Coconino National Forest

ECONOMIC AND SOCIAL SUSTAINABILITY ASSESSMENT

March 28, 2008

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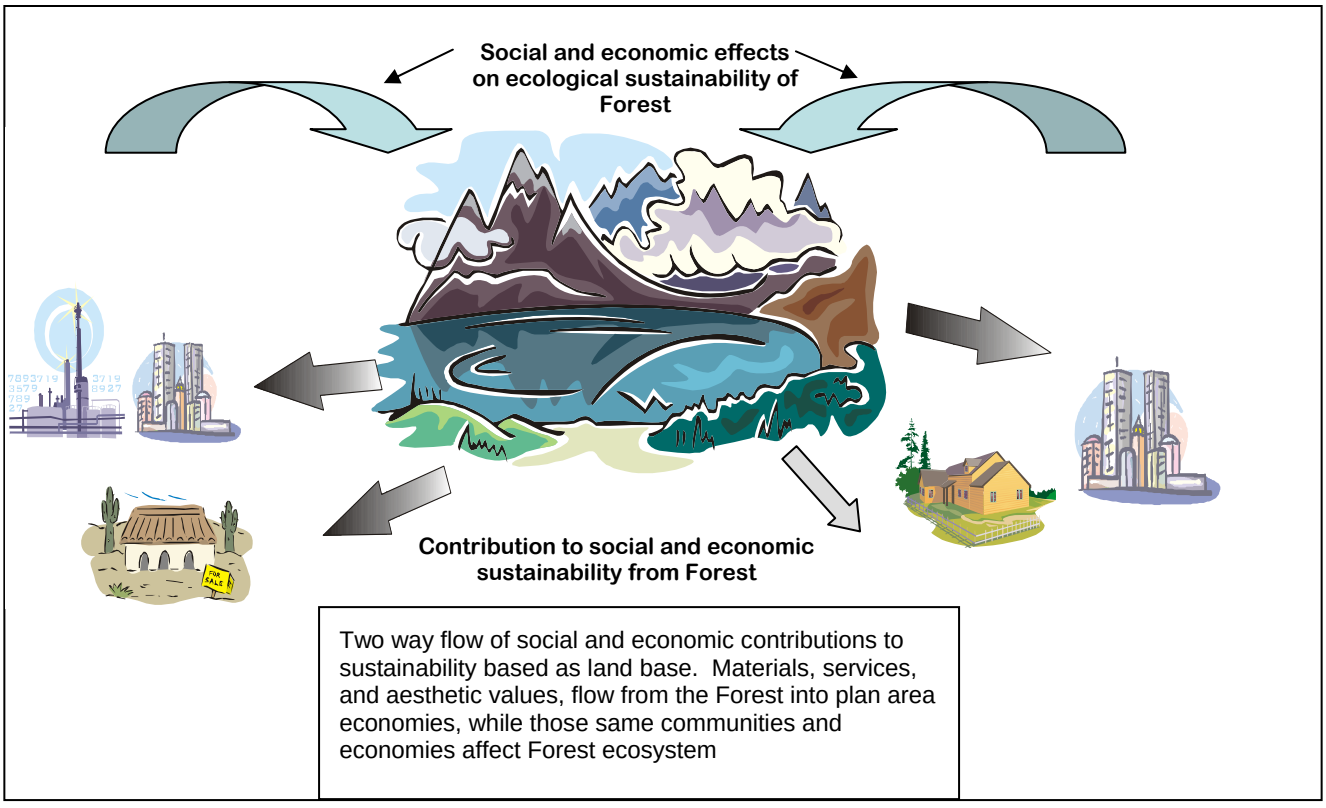
INTRODUCTION

The purpose of this report is to document the Coconino National Forest's contribution to economic and social sustainability of the assessment area. This report will be used during Forest Plan Revision to define the need for change. The Forest Service contributes sustainable social and economic flows of land uses, benefits, products, services, and visitor opportunities through the management of National Forest System lands. Ecosystems provide natural resources that encompass a variety of goods and services ranging from consumptive to recreational and spiritual. In offering these goods and services, National Forest System lands contribute to the social and economic sustainability of communities, regions, and the nation.

For example, forest ecosystems may contribute to the social and economic sustainability of local communities by providing a place to recreate. However, increasing numbers of people hiking and camping within an area of limited size and resources may affect the ability of forest ecosystems to sustain such experiences. In another example, industries, such as timber harvest or livestock grazing, may affect ecological structure and function by altering soil and water quality, which in turn will affect the sustainability of future social and economic endeavors. Changing social attitudes, beliefs, and values about how the Coconino National Forest is managed can influence ecological as well as economic sustainability by affecting how forest resources are managed.



Two way flow of social and economic contributions to sustainability based as land base. Materials, services, and aesthetic values, flow from the Forest into plan area economies, while those same communities and economies affect Forest ecosystem

The sources of information used in this assessment help document changing conditions and trends and provide the economic and social context for Forest Plan revision. These sources highlight the Coconino National Forest's unique socioeconomic position, and they clarify the Forest's roles in contributing to the sustainability of local economies. This document uses the following sources:

1. **Socio-Economic Assessment for the Coconino National Forest (SEA), by the University of Arizona.** The SEA is based on existing secondary data[1]. The secondary data sources consist, for example, of county and state economic data, U.S. Census data and a wide range of data from Forest Service databases.

2. **Focus Group Study Report of Values, Attitudes, and Beliefs regarding National Forest System Lands: Coconino National Forest, by Adams-Russell Consulting.** This focus group study provides information about attitudes, beliefs, and values related to forest management and resources.

3. **An IMPLAN[2] Economic Contribution Analysis for the Coconino National Forest, by TEAMS[3] Social Scientist, Barbara Ott.** The Forest Service contribution data is provided in a separate report for the Coconino National Forest, as a supplement to the University of Arizona socioeconomic assessments.

ORGANIZATION

Organizationally, the goal of this evaluation is to describe economic and social sustainability in the context of the Coconino National Forest. The idea is to describe the surrounding economic context, within which the Forest resides, and then to describe the Forest economic contribution within that context. The social conditions and trends are described, again as part of the overall context of the Forest. The goal is to describe the contribution of the Coconino National Forest to economic and social sustainability, which finally leads to changing trends and/or potential risks to that sustainability.

Barbara Ott of the TEAMS Planning Enterprise group produced the economics section. Richard Periman, Southwestern Region Social Scientist, assembled the social conditions and trends section. Coconino National Forest personnel reviewed the assessment, and rewrites were suggested when needed. Jennifer Kevil, Natural Resource Specialist on the Coconino Core Forest Plan Revision Team, handled additions and rewrites. Each new section builds on the previous section. This concept is reflected in the assessment's organization, as follows:

1. **Executive Summary** conditions and trends likely to affect the need for change assessment are summarized.
2. **Historical Context** is supplied, describing how the economic and social systems associated with the Forest developed through time.

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[1] Secondary data sources are books, reports, articles, and data compiled and available on the web, in which other researchers report the results of their research based on primary data or sources. Primary sources, on the other hand, are new data, compiled for the first time through new research, such as direct interviews, focus groups, or new surveys.

[2] IMPLAN (IMpact analysis for PLANing, Minnesota IMPLAN Group, Inc.), is a regional economic impact analysis system that uses county-level, input-output data to determine the extent to which these activities (such as livestock grazing) contribute to the local economy. Input-output analysis is an economist's tool that traces linkages among the structural parts of an economy and calculates the employment, income, and output effects resulting from a direct impact on the economy.

[3] TEAMS is a unit of the national Forest Service Enterprise Program. Enterprise Units are independent, financially self-sustaining entities that are funded by the customers they serve. Barbara Ott is a Social Scientist and Economist who is currently working in the Planning section of the TEAMS unit.

3. **Economic Conditions and Trends** are summarized, beginning with a summary of the current economic conditions, risks to the sustainability of conditions and trends, followed by a description of the Coconino National Forest direct, indirect, and induced economic impacts.
4. **Social Conditions and Trends** are described with the categories of demographics, Forest access and travel patterns, land use and land users, community relationships, and the risks to the sustainability of conditions and trends.

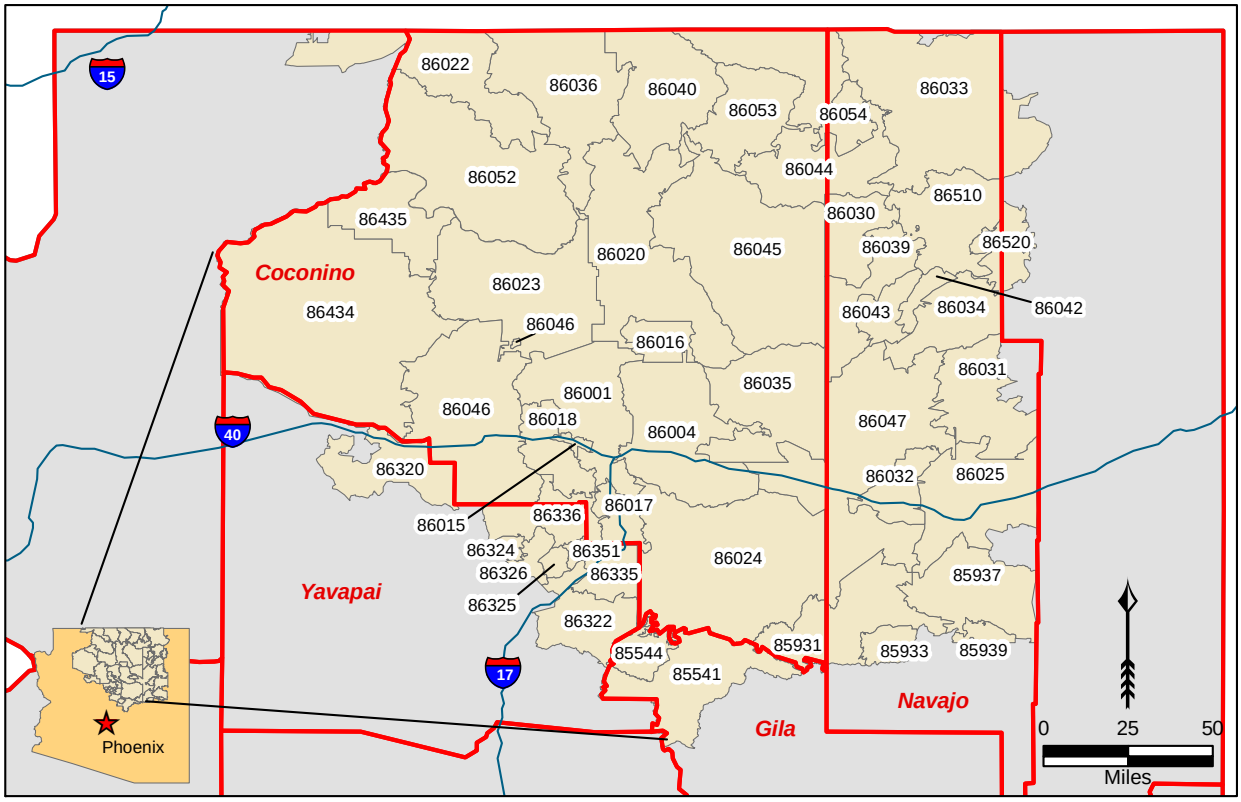
After each topic in the document, a risk assessment table follows the discussion. For our purposes here, risks to economic and social sustainability are defined as a combination of the likelihood that a negative outcome will occur and the level of severity of the subsequent negative consequences. Risk may arise from tradeoffs between Forest Plan components or from beyond control of the Forest Plan natural or human disturbances.

