other lands, waters, or interests therein administered by the Forest Service or are designated for administration through the Forest Service as part of the system.

National Forest System road – A road wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources. A forest road other than a road which has been authorized by a legally documented right-of-way held by a state, county, or other local public road authority (36 CFR § 212.1).

National Forest System trail – A trail wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources. A forest trail other than a trail which has been authorized by a legally documented right-of-way held by a state, county, or other local public road authority (36 CFR § 212.1).

Native species – A species which is a part of the original fauna or flora in the area in question.

Natural disturbance regime – The historic patterns (frequency and extent) of fire, insects, wind, landslides, floods, and other natural processes in an area.

Natural fire regime – The fire regime that existed prior to human facilitated interruption of frequency, extent, or severity.

Naturalized – A species that is not native to an area, but one which has adapted to that area and has a stable or expanding population. In some cases, species move into a new area by themselves, but in most instances they are human-associated introductions. An example of a desirable nonnative species that has become naturalized is the Rocky Mountain elk, first brought to the forests in 1913 (Forest Service et al., 1990) to replace the extinct native Merriam's elk (Purdue et al., 2002, Thomas and Toweill, 1982). An example of an undesirable nonnative species is the crayfish which has contributed to the decline of aquatic vegetation and native species such as the threatened Chiricahua leopard frog (AZGFD, 2003)

Natural potential condition – (pertaining to watershed conditions) Conditions that are referred to as pristine and show little or no influence from human actions. Watersheds that are properly functioning have terrestrial, riparian, and aquatic ecosystems that capture, store, and release water, sediment, wood, and nutrients within their range of natural variability for these processes. When watersheds are functioning properly, they create and sustain functional terrestrial, riparian, aquatic, and wetland habitats that are capable of supporting diverse populations of native aquatic- and riparian-dependent species (Forest Service, 2011).

Nonindustrial wood – Includes aspen, junipers, piñon pines, Chihuahuan pine, oaks, and any industrial species cut from non-suitable timberlands. Wood cut as nonindustrial may be used as firewood and/or biomass. Sometimes referred to as non-ASQ species.

Nonmotorized travel – Movement not relying on machines that use a motor, engine, or other nonliving power source (e.g., walking, canoeing, horseback riding).

Nonpoint source pollution (NPS) – NPS refers to water pollution affecting water quality from diffuse sources, such as polluted runoff from agricultural areas draining into lakes, wetlands, rivers, and streams. NPS can be contrasted with point source pollution, where discharges occur to a body of water at a single location, such as discharges from a chemical factory or urban runoff from a roadway or storm drain. NPS may derive from many different sources with no specific solution to rectify the problem, making it difficult to regulate.

Noxious weed – Any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment. The term typically describes species of plants that have been determined to be undesirable or injurious in some capacity. Federal noxious weeds are regulated by USDA-Animal and Plant Health Inspection Service under the Plant Protection Act of 2000, which superseded the Federal Noxious Weed Act of 1974. When the species are native, they are not considered invasive species by the Federal Government.

Old growth – In southwestern forested ecosystems, old growth is different than the traditional definition based on northwestern infrequent fire forests. Due to large differences among Southwest forested PNVTs and natural disturbances, old growth forests vary extensively in tree size, age classes, presence, and abundance of structural elements, stability, and presence of understory (Helms, ed., 1998). Old growth refers to specific habitat components that occur in forests and woodlands—old trees, dead trees (snags), downed wood (coarse woody debris), and structure diversity (Franklin and Spies, 1991; Helms, ed., 1998; Kaufmann et al., 2007). These important habitat features may occur in small areas, with only a few components, or over larger areas as stands or forests where old growth is concentrated (Kaufmann et al., 2007). In the Southwest, old growth is considered “transitional” (Oliver and Larson, 1996), given that that the location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). Some species, notably certain plants, require “old forest” communities that may or may not have old growth components but have escaped significant disturbance for lengths of time necessary to provide the suitable stability and environment. See appendix B for a more detailed description.

