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Analysis of the Management Situation

**Coconino
National Forest
May 2010**

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Analysis of the Management Situation

Coconino National Forest
Coconino, Yavapai, and Gila Counties, AZ

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Preface and Executive Summary

The current Land and Resource Management Plan (Forest Plan or 1987 Plan), as amended, for the Coconino National Forest (Coconino NF or the Forest) is the main document that guides Forest managers' decision-making with respect to managing natural resources (e.g., soil, water, vegetation, ecosystems) and human uses (e.g. recreation, thinning, burning, livestock grazing, firewood gathering, special use permits, search for solitude) of the Forest. The Forest Plan was created in 1987 following the guidance in the 1982 Forest Planning regulations. Preparation of the revised plan was underway when the 2008 National Forest System land management planning rule was enjoined on June 30, 2009, by the United States District Court for the Northern District of California (*Citizens for Better Forestry v. United States Department of Agriculture* (the Department), 632 F. Supp. 2d 968 (N.D. Cal. June 30, 2009)). At the time of enjoinder, the Forest halted use of the 2008 planning rule for all revision efforts. On December 18, 2009, the Department reinstated the previous planning rule, commonly known as the 2000 planning rule in the Federal Register (Federal Register, Volume 74, No. 242, Friday, December 18, 2009, pages 67059 thru 67075). The 2000 rule, through its transition language (36 CFR 219.35(b), allows optional use of the provisions of the 1982 planning rule to amend/revise plans. The Coconino National Forest has elected to use the provisions of the 1982 planning rule, including the requirement to prepare an EIS, to complete its plan revision.

Because ecological, social and economic conditions have changed since the 1987 Plan, the goal of the current Forest Plan revision process is to provide management direction that balances current social, economic, and ecological demands on Forest resources, so that the resources are maintained into the future and to update the plan with more current scientific information. In preparation for plan revision, the Coconino NF identified what current guidance is working, what new conditions need to be addressed, and what ongoing challenges could be better addressed. Benchmarks from the 1987 Plan were also reviewed to determine their applicability as outside limits of possible alternatives in the revised plan. The Analysis of the Management Situation documents this work.

What is the Analysis of the Management Situation (AMS)?

The AMS highlights the social, economic and ecological conditions and trends in and around the Coconino NF, as detailed in the Forest's Economic and Social Sustainability Assessment (USDA Forest Service 2008), the Ecological Sustainability Report (USDA Forest Service 2009), as well as the Recreation, Grazing, Minerals, and Timber Demand report (USDA Forest Service 2010a) for the Forest. This report uses these key findings, along with public input (see Appendix A), to identify areas in the current Forest Plan direction that do not provide adequate guidance for the present and the future, and attempts to consider potential implications of those Forest Plan needs for change to other resources. The draft of this report and its supporting materials were used by the Forest leadership team to determine the initial scope of Plan Revision topics. The decisions made by the Forest leadership team are documented in Chapter 5. This report only focuses on recommended changes to the Forest Plan, rather than existing direction to be retained in the revised Plan.

While the information that serves as the basis for this report was originally developed under the 2008 Planning Rule, which is no longer applicable, the findings regarding general conditions and trends are not tied to a particular planning rule and are still relevant to the Plan revision process under the current direction. Concepts that still apply under the 1982 rule provisions, such as coarse filter/fine filter analyses, also will be carried forward. Concepts or language specific to the enjoined 2008 rule, such as Species of Concern or Species of Interest, however, will not be carried forward.

Additional requirements of the Analysis of the Management Situation under the planning regulations currently in effect are also contained in this report.

This Analysis of the Management Situation is organized as follows:

Chapter 1 provides background information, a description of the analysis area, and the historical context and role of the Forest.

Chapter 2 outlines the social and economic conditions and trends of the Forest and surrounding areas and resulting management concerns.

Chapter 3 outlines the ecological conditions and trends of the Forest and surrounding areas and resulting management concerns.

Chapter 4 summarizes the recommended needs for change in the Forest Plan.

Chapter 5 provides a summary of the Forest Plan need for change topics selected by the Coconino National Forest leadership team during the Management Review.

Appendix A contains a summary of the public participation that occurred during this phase of revision.

Appendix B contains a summary of designated area proposals.

Summary of Plan Needs for Change

Overall, social, economic, and ecological trends and conditions show increasing demand on the Forest to meet desires for a wide variety of human uses, as well as ecological needs. Additionally, the Forest faces threats to ecosystem and species sustainability. Identified Plan needs for change are summarized below and grouped into three broad topics: Recreation, Community-Forest Interaction, and Maintenance and Improvement of Ecosystem Health. The last chapter of this report provides more detail on how the Forest intends to proceed with these Plan needs for change. For the most part, the Forest leadership team felt that the recommended needs for change identified in this report were topics that warranted carrying forward in the Plan revision process. Given time and staffing constraints, however, the leadership team identified alternative approaches for addressing certain items and limited the scope of work for others.

1) Recreation

Recreational use of the Forest has changed significantly since the current Forest Plan was developed. Chapter 2 discusses the conditions and trends of recreation in more detail. Some related concerns include increased use of developed recreation areas, changing populations, increased conflicts in values, culture and expectations, new types of recreation, increased recognition of tribal cultural uses and values, public safety, and pressures on riparian and wilderness areas.

Plan needs for change:

- Update desired conditions and other plan components for recreation and scenery management where guidance is partial or absent in the current Forest Plan.
- Update plan components for existing Special Areas.
- Where appropriate, incorporate the intent of Special Area proposals into revised Plan desired conditions. After incorporation, the Forest leadership team will reconsider the remaining proposals for Special Area for possible recommendation as Special Areas. Previously proposed

Research Natural Areas and potential wilderness areas will be considered later in the Plan revision process.

2) Community-Forest Interaction

Relationships with the community have changed significantly since the current Forest Plan was developed. Chapter 2 discusses the conditions and trends of the community-forest interaction in more detail. Some related concerns include a shift from commodity-based to service-based economy, the influence of Forest Plan activities on the local economy, population growth and loss of access or open space, and increased demand for community infrastructure.

Plan needs for change:

- Update Plan language to acknowledge open space values.
- Update Plan language to acknowledge potential future community expansion desires.
- Update guidance on energy and mineral development.
- Provide guidance related to forest products and consideration of culturally important forest products.
- Clarify regulatory authorities relating to air quality and include approaches for addressing smoke emissions.
- Review and update Plan guidance on communication sites.

3) Maintenance and Improvement of Ecosystem Health

Since the development of the current Forest Plan, there is new knowledge of the forest ecosystems, and the emphasis of forest management has shifted from timber outputs to the maintenance and improvement of ecosystem health. Chapter 3 discusses the conditions and trends of the ecosystem health on the Coconino NF in more detail. Some concerns related to Forest Plan direction include forest resilience, changed frequency and severity of natural disturbances in fire-adapted ecosystems, the decline of aspen, the loss of understory species, lack of current plan direction about more rare ecosystems (such as tundra, spruce-fir, and riparian), susceptibility to catastrophic disturbances (fire, drought, insects and disease), climate change, invasive species, and habitat connectivity.

Plan needs for change:

- Update desired conditions and objectives for soil resources.
- Integrate and update management direction for riparian, aquatic, and water resources.
- Incorporate desired conditions that reflect the composition, structure, and natural disturbance attributes appropriate for the different ecosystems and that are integrated across different resource areas.
- Address non-native invasive animals (including invertebrates) and grasses.
- Ensure plan components address concerns of Forest planning species and their habitat.
- Acknowledge the importance of habitat connectivity.
- Consider strategies to address effects of climate change.

Though the needs for change identified in this report are the primary drivers of plan revision, they do not represent a comprehensive list of needed changes. Review of the current Forest Plan

identified other needed updates. Direction in the existing plan that is still current and timely will be carried forward into the revised plan, but other direction may be modified or removed for the following reasons:

- Administrative functions, such as budgeting, are described rather than the desired conditions of land and resources;
- Duplications or conflicts exist with direction found in existing laws, regulations or policy; or
- The plan is based on outdated information, such as policies, schedules of activities, or science.
- The format is inconsistent and hard-to-use.

Chapter 1: Introduction

Area of Analysis

The Coconino NF is located in north central Arizona (Figure 1) in Coconino, Yavapai and Gila counties and encompasses about 2 million acres. Ranger District offices are located in Flagstaff, the Village of Oak Creek, and Blue Ridge. The Forest Supervisor's office is located in Flagstaff.

Forest planning occurs on several spatial scales. The primary analysis scale is the Forest scale, and most management direction is applied at this level. Some aspects of forest management are evaluated at different spatial scales as noted in the social-economic and ecological evaluations. Chapters 2 and 3 contain additional descriptions of the analysis areas.

Historical Context

The earliest inhabitants lived on the lands comprising the present-day Coconino NF over 13,000 years ago. Both prehistoric and historic cultures had strong connections to this landscape, and strong cultural connections to the landscape are present to this day.

Activities following European settlement of the area have also shaped the landscape. From 1821 to 1848, the Mogollon Rim forests were part of the Republic of Mexico. When the United States acquired the territory from Mexico, those lands became a part of the 'public domain' if private individuals, including those under earlier Spanish and Mexican land grants, did not own them. The land was made available under various laws to settlement, purchase, and use.

The Arizona Territory was established in the early 1860s. It urged the sale of all the territorial timberlands at public auction. In 1879 and 1880, Congress authorized the citizens of Arizona to "fell and remove timber from the public domain for mining and domestic purposes."

Since the Anglo-American and Hispanic settlement of this area in the late 1800's, the ponderosa pine underwent dramatic changes. Structural and functional changes were driven by three things: fire suppression, livestock over-grazing, and logging large trees. The natural low intensity, frequent fire regime was disrupted by over-grazing which removed the fuels that normally carried fire, and suppression of fires that thinned young ponderosa pine trees and maintained a relatively open, all-aged forest. A surge of pine regeneration followed and resulted in the establishment of dense young trees across the landscape.

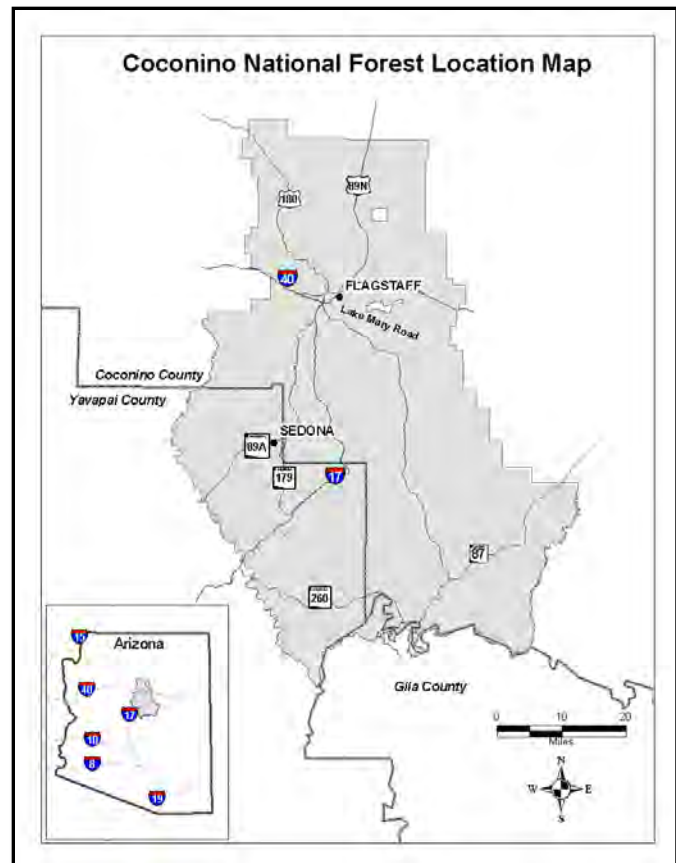


Figure 1: Coconino National Forest in relationship to nearby counties

The establishment of railroads in the Flagstaff area in the late 1800's assisted the development of a thriving timber industry. Only after the American Civil War and the completion of the railroad did a great change in public land use begin in Arizona. Domestic enterprises like cutting timber and fuel wood, mining, and raising cattle became corporate enterprises with national markets. Timber production in Arizona and New Mexico, estimated at 8 million board feet in 1879, rose to 22 million in 1889, and 67 million in 1900. Cattle grazed in ever greater numbers, increasing from a small number of herds in 1860 to 172,000 head in 1880 to 1.5 million by 1890. In 1891, Congress authorized the President to designate particular areas of forested public domain as 'reserves', to be set aside for future use. By law, the reserves were closed to public use and there was no management or supervision of the land, and in 1897 Congress restricted the President's authority with the passage of the Organic Act authorizing him to establish reserves only to preserve timber, protect watersheds, and provide lumber for local use.

By 1900, once productive grasslands could no longer support large numbers of livestock (Figure 2). The Secretary of Agriculture announced the transfer of the Forest Reserves to the Department of Agriculture. Some 21 million acres of public lands, almost one-eighth of the land area of Arizona and New Mexico, were now to be administered by a regional subdivision of the Forest Service. The Forest Service was charged to maintain the permanence of national forest resources, while providing for their use. In 1908, President Theodore Roosevelt signed several Executive Orders that created the Coconino NF by combining all of the San Francisco Mountains Forest Reserve, and parts of the Black Mesa, Tonto, and Grand Canyon Forest Reserves. Also in 1908, the Fort Valley Experimental Station was established to study the surrounding ponderosa pine ecosystem and determine the best management practices to ensure the health and productivity of ponderosa pine forests. This was the first forest research station in the United States. Arizona's population



Figure 2. Upper Lake Mary. Photo courtesy Gary Garner 2009.

increased dramatically following World War II. Logging, grazing, and the railroad were important economic factors in the local communities and the Forest provided employment where few other jobs were available.

Roles and Contributions of the Coconino NF

The approximately two million-acre Coconino NF is located in north central Arizona and is at the southern end of the Colorado Plateau. It is one of six National Forests in Arizona. The Forest shares borders with the Kaibab,

Prescott, Tonto and Apache-Sitgreaves National Forests, private land, and lands administered by the State of Arizona and National Park Service. It is within a couple miles of the Navajo Nation.

The Forest ranges in elevation between 2,600 and 12,633 feet. Numerous cinder hills and volcanoes of the San Francisco Mountains volcanic field pockmark the northern portion. The north part of the Forest is dominated by the San Francisco Peaks, which includes Mt. Humphreys, the highest point in

Arizona. The Mogollon Rim, a 1,000-foot high cliff that runs for about 200 miles across central Arizona, delineates the southeast border of the Forest. Deep canyons containing several perennial streams dissect it. The Verde River forms the southwest boundary of the Forest while one of its major tributaries, Sycamore Canyon, separates the Coconino from the Kaibab and Prescott National Forests on the west. The Forest has a high diversity of vegetative communities due to the wide range of elevations, complex topography, and the presence of perennial water. Vegetative communities at the lowest elevations are desert scrub and riparian areas supporting cottonwoods and willows while the highest elevation atop the San Francisco Peaks is the only well developed alpine tundra in Arizona. In between, are extensive areas of pinyon juniper, ponderosa pine, and mixed conifer forests interspersed with grasslands and scattered pockets of aspen at higher elevations. Riparian vegetation lines perennial and intermittent streams.

The Coconino NF contains more water than on most of the surrounding landscapes. There are about 224 perennial stream miles on the Forest. Mormon Lake is Arizona's largest natural lake. There are 13 reservoirs, constructed primarily for municipal water use, recreation, and livestock. The Forest lies mainly in the Verde River and Little Colorado River Plateau groundwater basins. The areas of highest precipitation and groundwater recharge for these basins occur on Coconino NF lands. The Forest also contains about 78 riparian wetlands totaling about 10,186 acres, the second highest number on National Forest lands in Arizona. Over 200 springs occur on the Forest.

The diverse ecosystems on the Forest provide habitat for a wide array of wildlife, fish, and plants. There are a number of unique species such as the Wupatki Arizona pocket mouse, Chiricahua leopard frog, and rare plants like the San Francisco Peaks groundsel, that only grows in the tundra zone of the San Francisco Peaks, and Arizona cliffrose. Fifteen native fish species occur on nearly 80 percent of the perennial streams. Some are only known from this area.

Most visitors are from Arizona's metropolitan areas or other parts of the country. They visit the Coconino NF seeking a change from summer heat and city living. Many people gravitate to water or snow-based activities. Others enjoy the diverse scenery of red rocks, grasslands, desert and cool forests. The activities that see the greatest number of participants are hiking/walking; driving for pleasure; and viewing natural features, wildlife, and archaeological sites.

Forest visitors enjoy the developed recreation sites throughout the Forest that include the Arizona Snow Bowl, popular lakes and campgrounds. There are abundant year-round dispersed recreation activities. Ten wilderness areas provide opportunities for solitude and backcountry experiences. Several archaeological sites developed by the Forest for public interpretation and an abundance of private sector guided tours display the significant cultural heritage preserved on the Forest. Over six thousand miles of trails and roads provide numerous hiking, biking, horseback, and motorized vehicle access to natural areas in the Forest landscape. Big game hunting and fishing are popular activities. The Coconino NF is a destination for winter activities such as snow play, snowmobiling, skiing and snowshoeing.