Additionally, even if an economic or social indicator is not changing, or if it is considered "stable," there may still be a "risk" to sustaining that condition at current levels. In other words, just because a trend is not changing does not mean that the Forest will continue to be able to provide the economic or social contribution necessary for maintaining that trend. The intent is to identify how the risks to sustainability affect management of the Forest. After identifying a trend, and its associated risk(s), it is imperative to identify how that specific trend and risk may affect management of National Forest System lands.

Assessment Area

Throughout the report, there are different configurations of the Forest assessment area. The Economic Conditions and Trends section assessment area used to evaluate existing economic conditions and trends is all of Coconino County; the northwest portion of Gila County; the northern three-quarters of Navajo County; and the northeast portion of Yavapai County. The assessment area is depicted in Figure 1. This area was identified as the functional economic area where the effects of forest management fall. In some cases, however, data specific to the assessment area identified was not available because the data is only collected and/or published at the sub-county level. Nonetheless, county data is cited when it provides a useful indicator of conditions and trends within the smaller area identified for analysis.

The Social Conditions and Trends section considers the area defined in (1) University of Arizona Socio-Economic Assessment for the Coconino National Forest and includes all of Coconino, Yavapai, and Gila counties.



Date Created: October 11, 2007
Data Sources: AZ State and County Boundaries, Roads-Coconino NF GIS Library; Zip Code data from http://www.census.gov/geo/www/cob/z52000.html
Datum: NAD 1983
Projection: UTM Zone 12 N
Cartographer: C. Barrett

Coconino			Gila	Navajo	Yavapai
	85931	86024	85541	85933	86320
	86001	86035	85544	85937	86322
**	86002	86036 **		85939	86324
**	86003	86038		86025	86325
	86004	86040		86030	86326
**	86011	86044		86031	86335
	86015	86045		86032	86336
	86016	86046		86033	86351
	86017	86052		86034	
	86018	86053 **		86039	
	86020	86339		86042	
	86022	86435		86043	
	86023	86434		86044	
				86047	
				86054	
				86510	
				86520	

**Not displayed P.O. location

Figure 1. Zip Code Areas Included in IMPLAN Analysis for the Coconino National Forest Economic Conditions ad Trends

EXECUTIVE SUMMARY

This report describes the overall economic and social context of the Coconino National Forest. The Forest is situated within existing social and economic systems, and it affects and is affected by those systems. The purpose of this sustainability assessment is to profile the economic and social environment surrounding the Coconino National Forest. The collection and analysis of quantitative and qualitative socioeconomic data in this report will serve as a baseline by which the Forest may assess the need-for-change prior to beginning the process of revising the Forest Plan.

Economic Conditions and Trends

GENERAL ECONOMICS OF THE ASSESSMENT AREA

EMPLOYMENT

Conditions and Trends: Within the counties surrounding the Coconino National Forest, economies based on commodity-related industries, such as mining and timber harvesting, have been shifting to an economic structure based more on service industries. There has been, and will likely continue to be, a trend toward transition from employment based on historical commodity industries to one based on service, recreation, and construction. Employment within the counties of the assessment area grew by 46 percent from 1990 to 2000, compared to 48 percent in the State of Arizona. Across the assessment area counties as a whole, this growth trend occurred within all sectors, with the exception of mining and manufacturing, which declined by 42 percent and 27 percent respectively.

The average unemployment rate for Arizona from 1980 through 2004 was 5 percent. In general, unemployment rates across the assessment area exceed the state average. The average unemployment rates by county ranged from a high of 13 percent in Navajo County to a low of 4 percent in Yavapai County.

Risk: Forest–related jobs that have been dependant on mining and timber harvest may continue to decline, while lower paying service jobs are increasing. Such changes may have a negative impact on the more traditional local natural resource consumption related economy sectors. The increase in lower paying service jobs could result in an increased demand for low-cost recreation opportunities on public lands. However, the relative expansion of information- and service-based industries has led to a more diverse economy. Higher-income service workers (professional services such as medical and legal services) may demand more amenities on public lands. An increase of 104 percent in industries related to housing development may mean increased housing development within the Wildland Urban Interface (WUI).

INCOME

Conditions and Trends: Relative increases in per capita and median family incomes were greater in each county in the assessment area than in the state from 1990 to 2000. Despite this trend, however, per capita and median family incomes remained below the state average in all counties. Demographic trends show an influx of retirement-age residents and seasonal homeowners, which brings an increase in non-labor income that is not tied to employment within the assessment area. Per capita incomes ranged from $34,805 in Coconino County to $24,590 in Navajo County compared to the 2000 state average of $35,450. All counties have a higher percentage of the population in the lower income brackets (less than $25,000) at an average of 36 percent compared to only 29 percent for the state.

Only 14 percent of the assessment area population had incomes above $75,000 compared to 21 percent for the state.

With the exception of Yavapai County, all counties have poverty rates that are higher than the state average. Only Yavapai County had poverty rates lower than the state average of 14 percent in 2000. Poverty rates for individuals were highest in Navajo County at 30 percent; 18 percent in Coconino County; and 17 percent in Gila County. Nonetheless, poverty rates in all counties have displayed a decreasing trend with relative rates of improvement ranging from 15 to 21 percent in Coconino, Navajo, and Yavapai counties. The rates of families in poverty in these same counties showed decreases ranging from 19 to nearly 23 percent between 1990 and 2000. This means that there were less individuals and families in poverty in 2000 than in 1990. While Gila County also had decreased poverty rates from 1990 to 2000, the improvement was less pronounced at 5 percent and 7 percent. The level of poverty was highest in the American Indian population. However, the relative improvements in the rate of poverty within the assessment area was greater than what was reflected at the state level where individual and family poverty decreased by 11 and 12 percent respectively during the same period.

Risks: While employment goes up, some counties, such as Navajo County, continue to have a high poverty rate. Increases of non-labor income in the assessment area will result in greater demand for recreation opportunities, water, and Forest resources. Non-labor income and high cost of housing usually indicate that an area is becoming "gentrified." High cost of living may exclude low-income workers from working in some areas, and/or increase commuting distances. Longer commuting distances may result in higher labor costs. Forest restoration and recreation maintenance will likely become more costly.

PAYMENTS TO STATES

Conditions and Trends: Counties in the study area receive payments under Payments in Lieu of Taxes (PILT). While not impacted by changes in the forest plan, these payments have tended to fluctuate as a function of variations in annual Congressional allocations. In addition to PILT payments, counties have received payments under the Secure Rural Schools and Community Self-Determination Act (SRSCS), which have remained relatively stable since they were implemented in 2001 and would not be impacted by changes in the forest plan. These funds are used to maintain public schools and roads. Coconino, Gila, and Yavapai Counties receive these payments. Although Navajo County is impacted by activities occurring on the Forest, none of the Forest's lands are located within the county, therefore the Navajo County does not receive SCSRS payments associated with the Coconino National Forest.

The original legislation authorizing SRSCS expired in 2006, but was recently extended for 2007. However, future funding for the program has yet to be passed by Congress. If Congress ultimately allows SCSRS to expire, payments to the counties would resume under the Twenty-five Percent Fund Act of 1908. This Act provides that 25 percent of the revenues generated on National Forest System lands, with the exception of certain mineral programs, be paid to the counties based on the acreage of National Forest System lands within each county.

Risks: If payments under the Twenty-five Percent Fund are resumed, average payments to the counties could decrease. Additionally, decreases or increases in Forest receipts could contribute to the fluctuation of payments made to the counties, thereby impacting the level of funding for schools and road maintenance.

THE COCONINO NATIONAL FOREST ECONOMIC CONTRIBUTION

Conditions and Trends: The largest single industry in the assessment area economy is government, which includes public education and civil servants. This is followed by accommodation and food

services, retail trade, and health care and social assistance sectors. Natural resource related industries impacted by Forest Service management activities within the assessment area include wood products and processing, grazing, mining, and tourism. These four sectors comprise approximately 6 percent of labor income and 9 percent of employment. Tourism is the largest of the four, contributing an estimated 4 percent of labor income and 7 percent of jobs within the assessment area economy.

The Coconino National Forest contributes support for approximately 2 percent of all jobs and labor income in the assessment area. Forest programs that contribute the greatest economic stimulus and the highest employment numbers are recreation and Forest Service budget expenditures. Of the jobs currently supported, most are in the accommodation and food sector, followed by government. These numbers are consistent with National Forest System land uses that are primarily focused on recreation and wildlife viewing.

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

Current recreation use monitoring data indicates that approximately 86 percent of the jobs and 87 percent of the labor income supported are a result of visitors coming to the Coconino National Forest from outside the assessment area. Expenditures by these visitors inject new money into the local economy, stimulating increased employment and labor income.

Risks: The economic sector most dependent on the contribution of Coconino National Forest management is agriculture. Although agriculture represents a very small portion of the total economic activity within the assessment area, Coconino National Forest management supports an estimated 6 percent of the employment and labor income in this sector. Decreases in management activities associated with timber management, grazing, could greatly affect individuals employed in this sector. Some small communities in the assessment area may be more dependent than others and could be negatively affected by such decreases.

Labor income and jobs related to the service industry are growing. The recreation program of the Coconino National Forest makes the largest contribution to the economy of the assessment area, contributing support to the service and tourism industries. Recreation maintenance and management actions have the potential to stimulate increased tourism, contributing support for service industry jobs within the assessment area. Management activities associated with recreation have the potential to offer a greater contribution to the economic sustainability of communities within the assessment area by attracting non-local visitors who would inject new money into the economy.

Social Conditions and Trends

DEMOGRAPHICS CONDITIONS AND TRENDS

Population: Arizona grew from 120,000 residents in 1900 to nearly 6 million by 2006. Population growth in the assessment area is increasing rapidly. Data from the 1980, 1990, and 2000 censuses show that total population growth was greatest in Yavapai County over the twenty-year period. In fact, population growth in Yavapai County far exceeded the rate of increase in overall state population over the same period (146 percent versus 89 percent, respectively). The trends in population growth between 1980 and 2000 were considerably lower in Coconino and Gila counties (55 percent and 38 percent, respectively). Among individual cities, Prescott Valley, Payson, Chino Valley, and Camp Verde experienced the greatest increases in total population between 1980 and 2000. The greatest

numbers of individuals moving from out-of-state came from the West and Midwest; however, both Yavapai and Coconino counties reported a significant increase in the number of migrants from the Northwest. As people in-migrate from other parts of the United States and from other countries, they also bring different sets of values about the management of public lands.