Old growth components – Include old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity.

Old tree – Any native tree established before natural disturbance patterns were notably altered by Euro-American settlement (generally between 1850 and 1890 on the Apache-Sitgreaves NFs). Such a tree exhibits all or most characteristics of overmaturity for its species, and/or has tree rings revealing its advanced age. For example, old ponderosa pine trees display the following: yellow/orange plates widened between bark furrows, horizontal to drooping limbs, rounded crown tops, and gradual bole taper (see Keen's tree class number 4 in appendix B).

Openings – Generally persistent treeless areas having a fairly distinct shape or size, occurring naturally due to differences in soil types as compared to sites that support forests or woodlands. Openings include meadows, grasslands, rock outcroppings, and wetlands. In contrast, created openings result from disturbances like severe fire or windthrow, or management activities to intentionally create space for new tree regeneration. Natural and created openings are not the same as interspaces found in the frequent-fire forests or woodlands. See "interspaces."

Other energy development – Infrastructure associated with the provision or transport of energy (e.g., biomass power generation, wind turbines, solar panels).

Outstanding Arizona Waters – Surface water designated by Arizona Department of Environmental Quality as an outstanding State water resource. These are waters with exceptional quality where water quality should not be degraded.

Patches – Areas larger than tree groups in which the vegetation composition and structure are relatively homogeneous. Patches compose the mid-scale, thus they range in size from 100 to 1,000 acres.

Phenotype – The visible characteristics of an organism resulting from the interaction of its genetic makeup and environment.

Plan set of documents – The complete set of documentation supporting the land management plan; it may include, but is not limited to, evaluation reports, documentation of public involvement, the plan including applicable maps, applicable plan improvement documents, applicable NEPA documents, and the monitoring program for the plan area.

Planned ignition – The intentional initiation of a wildland fire by hand-held, mechanical, or aerial device where the distance and timing between ignition lines or points and the sequence of igniting them is determined by environmental conditions (e.g., weather, fuel, topography), firing technique, and other factors which influence fire behavior and fire effects. See prescribed fire.

Planning period – The life of the plan, generally 10 to 15 years from plan approval.

Potential natural vegetation type (PNVT) – Coarse-scale groupings of ecosystem types that share similar geography, soils, vegetation, and historic ecosystem disturbances such as fire, drought, and grazing by native species. PNVTs represent the vegetation type and characteristics that would occur when natural disturbance regimes and biological processes prevail.

Prescribed fire – A wildland fire originating from a planned ignition to meet specific objectives identified in a written and approved prescribed fire plan for which NEPA requirements (where applicable) have been met prior to ignition. See planned ignition.

Primitive recreation – Reliance on personal skills and nonmotorized and non-mechanized means to travel and camp in an area, rather than reliance on facilities or outside help.

Priority 6th level (subwatershed) HUC watershed – The designated watersheds (subwatersheds) where restoration activities will concentrate on the explicit goal of improving watershed condition.

Proper functioning condition (PFC) – Proper functioning condition (PFC) is a qualitative method for assessing the condition of riparian-wetland areas. The term PFC is used to describe both (1) the assessment process or tool and (2) a defined, on the ground condition of a riparian-wetland area:

- (1) The PFC tool is designed to assess if the physical elements (abiotic and biotic) are in working order relative to an area's capability and potential. When these physical elements are in working order, then channel characteristics develop that provide habitat for wildlife and other uses. Functionality comes first; then desired conditions are achieved.
- (2) A riparian-wetland area is considered to be in proper functioning condition when adequate vegetation, landform, or large woody debris is present to:
    - dissipate stream energy associated with high water flow, thereby reducing erosion and improving water quality;
    - filter sediment, capture bedload, and aid floodplain development;
    - improve floodwater retention and groundwater recharge;
    - develop root masses that stabilize stream banks against cutting action;
    - develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and
    - support greater biological diversity (Bureau of Land Management, 1998).

Proposed Species – Any species of fish, wildlife, or plant that is proposed in the Federal Register to be listed under section 4 of the Endangered Species Act.