American Indians and ranchers were a significant part of the Forest history and their traditional uses remain an important part of the cultural landscape of the Coconino NF.

Some additional features that make the Coconino NF unique on a regional and national scale include the following:

- The state of Arizona has designated two streams, Oak Creek and West Fork of Oak Creek, on the Coconino NF as being outstanding state resources and classified them as Outstanding Arizona Waters.

- The only two designated Wild and Scenic Rivers (WSR) in Arizona occur on the Forest. The Verde River WSR is shared with the Prescott and Tonto National Forests. The Fossil Creek WSR is shared with the Tonto National Forest. Eleven additional segments in nine different streams are eligible for inclusion in the National Wild and Scenic Rivers System.
- Fossil Creek contains the largest assemblage of native fish species in a creek that is free of non-native fish in the state of Arizona. In addition, the travertine formation in Fossil Creek is of international significance because it is of similar scale and significance with a handful of travertine systems in China, Afghanistan, Croatia, Italy, Guatemala and Turkey. Travertine is what gives the stream its unique turquoise color. It is nationally unique and is comparable to Mammoth Hot Springs, Tonto Natural Bridge, and Havasu Creek.
- The Forest contains the two largest natural lakes in Arizona, Mormon Lake and Stoneman Lake.
- The Coconino NF accounts for 13 percent of the perennial streams that exist on national forests in Arizona. Fifteen percent of the stream reaches support native fish populations.
- Oak Creek has the largest number of caddisfly species reported in any drainage in Arizona.
- The Forest has all of Arizona's big game species except buffalo, and includes pronghorn, black bear, bighorn sheep, elk, javelina, turkey, mountain lion, mule deer and white-tailed deer.
- Several factors make the Forest unique for its bald eagle habitat. Edgar Mearns documented the first bald eagle nest in Arizona at Stoneman Lake in the late 1800's. The largest concentration of bald eagles ever counted in Arizona (120 eagles) was counted on the Forest near Mormon Lake. Fifteen to twenty percent of all bald eagles counted in Arizona in the winter occur on the Forest. The Forest contains both federally-listed (desert) and separate Forest Service sensitive populations (high elevation) of nesting bald eagles.
- Night sky viewing opportunities abound, and four observatories are located within or adjacent to the Forest boundary. In recognition of the area's unique and valuable night sky viewing opportunities, Flagstaff became the world's first international "Dark Sky City".
- In addition to having four National Monuments and four State Parks as neighbors, the Forest manages seven archaeological sites that are open to the public – Sacred Mountain, Honanki, Palatki, V-V and Red Tank Draw Petroglyph sites, Clear Creek Ruins, Old Caves Pueblo, and the award-winning Elden Pueblo Project, one of America's Hands on the Land designated sites.
- The Cinder Lakes volcanic field was used from 1968 to 1973 to train NASA astronauts in the Apollo 11 through Apollo 15 missions. This training was vital to the success of the Apollo program and the first U.S. landing on the moon by Neil Armstrong and Edwin Aldrin in July 1969.
- Coconino NF ranges from 2,600 feet in elevation in the Verde Valley to 12,633 feet atop Mt. Humphreys. This wide range in elevation makes the Forest unique in Arizona because it contains all the main biotic communities except true desert.
- The Coconino National Forest has one of the highest natural fire occurrences in the United States. Over a 23-year period, the Forest had the highest natural fire occurrence in the United States for 18 years. It was in the top six every year.

Chapter 2: Economic and Social Conditions and Trends

This section is a summary of the Coconino NF Economic and Social Sustainability Assessment (Coconino NF 2008); Attitude, Values and Beliefs survey (USDA Forest Service 2006); the Recreation, Grazing, Minerals, and Timber Demand report for the Forest (USDA Forest Service 2010a); and public comments. The following describes the overall economic and social context of the Coconino NF and presents an assessment of social and economic conditions and trends as they relate to Coconino NF, as a basis for understanding needs for changes in the current Forest Plan. This evaluation also considers social and economic information from the counties that surround the Coconino NF. This is based on information that was compiled and written between 2005 and 2008 using some of the best information at that time. Economic data changes over time, sometimes quite rapidly, and this information is simply a snapshot in time.

Economic Conditions and Trends

The economic assessment area used to evaluate existing economic conditions and trends included all of Coconino County; the northwest portion of Gila County; the western three-quarters of Navajo County; and the northeast portion of Yavapai County. The Coconino NF contributes toward approximately two percent of all jobs and labor income in the assessment area. The greatest economic stimulus and highest employment numbers come from recreation and expenditures originating from the Forest Service budget.

Area economies have been shifting from commodity-based to service-based industries. Recreation supports and stimulates the tourism industry.

Within the counties surrounding the Coconino NF, economies based on commodity-related industries, such as mining and timber harvesting, have been shifting and will likely continue to shift to an economic structure based more on service industries, recreation, and construction.

Tourism is the largest economic activity associated with natural settings in the assessment area. The natural, cultural, and historic resources of the Coconino NF play a large role in attracting visitors. Attractions include not only natural beauty and opportunities to experience nature, but also visitation to cultural sites. Current recreation use monitoring data indicates that, of the two percent the Coconino NF contributes to the economy of the assessment area, approximately 86 percent of the jobs and 87 percent of the labor income (wages and salary) supported are a result of visitors coming to the Coconino NF from outside the assessment area. Expenditures by these visitors from outside the area add new money into the local economy, stimulating increased employment and labor income.

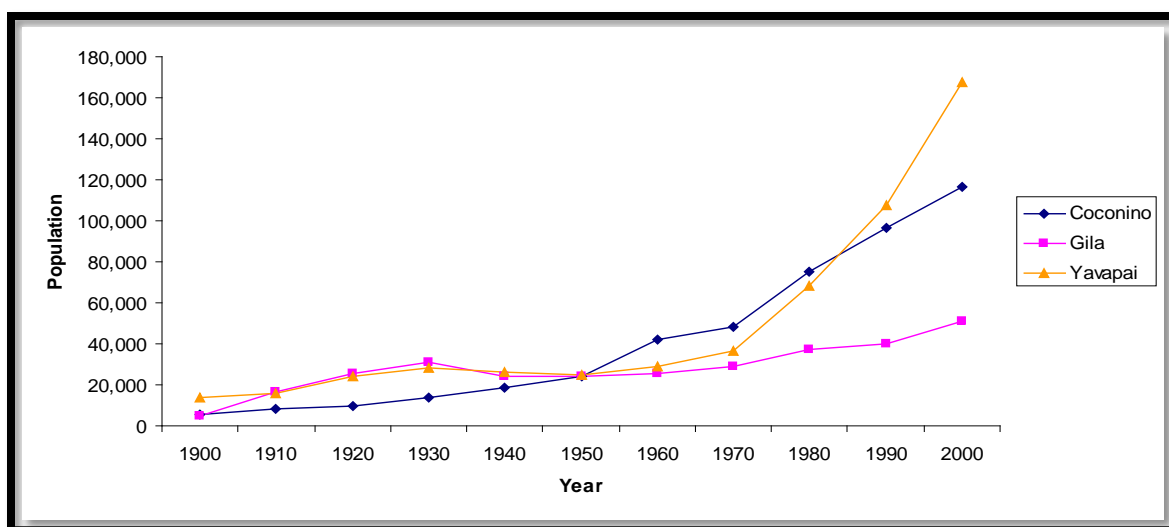
Agriculture, arts, entertainment, and recreation; accommodations and food services, and wholesale trade are the industrial sectors most dependent on Forest Service management activities and use of the Coconino NF. Contributions to the employment and labor income in these industries appear to be most closely connected to Forest activities associated with the timber management, grazing, recreation, and fish and wildlife program areas.

Social Conditions and Trends

Demographic information for the area surrounding the Coconino NF describes an area of sustained and rapid growth.

The social assessment area included all of Coconino, Yavapai, and Gila counties. The recent demographic history of the area surrounding the Coconino NF, and the region as a whole, represents one of sustained and rapid growth. The rates of population growth between 1980 and 2000 in Coconino, Gila, and Yavapai counties were 55 percent, 38 percent, and 146 percent respectively (Figure 3).

As the population has increased, there has been a shift in composition of race and ethnicity. Between 1990 and 2000, the overall percentage of whites in Arizona declined from 80 percent to 75 percent. Since 1990, the greatest percentage growth was in those individuals identifying themselves as being of multiple race or Hispanic in origin.¹ Hispanic presence has increased from 20 percent to 25 percent of Arizona's total population since 1940. The American Indian population grew from, 44,076 in 1940, to 275,321 in 2005.



Source: U.S. Bureau of the Census, Census of Population

Figure 3. Population Change in the Three-County Assessment Area, 1900-2000

Increased population growth is expected to continue into the near future. This trend includes an increase of retirement age, seasonal populations, and diversity of interest and ethics regarding natural resources. Increased population growth has the potential to put a higher demand on forest resources. This may result in increased conflicts between diverse interest groups over natural resource management. Examples include conflicts between users favoring motorized vs. non-motorized recreation, or people desiring fire risk reduction near communities and no smoke.

¹ Multiple racial background change between 1990 & 2000 is tied to change in census procedures—multi-race was not a valid choice prior to 2000. The population of Hispanic origin is defined for federal statistical purposes as another group and may be of any race.

Major transportation corridors may be inadequate for projected growth.

Two main travel corridors, Interstate-17 and Interstate-40, meet near the center of the Coconino National Forest. The Arizona Department of Transportation (ADOT) assessments have determined that these corridors are inadequate for projected growth and improved regional travel planning is needed. In particular, the need for an additional travel corridor between Phoenix and Flagstaff is being studied and Regional Transportation studies are underway for Northern Arizona and the Grand Canyon.

National Forest Land Use Condition and Trends

Land Ownership, Open Spaces, and Land Exchanges

Demand for land continues.

As a whole, land ownership within the social assessment area consists of large amounts of national forest and tribal lands and relatively small amounts of private land. The relative lack of private land has caused greater demands on the National Forests, for both development and conservation purposes. Land use within the assessment area ranges from traditional practices such as ranching in rural areas to concentrations of residential, industrial, and commercial development in and around urban population centers. Preservation of open space is a particularly difficult land use issue given both the public's desire to maintain the "rural character" of county lands and the need to accommodate rapidly growing populations and municipalities.

Three primary trends emerged from assessing the current condition of land use policy and open spaces in relation to the Coconino NF.

- Demand for the Forest Service to exchange more land from federal management with other entities is expected as communities adjacent to the Forest grow.
- Increases in community and private development within and adjacent to the Coconino NF will continue threatening open spaces.
- The Coconino NF involvement with county, town, and city planning for both open space and development needs of communities within the Coconino NF will continue.

Land exchanges involving the Coconino NF during the period of 1987 through 2006 resulted in a net acreage gain to the Forest of 5,266 acres. Most of these exchanges involved multiple land parcels within several Arizona National Forests. Overall, the Coconino NF gained 8,528 acres and 3,262 acres were conveyed into private ownership. Land purchases on the Coconino NF during an eight-year period between 1998 through 2005 acquired an additional 7,139 acres at a cost of \$43,661,000, which came from a variety of funding sources, but primarily from the national Land and Water Conservation Fund.

Fire Effects and Management

Wildfire risk, wildland urban interface, people, and smoke emissions are increasing.

Fire management activities and their effects are a critical social issue in the assessment area. Social and economic pressure associated with habitation, development, and resource utilization brought

about aggressive wildfire suppression after 1910. The Coconino NF, however, has many fire-adapted ecosystems. Vegetation on 68 percent of the Coconino NF historically evolved under a frequent fire conditions. Very few of the natural vegetation types that occur on the Coconino NF, however, are experiencing fire at their historic frequency. Social attitudes that accept more frequent burning help the Forest restore forest health; however, public health concerns may limit needed prescribed fire.

Human populations and associated infrastructure are found in and around the Coconino NF. The population of these developed areas adjacent to the Forest has increased significantly along with the associated homes, businesses, and infrastructure. Consequently, hazardous fuel treatment priorities have shifted to locations that better protect these areas from severe wildfire risk. Prescribed burning, particularly in these Wildland Urban Interfaces (WUI), has increased since the completion of the current Forest Plan. Thinning is also conducted to reduce fuels and tree density for wildfire risk reduction and forest health purposes.

There are several public health and safety concerns related to the potential for uncharacteristic fire, and fire and fuels management. People expressed concerns about the hazards of uncharacteristic wildfire to local communities. People also voiced concern over potential health dangers due to air quality

impacts from prescribed burns, wildfire, and fuels management. Fuel treatments within the WUI are expected to continue because managers want to maintain reduced fire hazard in these areas. An

increase in prescribed burns and wildfires may result in an increase in smoke emissions. The Forest Service, however, is required to meet minimum state and national air quality standards as administered through the Arizona Department of Environmental Quality. Figure 4 is a picture of smoke from the 2007 Birdie wildfire on Mormon Lake District.



Figure 4: Birdie Fire, July 2007. Photo Courtesy of Henry Provencio

Water and Watersheds

Demand for water is increasing, and groundwater supply is declining especially near municipalities.

The City of Flagstaff, and Coconino, and Yavapai counties are increasing in population, causing increasing water demand. Increased domestic water demand in Flagstaff will necessitate additional well drilling and procurement of additional water supply. Forest management of the municipal watershed in the Inner Basin, and the Lake Mary watershed, a source of additional water for the City of Flagstaff, affects domestic water quality and supply. The altered forest structure resulting from over a century of fire exclusion has greatly decreased water run-off and ground water supply. Therefore, collaborative, interagency agreements, watershed advisory groups and special-use permits have been crafted to guide appropriate management in these watersheds. While overall groundwater supply remains static to slightly declining, increasing domestic demand poses a risk to groundwater supply and those plants and animals that rely on it for their survival.

Forest surface water is limited and found in perennial streams, lakes, wetlands, seeps and springs, reservoirs, and earthen stock tanks. Supply remains static in normal years and declines slightly in drought years. There have been periodic drought years since about 1997.

Surface waters offer opportunities for water-based recreation, livestock, and wildlife watering and essential habitat for fish and wildlife. Recreation use in streams, riparian areas, seeps, springs, wetlands, and meadows has increased. There has been increased recreational use including camping and off-highway vehicle use in riparian areas, wetlands, montane meadows, and aspen stands causing deterioration in riparian area function and water quality where excessive use occurs.

Dark Skies

Development may increase light pollution and reduce sky darkness. At the same time there is increasing demand for more developed and undeveloped night sky viewing opportunities on the Coconino NF.

The night sky is a major contribution to northern Arizona's economy. Flagstaff has been designated the world's first International Dark Sky City by the International Dark Sky Association. The natural surroundings of the Coconino NF contribute to the preservation of dark skies. Four observatories exist on the Coconino NF and adjacent lands, including the new Discovery Channel telescope. Increased light pollution is a consequence of population growth and development in the dark sky areas surrounding the observatories. If the predicted trends of increased development occur in the area, there could be a loss of dark skies within communities. At the same time there is an increasing demand for more developed and undeveloped night sky viewing opportunities on the Coconino NF.

Nonnative and Invasive Species

Spread and establishment of nonnative and invasive species populations is expected to continue.

There are 24 taxa of serious² invasive or noxious weeds infesting the Coconino NF and over 6,000 areas of infestation have been identified on the Forest. Uses in and around the Coconino NF that are contributing to the spread of invasive weeds include motorized travel, development, off-highway vehicles, mountain bikes, and pack stock.

The introduction of non-native aquatic species such as crayfish, bullfrogs, and non-native fish has adversely affected native aquatic species and ecosystems. Non-native fish can provide sport fishing opportunities and economic revenue, but they negatively affect native aquatic species. Over 90 percent of the remaining native fish species on the Forest are federally listed as threatened or endangered, or are designated as Sensitive by the Forest Service. In addition, three species of leopard frogs have been extirpated from perennial stream systems due to crayfish and non-native fish and now only persist in isolated or man-made waters. The range of the rare narrow-headed gartersnake has greatly reduced since the 1980's. The establishment and upstream spread of crayfish is the main factor in the decline of this species.

² The invasiveness or seriousness of each species was determined from literature and local observations and was based on biological and ecological characteristics of the plant, such as number of seeds produced, ability to vegetatively reproduce, competitiveness, and rate of spread.

Because of increasing recreation and human activity throughout the forest, transport and spread of invasive weeds and non-native aquatic species on the Coconino NF will continue and is expected to increase. Untreated, these species threaten native species and alter ecosystems.

Special Use Permits

Demand is increasing especially for outfitter-guide and infrastructure related permits.

In 2007, the Coconino NF had 194 recreation permits and 386 non-recreation long-term permits. This does not include short-term or special-product permits issued for one year or less, for activities such as filming. Annual or shorter-term permits have ranged from 120 to 150 per year over the past few years. (See the Forest Product section for additional information about firewood and forest product permits). The Red Rock Ranger District has a large outfitter and guide permit program that generates millions of dollars annually for the local economy. In the last few years, there has been an increase in the demand for energy-related permits to accommodate new power sources, such as wind development, as well as new energy corridors. The Coconino NF also issues a number of special-use permits for research purposes.