Race and Ethnicity: The highest percentage of Arizona's population is classified as "white," by the US Census (US Census 2000). Between 1990 and 2000, the overall percentage of whites in Arizona declined from 80 percent to 75 percent, respectively. Since 1990, the greatest percentage growth was seen in those individuals identifying themselves as being of multiple race and Hispanic in origin[4]. Yavapai County experienced a dramatic increase in individuals of multiple race (351 percent) as well as the population of Hispanic origin (139 percent). Hispanic presence has increased from 20 percent to 25 percent of Arizona's total population since 1940. Proportionally, the American Indian population has declined over the past five or six decades, falling from 11 percent in 1940 to 5 percent in 2000 (US Census Bureau 2005). However, between 1940 and 2005, the American Indian population in Arizona grew from 44,076 in 1940, to 275,321 in 2005.

Age: Within the assessment area, the population of retirement-age individuals (age 65 and over) grew at a considerably higher rate between 1980 and 2000 than that of those under age 18. The 65 and older group increased in Coconino County by 46 percent and Yavapai County by 44 percent between 1990 and 2000. By comparison, during this same period, the overall rate of growth for Arizona, for the same population, was 40 percent. Reflecting an influx of younger-age families, there was also a major increase (54 percent) in the under-18 population within Yavapai County, which is not reflected in other counties in the study area.

Housing: There have been major increases in seasonal housing in the assessment area, especially in Yavapai County. Yavapai County saw major increases in housing units by 49 percent, and Coconino and Gila counties had smaller increases. While housing density for all three counties remained well below the state average, median home values in Coconino and Yavapai counties were higher than those of the state of Arizona as a whole. Housing prices in Flagstaff, Prescott Valley, and Sedona have had a major increase in the past five years, making housing unaffordable for many residents. The increase in seasonal housing was the most significant in Yavapai County, while Coconino and Gila counties saw smaller increases. Although the assessment areas increase of seasonal housing was less than the overall state as a whole, increases in median home values were higher than the state as a whole.

Demographic-associated Risks: Increased population growth has the potential to put a higher demand on forest resources. With an increasing population, there is anticipated increased demand on forest resources, especially recreation. If not properly managed, overcrowding and resource damage could occur in some areas. Displacement of recreation users could occur, and wilderness use could increase. Increases in retirement age and seasonal populations may, in turn, increase demand for age-specific recreation opportunities. Increases in population could enlarge the WUI and demands for access, water, and recreation. With increases in the Hispanic population, and other segments of the population, there may be more demands for recreation experiences that reflect the outdoor values and activities of diverse ethnic groups. Forest Service may not be prepared for such multi-cultural and multi-language needs. An influx in retirement-age people into communities within the assessment area will likely bring an increase in changing natural resource values. Additionally, this age group is

[4] 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.

itself diverse in its values and activity interests. This may indicate an increase in potential conflicts between established community interests and recently arrived residents/visitors causing friction over natural resource management. Finally, as housing prices increase and commuting distance for low-paying service jobs increase, wages may increase with these associated costs. Gentrification of local housing may also present a plethora of challenges to management of WUI areas.

TRIBES

Tribal members' use of National Forest System land includes free activities such as gathering herbs, food, boughs, and basket materials for which permits are not needed, as well as the use of products such as sawtimber, for which fees are charged. Spiritual values are placed on places, people, and things that are often hard to quantify from a western point of view. Landmarks such as the San Francisco Mountain are physical manifestations of the values and beliefs that give tribal members their identity as a people. These cultural values and beliefs are a living history for the tribes of this area and should be sustained into the future.

Risks: Tribes hold cultural and spiritual values throughout the forest. A decline in traditional cultural values could lead to a decline in cultural vitality. Continuing to allow access to traditional gathering areas and spiritual places, as well as restoring/maintaining native plants used by tribal members can add to the sustainability of cultural and spiritual values.

Tribes gather forest products and collect firewood on the Coconino National Forest. There is concern that some desired plants, such as pinyon and native tobacco, are at risk, and becoming more difficult to find and that the implementation of the 2005 Travel Management Rule will restrict access to some of these traditional gathering areas. Tribal relationships with the Coconino National Forest could suffer from lack of information about differing agency jurisdictions, permitting requirements, and plant protection policies. Providing the tribes with information regarding when prescribed burning will take place will help for plant gathering. Collaboration and working with the tribes is an important relationship.

NATIONAL FOREST LAND USES

LAND OWNERSHIP, OPEN SPACES, LAND EXCHANGES, AND OTHER LAND-OWNERSHIP ADJUSTMENTS

Today, about 15 percent of the land in Arizona is under National Forest System management. However, this small segment of the state's land represents a substantial portion of Arizona's natural resources, including 40 percent of the watersheds and nearly 60 percent of the timber base. Large amounts of American Indian- and Forest Service-managed land in the assessment area differs from overall ownership patterns found in the rest of Arizona.

County land use within the assessment area ranges from traditional uses such as ranching in rural areas to concentrations of residential, industrial, and commercial uses in and around urban population centers. Research shows that the rate of conversion of private land parcels from farming, ranching, and forestry to more urban land uses has outpaced population growth over the last several decades (USDA Forest Service 2005f). The predominance of publicly managed land has concentrated and accelerated development on existing private properties, particularly in light of population and related housing growth in recent decades.

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 opposing need to accommodate rapidly growing populations and municipalities. Coconino County has a Comprehensive Plan that identifies Forest Service lands that would be suitable for land exchange as needed to accommodate growth predictions. Some individuals and groups have opposed land exchanges, especially in certain areas of the Forest.

The general public sentiment in Sedona and the Village of Oak Creek is to no longer process land exchanges near these communities, beyond those currently described in the Forest Plan. In addition, there is general support for no land exchange south of Flagstaff in the Walnut Canyon Management Area unless it involves the Forest Service or other public entities acquiring key State Trust parcels.

Risks: Demands for land exchanges and other land-ownership adjustments (sales and grants) are increasing with the predicted population growth. Coconino County's Comprehensive Plan adopted in 2003 discussed land exchange needs in accordance with their predictions for growth. Currently, growth in the county has surpassed the original predictions, and the demand for land exchanges is more prevalent. Amendment 12 to the current Forest Plan outlined restrictive rules for land trades in the areas of Sedona and the Village of Oak Creek. Amendment 17 to the current Forest Plan described similar restrictions for the Walnut Canyon Management Area. There are groups and individuals who would like to carry those site-specific land-exchange restrictions in place through the Forest Plan revision.

At issue is whether private land owners and public land managers can come to an agreement on how to best manage the competing priorities of resource conservation and economic development. As seen in the county comprehensive plans reviewed for this assessment, planners are struggling to cope with growing demands for housing and recreation while ensuring preservation of a shrinking natural resource base that contributes to Arizona's highly valued "rural character." Over the last dozen years, the Coconino National Forest has been involved with the Coconino County Comprehensive Plan, Flagstaff and Coconino County's Regional Land Use and Transportation Plan, and their joint the Open Space and Greenways Plan. In addition, comments have been made to the Yavapai County Comprehensive Plan and the Verde Valley Regional Plan. If the county and cities can carry through on plan guidelines that promote open space (a non-residential buffer) next to Coconino National Forest lands, the surrounding forest lands would become less likely to be exchanged than if they lose their wildland character due to new developments.

The ability of the Forests to complete large, complex land adjustments, such as land exchanges, has begun to be an additional concern, as the lengthy multi-year processes are further extended due to appeal and litigation.

FIRE EFFECTS AND MANAGEMENT

Fire management activities and their effects are a paramount social concern in the assessment area. The Coconino National Forest is a fire-adapted ecosystem. The vegetation on more than 75 percent of the area has evolved with a frequent fire return interval. Social and economic pressure brought about aggressive wildfire suppression after 1910. Current scientific research indicates that fire exclusion eventually results in greater fire hazard and unhealthy forests. Many people support the return of natural fire to the forests, as they understand the benefits of fire and the risks of lack of fire, including fuel buildup due to the lack of low-intensity fire, the decline in vegetative treatments, and tree mortality from infestation and prolonged drought. In addition, others support it but do not like the smoke generated from any fire.

The WUI is important to all counties in the assessment area. Across the western United States, wildfires are trending to larger sizes with greater burn severity. Current wildfire trends show the acreage of devastating wildfire has increased while the overall fire occurrence has decreased. The vegetative conditions and fuel accumulation on the Coconino National Forest are conducive to larger more severe wildfires than could have occurred here historically.

Mitigating these conditions and educating the public are goals for the cities and counties, as well as state and federal agencies within the assessment area. Projects that reduce the trend of wildfire and

provide long-term forest health are greatly supported. Restoring fire-adapted ecosystems by managing fire from natural ignitions (Wildland Fire Use) and treatment of hazardous fuel accumulations with prescribed fire remain a priority for the Coconino National Forest.

The large acreage requiring treatment coupled with the low market value and limited presence of industrial capacity for the wood fiber removed through vegetative treatments has resulted in non-fire treatments progressing slowly in comparison to the identified need.

Risk: An increasing number of people are choosing to live adjacent to the Coconino National Forest. As more and more people build their homes in the WUI, conflicts will arise over wildland fire. People want their homes to be safe from a wildfire, but they are often opposed to the thinning and prescribed burning treatments necessary to achieve that level of safety. Smoke from prescribed burning and Wildland Fire Use sometimes enters communities and reduces public support for these forest management techniques. Educating the public on the need to reintroduce fire to maintain a healthy forest, as well as informing the public when there could be smoke pollution, mitigates this effect.

With more development in the WUI, the economic values increase. There is also an increase in the potential ignition sources. Consequently, the economic and social pressure to allocate limited fire resources to these areas increases as well. The Coconino National Forest must continue educating the public on the "Firewise Homes and Communities" program so that property owners improve protection on their side of the fence. It is important that the Coconino National Forest allocates its fire resources appropriately to all areas of the forest to maintain forest health and deter catastrophic fires.

WATER AND WATERSHEDS

Forest water supplies are drawn from surface and groundwater. Surface water and groundwater use and demand have increased since 1971 indicating an upward trend in water use and demand. Groundwater (wells, seeps, and springs) use now satisfies a very large portion of overall water demand Forest-wide from domestic to livestock and wildlife watering. Much of Forest groundwater use comes from seeps, springs, and to a lesser extent, wells. The City of Flagstaff, Coconino, and Yavapai counties are increasing in population, causing increasing water demand. A recent water supply and demand study, spearheaded by the Bureau of Reclamation, determined that water supply would not meet domestic water demand in the area by about 2040.

Due to the limited supply and increasing demand for water, the State of Arizona requires water rights be filed for any individual or entity desiring to use surface water. Water rights continue to be a big issue on the Forest and adjoining lands because they determine who has the right to use the water, how much can be used, and for what purpose. The trend continues to be a reliance on negotiated water rights settlement agreements in lieu of court adjudications that determine and decree who has the right to use the water.

The Forest contains streams, lakes, and human-made reservoir lakes with variable water quality. Maintenance of clean water remains an important issue on the Forest and continues to affect Forest management. Future water quality trend is projected to be similar to trend since 1989 (static to slightly upward) under continued, similar management—except downward for listed lakes and streams.

The health of soil and watersheds affects the health of other resources including wildlife and fish, range, timber, and recreation and their associated uses. There has been increased recreational use including camping and off-highway vehicle (OHV) use in wetlands, montane meadows, and aspen stands causing impairment of watershed function where use occurs. There is a downward trend

comparing historic pre-European settlement condition to current condition for the health of soil and watersheds.