Range condition – The present state of vegetation of a range site in relation to the climax (potential natural) plant community for that site. It is an expression of the relative degree to which the kinds, proportions, and amounts of plants in a plant community resemble that of the climax plant community for the site (Forest Service 1999). Range condition as evaluated and ranked by the Forest Service, is an adjective expression of the status or health of the vegetation and soil relative to the combined potential to produce a sound and stable biotic community. Soundness and stability are evaluated relative to a standard that encompasses the composition, density, and vigor of the vegetation and physical characteristics of the soil. The adjectives that describe range condition are: excellent, good, fair, poor and very-poor (FSH 2209.21, Southwestern Region). According to Holechek et al. (1989), range condition is measured in degrees of departure from climax; excellent range condition would represent climax, and very-poor range condition would represent the greatest departure from climax.

Recreation opportunity spectrum (ROS) – A framework for defining the types of outdoor recreation opportunities the public might desire, and identifies that portion of the spectrum a given national forest area might be able to provide. The ROS map can be found in the plan set of documents. The broad classes are:

- **Primitive (P)** – Characterized by essentially unmodified natural environment. Interaction between users is very low and evidence of other users is minimal. Essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is generally not permitted. Very high probability of experiencing solitude, closeness to nature, tranquility, self-reliance, and risk.
- **Semiprimitive Nonmotorized (SPNM)** – Characterized by a predominantly natural or natural appearing environment. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls and restrictions may be present but are subtle. Motorized use is generally not permitted. High probability of experiencing solitude, closeness to nature, tranquility, self-reliance, and risk.
- **Semiprimitive Motorized (SPM)** – Characterized by a predominantly natural or natural appearing environment. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls and restrictions may be present but are subtle. Motorized use is generally permitted. Moderate probability of experiencing solitude, closeness to nature, tranquility, self-reliance, and risk.
- **Roaded Natural (RN)** – Characterized by a predominantly natural appearing environment with moderate evidence of the sights and sounds of other humans. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate but with evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities. Opportunity to affiliate with other users in developed sites but with some chance for privacy.
- **Roaded Modified (RM)** – Characterized by substantially modified natural environment except for campsites. Roads and management activities may be strongly dominant. There is moderate evidence of other users on roads. Conventional motorized use is provided for in construction standards and design of facilities. Opportunity to get away from others but with easy access.
- **Rural (R)** – Characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided far away from developed sites. Facilities for intensified motorized use and parking are available. Opportunity to observe and affiliate with other users is important, as is convenience of facilities.
- **Urban (U)** – Characterized by a substantially urbanized environment, although the background may have natural appearing elements. Resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans onsite are predominant. Large numbers of users can be expected, both onsite and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site. Opportunity to observe and affiliate with other users is very important, as is convenience of facilities.

Redundancy – Multiple occurrences of the representative conditions across the landscape.

Reference conditions – Environmental conditions that infer ecological sustainability. Reference conditions are often represented by the historic range of variation (i.e., the characteristic range of variation, not the total range of variation) for a particular attribute, prior to Euro-American settlement and under the current climatic period. For some ecosystems, the historic range of variation reflects American Indian burning. Reference conditions may not necessarily represent desired conditions.

Reforestation – The natural or artificial reestablishment (restocking) of an area with forest trees.

Regulated – The technical (rather than legal or administrative) aspect of controlling forest stocking, periodic harvests, growth, and yields to meet management objectives including sustained yield. This control can be done either by area, volume of growing stock, or basal area or stand density index measures. An uneven-aged, regulated forest is one which has a balanced progression of three or more age/size classes, such that each younger/smaller class is advancing to replace the class above it on approximately the same acreage, until it is mature for harvest or other resource objectives. A regulated forest reaches sustained yield when the volume cut periodically equals the amount of net volume growth for that same period.

Repatriation – In the Native American Graves Protection and Repatriation Act (25 USC 3005), the term "repatriate" means to transfer physical custody of and legal interest in Native American cultural items to lineal descendants, culturally affiliated American Indian tribes, and Native Hawaiian organizations.