Overall, the trend is an increasing demand for all permitted activities. This includes using public lands for infrastructure, such as power lines, rights-of-way, telecommunications, and energy-related permits. Outfitter and guide permit demand is projected to increase commensurate with projected population increase.

Livestock Grazing

Livestock grazing produces food and fiber for domestic and export markets, provides economic contributions to state and local economies, and maintains open space. The demand for livestock forage on the Forest is expected to remain stable and is needed to maintain the viability of area ranching operations.

Livestock have grazed the Coconino NF since before the Forest was established. The total number of livestock permitted to graze on the Forest, however, has decreased by half in the past 65 years. The reductions occurred prior to the implementation of the current Forest Plan in 1987. Since 1987, the number of permitted livestock on the Forest increased slightly. While some people in the assessment area have expressed concern over the environmental impacts of grazing, ranching is a way of life for people who rely on the National Forest for grazing at least part of the year. Ranches also provide open spaces and habitat for wildlife. Without Forest permits, ranches may no longer be viable, and their loss could result in development and a loss of open space.

Livestock grazing numbers are relatively stable, while authorized use fluctuates from year to year due to annual conditions of the allotment. The demand for grazing, however, is ultimately dependent on the demand for livestock products. Counties that are reasonably dependent on forage from the Coconino National Forest are Coconino, Gila, and Yavapai counties. While the cattle inventory in these counties have declined by 40 percent over the period from 1975 to 2009, Yavapai and Coconino counties have experienced some recovery over the last decade. Therefore, ranches will continue to rely on use of the forest to maintain the viability of their livestock operations.

Timber Production

Since 1987, timber harvest has decreased on the Coconino NF. There has been a shift in emphasis from commercial timber production towards reduction of fuel loads, and forest restoration, with a focus on removing small-diameter trees. There are few markets for small trees and logging residue.

From about 1987 to 1992, annual timber production averaged 61 million board feet. The average annual production dropped to 10 million board feet during the last fifteen years. Likewise, acres treated for ecological management objectives dropped from approximately 25,000 to 4,000 acres annually. The reasons for these declines were declining Forest budgets; loss of timber mills; increased protection for the Mexican spotted owl, a federally threatened species; and management for the northern goshawk, a Forest Service sensitive species.

Due to the shift from a commodity-based economy to a service-based economy, natural resource-related jobs may continue to decline. This decline in skilled labor may pose a challenge to accomplishing needed forest land treatments. In addition, there are still local dependencies associated with timber, grazing, and forest restoration activities. Therefore, fluctuation in management activities could affect the labor income and jobs for these industries.

Current ponderosa pine management in National Forests in Arizona and New Mexico emphasizes attaining conditions more similar to reference conditions³ by creating open, uneven-aged forests. Management towards these desired conditions could produce regular timber yields, but the availability of this timber and the removal of generally smaller trees does not mean the demand for these materials will follow. Few local facilities utilize biomass, small diameter trees or logging residue, common by-products of current forest thinning. There have been community discussions and efforts, however, regarding the establishment of a timber or biomass process facility in northern Arizona to support forest health thinning projects and to contribute to local economic sustainability. The demand for these materials may increase with favorable market conditions, changes in energy markets and programs that support industries that utilize small diameter wood products and other by-products of current forest thinning.

Other Forest Products

The Coconino NF provides firewood and a variety of other forest products for the public and local communities. Demand for these products is expected to increase.

The Coconino NF offers permits for collection of firewood and special forest products, including posts and poles, edible plants, wildings, medicinal herbs, mushrooms, mistletoe, pinecones, native plant seeds, rock, and many other products. Forest product output has changed during the past 20 year planning cycle. Demand for special forest products such as medicinal and edible plants has increased over time. Firewood collection permits are the most numerous, especially on the north

³ Reference conditions are integral to the concept of historic range of variability. We used the concept of historic range of variation to help evaluate whether an ecosystem was functioning properly. Historic range of variation describes how ecosystems, and their characteristics, vary through time and space. Each characteristic changes as a result of varying environmental, age, and disturbance related processes and interacts with other ecosystem characteristics. An appropriate time frame is needed to begin the characterization of the reference period and/or *reference conditions*. The time frame can vary according to what has been recorded and published in the literature. We used existing literature as much as possible to establish reference conditions.

portion of the Forest. The number of firewood permits issued ranged from 3,944 to 5,055 between 2005 and 2009 which is still lower than the numbers issued in the late 1980's and early 1990's. Overall demand for forest products on the Forest is expected to increase with the projected increase in population.

Energy and Minerals

Saleable decorative rock and cinders are the most common permitted minerals on the Forest. There is little activity associated with locatable materials such as gold and silver or leasable materials such as oil and gas. Some areas are withdrawn from mineral entry. Demands for saleable minerals are expected to increase. National demand for energy is also projected to increase, and the Forest has received recent requests for additional powerline corridors and energy exploration on the Forest.

Mining activity on the Coconino NF falls into two categories: locatable materials such as hard rock minerals like gold and silver (which are subject to claim) and saleable (permitted) mineral activities such as sand, gravel, and common building stone. Historically there has been limited mining activity for locatable minerals on the Coconino NF. Currently, there are only a few active mining claims, and the expected trend is for minimal development. Mineral authorizations are largely comprised of mineral materials permits for saleable decorative rock and cinders. Construction related materials like these are typically consumed within the local area due to transportation costs. Therefore, demand is greatly influenced by local construction activities. The demand for these materials have been low in recent years, but as the economy recovers, the demand for construction materials should increase. According to a 1992 Mineral Land Assessment across this region by the US Bureau of Mines, clay, manganese, pumice, volcanic cinders, gypsum, various industrial materials, and uranium⁴ are all present on the Forest (USDOT 1992). Mining, however, is not a common activity on the Forest, and minimal extraction of construction materials has occurred in recent years. Volcanic cinders are the most abundant material on the Forest, and the supply of mineral resources on the Forest appears to be greater than what is currently demanded (Figure 5). Most of the market demand, however, is currently supplied by private and state lands around Flagstaff, and caution would need to be taken to ensure that resource and social concerns associated with mining activities on the Forest are mitigated to the best extent possible.

Several areas across the Forest are withdrawn from mineral extraction to protect key resources or values. Withdrawn means that specified types of mineral entry are prohibited in order to protect



Figure 5: Closure and slope restoration at Oak Pit

⁴ According to the 1992 Assessment, uranium occurs in the Verde Formation east of Tuzigoot National Monument near Clarkdale. Samples were taken to assess the extent and quantity of the resource. The lack of definable deposit boundaries, discontinuous occurrences, and overall low uranium concentrations precluded the estimation of resources. The report also noted that the area had been intensely investigated for uranium as evidenced by numerous cut in the buttes and that the sporadic nature of the carnotite occurrences, overall low uranium concentrations in samples, and the depressed uranium market indicated that development of uranium resources was not likely under such conditions.

other resources. Given the limited amount of mineral potential on the Coconino NF, these withdrawals do not present an economic impact to mineral development on the Forest.

The Department of the Interior regulates leasable activity on the Coconino NF. There has generally been little leasable activity because the potential for oil, gas, and other leasable material is very limited. However, there has been recent interest expressed in geothermal exploration and leasing, as well as energy corridors that would cross the Forest to connect new sources of alternative energy to existing transmission lines.

Recreation

Recreation use on the Forest has increased by about 72 percent in the span of five years. The Forest provides a wide variety of developed and undeveloped recreation including water and snow-based recreation, off-highway vehicle use, wildlife-related recreation, viewing archaeological sites, wilderness day use and bicycling.

Recreation use on the Coconino NF for calendar year 2000 was estimated at 1.89 million visits, and recreation use on the Forest for calendar year 2005 had increased to 3.25 million visits, an increase of 72 percent in just five years.

This is due to the rapid increase in the population of Arizona (Maricopa and Yavapai counties, in particular), and improved transportation infrastructure that enables rapid movement of people from the lower elevations of the state to the higher elevation and cooler climate of the Colorado Plateau. Demand has increased for developed and undeveloped recreation, motorized and non-motorized day use recreational opportunities. Water-based recreation is increasing, and resource impacts are occurring at many of these sites. Snow-based recreation is also increasing and there are related health and safety concerns, such as from overcrowding. The upward trend in recreational use on the Forest is expected to continue commensurate with state and regional population growth.

A diverse range of recreational activities takes place on the Coconino NF including both dispersed and developed recreation activities. The current Forest Plan directs that the Recreation Opportunity Spectrum (ROS) system be used to qualify and guide management of the recreation resources in order to increase opportunities for a wide variety of developed and dispersed recreation experiences. Many recreational activities that take place on the Coconino NF have increased in popularity in the last two decades, including off-highway vehicle use, wildlife viewing, archaeological site visits, bicycling, and wilderness day use. More recently emerging recreational activities include rock climbing, geo-caching, and paintballing.

Increasing demand and use of the Coconino NF prompts the re-evaluation of current ROS classifications. Increases in seasonal and retirement age populations, and increases in population and ethnic diversity are likely increasing the demand for related recreational opportunities. Projected trends for outdoor recreation estimate that the activities that are likely to experience the greatest growth are most water-based activities, winter activities, hiking and walking, sightseeing, and non-consumptive wildlife activities. There are no activities that are expected to experience a decline in use. Based on recreation trends and projected population growth in the state, however, it is expected that total demand for outdoor recreation at developed sites will surpass the Forest's ability to accommodate the demand during high use periods, given the current capacity of developed sites.

Wildlife viewing is consistently one of the top recreational activities, and demand for big game permits remains high.

Wildlife viewing includes bird watching and looking for big game such as elk, deer and pronghorn. Wildlife viewing has the third highest participation rate on the Forest, following viewing natural features, and hiking/walking. In 2006, 27 percent of Arizona's adult population participated in wildlife-associated recreation. Nine percent were hunters and anglers, and 21 percent were wildlife watchers. The number of hunters and anglers has declined somewhat in Arizona; however the demand for big game permits remains high, and the number of applicants has increased.

Coconino NF wilderness areas make up 1.4 percent of the National Wilderness system and are easily accessible. The relatively high use in the easy-to-access areas conflicts with people seeking a more primitive experience.

The Coconino NF includes all or part of ten designated Wilderness Areas, approximately 155,000 acres, making up 1.4 percent of the National Wilderness Preservation System and 8 percent of the Forest. Coconino NF wilderness encompasses a variety of ecosystems and landforms, including alpine tundra on Arizona's highest peak at 12,633 feet elevation, a variety of volcanic features, and perennial streams located in steep-walled canyons (Figure 6). Easy access and close proximity to local communities can result in the perception that Wilderness Areas serve more as "urban parks"



Figure 6. West Fork of Oak Creek in 2006. Photo courtesy of the Coconino National Forest

rather than providing a primitive wilderness experience. This shift in desired use and experience may ultimately conflict with users seeking a primitive wilderness experience. It also creates challenges for managers to retain the wilderness experience, quality, and character of an area. Comments from public meetings held for the Coconino Forest Plan Revision convey that though not all area residents go to Wilderness areas, they appreciate its intrinsic value and primitive character.

Based on known trends, use and pressure on all Wilderness Areas within the Coconino NF are anticipated to increase as Arizona's population increases.

Thousands of people annually visit Honaki, Palatki, V-V Petroglyphs, and Elden Pueblo, four archaeological sites that have been developed for public use on the Coconino NF. As population and visitation increase, there will also be increasing demand for more developed archaeological sites and elevated concern for damage to existing sites from overuse.

During the 150 years of archaeological research on the Coconino NF, over 10,000 archaeological sites have been recorded—80 percent of these since the Forest's heritage program was created in 1975. Site densities range from zero to over 60 sites per square mile, but average about 20 per square mile. These represent the remains of

seven prehistoric and 11 recent Indian cultural traditions. With the Coconino NF's proximity to National Monuments, museums, and Indian tribes, and the high visibility of many sites, archaeology has an important niche in the overall recreation program. For example, there were nearly 6,300 visitors to Elden Pueblo alone in 2008.

Visitor surveys of recreational uses of the western United States find that visiting archaeological sites is consistently rated as one of the top five recreational uses of public lands. As the population and visitation of Arizona increases, there is both a demand to have more sites developed for public use as well as a concern for damage to archaeological sites.

Recreational motorized vehicle use continues to increase. The Coconino NF has an extensive road network with over 6,000 miles of system and user-created, non-system roads.

Dispersed camping with motor homes, trailers, and truck campers and tent trailers is a common and popular activity. People often bring various off highway vehicles for motorized travel out of the base camp. Hunting seasons and holidays have a high volume of motor vehicle traffic.

There are over 6,000 miles of roads on the Coconino NF. Forest managers face major challenges in maintaining this transportation system to ensure user safety and resource protection. Motorized vehicle use is prohibited or is seasonally restricted on approximately 12 percent of the Coconino NF. The remainder of the Forest is open to motorized vehicle use, including cross-country travel. The establishment of unauthorized user-created trails is becoming a major concern. The Forest is, however, currently conducting planning to implement the 2005 Travel Management Rule, which when fully implemented, will restrict motorized vehicle use to designated routes and areas and will prohibit cross-country motorized travel.

With the prohibition of cross-country motorized travel, other motorized recreation opportunities may need to be evaluated in order to provide sustainable motorized recreation opportunities on the Coconino NF, while protecting the natural resources of the forests. The number of off-highway vehicles in Arizona has risen dramatically. Almost 500,000 Arizona households have one or more OHVs, and 29 percent of Arizonans operate off highway vehicles for recreation. This suggests that use on the Forest will remain high, if not continue to escalate, in coming years.

Community Relationships

Awareness of and commitment to community relationships is integral to the fostering of a shared strategic vision for Forest management that reflects the values and needs of its adjacent communities.

The Coconino NF and its landscapes create a strong sense of place. People have said that the Forest, its resources, open space, recreational opportunities, and quality of life, make this part of Arizona special. The relationships between the Coconino NF and associated communities, agencies and groups are important and vital to planning, getting things done, and problem solving at local and regional scales. The Coconino NF works closely with other federal agencies as well as city, county and state governments, research entities, and various groups. Collaborative groups include the Ponderosa Fire Advisory Council, that associated with the San Francisco Peaks Weed Management Area, Flagstaff Biking Organization, Friends of the Forest, Diablo Trust, Greater Flagstaff Forest Partnership, Four Forest Initiative stakeholder group, and many others. In addition, the Forest works with two communities with wildfire protection plans. Awareness of and commitment to relationships is integral to the maintenance of the dynamic linkages between the Forest and its stakeholders. The retirement of the baby-boomers may continue to generate increased volunteer interest in land management. The trend toward increased use and the need to provide for this use

while protecting the resource values of the Forest creates an ongoing need for partnerships and volunteers. The relationships between the Forest and communities will continue to evolve as we work towards shared visions of the Forest's role in the social, economic, and ecological sustainability of the area.

American Indian Rights and Interests

The Forest Service and federally recognized Native American tribes have a special and unique government-to-government relationship of one sovereign nation to another, based on the U.S. Constitution, statutes, and court decisions. The Coconino NF is about two miles from the Navajo Nation reservation boundary and the Forest regularly consults with 13 tribes.

American Indian tribes have lived on the land that is now the Coconino NF for centuries. Some consider the prehistoric sites to be the homes of their ancestors. Other tribes recognize some sites and places to be of historical, cultural, and religious significance. Tribes with ancestral relationships to prehistoric groups within the Forest, or a history of tribal use of the Forest, have certain legal rights to participate in decisions that involve the use of archaeological sites, artifacts, and human remains.

A Memorandum of Understanding has guided relationships with the Hopi Tribe since January 9, 2003. The Coconino NF regularly consults with 13 tribes about activities proposed on the Forest that may be of interest or concern. This includes the Pueblo of Acoma, the Ft. McDowell Yavapai Nation, the Havasupai Tribe, the Hualapai Tribe, the Hopi Tribe, the Navajo Nation, the San Carlos Apache Tribe, the San Juan Southern Paiute Tribe, the Tonto Apache Tribe, the White Mt. Apache Tribe, the Yavapai-Apache Nation, the Yavapai-Prescott Tribe, and the Pueblo of Zuni. Also included in the consultation process are seven Navajo Chapters in proximity to the Forest—the Cameron, Coalmine Canyon, Dilcon, Gap-Bodaway, Leupp, Tolani Lake, and Tuba City Chapters as well as the Dine' Medicine Man's Association.

American Indian tribal members' use of Coconino NF lands includes gathering of various forest products, such as boughs, basket materials, soil, water, fuel wood and plants, through the Forest permit system. Certain animals and raptorial birds are also collected for ceremonial purposes from the Forest through authorizations by the Arizona Game and Fish Department and the U.S. Fish and Wildlife Service.

Besides using the Forest for traditional cultural activities, both the Hopi and Navajo have permits to graze cattle on the Forest.

Officially Designated Areas

The Coconino NF has many areas with unique designations that attract visitors to the area who contribute to the local economy.

Special areas on the Coconino NF that have official agency designations include the following areas:

- Four Research Natural Areas: Casner Mountain, G.A. Pearson, Oak Creek Canyon, and San Francisco Peaks Research Natural Areas.