Risks: With the projected increase in growth, there will be a higher demand on water resources. Limited water availability will cause water shortages, increased water conservation measures, and may eventually limit growth. A large portion of surface water and subsurface water in Arizona originates on Forest-managed land, and therefore, the role of the Forest Service in protecting the integrity of area watersheds will become increasingly important. New wells dug adjacent to Forest lands could tap into local groundwater reducing connected spring, seep, or stream riparian habitat and negatively affect those species that rely on it for their survival. Additional riparian conservation measures may be needed to protect these areas.

There is an increase in Forest recreation use in streams, riparian areas, seeps, springs, wetlands, and meadows while livestock, wildlife, and fish use and demand for water remains static. Recent trend has been to reduce livestock access to riparian areas and wetlands. Fewer water access points could limit and reduce overall grazing carrying capacity, and permittee profits might decline.

Overall water quality continues to vary by type and location of water source. Impaired lake water will necessitate improved Forest management and require additional funding. Declined aquatic and fish populations may require additional conservation measures to be implemented by the Forest Service.

Watershed and soil conditions declined since pre-European settlement. Reduced soil productivity decreases the amount of commodity items that can be produced on the land, including timber products and livestock production, resulting in decreased timber volumes and profits to the timber and ranch industry. Reduced water quality can cause higher maintenance costs to Municipalities for domestic water treatment and limit swimming and fishing opportunities in the Forest, which can affect recreation opportunities. The Forest would need to improve management requiring additional funding.

INVASIVE SPECIES

Invasive species are considered one of the four threats to National Forest System lands (USFS 2005j). On the Coconino National Forest, there is a trend of increasing invasive weeds. Homes in the WUI that plant non-native species can directly impact the Coconino National Forest by spreading those species to the forest. Hikers, bikers, and pack stock also can carry non-native or invasive species into the forest. Invasive species can be more aggressive than some native species, as they lack natural pathogens to control the plant populations. Additionally, some invasive plants are not palatable to native species. The San Francisco Peaks Weed Management area was established in 1999 as a multi-agency entity to focus on reduction of invasive weeds. The Verde Valley Weed Management Area was created in 2001 and covers the remainder of the Coconino National Forest as well as other ownerships.

Risks: With an increase in population and development, more spreading of invasive or non-native species could occur. An increase in invasive species could cause massive disruptions in ecosystem function, reducing biodiversity, and degrade ecosystem health in our nation's forests. Treating and controlling these invasive or noxious weeds could alleviate the risks associated with these plants. The Coconino National Forest has been initiating prevention measures to try to stop the spread of invasive and noxious weeds. However, the Coconino National Forest's efforts are not keeping up with the spread of aggressive plant species. Public education efforts regarding invasive species could alleviate some of the spread by humans.

SPECIAL USE PERMITS

A variety of special-use permits are issued to the public for different forest uses. These include permits for privately managed facilities, such as organization camps, one-time recreation events, access roads, utilities, and research. Special permits are also used to authorize a number of gathering activities, such as collecting firewood and cutting Christmas trees. Commercial outfitter and guide special-use permits are in high demand on the Coconino National Forest. Cell phone towers are a new use that has arisen in the past twenty years. There is social concern over the impacts and aesthetics of these new developments. Future proposals for high demand uses will be coordinated by large-scale analysis, as was done for the I-17 cell tower system.

Risks: Increased demand for outfitter and guide special-use permits is a current trend on two of the ranger districts on the Coconino National Forest. Completing an outfitter and guide capacity analysis will help allocate permits and protect resources. One way in which the Coconino National Forest contributes to the economic sustainability of the adjacent communities is by issuing these permits to local businesses.

Advances in technology as well as population growth have produced a demand for more development across the Forest such as telecommunication towers and power line right-of-ways. Special-use permits are required for all of these developments, and the public has concerns about the aesthetics and environmental impacts of these uses. Demands for expanded highways and utility infrastructure are driven by the expanding populations. The Coconino National Forest supports the growth of communities by issuing these permits, while balancing the need to protect environmental and scenic qualities primarily by providing guidelines and oversight for these developments.

MINING

Mining in the National Forest System lands is directed by the General Mining Law of 1872; this law allows free access to individuals and corporations to prospecting on National Forest System lands. Upon discovery of a mineral resource, an individual or corporation can patent it to claim full title to the land the deposit is located on. Small fees are generally required to stake, maintain, and patent a claim (Humphries and Vincent 2004). Mining permits on the Coconino National Forest are largely comprised of marketable, decorative rock. Malapais rock, red rock, and red cinder permits are readily available to the public. Uranium mines are not proposed for the Coconino National Forest.

Risks: Fluctuations in mining permits and active mines could affect the small percentage of people who are dependant on that industry. Continued issuance of permits for mining can help sustain this use on lands available for mineral entry.

LIVESTOCK GRAZING

Livestock grazing has occurred on the Coconino National Forest since the forest was established, and this use has changed dramatically in the last sixty-five years. Besides the large reduction in sheep permits and numbers, the number of cattle permits has declined from 103 in 1940 to 30 in 2006. This is reflective of a reduction in the number of ranches in the area and the combination of allotments (93 allotments in 1940 to 33 in 2006). These combinations have been made to improve management and make the remaining allotments more economically viable. The total permitted use on the forest has decreased by half in the past sixty-five years. The reductions occurred prior to the Forest Plan being implemented. Since the Forest Plan was signed, the number of permitted livestock on the forest has increased slightly.

While there is concern over the environmental impacts of grazing from several people in the assessment area, ranching is looked at as a way of life for many people. In addition to the way of life, ranches provide open spaces and habitat for wildlife. According to the Coconino County

Comprehensive Plan, about 75 percent of the private land in the County consists of large ranches (Coconino County Comprehensive Plan, page 85). Many of these ranches rely on the National Forest for grazing at least part of the year. Without these permits, the ranches would most likely not be viable and could be subject to development and therefore a loss of open space.

Risks: Permitted livestock numbers are relatively stable, while authorized use fluctuates from year to year, and many ranches rely on the Coconino National Forest for grazing. If numbers fluctuate too greatly from year to year, the ranches may not be viable and could have effects to the management of the Coconino National Forest. Effects to management would be fewer permits to administer. This would result in a reduction in maintenance of stock tanks and fences, which would require the agency to either maintain them or remove them. The social risk is a direct impact on the people employed by the ranch and an indirect and induced impact on the larger community. It also reduces the number of people and places that are sustaining of the ranching way of life. If ranches go out of business, there is also the potential fragmentation of habitat and/or loss of open space if the private lands are developed.

FOREST PRODUCTS AND TIMBER PRODUCTION

Forest product output has changed during the past twenty-year planning cycle. The greatest change has been in timber products. Firewood production has remained constant, while special forest products (poles, firewood, ferns) demand has increased. The public perception of timber harvest is mixed. The short-term effects of ground disturbance and presence of slash cause concern for some, while others question the long-term Forest Plan objectives and changing landscape. Prior to the 1996 Plan Amendment, yellow pine harvest was controversial. Since the amendment, some have become concerned with the implementation of forest management that creates an open-grown, clumpy, uneven aged forest.

Risk: There is a decrease in timber harvesting, which could contribute to the loss of local manufacturing facilities for timber. The effects to management from this trend could be reduced acres treated for ecosystem management and increased costs of the projects. There is a continued trend of no demand for small-diameter (< 6” diameter) timber and no utilization of small trees for biomass or specialty products. Effects to management from this trend could be increased fuel loadings, smoke, and costs. There is a continuing controversy about timber harvest socially, which could make it more difficult to implement Forest Plan objectives.

RECREATION USE

Unmanaged recreation has been declared as one of the four threats to the National Forest System by the Chief of the Forest Service (USFS 2005j). The Coconino National Forest recreation use increased approximately 72 percent from 2000 to 2005 according to NVUM numbers. Interstate 17 provides easy access to the Coconino National Forest; coupled with the 3.3 percent annual growth rate in Maricopa County, the desire to escape the heat in the summer months, or escape the desert for a forested environment, the predicted trend is for increased visits from residents of the greater Phoenix metropolitan area.

There are a diverse group of recreational activities that have increased in popularity since the Forest Plan was initially created. OHV use has increased dramatically, and the 2005 Travel Management Rule creates a national framework that will result in the designation of motorized trails, routes, and areas. Other recreation activities that have emerged are mountain biking, rock climbing, geo-caching, and paint balling. Management direction for these kinds of growing recreational uses is needed to ensure opportunities for the future and protect from resource damage.

The Coconino National Forest is considered a major benefit to the quality of life for local residents. The expected trend for the assessment area and for the Phoenix metropolitan area is for the rapid rate

of population growth to continue. As a result, this trend of increasing pressure on recreational resources can be expected to continue into the future.

Risks: Fueled by the projected population growth, demand for recreation is increasing. As new people migrate into Arizona and the local communities, the demand for diverse recreation opportunities will arise. The Coconino National Forest is challenged in meeting the demand for recreation opportunities and facilities. By prioritizing recreation needs, the Coconino National Forest may be able to better plan for the increased demand.

The Forest Plan needs to address new types of recreation that either did not exist twenty years ago or have greatly increased in popularity, such as rock climbing, geo-caching, paint balling, and mountain biking. Potential conflicts between user groups in the existing community and new residents/visitors might occur.

Use of off highway vehicles is increasing with developments in technology over the past thirty years. Demands for recreation opportunities for this activity will increase. Irresponsible users cause resource damage and cause safety concerns and require more direct management from the Forest Service. The implementation of the 2005 Travel Management Rule will generally eliminate motorized cross-country travel and will designate trails, roads, and areas open for motorized use helping to mitigate the resource damage and disturbances caused by OHVs. Education efforts to emphasize responsible OHV behavior could mitigate some of the health and safety concerns. The Coconino National Forest has been collaborating with other government agencies and the public on what routes and areas to keep open and what routes to close. Fostering those relationships and forming partnerships with these user groups could help attain a common goal of National Forest access while reducing resource damage and disturbance.

WILDLIFE

On the Coconino National Forest, wildlife viewing is more common than fishing or hunting. Recreational wildlife activities such as wildlife viewing, fishing, and hunting contribute significantly to the economy. The protection and restoration of native wildlife is a strong social value for the assessment area. The presence of non-native species has mixed social values in the assessment area. Conversely, many people believe that some non-native species are competing with native wildlife for limited resources and the population should be reduced.

Risks: Wildlife is an important social value to communities in the assessment area. People enjoy wildlife viewing, fishing, and hunting. The Coconino National Forest will add to the sustainability of wildlife species by managing habitat. Challenges will be the scarcity of water, and the projected affects that climate change may have on many species. Viewing wildlife for recreation is increasing and the Coconino National Forest can provide places to do that activity. While the hunting trend has been decreasing, the Coconino National Forest can still provide access to lands that are suitable for that activity.

WILDERNESS

The Coconino National Forest includes all or part of ten designated Wilderness Areas of approximately 155,000 acres and 50,000 acres of inventoried roadless areas. Roughly 411,300 wilderness visits were made during 2005. With increased demand for recreation fueled by population growth, more pressure may be put on the Wilderness Areas on the Coconino National Forest. Areas that are already designated Wilderness are receiving high use and have potential to lose their Wilderness characteristics.