Research natural area – A physical or biological unit in which current natural conditions are maintained insofar as possible. These conditions are ordinarily achieved by allowing natural physical and biological processes to prevail without human intervention. Research natural areas are principally for non-manipulative research, observation, and study. They are designated to maintain a wide spectrum of high quality representative areas that represent the major forms of variability found in forest, shrubland, 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.

Resiliency –The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change.

Restoration – See ecological restoration.

Riparian area – Terrestrial ecosystems characterized by wet soils and plant species that are water loving and dependent on the water table or its capillary fringe zone (a zone in the soil just above the water table that remains saturated or almost saturated. Riparian areas make up the most biologically productive component of forest ecosystems providing unique wildlife habitat in the Southwest. Riparian areas also function to transport and filter water, soil and organic material from upslope to stream.). Examples of riparian areas on the forests include areas along streams, or around wetlands, lakes, ponds, springs and seeps, and include wet meadows, fens, bogs and floodplains.

Road decommissioning – Activities that result in the stabilization and restoration of unneeded roads to a more natural state (36 CFR § 212.1). It includes a range of activities from ripping and

seeding to full reclamation by restoring the original topography. Road decommissioning results in the removal of a National Forest System road from the forest transportation atlas.

Road removal – The elimination of unauthorized routes. It includes a range of activities from ripping and seeding to full reclamation by restoring the original topography.

Scale – The aerial extent of certain plan decisions are described at various scales:

- **Fine scale** is an area of about 10 acres or less at which the distribution of specific site characteristics such as individual tree species (single, grouped, or aggregates of groups) is described.
- **Mid-scale** is an area of 100 to 1,000 acres composed of assemblages of fine scale units that have similar biophysical conditions.
- **Landscape scale** is an assemblage of mid-scale units typically composed of variable elevations, slopes, aspects, soils, plant associations, and natural ecological processes. An area at this scale comprises multiple mid-scale units, most often 10 or more.
- **6th level HUC** watershed scale is a unit of the forest approximately comparable to a 6th level HUC (hydrologic unit code) watershed (approximately 5,000 to 80,000 acres).
- **4th to 5th level HUC** watershed scale is a unit of the forest approximately comparable to a 4th level HUC (hydrologic unit code) watershed (approximately 400,000 to 2,000,000 acres). A 4th level HUC watershed is an aggregation of multiple 5th level HUC watersheds. A 5th level HUC watershed scale is a unit of the forest approximately comparable to a 5th level HUC watershed (approximately 80,000 to 300,000 acres).

Scenic integrity – The state of naturalness or a measure of the degree to which a landscape is visually perceived to be "complete." The highest scenic integrity ratings are given to those landscapes that have little or no deviation from the landscape character valued by constituents for its aesthetic quality. Scenic integrity is the state of naturalness or, conversely, the state of disturbance created by human activities or alteration. Scenic integrity is measured in five levels:

- **Very high** (unaltered) – A scenic integrity level that generally provides for ecological change only.
- **High** (appears unaltered) – Human activities are not visually evident. In high scenic integrity areas, activities may only repeat attributes of form, line, color, and texture found in the existing landscape character.
- **Moderate** (slightly altered) – Landscapes where the valued landscape character "appears slightly altered." Noticeable deviations must remain visually subordinate to the landscape character being viewed.
- **Low** (moderately altered) – Human activities must remain visually subordinate to the attributes of the existing landscape character. Activities may repeat form, line, color, or texture common to these landscape characters, but changes in quality of size, number, intensity, direction, pattern, and so on, must remain visually subordinate to these landscape characters.
- **Very Low** (heavily altered) – Human activities of vegetative and landform alterations may dominate the original, natural landscape character but should appear as natural occurrences when viewed at background distances.

Seed cut – One step of an even-aged regeneration cutting method in which the healthiest, most desirable trees are left, and stand conditions are created for them to become good cone producers. The intention is to promote natural tree regeneration where needed.