- All or part of ten Wilderness Areas⁵: Sycamore Canyon Wilderness, Fossil Springs Wilderness, Kachina Peaks Wilderness, Red Rock-Secret Mountain Wilderness, West Clear Creek Wilderness, Wet Beaver Wilderness, Strawberry Crater Wilderness, Kendrick Mountain Wilderness, Mazatzal Wilderness, and Munds Mountain Wilderness.
- Two Wild and Scenic River segments: Fossil Creek and the Verde River
- One Scenic Area: Oak Creek Canyon Scenic Area
- Four Botanical Areas: Mogollon Rim, Verde Valley, Fern Mountain and Fossil Springs Botanical Areas
- One Geological Area: Red Mountain Geologic Area.
- One National Recreation Trail: General Crook Trail
- One National Scenic Trail: Arizona Trail
- One National Historic Road: The Beale Road
- Two National Historic Landmarks: Winona Village and the C. Hart Merriam Base Camp
- Eleven segments of stream courses are eligible for consideration for Wild and Scenic River designation.
- Two experimental Forests: five units in the Fort Valley Experimental Forest (primarily located along Highway 180 on the southwest side of the San Francisco Peaks and around Flagstaff) and two units of the Long Valley Experimental Forest (just above the Mogollon Rim). Rocky Mountain Research Station manages these areas, therefore, they are excluded from Forest Plan direction.

Other designated areas

Other areas on the Coconino National Forest have designations by the Forest, such as Environmental Study Areas, or by other agencies and organizations. These areas include:

- Three Environmental Study Areas: Mount Elden, Old Caves, and Griffith's Spring Environmental Study Areas
- 12 fire lookouts listed in the National Historic Fire Lookouts Register
- 140 sites listed on the National Register of Historic Places
- Six National Register Districts: Ridge Ruin, Nuvakwewtaqa, Clear Creek Ruins, Winona Village, Sacred Mountain, and Honanki
- Several Watchable Wildlife Sites designated by the Coconino NF, the State, and other organizations
- Three Important Bird Areas designated by the Audubon Society: Anderson Mesa, Lower Oak Creek, and a portion of the Lower Salt and Verde Riparian Ecosystem
- All or portions of seven Game Management Units designated by the Arizona Game and Fish Department

⁵ Kendrick Mountain Wilderness is managed under the Kaibab National Forest Plan. The Mazatzal Wilderness is managed under the Tonto National Forest Plan.

- Three scenic Roads designated by the State: Sedona-Oak Creek Canyon, Dry Creek, and San Francisco Peaks
- Historic Route 66 National Scenic Byway designated by the Federal Highways Administration passes through the Forest
- Highway 179 into Sedona designated as the Red Rock All American Road by the Federal Highways Administration
- The Beaver Creek Experimental Watershed Biome designated by the United Nations Educational, Scientific, and Cultural Organization (UNESCO)
- The Oak Creek Outstanding National Resource Water designation by the State, which includes West Fork

Management Concerns

This section summarizes management concerns or challenges identified in the social and economic environment that influence, or are influenced by, management of the Coconino NF. They were derived from conditions and trends described in this chapter and public comments noted in Appendix A.

An increasing and increasingly diverse population of users and has resulted in an increase in demand for a variety of recreation opportunities. Potential conflicts in value, culture, and expectations between groups, including long-time residents and people who have recently moved into the area, can create friction over natural resource management (e.g. tourist development of Sedona over the past decade). Forest managers face challenges in balancing opportunities and uses to the public, as well as reduce conflicts between users and forest resource protection. In some areas, like the San Francisco Peaks, there is a conflict between levels of use, demands, and American Indian cultural and spiritual values.

Increased population growth and changing demographics have the potential to put additional and different demands on forest resources and for access to them, especially water and recreation. More pressure may be put on riparian and wilderness areas to provide recreation opportunities. Watersheds and riparian areas in particular could experience increased resource damage, and wilderness values such as solitude or primitive and unconfined recreation may be affected. Demand for winter snow play areas is also increasing as is the associated need for parking and facilities. Unmanaged recreation could cause resource damage and user conflicts.

Off-highway vehicle use has increased dramatically, and unmanaged off-highway vehicle use can cause resource damage, user conflicts, and safety concerns. Current planning efforts to implement the 2005 Travel Management Rule by designating a road system and prohibiting cross-country motorized travel, however, is expected to address many of these concerns.

The focus on reducing fire risk to communities and restoration treatments increases smoke impacts to a growing community and concerns about associated health effects.

There is tension between communities wanting to maintain open space, and desire for infrastructure improvements such as roads, energy development and associated utility lines, aggregate material, water tanks, transfer stations, communication sites, community facilities, trails, and recreation sites which may ultimately impact those open space values. Open space assists communities in retaining a sense of place and provides a sense of naturalness that improves quality of life. It also is beneficial for wildlife habitat and corridors.

Increasing population, recreation, changes in demographics, and tourism creates continuous opportunities and challenges for managers to increase awareness of Forest Service resources and activities. It also creates opportunities for relationship building and value sharing.

National demand for energy is projected to increase, and the Forest has received recent requests for additional powerline corridors and energy exploration on the Forest. There has been recent interest expressed in geothermal exploration and leasing, as well as energy corridors that would cross the Forest to connect new sources of alternative energy to existing transmission lines.

Demand for firewood and a variety of other forest products are expected to increase as population increases.

The ability of the Coconino NF to meet ecosystem management objects is interdependent with the local biomass and forest product industries. Ecosystem management, thinning, and fuel reduction treatments would be prohibitively costly if not for the industry purchasing small-diameter timber products. Similarly, the industry will not be as successful without a sustainable stream of products from the National Forest. Current efforts are underway to identify mutually-beneficial opportunities for the forest product industry, the Forest Service, and other stakeholders. This is a challenge for both Forest managers and industry as they plan projects and sustain the forest products industry.

Chapter 3: Ecological Conditions and Trends

This chapter presents an assessment of the conditions of Forest ecosystems and key findings from the Coconino NF Ecological Sustainability Report (USDA Forest Service 2009) which provides a basis for understanding recommended ecological needs for change in the current Forest Plan.

This evaluation considers ecological information at various scales including: within the boundaries of the Coconino NF; the White Mountains-San Francisco Peaks-Mogollon Rim, Tonto Transition, and Painted Desert Ecoregion sections and subsections⁶; and the watersheds⁷ that overlap the Forest.

Physical Resources

This section describes the conditions and trends of soil, air and water resources on the Forest which provide the foundation for the plants and animals that live here.

Soils

Approximately 62 percent of the soils on the Forest are considered to be in satisfactory soil condition⁸, about 20 percent are impaired, about 7 percent are in unsatisfactory condition, and about 11 percent are inherently unstable. Recent drought conditions have contributed to reduced vegetative growth and ineffective ground cover.

- About 27 percent of the soils, in eight Potential Natural Vegetation Types (PNVTs)⁹, are classified as being impaired or unsatisfactory. These vegetation types are Montane Subalpine Grassland, Wetland Cienega, Pinyon Juniper Woodland, Pinyon Juniper Evergreen Shrub, Great Basin Grassland, Semi-Desert Grassland, Cottonwood Willow Riparian Forest, and Desert Communities. This means that there is a reduction or loss of soil function in these types and ecological functions and soil productivity will not be maintained.
- Soil is mainly in satisfactory condition in Ponderosa Pine, Mixed Conifer and Spruce Fir, Mixed Broadleaf Deciduous Riparian Forest, and Montane Willow Riparian Forest.
- Soil is mainly in satisfactory, but inherently unstable condition in both Alpine Tundra and Interior Chaparral PNVTs. These soils are located on very steep slopes where natural erosion rates exceed tolerable rates and are eroding faster than they are renewing themselves, but are functioning properly and normally.

⁶ Ecoregion sections and subsections are units in the National Hierarchy of Ecological Units ranging in size from 13 million acres (section) down to 10,000 acres (subsection) that describe areas of similar environmental and biological features. The Coconino NF falls within the White Mountains-San Francisco Peaks-Mogollon Rim, Tonto Transition and Painted Desert sections.

⁷ Watersheds are cataloged using a uniform hierarchical system developed by the U.S. Geological Survey. The U.S. is divided and sub-divided into successively smaller hydrologic units. The hydrologic units are nested within each other from largest to smallest (region, sub-region, basin, and subbasin). The Ecological Sustainability Report focused on subbasins (4th code watersheds) and the next smaller watersheds within them (5th code watersheds).

⁸ *Satisfactory*: Soil function is being sustained and soil is functioning properly and normally. *Impaired*: The ability of soil to function properly and normally is reduced and/or there is increased vulnerability to degradation. *Unsatisfactory*: A loss of soil function has occurred such the soil is unable to maintain resource values, sustain outputs or recover impacts.

Inherently unstable: Soils are naturally eroding faster than they are renewing and are functioning normally.

⁹ Potential Natural Vegetation Types (PNVTs) are biophysically based ecological units that depict the potential vegetation type that would dominate a site under historic fire regimes and biological processes.

- All PNVTs except Montane Subalpine Grassland and Ponderosa Pine contain inherently unstable soils. All of Alpine Tundra and more than 88 percent of Interior Chaparral acres are considered inherently unstable. Around 28 percent of the acres in Semi-Desert Grassland and Pinyon Juniper Evergreen Shrub PNVTs fall into this category while the remaining PNVTs have 10 percent or less of their acres in this condition.
- The Coconino has experienced multiple years of drought since about 1997. This has resulted in reduced upland vegetative growth and ineffective ground cover, putting the soil at risk of accelerated erosion, loss of soil productivity, and increasing sediment delivery to streams during storm events causing local water quality degradation.

Air

Air quality on the Coconino is considered good, although visibility impairment has been documented.

- Air quality in the Forest meets national air quality standards. Smoke from wildfires and prescribed burning is the Forest's primary contribution to air pollution. The presence of smoke can prompt concerns about safety, visibility and health from local citizens and visitors. An increase in prescribed burning and wildfires would result in increased smoke.
- The Forest overlaps one Class I area that is associated with the Sycamore Canyon Wilderness Area. Class I areas are one of three classes provided for in the Clean Air Act and are the "cleanest" of the classes receiving special visibility protection. Airsheds on the forests are within regulatory requirements for air pollution. Visibility impairment has been documented in all Class I areas in Arizona, generally due to regional haze¹⁰ from sources outside the Forest boundary. If recently adopted state and federal regulations related to air quality are met, visibility is expected to steadily improve over the next several decades.

Water

Overall water quality on Coconino NF lakes and streams is good and quality meets State Water Quality standards. However, 33 miles (about 15%) of streams and five reservoir lakes on the Forest are classified as impaired¹¹, the category of most severe water quality problems. An additional 24 miles (about 11%) are classified as *not attaining*¹², the next most severe water quality category. These lakes and streams miles do not meet state and federal water quality standards and do not support designated beneficial uses including either aquatic and warm water fisheries, full body contact (swimming) or fish consumption.

¹⁰ Regional Haze is defined as visibility impairment that is caused by the emission of air pollutants from numerous sources located over a wide geographic area. In the Intermountain West, sulfate (energy production), organics (wetlands, energy production, agriculture, landfills, wood burning), and elemental carbon (diesel engines, forest fires, prescribed burning) are the main cause of visibility impairment.

¹¹ *Impaired* waters are those the Environmental Protection Agency and the State of Arizona have identified as Category 5 waters and placed on their 303d list. These waters have the most severe water quality problems. These waters are scheduled for Total Maximum Daily Load (TMDL) assessments which contain strict discharge permit requirements to assure that any new discharges or modifications will not further degrade water quality.

¹² *Not attaining*, or Category 4 waters, are those where designated use is 'not attaining state water quality standards' and have past water quality impairments and current Total Maximum Daily Load plans aimed at improving water quality.

- The 33 impaired stream miles are in the Upper Verde River 4th code watershed (Oak Creek 5th code watershed) in Spring Creek and Oak Creek. The impairment is due to the presence of *Escheria coli* bacteria. Swimming is restricted during periods when levels are exceeded. This is attributed to the proximity of privately owned septic systems in certain stretches, wildlife contamination, and improper sanitary habits of swimmers during busy weekends.
- Impaired lakes in the Middle Little Colorado River 4th code watershed (Jacks Canyon 5th code watershed) are Long, Soldiers, and Soldier's Annex Lakes. Impaired lakes in the Canyon Diablo 4th code watershed (Walnut Creek 5th code watershed) are Upper Lake Mary and Lower Lake Mary. The impairment is due to elevated mercury levels in fish tissue and restricts fish consumption.
- Three 5th code watersheds in the Upper Verde River 4th code watershed contain *not attaining* waters. About 1.5 miles of Oak Creek in the Oak Creek 5th code is rated as *not attaining* because of high levels of turbidity, likely coming from roads and hill slopes and do not adequately support aquatics and warmwater fishery. In the Cherry Creek-Upper Verde River 5th code watershed, approximately 15 miles in the Verde River are also rated as *not attaining* because of high levels of turbidity. Stoneman Lake, in the Beaver Creek 5th code watershed, is categorized as *not attaining* primarily due to high nutrients, high pH, and low dissolved oxygen and does not adequately support aquatics and coldwater fishery. Sixty percent of Stoneman Lake is on Forest Service land.
- The remainder of surface waters either support some or all designated beneficial uses and meet State Water Quality Standards or have inconclusive data.

There is a concern that groundwater pumping may be exceeding the inflow or recharge of water into the Little Colorado River Plateau basin and the Verde River basin, two of the three groundwater basins under the Coconino NF.

- Streamflow and some well data indicate a downward trend in groundwater levels adjacent to Flagstaff and communities in the Verde Valley, particularly in areas that have the most well pumping on private lands. Continued or increased pumping may negatively affect the base flow of streams especially the Verde River, Beaver Creek, West Clear Creek, and Oak Creek because domestic use is high adjacent to these streams, which are in the Upper Verde River and Lower Verde River 4th code watersheds.

Aquatic Resources

This section describes the conditions of wetland riparian, springs, stream riparian, and aquatic species.

There are 78 known wetlands on the Forest. Overall, most wetland acres are in Proper Functioning Condition¹³. A few large wetlands account for the majority of the acreage.

¹³ Proper Functioning Condition for riparian and wetland areas is when there is adequate vegetation, landform, or large woody debris present to: dissipate stream energy associated with high flows, thereby reducing erosion and improving water quality; filter sediment; capture bedload and aid in floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize banks; develop diverse ponding and channel characteristics to

Eighty-one percent of the inventoried wetland acres (55% of the wetlands) on the Forest are in Proper Functioning Condition. Nine percent of the inventoried wetland acres (38 % of the wetlands) are classified as Functional-at-risk. The remaining wetland acres are reservoirs. This is displayed in

Table 1.

Table 1: Wetland riparian condition class on Coconino National Forest

Condition class	Number of acres	Number of wetlands
<i>Proper functioning condition</i>	8,295	43
<i>Functional-at-risk</i>	865	30
<i>Unknown (includes reservoir wetlands)</i>	1,026	5
Total	10,186	78

- In the Canyon Diablo 4th code watershed, the San Francisco Wash 5th code watershed has the most inventoried Functional-at-risk wetlands on the Coconino (490 acres in ten wetlands). In the Middle Little Colorado River 4th code, the Upper Clear Creek 5th code has 114 acres (3 wetlands) classified as Functional-at-risk, and in the Upper Verde River 4th code, the Sycamore Creek 5th code watershed has 100 acres (1 wetland). This risk status is because livestock and wildlife use is higher in unfenced areas which consequently impacts soil condition (as described for Wetland Cienega PNVT) and vegetation production.

Knowledge about the functional and ecological condition of the over 200 springs¹⁴ on the Forest is limited. However, where information has been collected, a majority of unfenced springs and springs that have been modified with pipelines and tanks or have been heavily grazed by livestock or elk are classified as either Non-Functional or Functional-At-Risk.

- Forest springs are located in the Middle Little Colorado River, Canyon Diablo, Lower Little Colorado River, Upper Verde River and Lower Verde River 5th code watersheds. Unfenced accessible springs are considered at risk because of the increased potential for excessive use from recreationists, livestock, and wildlife.
Tanks and pipelines alter natural flow, filtering, ground-water recharge, and vegetation. Springs are also projected to remain at risk or non-functional due to drought, adjacent domestic well use, and conditions of the surrounding landscape.

provide habitat for fish, waterfowl and other uses; and support greater biodiversity. Functional-at-risk means they are functioning properly but have an existing soil, water, or vegetation attribute that makes them susceptible to degradation. Non-functional means they lack vegetation, stream channel, or large woody debris to adequately deal with high water and, thus, are susceptible to excessive erosion or sedimentation and are not functioning properly.