Risks: Fueled by the increase in population, wilderness use could increase. Patterns of use could change due to crowding in order for wilderness users to find the experience of solitude. The Coconino

National Forest could prioritize and manage wilderness recreation opportunities to provide for a broad range of experiences allowing for this projected increase in users.

ARCHEOLOGICAL SITE USERS

The Coconino National Forest has a large number of archaeological sites, many of them undisclosed. However, there are several developed archaeological sites that are open to the public and receive thousands of visitors every year.

Risks: The Coconino National Forest has a large concentration of archeological sites that many people enjoy visiting. Irresponsible users and looters may vandalize or damage a site. The Coconino National Forest currently provides several developed sites for people to visit where their impacts could be minimized and controlled. By concentrating impacts on developed areas the Coconino National Forest could provide this experience without damaging the resource. Many of the archeological sites are not disclosed by the Coconino National Forest in order to mitigate resource damage.

ACCESS AND TRAVEL MANAGEMENT

County and state transportation networks have been developed as needs have arisen and may be inadequate for accommodating projected long-term growth. Travel by motorized vehicle is the dominant mode of travel throughout Arizona and to and from the Coconino National Forest; a trend that is likely to continue. Mechanical innovations, industry developments, and less-demanding physical activity required to access federal lands have all led to a dramatic increase in OHV ownership and use in Arizona. The Travel Management Rule directs each National Forest to establish a system of roads, trails, and areas designated for motor vehicle use. By 2009, only those designated roads, trails, and areas will be available for motor vehicle use. The designations may impose restrictions as to the type(s) of motor vehicle and to the time of year a road, trail, or area may be used.

Risks: Transportation network challenges include reduced levels of road maintenance, which is the result of decreasing county and federal transportation budgets. Reduced road maintenance leads to increased safety risks, potential access constraints, and possible unauthorized use around road-bed hazards.

Forest road maintenance funding is not able to keep up with the demand and amount of current roads. Several routes will be closed as a result of the implementation of the Travel Management Rule and will result in changes to access and modes of travel on Forest roads. Primary issues include the ability to effectively and efficiently enforce proposed travel restrictions as well as the ability of diverse user groups to access recreation sites and resources, such as firewood and big game retrieval.

Population growth and population composition changes are increasing the importance of recreation as a use of the Coconino National Forest and other National Forest System lands in this assessment area. Access to the forest will remain an important issue to accommodate the increasing demand for recreation.

COMMUNITY RELATIONSHIPS

The Coconino National Forest continues their efforts in reaching out to both national and local communities. Local communities, surrounding the Coconino National Forest, have a history of involvement with national forests and with natural resource issues in general. Many residents' appreciation of natural resources transforms into action to assist in stewardship efforts or become involved in Forest policy, planning, and management efforts. Many local communities support current education efforts and would like to see an increase in Forest educational opportunities, outreach, and availability of information.

Many public comments express that it is because of the forest and its recreational opportunities, quality of life, and resources it offers that make this part of Arizona so special. This connection with the Coconino National Forest results in a variety of community interests and forest partnerships.

The Coconino National Forest has very strong community relationships, and continued involvement is needed. Communities continue to value the aesthetics and benefits of open space and ready access to forest lands and resources. In these types of social environments, forums and other partnerships provide important ways to identify and resolve differences that can inhibit more socially disruptive polarization about natural resource and forest management issues (Russell 2006).

Risks: Communities are becoming more diverse as a result of recent population growth throughout Arizona. More diverse communities and area populations may result in new management challenges, but also new opportunities. Residents continue to share a strong sense of place about the Coconino National Forest and therefore are concerned with the management of National Forest System lands. Public comments support more education and enforcement by the Forest Service, which may pose a risk as organizational capacity to meet those desires are unknown.

HISTORICAL CONTEXT

Arizona has undergone a relatively rapid transformation over the past century. During the first half of the century, mining, agricultural, and ranching industries dominated the economy. The state's population increased dramatically following World War II and continues to increase today. Economic dominance has shifted to a mix of urban and rural industries that cover nearly every sector (University of Arizona School of Natural Resources 2005).

The natural resources of the area now known as the Coconino National Forest have provided sustenance for people since the earliest appearance of humans in the New World. Spear points that are the distinctive hallmark of the Clovis archaeological tradition have been found at eleven sites within the boundaries of the Forest (Pilles and Geib 2001) and are dated between 13,500 to 11,500 years ago. As the climate became cooler and drier, the large animals (mammoths and mastodons) became extinct, and smaller animals, such as deer and rabbit, were most commonly hunted. By 2100 years ago, Late Archaic people had begun to cultivate corn, beans, and a variety of squashes alongside wild plant foods. However, it was not until about A.D. 200 that agriculture and settled villages became established and, with that, made way for the major prehistoric cultures of the Southwest—the Mogollon, Hohokam, and Prehistoric Pueblo. Within the area of what would become the Coconino National Forest, however, population densities, climate, and an abundance of wild plant and animal resources allowed the Archaic lifestyle to exist until about A.D. 600, when agriculture, the manufacture of pottery, and sedentary life in pit-house villages indicate that a new lifestyle had been adopted. This lifestyle has been called "Sinagua," a name applied to them from the term the earliest Spanish explorers gave to the peaks of San Francisco Mountain—the Sierra Sinagua—the "mountains without water" (Colton 1939:34). Neighboring cultures were the Cohonina, northwest of the peaks, and two Prehistoric Pueblo groups along the Little Colorado River Valley—the Kayenta to the north, and the Winslow to the east.

The prehistoric hunters and gatherers of previous centuries had lived light on the land, leaving little trace of their presence; however, early Sinagua farmers had developed soil and water control technologies that resulted in long-lasting effects on the environment, including deforestation, reduction of game populations, and depletion of soil nutrients. Their dry-farming techniques included rock terracing, grid borders, gravel mulching, check dams, and run-off water diversion and reservoir systems. Between A.D. 600-1400, such systems were constructed over large areas, especially in the Verde Valley and Anderson Mesa areas, and can still be seen today. However, the climate changed to warmer and drier conditions, and there was a change in the seasonal precipitation pattern. These weather factors combined with deteriorating health conditions, dissolution of long-standing trade relationships, and break-down of social institutions, caused the Sinagua cultural tradition to come to an end. Ultimately, it was absorbed into the emerging Hopi cultural pattern to the east and northeast.

In 1583, when Antonio de Espejo led the first Europeans into the area in search of mineral wealth, they encountered Yavapai living along the creeks of the Verde Valley, near the ruins of major Sinagua pueblos. Finding little to interest them, the Spanish ignored central Arizona, establishing missions among the Hopi Mesas to the north, until they were killed or driven away during the Pueblo Revolt of 1680.

Mountain men began exploring the Mogollon Rim and Verde Valley regions in the 1820s, trapping beaver and fox along the creeks of the region. They had little impact on the land or the environment, but that quickly changed with the discovery of gold near Prescott in 1863. That same year, Arizona was separated from the New Mexico Territory and that was quickly followed by the creation of Yavapai County in 1864. Gold fever hit the Territory, and people flocked into central Arizona with a frenzy. Pioneers moved into the Verde Valley to grow fresh fruit and vegetables for the miners of

Prescott, disrupting the hunting and gathering land use practices of the native Yavapai and Tonto Apache in the process. Frictions quickly developed into hostilities and in 1865 a military force was established near present-day Camp Verde to protect the settlers and move the Indians onto a reservation. Crooked Indian agents and increased demands for reservation lands led to the forced removal of the Yavapai and Tonto from the fertile Verde Reservation to the cactus desert of the San Carlos Reservation in 1875.

Immigrants from the East Coast settled at a spring along the route of the Atlantic and Pacific Railroad in 1876, and during their July 4th celebrations, raised an American flag to the top of a tree, giving the spring a new name—Flagstaff. The name continued to be used when a railroad construction camp was established at the spring in 1882. Development of northern Arizona by lumber, cattle, sheep, agricultural, and mining interests continued through the 1880s. The Aztec Land and Cattle Company ran sixty thousand cattle over the largest cattle range in northern Arizona, which included parts of the future Coconino and Apache-Sitgreaves National Forests. The Atlantic and Pacific Railroad reached the area in 1882, helping Edward Ayer develop a thriving lumber company as he bought up considerable land around Flagstaff and the Kaibab Plateau. With the development of the railroad, tourism rapidly became another industry, and by 1886 John Hance was advertising the wonders of Grand Canyon. In 1893, as settlement and commercial development of the region rapidly grew, Coconino County was established by the Territorial Legislature, with Flagstaff as the county seat.

Having witnessed the destruction of the forests of the Great Lakes region, and the flooding, erosion, river pollution, and other environmental disasters that accompanied the unregulated logging of the time, a conservation movement began in the eastern United States during the 1870s. A concern was voiced that, without government control, the forests of the west would suffer a similar fate; the creation of the U.S. Division of Forestry in 1876 was, in part, an effort to deal with the public lands of the western states. In 1891, "An Act to Repeal Timber Culture Laws and for other Purposes …" was passed that was an effort to revise the land laws of the country. Better known as "the Creative Act" or the "Forest Management Act," it is considered the beginning of the National Forest System (Steen 1992: vii, 8). The act authorized the president to proclaim Forest Reserves to protect the watersheds of the western states and to provide for sustained production of timber and forage. Initially, the Forest Reserves were administered by the Department of the Interior, but in 1905, those responsibilities were transferred to the Department of Agriculture and its "Bureau of Forestry," renamed as the "Forest Service" in 1907 (Steen 1992:8).

In 1893, the Grand Canyon Forest Reserve was proclaimed by presidential proclamation followed in 1898 with the Black Mesa and San Francisco Mountains Forest Reserves. On July 2, 1908, all of the San Francisco Mountains Reserve, and parts of the Black Mesa, Tonto, and Grand Canyon Forest Reserves, were merged and named the Coconino[5] National Forest by President Theodore Roosevelt.

In the early years of the Forest Service, many Forest Rangers were former cowboys, trappers, and woodsmen who came from local families and had a long-term familiarity with the land and the community they served. After leaving the Forest Service, many stayed in the area, operating their own ranches, becoming local law enforcement officers, working for the logging companies, or serving in some other local capacity. Rangers spent much of their time riding horseback-patrols of the forest, meeting with ranchers to discuss the numbers of livestock being grazed on the forest, patrolling and repairing fence lines, monitoring activities on timber sales, and, of course, spotting and dealing with

[5]The word "Coconino" is one of several variations/spellings of the Hopi word for the Havasupai Indians, including "Cosnino", "Cohonina", "Coch-ni-ch-nos", "Kohonina", "Konin", "Kònin", "Kòonin" (Barnes 1935:101, Colton 1939:28, Granger 1960:60, Hopi Dictionary Project 1998:150).

forest fires. Their activities and authorities were prescribed by "The Use Book," a 142-page, pocket-size manual written in 1905 that included all the rules and regulations of the Forest Service, as well as practical instructions on how to perform the duties of a Forest Ranger. Over the years, it has grown to become the Forest Service Manual.

Between 1909 and the 1940s, the Forest Service devoted considerable attention to the inspection and administration of homestead claims on the National Forests. The Homestead Acts promoted the settlement of the West by giving federal lands to private individuals. The program began in 1862 to bolster dry farming of grains and grasses, stock raising, and reclamation of lands through irrigation. At the end of five years, the land would be deeded over to the homesteader if all of the conditions had been met. Forest Rangers administered various aspects of the homestead program, maintained records of how many acres were being cultivated under the program, and routinely inspected homesteads to ensure that they were being lived-in, improved, and used as per the laws' requirements.