Selection regeneration method – An uneven-aged method where individual trees or groups of trees of all size classes are removed, more or less uniformly throughout the stand, to promote growth of remaining trees and to provide space for regeneration. Includes individual tree selection and group selection methods.

Sense of place – The aesthetic, nostalgic, or spiritual effects of physical locations on humans based on personal, use oriented, or attachment oriented relationships between individuals and those locations. The meaning, values, and feelings that people associate with physical locations because of their experiences there.

Sensitive species – A sensitive plant or animal species for which population viability is a concern as evidenced by: (1) a significant or predicted downward trend in population numbers or density, or (2) a significant current or predicted downward trend in habitat capability that would reduce a species' existing distribution (FSM 2670.32). Sensitive species are designated by the regional forester and that status is periodically reviewed. Impacts to sensitive species from forest management and activities are analyzed in a biological evaluation.

Seral state – A particular plant and animal community developmental stage which is transitional between other stages along the continuum of succession or change. Changes in seral states can take place over time or very quickly and movement between states can be in either direction. Aspen is an example of a seral state that, without disturbance over time, will eventually be replaced by a subsequent seral state dominated by conifers.

Silvics – Knowledge of forest tree species differing needs for light, water, soil nutrients, growing space, and temperature ranges; it includes species adaptations and responses to various environmental factors such as fire, flood, extreme temperatures, wind, drought, insects, diseases, wildlife, and other tree species. The basis for silviculture.

Silviculture – The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands using species silvics to meet the diverse needs and values of landowners and society on a sustainable basis. Under this definition, silvicultural treatments include all management activities that control the establishment, growth, composition, health, and quality of forested lands to achieve stated land management objectives. The use of prescribed fire on forested lands qualifies as a silvicultural treatment in the context of this definition.

Sinkholes – Large depressions in limestone geology; rimrock-lined depressions in basaltic geology may be considered sinks as well.

Slash – The residue (e.g., branches, bark) left on the ground after a management activity such as logging, or natural ecological process such as a storm or fire.

Snags – Standing dead or partially dead trees (snag topped), often missing many or all limbs and/or bark. Snags (generally 12 inches or larger) provide essential wildlife habitat for many species and are important for forest ecosystem function.

Soil and water conservation practices – Set of practices, which when applied during implementation of a project, protects soil and water quality to the level required by beneficial uses. These lead to the formation of site-specific BMPs during project planning.

Soil condition rating – A qualitative rating developed within the Southwestern Region of the Forest Service that provides an overall picture of soil condition vital in sustaining ecosystems. It is based on three soil functions: the ability of soil to resist erosion, infiltrate water, and recycle nutrients. There are four soil condition ratings:

- **Satisfactory** – soil function is being sustained and soil is functioning properly and normally.
- **Impaired** – the ability of the soil to function properly and normally has been reduced or there exists an increased vulnerability to degradation.
- **Unsatisfactory** – degradation of vital soil functions result in the inability of the soil to maintain resource values, sustain outputs, or recover from impacts.
- **Inherently unstable** – these soils are eroding faster than they are renewing themselves.

Soil productivity – The inherent capacity of the soil to support appropriate site-specific biological resource management objectives, which includes the growth of specified plants, plant communities, or a sequence of plant communities to support multiple land uses.

Special use authorization – A permit, term permit, temporary permit, lease, easement, or other written instrument that grants rights or privileges of occupancy and use subject to specified terms and conditions on National Forest System land.

Species diversity – Abundance of different species (both plant and animal) on the Apache-Sitgreaves NFs and adjoining lands; species richness. NFMA requires that land management plans provide for diversity of plant and animal communities.

Springs and seeps - Springs and seeps are groundwater-dependent ecosystems where groundwater discharges at the ground surface, often through complex subsurface flow paths (Stevens and Meretsky, 2008).

Stand – A contiguous group of trees generally uniform in age class distribution, composition, condition, and structure, and growing on a site of generally uniform quality, to be a distinguishable unit, such as mixed, pure, even-aged, and uneven-aged stands. A stand is the fundamental unit of silviculture reporting and record keeping.