¹⁴ From National Hydrologic Dataset information

Although 44 percent (342 miles) of riparian stream miles on the Forest are in Proper Functioning Condition, 23 percent (179 miles) are classified as Functional-at-risk which means they are functioning properly yet have an existing soil, water, or vegetation attribute that makes them susceptible to degradation. Another 6 percent (47 miles) are Non-functional.¹⁵

- Slightly over half (113 miles) of the inventoried riparian miles in the Upper Verde 4th code watershed is Functional-at-risk or Non-functional. Its most highly departed 5th code watersheds are Grindstone Wash-Upper Verde River, Beaver Creek, and Cherry Creek-Upper Verde River. This is due to excessive past and current livestock grazing and wildlife herbivory, and off-highway vehicle and recreation disturbance.
- Although most of the perennial stream miles in the Middle Little Colorado River 4th code watershed are in Proper Functioning Condition, the Upper Clear Creek 5th code watershed is highly departed from reference conditions. There are 48 Functional-at-risk miles and 21 Non-functional miles primarily due to excessive wildlife herbivory.
- Twenty-nine percent of the inventoried stream miles in the Walnut Creek 5th code watershed (Canyon Diablo 4th code) are either Functional-at-risk or Non-functional. In the Lower Verde River 4th code, 20 percent of the West Clear Creek 5th code and 26 percent of the Fossil Creek-Lower Verde River 5th codes are also either Functional-at-risk or Non-functional. This is due to excessive past and current livestock grazing and wildlife herbivory, and off-highway vehicle and recreation disturbance.
- Of the remaining miles, about four percent have not been inventoried because of difficult access (which also limits both people and livestock access). These areas are probably in Proper Functioning Condition due to limited human and animal impact. Inaccessible areas and areas that are currently functioning properly are expected to remain functional because Best Management Practices are being implemented¹⁶, or livestock grazing and recreation use is low. Areas susceptible to degradation and areas currently not functioning will improve over time where Best Management Practices are used. Improvement will be slower in areas with wildlife or livestock or high recreation use.

The Forest overlaps portions of three 4th code watersheds, the Middle Little Colorado River, Upper Verde River, and Lower Verde River, which contain the fish-bearing waters on the Coconino NF. The Forest contributes to the sustainability of native fish in these systems. Nonetheless, native stream species composition has changed, and most of the Coconino NF's perennial streams in these watersheds have lost 30-50 percent of their native fish species.

- The Upper Clear Creek 5th code, in the Middle Little Colorado 4th code, contains the same native fish species that occurred during reference conditions. It is the least departed from

¹⁵ Percentages do not add up to 100% because the remaining miles on the Forest are classified as either non-riparian or were not inventoried because of difficult access.

¹⁶ Best Management Practices are methods determined to be the most effective practical means of prevention or reducing pollution from non-point sources. Non-point sources are pollution sources without a single point of origin or not introduced into a receiving stream from a specific outlet. Pollutants are generally carried off the land by storm water and common sources are agriculture, forestry, channels and urban.

reference conditions in terms of the number and composition of native fish species. The Fossil Creek-Lower Verde River 5th code watershed (within the Lower Verde River 4th code) supports 11 native fish out of 12 that occurred under reference conditions. It is the next least departed in terms of the number and composition of native fish species.

- The most departed 5th code watersheds in terms of number and composition of native fish species are Sycamore Creek, Grindstone Wash-Upper Verde River, Beaver Creek, and Cherry Creek-Upper Verde River, all in the Upper Verde River 4th code watershed. The streams in these watersheds currently support about half of the native fish species compared to reference conditions.
- The next most departed 5th code watersheds in terms of native fish are West Clear Creek in the Lower Verde River 4th code, and Oak Creek in the Upper Verde River 4th code. The streams in these watersheds currently support about 70% of their native fish species compared to reference conditions.

The structure and connectivity of streams have changed from reference conditions due to past activities such as dams, water diversions and roads. Non-native animal and plant species have major impacts to fish and other aquatic species (e.g. frogs and snakes) as well as their habitat.

- Historical impacts (e.g. dams, water diversions, roads, grazing, OHV use, and timber harvest) resulted in significant impacts to aquatic communities and their watersheds. Stream channel down cutting, lowering of the water table, change in natural stream flow over time, and conversion of perennial streams to perennial-interrupted or intermittent streams has occurred on a wide spatial scale. Fish populations have changed from large interconnected populations, to isolated populations within altered habitats.
- Non-native animal and plant species have major impacts to fish, other aquatic species (e.g. frogs and snakes), and their habitat across the Coconino NF. Twenty-one non-native fish, and other non-native invasive animals, such as crayfish and bullfrogs, prey on, out-compete, or hybridize with native species, as well as degrade habitats on which many aquatic native species rely.

Vegetation

Fifteen vegetation communities on the Forest were evaluated for departures from reference conditions. This section highlights prominent conditions and trends and focuses on composition, structure, and natural disturbance regimes.

Four (~27%) of the 15 PNVTs on the Forest have high vegetative departures¹⁷ from reference conditions, seven (47%) are moderately departed, and the remainder have low departures. These departures indicate a shift in the structure of dominant life forms, species composition, and disturbance processes and may serve as indicators of whether the systems are sustainable under current conditions and management. Because soil conditions are important for improvements in vegetative changes, PNVTs with high vegetative departures

¹⁷ In the Ecological Sustainability Report, vegetation departure was assessed as high (>66%), moderate (34-66%), and low (0-33%).

and impaired and unsatisfactory soil conditions are of greater concern than PNVTs with high vegetative departures but satisfactory soils. Figure 7 shows percent vegetative departure from reference conditions for different vegetation types going from forest types on the left through woodlands, grasslands, shrublands, and riparian types on the right.

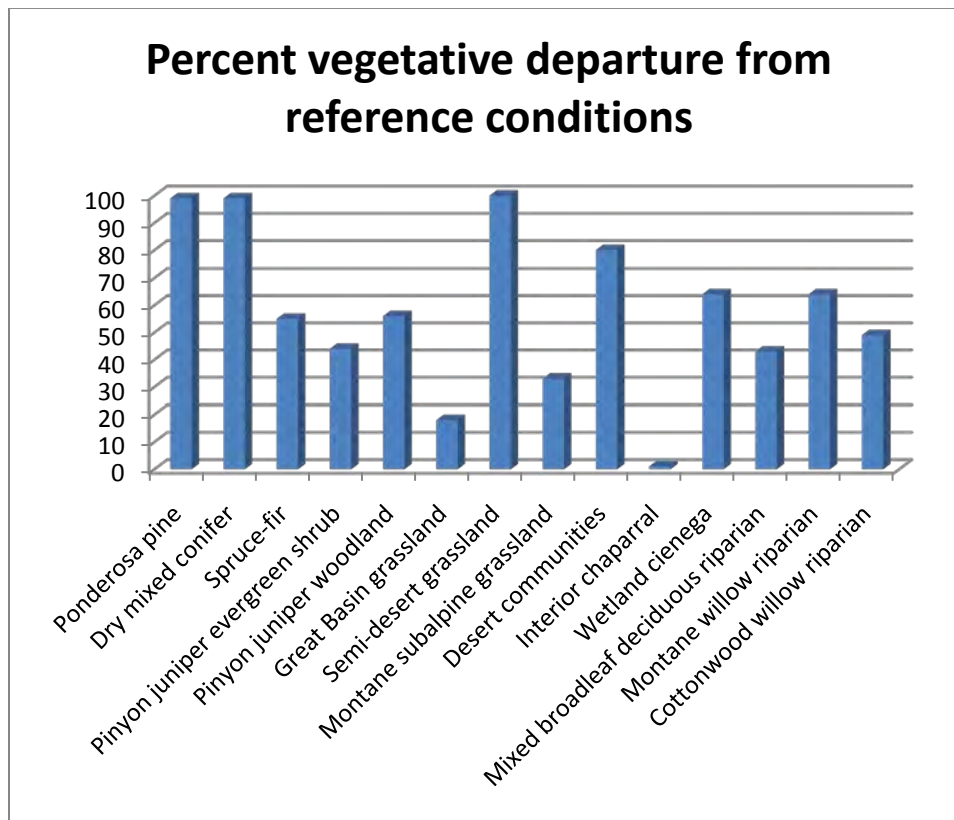


Figure 7. Percent vegetative departure¹⁸ from reference conditions on Coconino NF

- Semidesert Grasslands and Desert Communities have high vegetative departures combined with impaired or unsatisfactory soils. These departures indicate that composition, structure, and natural disturbances are substantially altered from reference conditions and ecological sustainability of these PNVTs may not be maintained. About 30 percent of the Semidesert Grasslands PNVT have become so invaded by shrubs that there may be little potential to restore these to open native grassland condition. Both communities have moderate weed departures (invasive, nonnative plants, particularly annual grasses), and are trending away from reference conditions. This threatens native plant diversity and can potentially alter fire frequencies and severity. These PNVTs represent 153,912 acres or about 8 % of the Forest.
- Pinyon Juniper Evergreen Shrub, Pinyon Juniper Woodland, Montane Subalpine Grassland, and Cottonwood Willow Riparian Forest PNVTs have moderate vegetative departures

¹⁸ Departure is described in detail in the Ecological Sustainability Report. It describes how different current conditions are from reference conditions based on various models. A vegetation type with 99% departure has a substantially different structure now than what it had during reference conditions.

combined with impaired or unsatisfactory soils. Their composition, structure, and disturbance processes are moderately changed from reference condition and ecological sustainability of these PNVTs is at risk. Highly invasive weeds threaten the diversity and regeneration potential of native plants in Montane Subalpine Grassland and Cottonwood Willow Riparian Forest PNVTs and may cause a decline in instream flows in the riparian community. In addition, Montane Subalpine Grasslands have 33% more trees than under reference conditions. These PNVTs represent 628,045 acres or about 34 % of the Forest.

- The composition and structure of Ponderosa Pine and Dry Mixed Conifer PNVTs have high vegetative departures from reference conditions, but satisfactory soil conditions. They have shifted from frequent fire as the natural disturbance process to infrequent fire. Apparently, in response to these altered disturbance regimes, the incidence and infection severity of dwarf mistletoe and bark beetles has increased over time, resulting in past and projected mortality of ponderosa pine and Douglas-fir. In addition, many invasive plant species infest thousands of acres throughout Ponderosa Pine threatening native plant diversity. Another concern is about quaking aspen, an early succession species found mainly in Dry Mixed Conifer. It is declining because of a combination of factors that include insects, disease, excessive browsing by wildlife, fire exclusion, drought, and shading by conifers. These two PNVTs represent 886,484 acres or approximately 48% of the Forest.
- The composition, structure, and disturbance processes of Spruce Fir, Montane Willow Riparian Forest, and Mixed Broadleaf Deciduous Riparian Forest PNVTs are moderately changed from reference conditions, and ecological sustainability of these PNVTs is at risk. The condition of Spruce-Fir makes it more vulnerable to damage or mortality from insects and disease. The Spruce-fir PNVT is threatened by the exotic spruce aphid and potentially by the exotic white pine blister rust. Both infestations have occurred on other National Forests in the Southwestern Region of the Forest Service. These could cause extensive damage and mortality to several species in the Spruce-fir PNVT, including Southwestern white pines, limber pine, bristlecone pine, and Engelmann spruce. These three PNVTs represent 17,061 acres or about 1% of the Forest.
- Great Basin Grassland, Interior Chaparral, Wetland Cienega, and Alpine Tundra have low vegetative departures compared to reference conditions, although Great Basin Grasslands have 17 percent more shrubs and trees than they did under reference conditions. While the Alpine Tundra ecosystem covers only about 0.1 percent of the Forest, it is notable that this represents 100 percent of the tundra in the White Mountains-San Francisco Peaks-Mogollon Rim section.
- There are more stock tanks in grasslands and in Wetland Cienega PNVT now. Livestock and wildlife concentrate around water so that soil compaction, soil erosion, and vegetation impacts occur. Although infrequent across the landscape, this is locally significant where it occurs. Stocktanks and dams in Wetland Cienega PNVT have also altered water persistence and depth.
- Most Wetland Cienega riparian areas now have stock tanks or dams associated with them. These were constructed many years ago. Vegetation composition and structure, and soil condition have been altered because water persistence and depth has changed, negatively affecting riparian function. Livestock and wildlife concentrate around these waters, compact the soil and affect vegetation structure and composition unless they are fenced.

Wildlife and Botanical Resources

Reference conditions are not readily available for most animal and plant species, so a different process was used to identify areas of concern relating to species and species habitat than that used for vegetation, water and soil resources. This section describes the results of a tiered, coarse filter/fine filter process that highlights the species or species groups for which there is most concern. These species or groups were then related to ecosystem conditions and threats to habitat and species.

We initially examined about 1,845 species for further evaluation. Seventy-seven percent of these species were not considered further because their home range did not overlap the Forest, because there was insufficient information available to determine occurrence on the Forest, because of taxonomic uncertainties, or because they did not meet certain criteria¹⁹. The Ecological Sustainability Report (2009) describes these processes in more detail.

The coarse filter/fine filter screening process resulted in 190 species considered for additional analysis. Eighteen of these are threatened and endangered species, and the remaining 172 are Forest planning species²⁰. The species on this reduced list were placed into groups by similarity of habitat to further focus on areas of concern.

- Species linked with habitat: One group was species linked with vegetation or aquatic habitat associations, such as PNVTs or water. The threats and risks to these species were assumed to be the same as the threats and risks for that particular habitat or ecosystem characteristic.
- Species linked with special features: Another group was species associated with features that are key elements in their habitat that could be finer or larger than landscape scale. There are threats and risks to these species as a result of the management of those features. The features are Rocks, Water features, Human made structures, and Soil types²¹.
- Other species: The last group contains species with needs other than those in the previous two groups. This includes animals that use a variety of habitats, as well as invasive animal and plant species.

Thirty-six species are linked with habitats. These habitats include 12 at-risk ecosystems described in the vegetation or aquatic resources section of this chapter.

¹⁹ Criteria included, but were not limited to: conservation ranking in NatureServe, species identified as proposed and candidate species under the Endangered Species Act, recently delisted species, species that have been petitioned for federal listing and for which a positive “90 day finding” has been made, Species of Conservation Concern identified by Arizona Game and Fish Department, species on the U.S. Fish and Wildlife Service, Birds of Conservation Concern National Priority List, species on the Southwestern Region of the Forest Service sensitive species list, species dependent on specialized or limited habitat on the Forest. We also considered species or habitat declines, population numbers, distribution of species and habitats, species security in the plan area, whether they are affected by management, information from a variety of experts, various databases, and feedback from a Species Diversity Workgroup.

²⁰ Forest planning species include species that met the above criteria, passed through the screening process, and were not threatened and endangered under the Endangered Species Act.

²¹ Rock features include canyons, cliffs, caves, talus, and other surfaces. Water features include hanging gardens, ephemeral pools, seasonally wet areas, springs, stock tanks. Human made structures include bridges, buildings, archaeological sites, railroad beds. Soil type includes soil with different parent materials or mineral concentrations like limestone, sandstone or basalt.

- At-risk habitats associated with threatened and endangered or Forest planning species that were linked with habitat include Semidesert Grassland (3 species), Desert Communities (2), Pinyon Juniper Woodland (4), Montane Subalpine Grassland (6), Wetland Cienega (1), Cottonwood Willow Riparian Forest (3), Ponderosa Pine (11), Dry Mixed Conifer (11), Spruce Fir (10), Montane Willow Riparian Forest (3), and Mixed Broadleaf Deciduous Forest (5) PNVTs and water (3). This is based on departures from reference conditions for soil, PNVTs, water, and aquatic resources described earlier in this chapter.

Special features, such as rocks, human-made structures, soil type, and water features, are required habitat for some species. As shown in

Table 2, these features are at risk from primary threats, that is, activities that alter or remove habitat, or damage and kill or remove individuals, groups, or populations. Most of the species associated with special features also have limited distributions or are endemic.

- The threats listed in

- Table 2 are those under management authority of the Forest Service, at least in part. Threats outside the management authority of the Forest Service are not listed.

Species included in the last group are at risk because of additional primary threats not associated with habitat or special features. These threats can result in mortality, competition, and hybridization of native species; alteration of seasonal movements, dispersal, gene flow, and predator-prey relationships, reduce the quality of nesting and prey habitat, habitat fragmentation, and reduce the vigor, maintenance, and survival of plants. One hundred and seven species have threats associated with limited distributions or endemism²². These species also may have other threats associated with their habitat.

- Risks to limited distribution and endemic species are associated with the narrowness of their range, threats to the habitat at those locations and the number, size, and distribution of populations (rarity). The Forest has a high contribution to the persistence of these species because they are rare, restricted to a narrow geographic area, or found only in certain locations on the Forest.
- The threats listed in Table 3 are those under management authority of the Forest Service, at least in part. Threats outside the management authority of the Forest Service are not listed.

²² Limited distribution and endemic species are found in a few localities, occur to a limited extent in the southwest, or may have very limited distribution or habitat in northern Arizona or the Coconino NF.

Table 2: Risk and threats to special features.