In the late nineteenth century, Gifford Pinchot and Dr. B.E Fernow had created a forest management concept based on models developed for European forests as leaders in the early days of the Forest Service. However, they realized that there were differences between European and American forests and that research would be needed to understand the natural resources and functioning of American forest environments. In 1908, the same year the Coconino National Forest was created, the Fort Valley Experimental Station was also established within the Coconino National Forest to research the ponderosa pine ecosystem and to determine the best timber management techniques to ensure its propagation and sustained growth. This was the first forest research station in the United States and in 1909 it also established the Fort Valley, or Coconino, Ranger School, the first such school located on a National Forest (Rodgers 1991:419). Silviculturalist Gustaf Adalph Pearson was the first director of the Station, and he served in that capacity from its beginning, in 1908, until his death in 1949 (Plateau 1956:86). The Pearson Natural Area is named in his honor.

In addition to the Pearson Natural Area, eleven other areas have been designated by the Forest Service as special areas because of their floral, faunal, geological, and archaeological significance. Designated Special Areas include: four Research Natural Areas (Casner Canyon, Oak Creek, San Francisco Peaks, and G.A. Pearson); four Botanical Areas (Fern Mt., Mogollon Rim, Fossil Springs, and Verde Valley); one Geologic Area (Red Mountain); and three Environmental Study Areas (Mt. Elden, Old Caves, and Griffiths Springs).

The Forest also has ten congressionally designated Wilderness Areas (Wet Beaver, Fossil Springs, West Clear Creek, Strawberry Crater, Kachina Peaks, Kendrick Mountain, Red Rock-Secret Mountain, Munds Mountain, Mazatzal, and Sycamore Canyon). Sycamore Canyon was the first Wilderness designated by Congress in 1972, and the Arizona Wilderness Act of 1984 designated the others.

In addition to these designated Special Areas, the Beaver Creek Watershed has been another important area for studying the importance of providing water to Phoenix and the Salt River Valley. Measurement of precipitation throughout the Beaver Creek Watershed and changes in water yield due to different vegetation manipulations were the subject of research between 1964 and 1979.

The Coconino National Forest is the third largest National Forest in Arizona, consisting of approximately 1,842,700 acres, and stretches from the Little Colorado River to the Verde River. The most prominent feature of the Forest is San Francisco Mountain. Known locally as "the Peaks," the mountain consists of Agassiz Peak, Aubineau Peak, Doyle Peak, Fremont Peak, O'Leary Peak, Reese Peak, Schultz Peak, and Mt. Humphreys, the highest point in Arizona at 12,633 feet.

The Forest is remarkable for its environmental diversity. With a range in elevation from 2,500 feet to nearly 13,000 feet, it covers numerous distinct ecological areas, ranging from the picturesque Red Rock area near Sedona, to pine-covered country along the Mogollon Rim country, to the bristlecone pine tundra zone atop the Peaks, home to a unique flowering plant found nowhere else in the world, the San Francisco Peaks groundsel (Senecio franciscanus). In 1889, C. Hart Merriam developed his life zone concept while studying the mountain.

The Peaks can be seen for distances greater than one hundred miles and are sacred to a number of American Indian tribes of the northern Southwest. Snow melt from the San Francisco Mountain replenishes numerous springs on and around the mountain, which provided the water source that allowed the growth of Flagstaff during its early years. Today, Upper Lake Mary reservoir and deep wells in the Woody Mountain area provide most of Flagstaff's municipal water, but rainfall generated by the Peaks, as well as snow melt, provides water for wildlife, livestock, as well as people. It also provides moisture for the crops that are the mainstay for Hopi and Navajo farmers.

In addition to its natural diversity, the lands of the Coconino National Forest have significant cultural resources as well. Most of the sites of the prehistoric Northern Sinagua and Southern Sinagua cultures are on Coconino National Forest land. Pre-agricultural traditions represented on the Forest are the Clovis Paleo-Indians and the Early, Middle, and Late Archaic periods. Prehistoric agricultural groups, besides the Sinagua, include the Cohonina, Kayenta, Winslow, and Hohokam traditions. In historic times, the forest was used by the Hopi, Acoma, Zuni, Navajo, Walapai, Havasupai, Paiute, Tonto Apache, and Northeastern Yavapai. Since the start of the Forest Archaeological Program in 1975, about 17 percent of the Forest has been completely surveyed, and about 30 percent has been sampled. Archaeological site densities are among the highest known site densities in the Southwest, ranging from one to ninety-nine sites per square mile, but averaging about twelve sites per square mile. It is predicted that the Forest contains about seventy thousand archaeological sites, of which about ten thousand have been formally recorded.

With such a range of natural and cultural diversity, the Forest has been the scene of active scientific research by a number of other agencies and institutions, besides the Fort Valley Experimental Station. A unit of the U.S. Geological Survey is stationed in Flagstaff and was central to the development of NASA's programs of exploration and mapping of the moon and Mars. Astronauts in the Apollo 11 and subsequent space programs were trained for their moon landings in the cinder fields north of Flagstaff. From its perch on Mars Hill, on the west side of Flagstaff, Lowell Observatory has been the scene of astronomical research since it was established by Dr. Percival Lowell in 1894. Today, because of clear air and dark skies, Flagstaff was designated as the first "International Dark Sky City" to support astronomical observations. There are other telescopes near the city operated by different groups. Many are located on National Forest lands. These include the Navy Prototype Optical Interferometer (NPOI) telescope on Anderson Mesa and the multi-million dollar Discovery Telescope, currently under construction near Happy Jack, south of Flagstaff.

The Forest has also been the subject of numerous studies by the Museum of Northern Arizona. Founded in 1928 to preserve and study the cultural and natural history of the Colorado Plateau, the museum has conducted landmark research into the geology, volcanology, paleontology, anthropology, archaeology, botany, and biology of northern Arizona and the Coconino National Forest. During the early years of the Museum, Coconino National Forest supervisors were members of its Board of Trustees and helped guide the development and focus of the institution.

In 1925, Northern Arizona University was established as Arizona State Teachers College to provide teachers for rural areas and training in agriculturally-related activities. Today, it has expanded well beyond that original purpose into a major research institution with the state's only School of Forestry.

Each year, a large number of permits are issued to various departments in the university for the purpose of conducting research projects on the Coconino National Forest. A number of these are done in partnership with the Rocky Mountain Research Station, part of the Forest Service's research branch, located on the NAU campus.

Six National Monuments within or in close proximity to the Forest are preserves that protect some of the most significant cultural and natural resources of the Southwest. Walnut Canyon came under the protection of the Forest Service in 1898 as part of the San Francisco Mountain Forest Reserve. In 1910, the recently created Coconino National Forest assigned a ranger to protect the well-known cliff dwellings. It continued to be administered by the Forest Service until 1915, when it was designated a National Monument. Wupatki and Sunset Crater Volcano National Monuments feature a landscape created by the most recent volcanic eruptions, in A.D. 1063-1067, when the area was occupied by the Prehistoric Sinagua. Investigating the effects of the eruption on local cultural developments, as well as the climatic history of the area, has been a topic of long-standing scientific interest. To the south, in the Verde Valley, Montezuma Castle, Montezuma Well, and Tuzigoot National Monuments[6] display some of the last pueblos inhabited by the Southern Sinagua, between A.D. 1300 and 1400.

Most of these monuments, Wupatki, Sunset Crater Volcano, Walnut Canyon, and Montezuma Castle were originally on National Forest land and under Forest Service administration before they were proclaimed as National Monuments by various presidents under the authority of the 1906 Antiquities Act. In 1979 thirteen acres containing fossil mammal tracks on the Forest from the Pliocene and Pleistocene were transferred to Montezuma Castle National Monument and, most recently, 1,380 acres of National Forest land were given to the Park Service to expand the boundaries of Walnut Canyon National Monument in 1996.

The Coconino National Forest occupies a major part of Coconino and Yavapai Counties, and most of the rest of these counties are managed by other National Forests, National Monuments, the Bureau of Land Management, the State of Arizona, and several Indian tribes. As a result, although Coconino County, with more than eighteen thousand square miles, remains the second largest county in the United States, it is one of the least populated (Grahame and Sisk 2002). Only a very small percentage of these counties are owned by private individuals or are available for commercial development.

The past fifty years of increased growth is considered to be a marked pattern for the assessment area. In fact, over the past twenty years, Yavapai County has been the fastest growing area in Arizona, maintaining a growth rate of more than 50 percent. The Camp Verde and Prescott areas between 1980 and 1990, in particular, grew at rates of 454 percent and 287 percent, respectively. These dramatic population surges have changed the composition of the county. In 1980, the majority of people in Yavapai County lived in rural areas (55 percent). However, by 2000, with a 20 percent increase in urban population, this relationship has reversed, significantly altering the social, residential, and economic characteristics of the county (this report, page. 40).

Continued growth, with concomitant changes in the areas cultural, social, and economic base is predicted for the near future of Yavapai and Coconino Counties. As these local populations increase, additional pressure for space, water, power, and additional infrastructure will result. This will impact the borders, integrity, and biodiversity of federal lands surrounding such growing communities as more homes are built adjacent to Forest lands and a higher concentration of visitors travel to favored Forest destinations (USFS 1999a).

[6] Tuzigoot, NM, is outside of the proclaimed Coconino boundary, being located just south of the Verde River.

ECONOMIC CONDITIONS AND TRENDS

Current Economic Conditions and Trends

The assessment area used to evaluate existing economic conditions and trends is all of Coconino County; the northwest portion of Gila County; the northern three-quarters of Navajo County; and the northeast portion of Yavapai County. Data specific to the assessment area identified was used when ever possible, however, in some cases, only county level data is available. Nonetheless, county data is useful for assessing conditions and trends within the smaller area identified for analysis.

The assessment area for the Coconino National Forest has experienced major economic growth over the past two decades. Yavapai County has been the center of much of this growth. Growth occurred much more slowly in Coconino, Gila, and Navajo counties. As a whole, the counties of the assessment area experienced major increases in tourism employment in the last decade.

Employment

Current Condition

Total full- and part-time employment in 2000 within the four counties of the assessment area estimated 195,260. Wage and salary positions (Table 1) represent the bulk of employment within the assessment area at 77 percent. Proprietor employment represented approximately 23 percent, exceeding the state average of 17 percent. Farm employment is 0.7 percent of the total. Figure 2 (page 28) illustrates that the largest sector is services (30 percent), followed by government (21 percent), and retail trade (20 percent). Figure 4 (page 29) illustrates that the employment distribution among industries in the assessment area is generally reflective of the distribution for the State of Arizona. The assessment area proportion of employment in the government sector is larger within the assessment area than within the state. By the same token, wholesale trade and manufacturing represent smaller shares of the economy in the assessment area than in the State (University of Arizona School of Natural Resources 2005). In 2004, Navajo County's unemployment rate of 11 percent exceeded the state average of 5 percent. Unemployment rates in Coconino and Gila Counties (6 and 7 percent respectively) also exceeded the state average. Yavapai County however, had a much lower rate at only 3 percent (University of Arizona School of Natural Resources 2005).