Stray equine – Equine livestock whose owner is unknown or cannot be located, or any such animals whose owner is known but permits the animal to roam at large on roads, range, or premises of another without permission. This section does not apply to livestock where the principles of a federal permit, federal allotment or federal lease are in dispute [adapted from Arizona Revised Statue, Title 3 – Agriculture (Ownership, Control and Regulation of Livestock), Chapter 11, Article 7, 3-1401 (Definitions)].

Structure – Structure includes both the vertical and horizontal dimensions of a vegetation type or plant community. The horizontal structure refers to spatial patterns of individual and groups of plants and openings, as well as plant size and species composition. The vertical component refers to the layers of vegetation between the forest floor and the top of the canopy. Each vegetation

type has its own structure. For example, forests have greater vertical structure than a grassland or woodland based on the height of the dominant species.

Suitable timberlands – Land to be managed for timber production on a regulated basis. Such lands are those which have been determined to meet the following criteria: (a) are available for timber production (i.e., not withdrawn for wilderness or other official designation by Congress, the Secretary of Agriculture, or Chief of the Forest Service); (b) are physically capable of producing crops of industrial wood without irreversible resource damage to soils productivity or watershed conditions; (c) adequate tree restocking within 5 years of final harvest is reasonably assured; (d) adequate information exists about responses to timber management activities; (e) timber management is cost efficient over the planning horizon in meeting forest objectives that include timber production; (f) timber production is consistent with meeting the management requirements and multiple use objectives specified in the forest plan or plan alternative; and (g) other management objectives do not limit timber production activities to the point where it is impossible to meet management requirements set forth in 36 CFR § 129.27 (per FSH 2409.13, WO Amendment 2409.13-92-1, O Code and Chapter 20).

Sustainability – Meeting the needs of the present generation without compromising the ability of future generations to meet their needs. Sustainability is composed of desirable social, economic, and ecological conditions or trends interacting at varying spatial and temporal scales embodying the principles of multiple use and sustained yield.

Temporary road or trail – A road or trail necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road or trail and that is not included in a forest transportation atlas (36 CFR § 212.1).

Terrestrial ecosystem survey (TES) – Also called the terrestrial ecological unit inventory, the TES identifies ecological units for the Apache-Sitgreaves NFs that are distinct from each other in terms of their soil, vegetation, and climate components.

Thinning – An intermediate treatment made to reduce the stand density of trees primarily to improve growth, enhance forest health, recover potential mortality, emphasize desired tree species, and/or emphasize desired forest structure. It includes crown thinning (thinning from above, high thinning), free thinning, low thinning (thinning from below), selection thinning (dominant thinning), mechanical thinning (leaves trees in equally-spaced rows), and mechanized thinning (any spacing arrangement). Mechanized thinning should not be confused with mechanical thinning. As used in this plan “mechanized thinning” includes prescribed cuts made by both hand and/or mechanized equipment, as a distinction from prescribed thinning by use of wildland fire only. Traditional (cutting) prescribed thinning can be used with both even- and uneven-aged management systems. Thinning with prescribed fire can qualify as an intermediate treatment, but may not provide enough controlled tree selection to clearly fit in either management system.

Timber production – Purposefully growing, tending, harvesting, and regenerating regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. In addition, managing land to provide commercial timber products on a regulated basis with planned, scheduled entries. It does not include firewood or harvest from unsuitable lands. (FSM 1900)

Traditional cultural property (TCP) – Defined in National Register Bulletin 38 as properties associated "with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community." TCPs can range from structures, mountains, and other landforms to plant gathering locations to communities. These areas are considered historic properties that may be eligible to the National Register of Historic Places.

Tree cutting – The cutting or removal of trees for wood fiber use and other multiple use purposes. Sometimes referred to as "timber harvest" or "thinning."

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Unauthorized livestock – Any cattle, sheep, goat, hog, or equine not defined as a wild free-roaming horse or burro by 36 CFR § 222.20(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 (livestock owned by other than a national forest grazing permit holder). 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 administered land do not fall under this definition.