Special feature	Risk	Threat	Number of species
Rock features	Habitat alteration may prevent plant establishment, destroy plants or individuals, or affect the survival of talussnails. Roosts and caves may become unsuitable for bats. Nesting habitat can be modified or removed.	Rock climbing, caving construction, mineral activities, and vandalism.	23
Human-made structures such as buildings, bridges and railroad beds.	Habitat or individuals may be damaged or destroyed. Species or prey may be poisoned.	Vandalism, maintenance, construction, and demolition activities. Associated chemical and pesticide use.	3
Archaeological sites, another type of human-made structure.	Plant numbers, especially young plants, can decrease.	Ground or site disturbing activities and compaction around the sites.	3
Soil type: basalt and cinders.	Plant removal or damage	Large scale ground disturbing activities, including, but not limited to, recreation, road related work, and construction and mineral withdrawal.	11
Calcareous, alkaline and gypsum soils	Slower growing native plants can be out-competed	Invasive plant species.	7
Limestone and dolomitic limestone, sandstone, Verde Formation	Soil disturbance can destroy plants.	Dispersed recreation, camping and management activities.	19
Water features	Decline in plant numbers. Decrease in larval host plants for a rare butterfly	Recreation, construction or maintenance activities, spring related projects, managed and unmanaged grazing, and ungulate herbivory.	16

Table 3: Other risks and threats to species.

Risk	Threat	Number of species
Disturbance that can disrupt sensitive life stages such as breeding and hibernation.	Recreation, caving, construction, vegetation treatments, and vandalism.	10
Loss of individuals to populations, or mortality.	Collection or harvest	9
Mortality	Activities that result in the spread of disease or infected soil and water such as fire and grazing management, and research.	4
Reduced survival of the host species' young.	Nest parasitism from brown-headed cowbirds which associate with livestock.	2
Eat, compete with, and hybridize with native aquatic species.	Non-native or aquatic species.	22
Hybridization, loss of genetic diversity	Water impoundments	1
Alteration of seasonal movements, dispersal, gene flow, and predator-prey relationships as a result of habitat fragmentation.	Development, dams, fencing, major transportation corridors, road construction and maintenance can cause habitat fragmentation.	20
Reduction in vigor, maintenance and survival of highly palatable plants. Can reduce habitat quality for nesting riparian birds and for prey habitat for some bird species.	Ungulate herbivory, managed and unmanaged grazing	3
Reduction in the vigor, maintenance and survival of alpine tundra plants.	Off-trail hiking	6
For endemic or limited distribution species, reduction in number, size, distribution of populations or individuals. Site specific threats to habitat.	Variety of management activities or human uses that threaten species specific habitats or populations.	107

Climate Change

Climate models predict a warming and drying of the Southwest. Such effects of climate change has the potential to affect all PNVTs and aquatic systems on the Forest because they are already highly departed, are small and localized, or are sensitive to changes in water temperature and availability. Species that depend on PNVTs that are particularly vulnerable to climate change are also threatened.

- Currently there appears to be broad agreement among climate modelers that the Southwestern U.S. is experiencing a drying trend that will continue well into the latter part of 21st century (USDA Forest Service 2010b). Climate models depict temperatures rising approximately 5 to 8 degrees Fahrenheit by the end of the century (IPCC 2007). Precipitation changes remain much more difficult to predict than temperature, because precipitation is more variable and operates on a smaller scale, but is projected to drop by 5 percent by 2100 for much of Arizona and New Mexico. While the region is expected to dry out, it is also likely to see larger, more destructive flooding.
- The potential ecological implications of climate change trends in the Southwest may include more extreme disturbance events, such as wildfires and intense rain and flashfloods and wind events; greater vulnerability to invasive species; long-term shifts in vegetation patterns; migration of vegetation moving more northerly, upslope, or disappearing in some areas; potential decreases in overall forest productivity due to reduced precipitation; and shifts in the timing of snowmelt (already observed) in the American West; and changes in temperature and availability of water. These implications could be widespread and affect all PNVTs and systems on the Forest. Changes in climate may also influence the distribution and abundance of plant and animal species through changes in resource availability, fecundity, and survivorship.
- The effects of climate change may increase the vulnerability of highly departed ecosystems that are already susceptible to negative effects from drought, wildfire, insects and disease, and invasive species. PNVTs on the Coconino NF that may be particularly susceptible in this way include: Pinyon Juniper Woodland, Ponderosa Pine, Dry Mixed Conifer, and Spruce Fir.
- Small, localized PNVTs, such as Alpine Tundra and Spruce Fir, are threatened by temperature changes that result in upward shifts in vegetation. In addition to some of the potential threats posed above, riparian and wetland habitats, as well as aquatic systems, are vulnerable to shifts in water temperature and availability. This includes Cottonwood Willow Riparian Forest, Mixed Broadleaf Deciduous Forest, Montane Willow Riparian Forest, and Wetland Cienega PNVTs in addition to streams, lakes, and springs. This would also influence the Forest's contribution to three associated groundwater basins and local aquifers.
- Species that depend on ecosystems that are particularly vulnerable to climate change are also threatened. All species would be affected in some degree, but especially vulnerable species would likely include aquatic and riparian dependent species, species associated with high elevation habitats like Spruce Fir and Alpine Tundra, species associated with particular or special water features, and species with the highly departed PNVTs mentioned above.

Management Concerns

This section identifies management concerns extracted from conditions and trends set forth in this chapter and public comments noted in Appendix A.

Soil – One-third of the Forests’ soils is in impaired or unsatisfactory condition because of off highway vehicle use, improperly located roads, historical livestock grazing, or exclusion of fire. These soils are susceptible to accelerated erosion and loss of soil productivity. Additionally, drought has resulted in reduced vegetation and ground cover, putting soils at greater risk. Risks associated with these conditions include increased sedimentation in lakes and rivers that degrades water quality and decreased plant and tree growth. These risks can place species that depend on these habitats at risk, as well as impact humans that depend on the water or vegetation for recreation or their livelihood.

Air quality – The community has health and visual quality related concerns about the smoke associated with wildfire and prescribed burns.

Water quality – Some streams and lakes on the Forest do not meet state and national water quality standards for their designated uses and are currently listed as impaired by the Environmental Protection Agency and the Arizona Department of Environmental Quality. Improper sanitary habits of swimmers during busy weekends, septic systems, and wildlife contamination has resulted in elevated pathogen levels of *E. coli* in two impaired streams. Elevated levels of mercury in fish tissue from yet-to-be-determined sources has impaired 5 lakes. Dispersed recreation and improper placement of roads has contributed to high levels of turbidity in several perennial streams. Consequently, these streams do not adequately support aquatic species and warm water fisheries.

Groundwater - Increased demand for water has elevated concerns regarding water availability. Continued or increased pumping may negatively affect base flow of streams that are directly connected to major aquifers and, thus, affect the plants and animals that depend on that instream flow. Groundwater pumping from the Verde River and Little Colorado River Plateau groundwater basins negatively affects water sources on the Forest.

Aquatic resources – Non-point sources of sediments have caused a decline in stream riparian condition and these areas are susceptible to degradation or are not functioning. These sources include improperly located roads, road construction and maintenance, recreation disturbance, including off highway vehicle use, excessive past and current livestock grazing and wildlife herbivory.

Concentrations of livestock and wildlife around wetlands have caused a decline in wetland riparian condition. Because of this, nearly a third of the wetlands are susceptible to degradation.

Excessive use from recreationists, livestock, and wildlife, combined with the past installation of pipes and tanks, place unfenced accessible springs at risk. Some springs are projected to remain at risk because of adjacent domestic well use.

Non-native animal and plant species have major impacts to native aquatic species and their habitat because they prey on, out-compete, or hybridize with native species, as well as degrade habitats on which many aquatic native species rely. Structures and activities, such as dams, water diversions,

roads, grazing, off-highway-vehicle use, and vegetative treatments, have resulted in stream channel down cutting, lowering of the water table, changes in natural stream flow over time, and conversion of perennial streams to perennial-interrupted or intermittent streams. As a result, native fish populations have changed from large interconnected populations, to isolated populations within altered habitats. Diversity and viability of native aquatic species are threatened.

Vegetation - The exclusion of fire has changed the composition, structure, and natural disturbance regimes of fire adapted ecosystems. As a result, catastrophic fire and insect and disease outbreaks threaten these systems and there is substantive decline in herbaceous understory abundance, distribution, and diversity.

The increasing threat of catastrophic fire presents considerable risk of sedimentation and erosion into connected perennial streams increasing flood potential and damage to already vulnerable aquatic ecosystems. This also threatens riparian communities because they are not adapted to fire, and a shift to a nonnative species mix is likely.

Exclusion of fire in fire-adapted PNVTs adjacent to the Forests' 3 grassland communities has facilitated the encroachment of shrubs and trees in grasslands. This has caused fragmentation and reduction of grasslands and reduced herbaceous understory vigor, abundance and diversity. Fire exclusion in adjacent communities has also facilitated the encroachment of conifers into high elevation riparian ecosystems overtopping and competing with deciduous riparian vegetation.

Nonnative and invasive plants, including grasses, are infiltrating many PNVTs. They threaten the diversity and regeneration potential of native plants, may cause a decline in instream flow in riparian communities, and potentially alter fire frequencies and severity. Nonnative invasive invertebrates and pathogens threaten native plant species and the possible future establishment of invasive invertebrates, such as the quagga mussel, would seriously alter aquatic communities.

Water diversions and increasing human development in watersheds have affected quantity and seasonality of historical flood regimes, eliminating or reducing native species that provide competition to non-native plants.

Species - When terrestrial or aquatic habitats are not functioning properly or are threatened, species are likewise at risk because they are inseparable from their habitat. Many of the species on the Forest are threatened because their associated vegetation communities, or the structures within them, are not functioning properly.

A wide variety of management activities and human uses cause habitat alteration and modification and disturbance, damage, or mortality to species at various scales. Species linked with special features, or have limited distribution or are endemic are particularly vulnerable.

The continued and increasing occurrence of non-native plant and animal invasive species has substantial potential to alter ecological systems and processes. The most vulnerable species are those tied to aquatic systems, including riparian habitats.

Connectivity of habitats on the Forest is threatened by projected expansion of major interstates and increasing use of roads; structures such as dams, culverts, and water diversions; and fences. In addition, fire exclusion has facilitated tree and shrub encroachment in grasslands which has

fragmented these communities. Movements, dispersal, and genetic diversity of wide-ranging and migratory species, and aquatic, riparian, and grassland dependent species are threatened.

Climate Change – Forest managers are challenged by the uncertainties of climate change. Climate change has the potential to alter forest ecosystems in the Southwest due to changes in temperature, precipitation, and variability of disturbances. It may cause additional strains on water resources or facilitate uncharacteristic wildfires that lead to not only ecological impacts, but also social and economic impacts relating to demands for resources, such as water.

Chapter 4: Summary of Required Processes and Recommended Plan Needs for Change

This chapter summarizes required Forest Plan processes, updates to the current Forest Plan organization and content, and the Forest Plan revision topics identified in Chapters 2 and 3. The Forest leadership team will review this report with associated public feedback, the Economic and Social Sustainability Assessment, and the Ecological Sustainability Report. As part of the review, the Forest Supervisor will determine which revision topics will be carried forward into the next phase of the Forest Plan revision process.

Required Forest Plan Revision Processes

In addition to needs for change based on social, economic, or ecological conditions and trends, several required topics will be evaluated as part of the Plan Revision process. These topics include addressing diversity and viability of plant and animal communities; identification of management indicator species; timber suitability; completing a wilderness evaluation; review and update the existing Wild and Scenic Rivers eligibility report; analysis of the Coconino NF for areas that should be recommended for Research Natural Area status; response to climate change; analysis of suitability of lands for regulated timber harvest or grazing; and analysis of benchmarks to provide a threshold of feasibility for alternatives developed. A short explanation of Management Indicator Species and Benchmark Analysis, two requirements associated with the 1982 Planning Rule provisions, follow.

Management Indicator Species (MIS)

Management Indicator Species are species selected during the Forest Planning process to allow evaluation of the differences between alternatives in the revised plan's Environmental Impact Statement (EIS). There may be a need to change the MIS in the current plan to reflect changes in management direction in different alternatives in the EIS and, ultimately, within the revised Forest Plan. MIS selected for the final revised plan will be based on the proposed management in the selected alternative.

Benchmark Analysis

Benchmark analyses are one of the required provisions of the 1982 Planning Rule pertaining to the Analysis of the Management Situation. Benchmark analyses define the range within which alternatives in an environmental impact statement may be developed. All National Forests and Grasslands in the Southwestern Region developed benchmarks during development of their original plans. Benchmark data from the *1987 Coconino National Forest Plan* (the 1987 Plan) and *Final Environmental Impact Statement (EIS) for the Coconino National Forest Plan* was reviewed to determine if there was a need to change any previously established benchmarks. Of these eleven, eight are deemed adequate to set the range of the alternatives that may be developed as part of Coconino plan revision, and three benchmarks – Wilderness Recreation, Developed Recreation, and Wildlife and Fish User Days – require modification because they exceed or fall below previously established benchmarks, or are accounted for within another benchmark.

According to National Visitor Use Monitoring (NVUM) from 2005, which is the most current information available, Wilderness Recreation levels exceed the previously established maximum benchmark. The previous benchmark was based on the projected use and past history of uses. The new benchmark is 89 thousand recreation visitor days (MRVDs) for the period 2001-2010 and 123 MRVDs for the period 2011-2020.

Developed Recreation levels fall below the previously established minimum benchmark. The previous benchmark was based on past history of uses and the assumption that demand would increase proportional to Arizona's population increase. Using 2005 data (number of site visits at day use developed sites and number of site visits based on overnight use at developed sites), the new benchmark was adjusted to be 857 MRVDs for the period 2001-2010 and 1185 MRVDs for the period 2011-2020.

The Wildlife and Fish User Day benchmark was grouped with dispersed recreation because available data from NVUM do not quantitatively discriminate between wildlife -based and other types of recreation, so we were not able to separate wildlife and fish based activities from other activities. Consequently, we considered dispersed recreation to include wildlife related activities.

A more detailed analysis is located in the project record and is available upon request. If, in the process of alternative development, it is discovered that an alternative falls outside the range of an existing benchmark, then the affected benchmark will need to be re-evaluated and re-established as necessary.

Forest Plan Organization and Corrections

Even though the needs for change identified in this report are expected to be the primary drivers of the development of a revised Forest Plan, they are not a comprehensive list of needed changes. Some areas of the current Forest Plan are still timely and adequate, and that direction will be carried forward into the revised Forest Plan. Many components of the current Forest Plan will be modified or removed, for reasons including:

- Administrative functions are described, such as budgeting, rather than the desired conditions of land and resources;
- There is duplication or conflict with direction found in existing laws and regulations or policy;
- Components are based on outdated information, such as policies, science or information;
- Existing format is inconsistent and hard-to-use.

Recommended Forest Plan Needs for Change

Recommended Socio-Economic Plan Needs for Change

Update desired conditions for recreation and scenery management - As diversity and number of Forest users escalates, demand increases for a greater range of recreational experiences. Guidance for recreational opportunities, uses and demand is partial or absent

in the current plan. Direction in the revised Forest Plan should also tie to the recreation goals in the National Strategic Plan, and the recreational niche²³ of the Forest.

Designated Areas – The Coconino NF has many designated areas that attract visitors. Comments received from the public both support the creation of Special Areas and note concern about the impacts that could result from increased visitation to them. There is also limited capacity by the Forest to manage Special Areas, as intended. A list of proposed changes to Special Areas is displayed in Appendix B, as is a list of possible new Special Areas recommended by the public.

All National Forest System lands possessing wilderness characteristics must be evaluated as potential wilderness areas. If there are recommendations for new designations, they will need to be incorporated into the revised Forest Plan.

The current Forest Plan provides management direction for only a small portion of rivers that are currently eligible for designation into the National Wild and Scenic Rivers System. The Forest Plan needs to be updated to reflect these eligible rivers.

The current Forest Plan management direction is outdated or lacking for Forest Service specially designated areas. Specifically, direction in the current plan is silent or partial on Research Natural Areas, Special Interest Areas, and Environmental Study Areas. Thorough desired conditions are recommended for these areas. Existing direction in the plan for Wilderness areas should be updated to reflect current policy. Objectives in the plan that are no longer realistic or attainable should be removed.

Open space -The revised Forest Plan should tie open space direction to agency policy on open space. The revised direction should acknowledge the ecological aspects of open space preservation, partnerships with communities to preserve open space, as well as benefits to nearby communities.

Land Ownership Adjustment - Since many communities are completely surrounded by the Forest and limited in their ability to expand, managers may receive pressure to exchange land to provide for community growth. The revised Forest Plan should acknowledge the potential future desires for community expansion, as well as values related preservation of open space and water.

Energy and Minerals – The revised Forest Plan could provide additional guidance regarding appropriate locations for mineral development and associated rehabilitation, as well as energy development and related infrastructure.