Trends

Table 1(page 27) displays employment for the years 1990 and 2000 as well as the percentage of employment by type (wage and salary, farm proprietor, or non-farm proprietor). The 65.17 percent increase in total full- and part-time employment in Yavapai County considerably exceeded the state average of 47.62 percent. Across all of the counties, the strongest job growth occurred in non-farm proprietor employment with the greatest increases occurring in Coconino and Gila counties. However, overall employment grew more slowly in Navajo County (University of Arizona School of Natural Resources 2005). Employment growth within the counties of the assessment area averaged 46.2 percent from 1990 to 2000, compared to 47.62 percent in the State of Arizona. Figure 2 illustrates the growth of employment by industry from 1990 to 2000 in the assessment area.

Table 1. Total Employment and Employment by Type, 1990–2000 with Percentage of Change

Location	Employment			Wage and Salary Employment			Farm Proprietor Employment			Non-Farm Proprietor Employment		
	1990	2000	percent change	1990	2000	percent change	1990	2000	percent change	1990	2000	percent change
Coconino County, AZ	48,977	70,286	43.51%	41,079	55,639	35.44%	276	204	-26.09%	7,622	14,443	89.49%
Gila County, AZ	15,108	20,655	36.20%	11,932	14,810	24.12%	162	198	22.22%	3,014	5,647	87.36%
Navajo County, AZ	26,878	34,033	26.62%	22,377	27,429	22.58%	404	357	-11.63%	4,097	6,247	52.48%
Yavapai County, AZ	42,555	70,286	65.17%	29,717	51,881	74.58%	509	527	3.54%	12,329	17,878	45.01%
Arizona	1,909,879	2,819,302	47.62%	1,607,628	2,355,299	46.51%	8,027	7,572	-5.67%	294,224	456,431	55.13%

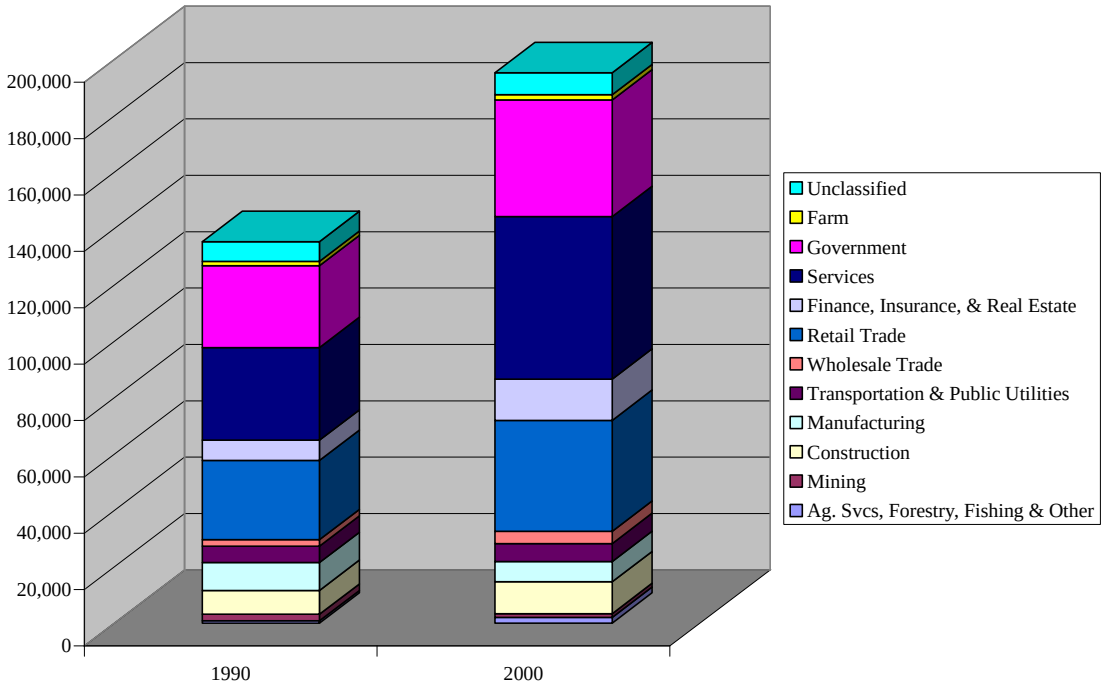


Figure 2. Assessment Area County Employment by Industry, 1990–2000

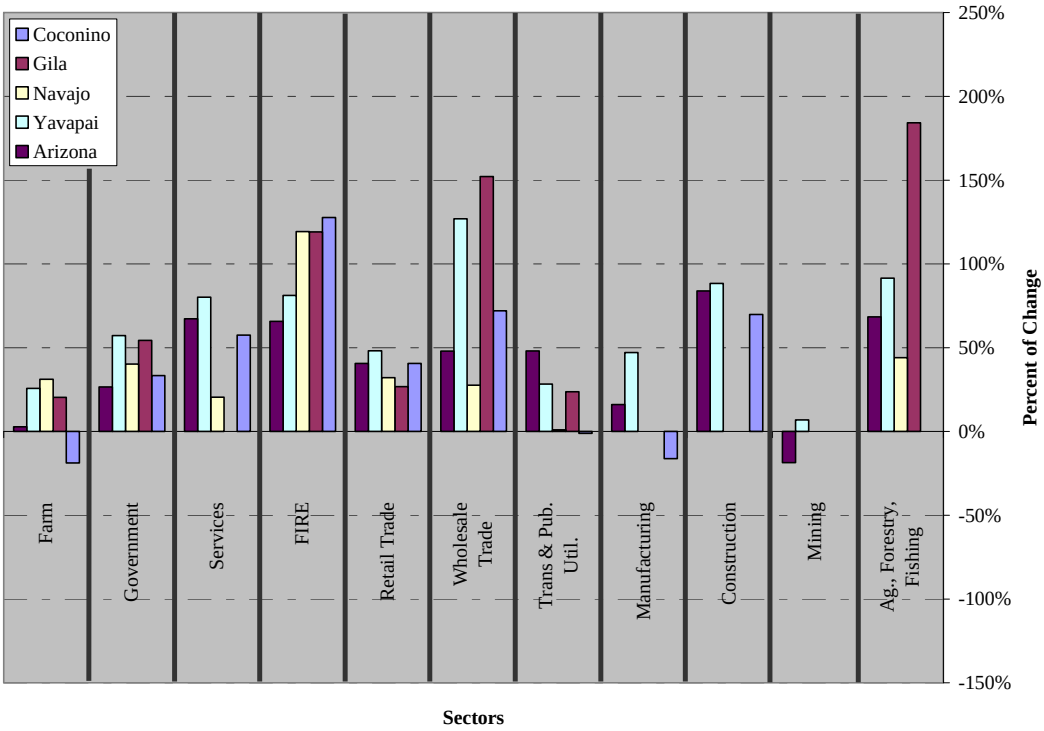


Figure 3. Percentage of Industry Employment Change by County from 1990 to 2000 (F.I.R.E stands for the Finance, Insurance, and Real Estate Sector).

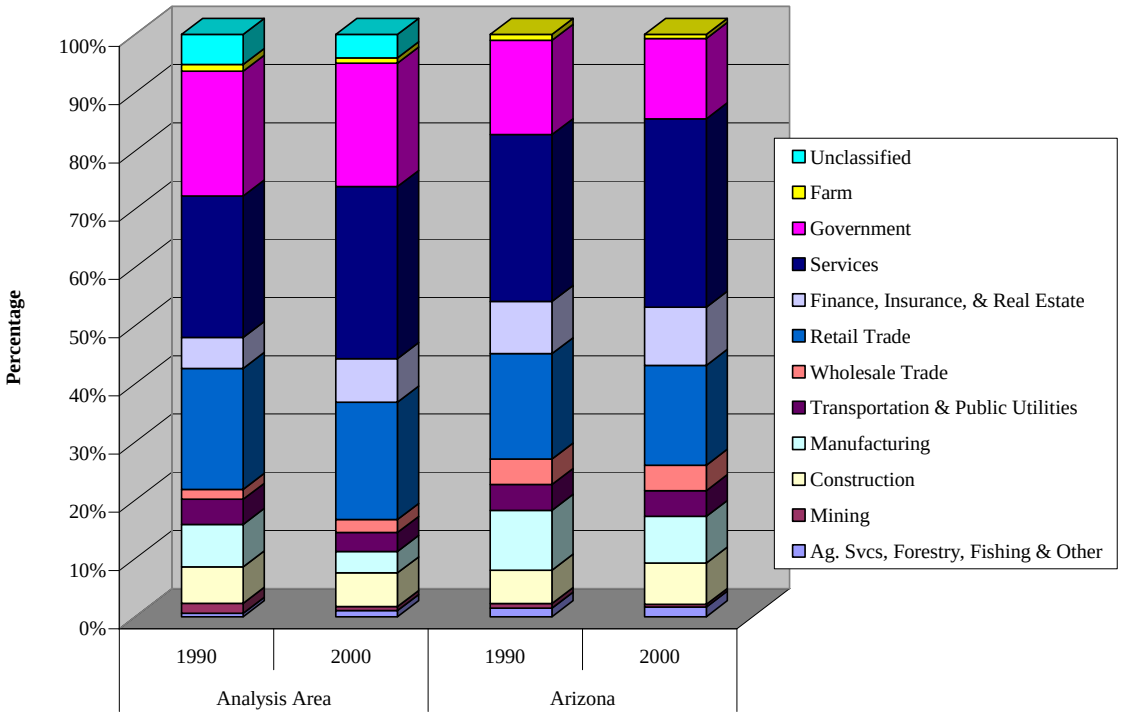


Figure 4. Assessment Area Counties and Arizona Industry Distribution: 1990 and 2000

For the assessment area counties as a whole, growth occurred within all sectors, with the exception of mining and manufacturing, which declined by 42 percent and 27 percent respectively. The greatest rates of growth occurred in the agricultural services, forestry, fishing, and other sectors (155.6 percent); and finance, insurance and real estate (F.I.R.E) sectors (103.5 percent). The growth in the agricultural services, forestry, fishing sector was focused primarily in cattle and livestock operations. The sector entitled "unclassified" represents jobs data that was suppressed and not displayed in a particular sector in order to avoid the disclosure of confidential information. As a result of the suppressed data, the growth rates in some sectors may be over or understated. Figure 3 (page 28) illustrates that growth within the counties exceeded the state average in many sectors. If data for either year was suppressed, no estimate for the rate of growth in that sector was made. Gila County accounted for much of the strongest growth, particularly in the finance, insurance, and real estate; wholesale trade; and agricultural services, forestry, fishing sectors. Coconino County also registered strong growth in the finance, insurance, and real estate sector. Yavapai had major growth in the wholesale trade sector (University of Arizona School of Natural Resources 2005).

From 1980 to 2004, Navajo County experienced the highest rates of unemployment with an average of approximately 12.6 percent. Gila and Coconino counties also reported average rates of unemployment (7.4 percent and 7.2 percent respectively) that exceeded the state's average of 5.2 percent. Yavapai County had a lower average at 4.2 percent. Unemployment was particularly high in the community of San Carlos (21.3 percent) within Gila County and in Whiteriver (22 percent) within Navajo County during the period examined. The community with the lowest rate of unemployment was Sedona with an average of only 2.2 percent (University of Arizona School of Natural Resources 2005).