Unauthorized road or trail – A road or trail that is not a forest road or trail or a temporary road or trail and that is not included in a forest transportation atlas (36 CFR § 212.1). Sometimes referred to as a "user-created" road or trail.

Uncharacteristic wildfire – An increase in wildfire size, severity, and resistance to control compared to reference conditions which occurred historically. These fires result as a consequence of more continuous canopy cover, ladder fuels, and accumulated live and dead woody material. Uncharacteristic wildfires burn with more intensity; cause higher tree mortality; degrade watersheds; sterilize soils; and threaten adjacent communities, forest infrastructure, and wildlife habitat. See reference conditions

Uneven-aged forests – Forests that comprise three or more distinct age classes of trees, either inter-mixed or in small groups.

Uneven-aged management – The application of combined actions needed to simultaneously maintain continuous forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

Unplanned ignition – The initiation of a wildland fire by lightning or unauthorized and accidental human-caused fires. See wildfire.

Use of wildland fire - Management of either wildfire or prescribed fire to meet resource objectives specified in land management plans.

Values to be protected (values at risk) - Includes property; structures; physical improvements; natural and culture resources; community infrastructure; and economic, environmental, and social values.

Vigor – Relates to the relative robustness of a plant in comparison to other individuals of the same species. It is reflected primarily by the size of a plant (i.e., height, weight) and its parts in relation to its age and the environment in which it is growing.

Wild and scenic rivers – These rivers are free-flowing and have at least one outstandingly remarkable value. Eligible and suitable rivers are given a tentative classification of wild, scenic, or recreational. These rivers may be included in the National Wild and Scenic Rivers System.

- **Wild** – Those rivers or segments of rivers free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive, and waters unpolluted. These represent vestiges of primitive America.
- **Scenic** – Those rivers or segments of rivers free of impoundments, with shorelines or watersheds still largely primitive, and shorelines largely undeveloped but accessible in places by roads.
- **Recreational** – Those rivers or segments of rivers readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Wild horse (wild free-roaming horse) – All unbranded and unclaimed horses and their progeny using National Forest System lands on or after December 15, 1971. This definition does not include any horse introduced onto National Forest System lands on or after December 15, 1971, by accident, negligence, or willful disregard of private ownership. Animals that stray from other lands onto National Forest System lands are not considered wild free-roaming horses and are not under Forest Service protection. No known records or documentation exists that the Apache NF had any unbranded and unclaimed horses prior to December 15, 1971. See 36 CFR § 220 and FSM 2260 for more information.

Wildfire – Unplanned ignition of a wildland fire (e.g., fires caused by lightning or unauthorized and accidental human-caused fires) and escaped prescribed fires. See unplanned ignition.

Wildfire hazard – A fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree or ease of ignition and of resistance to control.

Wildland – An area in which development is essentially nonexistent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered.

Wildling – A native plant growing uncultivated in the wild: specifically, the collection or transplant of such whole live plants.

Wildland fire – A general term describing any non-structure fire that occurs in the vegetation and/or natural fuels. The two types of wildland fire are wildfires and prescribed fires. Other terms such as “fire-use fires,” “resource benefit fires,” or “suppression fires” are not used in this plan.

Wildland-urban interface (WUI) – Wildland-urban interface includes those areas of resident populations at imminent risk from wildfire, and human developments having special significance. These areas may include critical communications sites, municipal watersheds, high voltage

transmission lines, church camps, scout camps, research facilities, and other structures that, if destroyed by fire, would result in hardship to communities. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved. (FSM 5140.5, Southwestern Region supplement).

Windthrow – Trees susceptible to wind damage (e.g., uprooting, toppling, bole breakage).

Woody biomass – The trees and woody plants, including limbs, tops, needles, leaves, and other woody parts, grown in a forest, woodland, or grassland environment, that are the byproducts of forest management used to produce bioenergy and the full range of bio-based products.

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