Other Forest Products – Language in the existing Forest Plan needs to be updated for Forest Products. For example, desired conditions are absent, and the Plan should reference national policy. The current Forest Plan partially covers the cultural importance of a variety of forest products, such as the management of pinyon trees for pinyon nut gathering,

²³ The recreational niche on the Forest is described in terms of red rocks, green forests, white peaks, and dark skies. The Forest is special because of its elevation differences that support diverse animal and plant life, climate, seasonal opportunities, and geology. Prehistoric and historic cultures had strong connections to this landscape, which inspires visitors today. These connections are exemplified by rock art, heritage sites and the abundance of guided tours to special places. Dispersed day-use activities are what most visitors do. These activities include looking at the scenery, hiking, using OHVs on designated motorized trails or play areas. Night sky viewing and four observatories are supported by an internationally designated 'Dark Sky' area.

collection of various ceremonial materials, and continued access to gather firewood. The revised Forest Plan should contain language that provides protection and consideration of these resources, while also meeting the needs of the public. An Interim Directive was issued in 2009 providing direction under the 2008 Farm Bill for implementing the free-use collecting of forest products by recognized tribes for traditional and cultural purposes. The Forest Service plans to issue a regulation to implement this portion of the 2008 Farm Bill, but anticipates this will take some time to finalize. Until then, the Interim Directive authorizes the use of the 2008 Farm Bill, Section 8105, until regulations are issued. Once these changes have been approved, they should be reflected in changes to the Forest Plan.

Air quality – The community has health and visual quality related concerns about the smoke associated with wildfire and prescribed burns. Language regarding regulatory authorities and approaches for addressing smoke emissions should be clarified in the revised plan.

Recommended Ecosystem Plan Needs for Change

Soil – One of the main goals of the current Forest Plan is to improve and maintain soil condition and productivity. Plan direction for soils should be reviewed and updated where needed.

Water and watersheds – There is a need to improve upland watershed conditions, restore proper functioning condition to riparian areas, and reduce pollutants associated with streams and lakes. Although the current Forest Plan emphasizes improvement of riparian resources and includes direction to prevent water quality deterioration, this direction could be improved if management direction for riparian, aquatic, and water resources were integrated. The revised Plan should articulate the importance of groundwater because sufficient recharge of groundwater is essential to maintain fish habitat, riparian health, and water yield, as well as point to regional guidance on groundwater management. The revised Plan should also acknowledge the importance of improving and maintaining healthy upland watershed conditions in all vegetation types in improving stream flow conditions.

Vegetation and Natural Disturbance– Current Forest Plan language is difficult to use for Ponderosa Pine and Dry Mixed Conifer because it contains conflicting direction, and it is scattered throughout the Plan document. Current Plan language for Pinyon-Juniper Woodlands is outdated and does not reflect the different types of pinyon-juniper ecosystems that exist on the Forest. Desired conditions in the revised Plan should reflect the composition, structure and natural disturbance attributes appropriate for the different systems and the language should be updated.

The existing Forest Plan lacks clear direction for the smaller, but no less important, ecosystems such as the different grassland types, Spruce-Fir, Desert Communities, Interior Chaparral, and Alpine Tundra. Existing Forest Plan language emphasizes improvement of riparian areas, but it lacks desired conditions for the different riparian vegetation types on the Forest, as well as springs. Clear desired conditions and other plan components for the different types of riparian ecosystems are needed.

Species – The existing Forest Plan does not fully address non-native invasive animals or plants. Forest Plan language should be revised to address nonnative invasive animals (including pathogens and invertebrates) and grasses.

Forest Service Sensitive and U.S. Fish and Wildlife Service Candidate species should be evaluated to reduce the likelihood of being listing as threatened or endangered. Plan language does not fully address the needs for at-risk species and should be updated to do so. Some species may require plan components associated with their habitat, while others may need species-specific plan components. Plan language should address management of habitat and point to conservation agreements, both of which may preclude listing of proposed or candidate species.

Habitat connectivity – Habitat connectivity is briefly addressed in the current Forest Plan. plan components should be revised to address fragmentation to specific at-risk ecosystems or species.

Climate Change – While the state of knowledge needed to address climate change at the National Forest scale is still evolving, the revised Forest Plan should include consideration of strategies to mitigate the effects of climate change. These strategies may include reducing vulnerability to climate change by maintaining and restoring resilient native ecosystems, particularly those that are already at-risk and vulnerable to threats from climate change; adjusting management activities to anticipate more extreme disturbances and changes in the demand and availability of water; and considering adjustments to the monitoring program that may improve understanding of the relationships between key plan components and climate change.

Integration of Needs for Change

Table 4 integrates the needs for change across disciplines and reviews the potential ecological and socio-economic results of the potential Forest Plan needs for change. In some cases, these results may indicate a conflict between Forest resources. It also identifies the management influences that may assist or constrain any potential Forest Plan changes. This will help Forest leadership to determine which topics to carry forward into Forest Plan revision.

Table 4. Integration of recommended Plan needs for change with socio-economic and ecological considerations

Ecological or Socio-Economic Need	Potential Forest Plan Need for Change	Ecological Results/Change	Social and Economic Results/Change	Management Influence
RECREATION				
Provide desirable scenic opportunities	Update desired conditions for scenery management (utilize Visual Quality Objectives in the Scenery Management System).	<p>Promotes retention of large trees, oak, aspen, other deciduous trees, and understory species.</p> <p>May promote more savannah-like landscapes in some areas.</p>	Maintains and improves scenic integrity and recreational settings.	Scenery management guidelines may affect other management activities.
Provide desirable recreation experiences.	<p>Update desired conditions for recreation management (utilize Recreation Opportunity Spectrum).</p> <p>Consider emerging recreational uses (such as Geo-caching, rock climbing, paintballing).</p>	<p>Can concentrate recreation use away from sensitive areas</p> <p>May create site disturbances, fragment wildlife habitat, and promote the spread of invasive species</p> <p>May influence water quality</p>	Strives to accommodate diverse groups of users.	<p>Consider 5-year plan for Recreation Facilities Analysis.</p> <p>Seek partnerships and utilize volunteers to manage developed recreation sites.</p> <p>Concessionaire permits.</p>

Ecological or Socio-Economic Need	Potential Forest Plan Need for Change	Ecological Results/Change	Social and Economic Results/Change	Management Influence
Provide direction for a variety of designated Special Areas on the Forest because the existing Forest Plan direction is absent or outdated.	<p>Provide additional desired conditions and objectives for Wilderness areas.</p> <p>Provide additional language for Research Natural Areas to protect them against human caused disturbances.</p> <p>Provide additional language for Forest Service designated Special Areas to reflect the desired condition.</p> <p>Provide Forest plan components for eligible Wild and Scenic River segments.</p>	<p>May maintain natural ecological systems in Special Areas</p> <p>In some cases, these areas may experience impacts from recreation use.</p>	<p>Provides for wilderness experiences</p> <p>Restricts use in some Special Areas</p>	

Ecological or Socio-Economic Need	Potential Forest Plan Need for Change	Ecological Results/Change	Social and Economic Results/Change	Management Influence
Consider Special Area proposals generated by the public and internal employees (See Appendix B).	Provide Forest plan components for any recommended new Special Areas.	<p>Provides additional habitat and connectivity for species.</p> <p>Maintains natural ecological systems in Special Areas</p> <p>In some cases, these areas may experience increased impacts from recreation use due to increased awareness of areas because of designation.</p>	<p>Provides for additional pristine recreation experiences in some areas</p> <p>Protects uniqueness of areas for which they were originally established.</p> <p>Restricts use in some Special Areas.</p> <p>Increases educational opportunities for Forest users.</p>	<p>Refer to the R3 Special Areas Workgroup Product on the processes for recommendation of any new Special Areas.</p> <p>Any new Special Areas that are recommended in the Forest Plan will require subsequent NEPA to officially designate areas.</p>

Ecological or Socio-Economic Need	Potential Forest Plan Need for Change	Ecological Results/Change	Social and Economic Results/Change	Management Influence
COMMUNITY-FOREST INTERACTION				
Acknowledge value of open space to communities.	<p>Acknowledge values of open space preservation while considering potential future desires for communities to expand.</p> <p>Tie open space direction to the agency policy on open space.</p>	<p>Promotes habitat connectivity</p> <p>May promote wildlife viewing</p>	<p>Acknowledges the importance of open space to the surrounding communities</p> <p>Recognizes the importance of ranches in preserving open space, and the economic benefits derived from scenic open space view sheds in communities</p> <p>May promote wildlife watching</p>	<p>USDA Forest Service Strategic Plan FY 07-12; Goal 3 Conserve Open Space</p> <p>U.S. Forest Service Open Space Conservation Strategy</p> <p>All surrounding community and county plans</p>
Provide direction for mineral development and rehabilitation, traditional (power line and gas line corridors), and new energy-related uses (solar, wind and geothermal).	<p>Update existing direction for energy and minerals.</p> <p>Direction in revised Plan could address suitability of areas for these uses and provide plan components for new uses.</p>	Promotes balance between ecological and social needs		<p>Permits issued for these purposes</p> <p>Coordination with city, county, state and federal plans and requirements</p>

Ecological or Socio-Economic Need	Potential Forest Plan Need for Change	Ecological Results/Change	Social and Economic Results/Change	Management Influence
Provide direction for managing forest products, including those that have cultural importance.	Provide Forest plan components for the forest products program and address the cultural importance of a variety of products.	<p>Improves forest health, fire frequency and fire severity that will move ecosystems towards improved sustainability</p> <p>Emphasis on sustainability of ecosystems to insure long term availability of forest products</p> <p>Overuse and off-road motorized activity may damage vegetation and disturb wildlife during collection of forest products.</p>	<p>Provides Forest products for the public and creates employment opportunities</p> <p>Promotes economic sustainability to ensure long-term availability of forest products</p> <p>Maintains traditional and culturally important lifestyles</p>	<p>Illegal fuel wood cutting is ongoing, particularly in oak and large junipers.</p> <p>Key wildlife habitat components may need protection.</p> <p>Improvements may be needed for permit system, monitoring, and various contract types.</p>

Ecological or Socio-Economic Need	Potential Forest Plan Need for Change	Ecological Results/Change	Social and Economic Results/Change	Management Influence
MAINTENANCE AND IMPROVEMENT OF ECOSYSTEM HEALTH				
Restore ecosystems for reliance/adaptation.	<p>Incorporate desired conditions that reflect the composition, structure, and natural disturbance attributes appropriate for the different systems.</p> <p>Update language related to ecosystems on the Forest.</p> <p>Acknowledge long term uncertainty about ecosystem responses. to climate change</p> <p>Update desired conditions for soil resources</p>	<p>Improves understory and deciduous tree diversity and abundance, soil condition, connectivity of grasslands, and habitat for wildlife and plants</p> <p>Restores vegetative structure similar to reference conditions, natural fire regime</p> <p>Reduces risk of uncharacteristic fire and erosion</p> <p>Protects watersheds</p> <p>Promotes age class diversity and early succession species such as aspen</p> <p>Ecosystems may be more resilient to variations in weather and climate and less susceptible to insects and disease.</p>	<p>Improves scenic integrity, including viewing fall colors</p> <p>Potential for wood product based industries</p> <p>Provides fuelwood and other forest products</p> <p>Protects heritage resources from high intensity fires</p> <p>Maintains and improves recreation settings</p> <p>May reduce fire risk to communities, infrastructure, and fire fighters</p>	Numerous laws, regulations and policies (e.g. Endangered Species Act, Migratory Bird Treaty Act, Arizona Department of Environmental Quality, National Historic Preservation Act, conservation agreements, etc.)

Ecological or Socio-Economic Need	Potential Forest Plan Need for Change	Ecological Results/Change	Social and Economic Results/Change	Management Influence
Reduce or control nonnative or invasive animal species.	Add to existing Forest Plan language	Restores ecological integrity and native species diversity and populations, including aquatic species	May change sport fishing opportunities	
Protect and restore seeps, springs, wetlands, surface water, and riparian areas	Create and refine create plan components for riparian areas, seeps and springs. Update plan components to be consistent with recent regional groundwater management guidance.	Retains and restores pockets of high biodiversity in surrounding arid landscape Restores natural water flow Provides water for wildlife and plants, supplies habitat for aquatic dependent species	Protects areas of high cultural/Tribal value and scenic and recreation values Provides water for livestock and wildlife viewing opportunities	
Forest planning species may need further considerations.	Where needed provided habitat or species-specific plan components.	Maintains species diversity Maintains or enhances the 'fine filter' component of species diversity such as species that are unique to the Coconino NF		Some species may fall under other regulations and guidance (ex. Endangered Species Act).

Ecological or Socio-Economic Need	Potential Forest Plan Need for Change	Ecological Results/Change	Social and Economic Results/Change	Management Influence
Restore fire regime in both frequency and severity similar to reference conditions.	Refine Forests related to restoration of natural disturbance regimes in fire-adapted ecosystems.	<p>Increases understory diversity</p> <p>Restores vegetative structure similar to reference conditions</p> <p>Improves soil condition habitat for wildlife and plants</p> <p>Reduces risk of uncharacteristic fire and resulting erosion</p> <p>Ecosystems may be more resilient to variations in weather and climate and insects and disease.</p> <p>Promotes age class diversity and early succession species</p> <p>Can facilitate the establishment of invasive plants</p>	<p>Improves scenic integrity</p> <p>Protects heritage resources from high intensity fires</p> <p>Reduces fire risk to communities, infrastructure, and firefighters</p> <p>Adverse effects to human health from smoke emissions</p> <p>Occasional impairment to visibility in scenic areas</p>	Air quality standards (Arizona Department of Environmental Quality)

Ecological or Socio-Economic Need	Potential Forest Plan Need for Change	Ecological Results/Change	Social and Economic Results/Change	Management Influence
Reduce or control invasive plant species in all vegetation types where applicable.	Refine existing plan components and include invasive or nonnative annual grasses	Helps to preserve ecosystem function Reducing cheatgrass helps restore natural fire regime. Reduces competition between native and nonnative plant species and restores riparian function	Maintains and improves recreation settings Potentially creates conflicts with special forest products such as herbs and basketry materials if herbicides are applied in gathering areas Herbicides can have adverse impacts to chemically sensitive people.	2004 Record of Decision and Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds
Restore or maintain habitat connectivity in at-risk ecosystems or for at-risk species.	Refine existing Forest Plan language.	Maintains or enhances migration, daily and seasonal movements, and the opportunities for genetic exchange between existing populations of plants and animals	Increases wildlife related recreation opportunities	All associated land owners and jurisdictions such as Federal Highways Administration, Arizona Department of Transportation

Ecological or Socio-Economic Need	Potential Forest Plan Need for Change	Ecological Results/Change	Social and Economic Results/Change	Management Influence
Anticipate and reduce the effects of climate change.	Include Plan language that considers strategies to mitigate the effects of climate change.	Increases ecosystem resilience to climate change	May reduce potential social and economic effects resulting from changes in ecological resources.	Evolving science.

Chapter 5: Primary Plan Needs for Change

An internal Management Review of this report and associated background material was conducted in April 2010 to determine the primary needs for change and focus areas for the Forest Plan revision process. The Forest leadership team identified three priority themes to focus the scope of this revision effort: Recreation, Community-Forest Interaction, and Maintenance and Improvement of Ecosystem Health. To a large extent, the Forest leadership team felt that the recommended Plan needs for change identified in this report should be carried forward into the development of the revised Forest Plan. These decisions are summarized below and include alternative approaches or limitations in scope where the Forest leadership team felt it was necessary to feasibly address needs with the available staffing and time. While these topics do not capture all of the changes that will likely occur, they reflect priority needs and the focus areas for the initial development of the revised Forest Plan.

1) Recreation

Recreational use of the Forest has changed significantly since the current Forest Plan was developed. Chapter 2 discusses the conditions and trends of recreation in more detail. Some related concerns include increased use of developed recreation areas; changing populations; increased conflicts in values, culture and expectations; new types of recreation; increased recognition of tribal cultural uses and values; public safety; and pressures on riparian and wilderness areas.

Plan needs for change:

- **Update desired conditions and other Plan components for recreation and scenery management where guidance is partial or absent in the current Forest Plan.** Such guidance will consider current and projected recreation needs, natural resource impacts, and public input. Management of new and existing forms of recreation, including motorized recreation, should be addressed in a way that provides for the needs of other resources, user safety and consideration of other user groups.
- **Update plan components for existing Special Areas.** A number of changes are needed to update plan components for Special Areas, such as wilderness. The boundaries of some botanical areas should also need to be reviewed and adjusted to better reflect current knowledge of species and habitats for which the botanical areas were established.
- **Where appropriate, incorporate elements of Special Area proposals into revised Plan desired conditions.** The Forest leadership team considered proposals submitted for new Special Areas and acknowledged that there are many places on the Forest that people value for both social and ecological reasons. The Forest leadership team decided that the intent of the Special Area proposals should first be considered for incorporation

into components of the revised Plan, such as desired conditions, where they would be appropriate. The reasons for this are because:

- many of the proposals could be included the desired conditions for the areas of interest,
- Special Area designation would not necessarily offer any additional protections to that of plan components.
- there is currently limited staff available to complete the required NEPA analysis for new Special Areas, and

Following incorporation into the plan components, the Forest leadership team will review the remaining proposals that were not included to see if any warrant recommendation as a Special Area or other action. Previously proposed Research Natural Areas and potential wilderness areas will be considered later in the Plan revision process.

2) Community-Forest Interaction

Relationships with the community have changed significantly since the current Forest Plan was developed. Chapter 2 discusses the conditions and trends of the community-forest interaction in more detail. Some related concerns include a shift from a commodity-based to service-based economy, the influence of forest management activities on the local economy, population growth and loss of access or open space, and increased demand for community infrastructure.

Plan needs for change:

- **Update Plan language to acknowledge open space values.** The revised Plan should acknowledge the community desires for open space, as well as social and ecological benefits of open space. The revised Plan should also encourage partnerships with communities to preserve open space and point to existing agency policy on open space.
- **Update Plan language to acknowledge potential future community expansion desires.** Given projected population growth in the state and in communities around the Forest, there will likely be requests for land exchanges and land adjustments. The revised Plan should point to agency policy and criteria for land exchanges. Plan guidance related to land exchanges should consider maintenance of public access to National Forest lands and consider access to other land ownership.
- **Update guidance on energy and mineral development.** While the current Plan includes guidance on energy corridor locations, Plan guidance related to energy development should anticipate emerging technologies and alternative energy sources. Plan language should also be reviewed to ensure that restrictions are not in conflict with any homeland security or other requirements for energy infrastructure. Existing

mineral withdrawals should be identified, but analysis of mineral leasing availability will not be considered as part of the Plan revision process.

- **Provide guidance related to forest products and consideration of culturally important forest products.** The revised Forest Plan should provide guidance on forest products, plant materials gathered from the Forest other than commercial timber harvest. Where possible, the maintenance of culturally important forest products should be included as part of vegetative desired conditions. plan components related to culturally important forest products, however, should be adaptable to changing national policy.
- **Clarify regulatory authorities relating to air quality and include approaches for addressing smoke emissions.** Fire is a necessary component of ecosystems on the Forest, but the resulting smoke from those fires affects visual quality and human health. To the extent possible, the revised Plan will identify regulatory authorities for air quality and include approaches for reducing smoke impacts on communities.
- **Review and update Plan guidance on communication sites.** The Forest leadership team also identified a need to review Plan guidance on communication sites as it relates to future needs of new and existing sites, as well as related access and safety issues.

3) Maintenance and Improvement of Ecosystem Health

Since the development of the current Forest Plan, there is new knowledge of the forest ecosystems, and the emphasis of forest management has shifted from timber outputs to the maintenance and improvement of ecosystem health. Chapter 3 discusses the conditions and trends of the ecosystem health on the Coconino NF in more detail. Ecosystem health related concerns include forest resilience, changed frequency and severity of natural disturbances in fire-adapted ecosystems, the decline of aspen, the loss of understory species, lack of current plan direction for rarer ecosystems (such as tundra, spruce-fir, and riparian), susceptibility to catastrophic disturbances (fire, drought, insects and disease), climate change, invasive species, and habitat connectivity.

Plan needs for change:

- **Update desired conditions and objectives for soil resources.** One-third of the Forests' soils is in impaired or unsatisfactory condition because of off highway vehicle use, improperly located roads, historical livestock grazing, or exclusion of fire and are susceptible to accelerated erosion and loss of soil productivity. Because soil condition influences ecosystem health and water quality, Plan language regarding soil resources should be reviewed and updated in the revised Forest Plan.

- **Integrate management direction for riparian, aquatic, and water resources.** The revised Plan should reflect the inter-connectedness of riparian, aquatic, and water resources, as well as the importance of in-stream flow for maintaining functional riparian and aquatic habitats. The revised Plan should likewise articulate the importance of groundwater because sufficient recharge of groundwater is essential to maintain fish habitat, riparian health, and water yield, as well as point to regional guidance on groundwater management. The revised Plan should also acknowledge the importance of improving and maintaining healthy upland watershed conditions in all vegetation types in improving stream flow conditions.
- **Update desired conditions to reflect the composition, structure, and natural disturbance attributes (such as fire) appropriate for the different ecosystems, and integrate desired conditions across different resource areas.** There is a need update current Plan language to ensure that desired conditions maintain functioning ecosystems and consolidate direction to improve usability. Where lacking, desired conditions and associated plan components should be added commensurate with need for the smaller, but no less important, ecosystems such as the different grassland and riparian types, Spruce-Fir, Desert Communities, Interior Chaparral, and Alpine Tundra.
- **Address non-native invasive animals (including invertebrates) and grasses.** Non-native invasive species increasingly threaten terrestrial and aquatic ecosystems, but are not well addressed in the current Forest Plan.
- **Ensure plan components address concerns of Threatened, Endangered, and Forest planning species and their habitats.** Forest Service Sensitive and U.S. Fish and Wildlife Service Candidate species should be evaluated to reduce the likelihood of being listing as threatened or endangered. Plan language should address management of habitat and point to conservation agreements, both of which may preclude listing of proposed or candidate species. Some species may require plan components associated with their habitat, while others may need species-specific plan components.
- **Acknowledge the importance of habitat connectivity.** In light of increasing development and uses in and around the Forest, maintaining habitat connectivity will be an important consideration for certain at-risk ecosystems and species. Plan language, however, will need to be adaptable enough to allow for evaluation at the project level. Opportunities to partner with other agencies and stakeholders to maintain habitat connectivity should be encouraged in the revised Plan.
- **Consider strategies to address effects of climate change.** While the science on climate change continues to evolve, general strategies could be identified to mitigate the effects of climate change on Forest ecosystems. An example of such a strategy is

reducing vulnerability to climate change by maintaining and restoring resilient native ecosystems, particularly those that are already at-risk and vulnerable to threats from climate change.

These primary Plan needs for change will be carried forward as the initial scope of the Plan revision effort and used to solicit public input on the development of the revised Forest Plan and associated Environmental Impact Statement.

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Appendix A – Summary of Public Involvement

Engaging the Public

The Coconino NF plan revision team provided multiple ways the public, other agencies, and tribes to contribute ideas about how the current Forest Plan needs to change or improve including topics not addressed in the plan. Public involvement began in earnest in mid-2006. Formal and informal meetings, information in the Coconino National Forest Annual Stakeholders Report, letters, emails, phone calls, radio announcements, and postings to the Coconino NF webpage were used to share and gather information and encourage participation. Revision team members also gave presentations, went to the field, and met with individuals and groups. The revision team later met with the public, summarized feedback they had heard so far, then discussed topics that would inform current and desired conditions. These topics were framed as questions such as, “how should the forest look in the future?,” “what is the socio-economic role of the forest?,” and “how is the forest important to your community?” Four topic-based workgroups were also formed to focus on Special Areas, socio-economic diversity, ecological diversity, and species diversity.

Objectives of these workgroups were to:

- Gather condition and trend information for individual resources, to validate existing information, to articulate how different management activities affect those resources,
- Identify in what locations different uses may be appropriate,
- Identify uncertainties and gaps in our knowledge and collaboratively fill those gaps, and
- Describe Forest Service methodology for addressing complex analyses associated with ecological and species diversity.

Meetings

Over a 15 month period, meetings were conducted in different locations within and near the Forest to get broad representation from stakeholders. Meetings with an asterisk in the list below were held in conjunction with Kaibab National Forest.

Open House Meetings

- Happy Jack- October 3, 2006 and November 14, 2007
- Flagstaff- October 4, 2006 and November 15, 2007
- Winslow- October 5, 2006 and November 16, 2007
- Phoenix- October 7, 2006 and November 18, 2007*
- Camp Verde- October 11, 2006 and November 17, 2007

Other Agencies

- Phoenix- October 6, 2006*
- Flagstaff- November 17, 2006*

Tribal Meetings

- Flagstaff – Multi-tribal²⁴ meetings August 25, 2006* and November 1 -2, 2006*
- Cameron Chapter House - December 17, 2006
- Open house - Leupp Chapter House- February 16, 2007
- Open house - Cameron Chapter house- March 18, 2007
- Leupp Chapter House- January 19, 2007
- Window Rock , Navajo Nation Headquarters- January 31, 2007*
- Tuba City Chapter House- March 11, 2007

Topics identified by the public and other agencies

Over 2,500 comments were received as a result of the public participation efforts to date. They were read, entered into a comment analysis database, and coded into thematic areas. The analysis resulted in the following topics as being areas that warranted further discussion:

Ecosystem and species diversity:

Some things that were important: native species, healthy forests, big game, snags, Important Birding Areas, healthy big trees, old growth and natural species diversity. Some people supported seasonal and permanent closures for wildlife in sensitive areas and others did not like seasonal restrictions.

Some concerns: invasive species, trees being too dense, loss of aspen, and loss of historic predators.

Some people wanted us to increase focus: on consideration of all species (not just big ones) and on other vegetation types like pinyon-juniper, grasslands, and mixed conifer. Some wanted us to emphasize natural processes like stream flow.

Special management areas:

Some things that were important: roadless areas, designated wilderness.

Some concerns: Multiple user conflicts in wilderness and in the winter. Too many people in wilderness so not wilderness any more. Some people wanted no changes to existing wilderness designations.

Some people wanted us to increase focus: on the need for Special Areas to isolate and address specific issues, on management direction for Wild and Scenic rivers, on expansion of wilderness, and protection of remote sites. Some wanted Wet Beaver Creek and the Verde River expanded into wild or scenic river category, for the Forest to expand (the endangered) cliffrose area near Cottonwood, and for the Forest to save geological areas. Some suggested winter quiet areas be established to reduce user conflicts.

²⁴ Multi-tribal meetings provide an opportunity for Forest Service leadership and staff to talk with tribes about a variety of issues, Forest plan revision and how it related to the tribes was one of the topics discussed. All of the tribes routinely consulted by the Forest Service were invited to attend.

Livestock grazing:

Some things that were important: sustainable ranching and cattle grazing. Some like the way the Forest is managing livestock grazing out of riparian.

Some concerns: livestock overgrazing, and helping ranchers stay in business otherwise ranch land will be developed.

Some people wanted us to increase focus: on where grazing should be allowed, and removing grazing related fencing and water facilities that are no longer being used.

Recreation, roads and trails:

Some things that were important: hunting, sport fishing, multiple use (mining, timber, recreation), dispersed recreation, solitude, quiet, scenery especially near National Monuments, commercial recreation, outfitter guides within appropriate capacities, social trails, well maintained trails, primitive trails, and trails next to the community. People want to be able to access the Forest.

Some concerns: too many people in sensitive areas, too many social trails, and conflicts with commercial tours. Some people said social trails should be closed.

Some people wanted us to increase focus: on more developed recreation, places for motorized recreation, and better access to firewood. Some people support a large sustainable trail system that offers opportunities for all uses including motorized single tracks, bicycles, and handicap access.

Fuels reduction:

Some things that were important: getting fire back in the ecosystem, reducing fire risk around communities, and clean air.

Some concerns: smoke management, health and breathing issues, smoke impact to visibility and scenery, smog and haze issues.

Some people want us to focus: on having fewer burns and finding better ways to dispose of slash piles beside burning.

Forest products and industry:

Some things that were important: sustainability of biomass supply to keep industry going.

Some people were concerned: about finding alternate wood industry solutions to slash piles besides burning, such as chipping.

Some people wanted us to increase focus: on the increased use of small diameter trees for biomass.

Water and riparian:

Some things that were important: protection of and management direction for riparian areas. Clean water.

Some concerns: shrinking water table, effluent, erosion, and water supply,

Some people wanted us to increase focus: on managing watersheds and removing some stock tanks.

Open Space:

Some things that were important: open space between communities

Some people wanted to us to increase focus: on studying and preserving wildlife corridors.

Land sale and exchanges:

Some things that were important: the retention of the land exchange provisions in Forest Plan Amendment 12.

Some people wanted to us to increase focus: on lands acquired through land exchange, private inholdings with important or valuable resources that could be put in public management, and developable pieces of Forest land that may be inefficient for Forest management that may lend themselves to disposition.

Other items:

Some things that were important: protection of cultural and archaeological sites and shrines, research opportunities.

Some people wanted to us to increase focus: opportunities with a collaborative approach for protection; on education, youth, future generations, and new users in the forest. Some wanted us to support and consider future generations. Others desire protection of long-term research sites.

Special places:

Some places that were specifically mentioned:

Anderson Mesa wetlands, Arizona Snowbowl, aspens, Bearjaw, Blue Ridge Reservoir, Bull Pen, Campbell Mesa. Cinder Hills, Crescent Moon, East Clear Creek,	Fossil Springs, Griffith Spring, Hart Prairie, Inner Basin, Kendrick Park, Lava river caves, Little Springs, Lockett Meadow, Lower and Upper Lake Mary, Matatzal Wilderness,	Mogollon Rim, Mt. Elden, Munds Mountain, Oak Creek, Red Mountain, Red Rock Wilderness, Marshall Lake, Roger's Lake, San Francisco Peaks, Sedona,	Sheepshead Spring, Slate Mountain, Sycamore Canyon, the forest, V-Bar-V archaeological site, Verde River, Walnut Canyon, Weatherford Trail, West Clear Creek, West Fork, and Wupatki area.
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How comments were considered

The plan revision team shared this summary with the Forest leadership team to keep them aware of topics that were important to the public, other agencies, and the tribes and will continue to do so through the Forest Plan revision process. Involving the public, other agencies and the tribes in the revision process is important and crucial for the revised plan to be meaningful and relevant.

Appendix B – List of Designated Area Proposals

Below is a summary of Special Area proposals from the public and Forest Service employees. Some proposals recommend modifications of existing Special Areas and some propose new ones. The expansion of existing or establishment of new Special Areas is optional under current regulations. If the Forest Supervisor (and then Regional Forester) approves any areas, plan components would need to be included in the Forest Plan and subsequent NEPA would have to be completed. Objectives of some of these areas, however, may be achieved through desired conditions and without a Special Area designation.

The Coconino NF is also conducting a Wilderness evaluation during the Forest Plan Revision process. This process will look at potential new wilderness areas and determine their capability, availability, and need as Congressionally-designated Wilderness areas. During revision, the Forest will also review the eligibility of 11 river segments for Wild and Scenic rivers status and make any needed updates.

Proposed changes to existing Special Areas

- *Fern Mountain Botanical Area and the Verde Valley Botanical Area* should have boundary adjustments to better reflect current knowledge of the species and habitats for which the botanical areas were established.
- *Mogollon Rim Botanical Area* designation should be considered for further analysis to determine whether to keep it as a Botanical Area or change the boundary. The area was established as a good example of the unique white fir/big-toothed maple ecosystem, but concern has been expressed that it may not be the best representative area for this ecosystem type. Suggestions have been made internally to change the boundaries rather than take away the designation.
- *San Francisco Peaks Addition, Rocky Gulch, and West Clear Creek proposed RNA's* should be evaluated and recommended to the Regional RNA Committee if they still meet the RNA criteria for which they were originally proposed.
- *Fossil Creek* was designated as a Wild and Scenic River in 2009, so management guidance for that area will need to be updated to protect its outstanding remarkable values.

Proposed New Special Areas

Zoological

Flagstaff Regional Zoological Area - Proposes the designation of a network of watchable wildlife sites, whose designation would shift management towards conserving and enhancing unique wildlife habitat features, while maximizing interpretive and educational opportunities.

Rio de Flag Zoological Area - Proposes the designation of a small section of undeveloped important bird habitat that is surrounded by development.

Antelope Range Zoological Area - Proposes the designation of approximately 30,000 acres- around Anderson Mesa and southwest of Sedona west of U.S. Highway 89A to be managed as an antelope habitat Special Area.

Anderson Mesa Zoological Area - Proposes the designation of 250,000 acres around Anderson Mesa to be managed for the conservation and improvement of soils, forbs and shrubs, herbaceous community, hydrology, and wildlife.

Anderson Mesa Zoological Area - Proposes the designation of 200,000 acres of grasslands, wetlands as a Zoological Area to provide long-term protection habitat protection for a variety of wildlife and protect the headwaters for Mormon, Young, Padre, and Anderson Canyons.

Zoological Areas- Proposes the designation of the following areas as wildlife habitat and botanical areas to provide management direction for long term protection of significant wildlife habitat. Proposed areas are:

- Hospital Ridge: 4,844 acres,
- Jacks Canyon: 13,357 acres,
- Knoll Lake: 1,332 acres,
- Limestone Pasture: 2,423 acres,
- Pine Grove: 12,000 acres, and
- Second Chance: 1,143 acres

Geology

Cottonwood Basin Fumaroles Geologic and Botanical Special Area - Proposes the designation of approximately 200 acres of land in a small subwatershed of Cottonwood Basin as a Geologic/Botanical Area.

Scenic

Sedona Red Rock Scenic Area - Proposes the designation of approximately 160,000 acres of land surrounding Sedona, encompassing the majority of red rock formations and Oak Creek Canyon.

Recreation

Single Track Trail Systems Recreation Area - Proposes the creation of a variety of single track trail systems throughout the forest. The proposal would meet the needs of motorized single track users, for which the Coconino does not currently provide many services.

Other Designated Areas

Environmental Study Areas

Astronomical Environmental Study Area - Proposes the designation of areas near Anderson Mesa and Happy Jack, to preserve the dark sky and provide astronomical opportunities.

Educational Site Network for ESA's - Proposes the designation of a variety of unique archaeological, botanical, and geological sites to be unified as an educational network, rather than stand alone sites. Sites may include Palatki, Fossil Springs, the interagency national Hands on the Land Program, and a variety of other environmental study areas.

Fossil Creek ESA - Proposes the designation of Fossil Creek as an ESA, recognizing its outstanding and unique geological, fisheries, wildlife, scenic, and historic features.