Risk Assessment:

Table 2. Description of Trends, Risks, and the Effects to Management of Employment.

Trend	Risks	Effects to management
Increase in services sector.	Increase of low-wage jobs, resulting in individuals needing to work more hours or more than one job.	Maintain majority of forest as remaining free to the public allowing visitation by all income levels.
Increase of 104 percent in finance, insurance, real estate service employment; also a major increase in the construction sector.	Increase in housing development, potentially more development in WUI. Higher-income service workers (professional service providers such as medical and legal) may demand more amenities on public lands.	There may be more human pressure and use of WUI lands, resulting in a need for an adjustment of management.
Unemployment continues to be higher than the state average in Coconino, Gila, and Navajo counties.	Higher numbers of people are unemployed.	No effects to management, entirely outside Forest Service control and authority.

Income

Current Condition

Per capita personal income across the assessment area was generally lower than the state average in 2000. Yavapai County per capita incomes were approximately 94 percent of the state average. Navajo, Coconino, and Gila Counties reported much lower incomes that represented 57.3 percent, 78.6 percent, and 76.5 percent respectively of the state average. Median family incomes were also lower than the state in all counties. However, Coconino County had the highest among the three counties at $34,805 compared to $31,039 in Yavapai County, $27,764 in Gila County, and $24,590 in Navajo County. The state average that year was $35,450 (University of Arizona School of Natural Resources 2005).

Income levels below $11,214 a year for a household of two people was the threshold for poverty classification in 1999. Poverty rates for both individuals and families were highest in Navajo County at 29.5 percent, exceeding the state average of 14 percent. Average poverty rates were also higher than the state average in both Coconino and Gila counties. Approximately 18.2 percent and 17.4 percent of individuals in Coconino and Gila counties respectively were below poverty level in 2000. Among families, 23.4 percent, 13.1 percent, and 12.6 percent were below poverty level in Navajo, Coconino, and Gila counties respectively, compared with 10 percent across the state as a whole. Yavapai County on the other hand had lower poverty rates: 11.9 percent of individuals and 7.9 percent of families (University of Arizona School of Natural Resources 2005).

Table 3 displays the percentage of the population below poverty level by race. Across the assessment area, a total of 18.2 percent of the population was below poverty level in 2000. The level of poverty is highest in the American Indian and Alaska Native population followed by Black or African Americans, and those of two or more races.

Table 3. Poverty Levels by Race/Ethnicity, 1999.

Location	White	Black or African American	Am. Indian & Alaska Native	Asian	Native Hawaiian & Other Pacific Islander	Some Other Race	Two or More Races	Hispanic or Latino
United States	9.1%	24.9%	25.7%	12.6%	17.7%	24.4%	18.2%	22.6%
Arizona	10.3%	19.9%	37.3%	12.3%	16.1%	25.3%	18.5%	24.5%
Coconino Co., AZ	11.7%	19.0%	32.1%	15.2%	12.9%	20.4%	22.3%	20.4%
Gila Co., AZ	12.1%	6.8%	48.0%	4.1%	66.7%	21.8%	19.6%	18.7%
Navajo Co., AZ	12.2%	25.3%	46.0%	24.2%	13.0%	31.1%	26.7%	26.0%
Yavapai Co., AZ	10.9%	38.1%	27.6%	19.5%	41.4%	22.1%	23.8%	22.8%
Assessment area	11.4%	23.5%	40.5%	16.5%	21.9%	23.1%	23.4%	21.9%

Source: (US Census Bureau 2000a)

Figure 5 (page 32) illustrates the distribution of household incomes in the counties within the assessment area. All counties have a higher percentage of the population in the lower income brackets. Approximately 36.3 percent of the population in the three counties of the assessment area has incomes below $25,000 compared to 28.8 percent for the state. Approximately 14.3 percent of the assessment area population has incomes of $75,000 and above compared to 20.5 percent in the state as a whole (University of Arizona School of Natural Resources 2005).

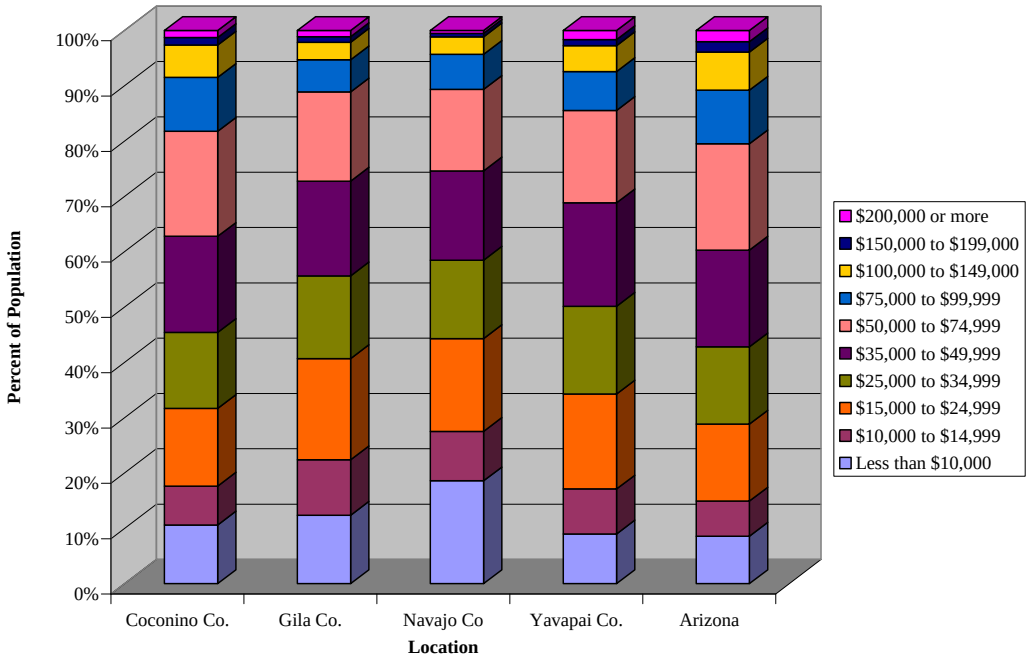


Figure 5. Household Income Distribution, 1999

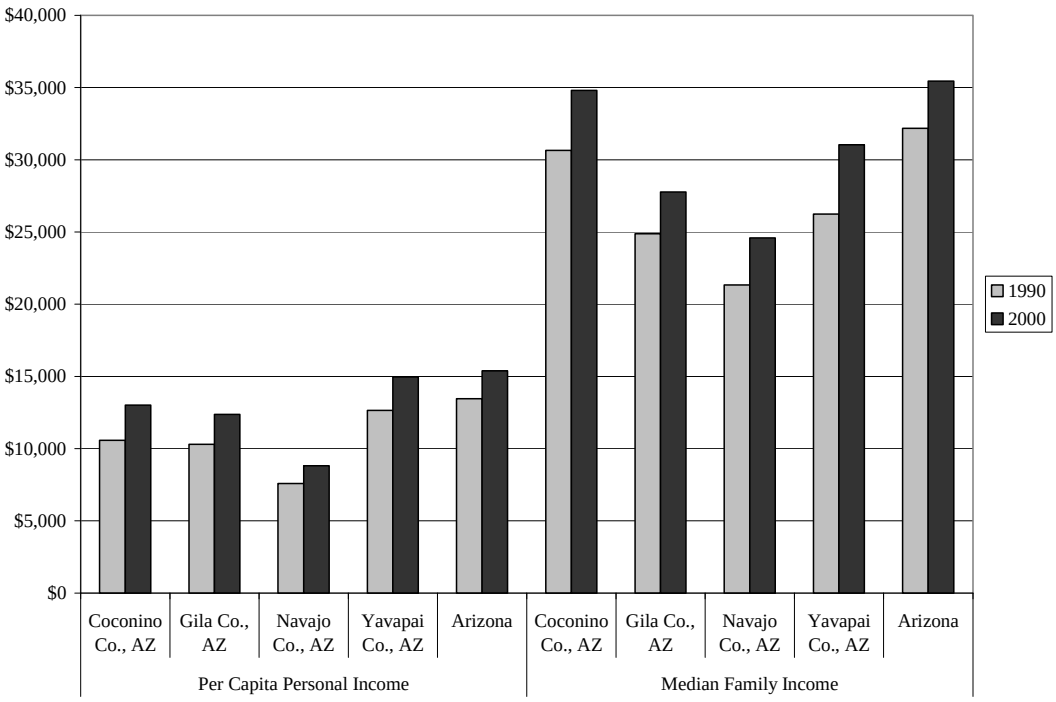


Figure 6. Per Capita Personal Income and Median Family Income, 1990 and 2000

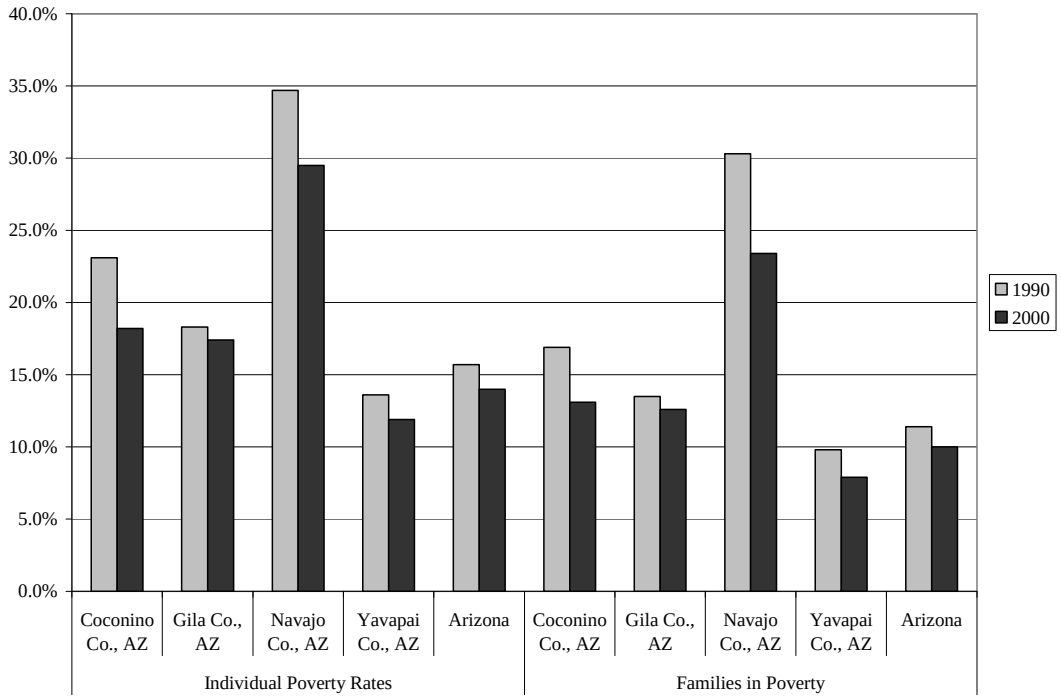


Figure 7. Individual and Family Poverty Rates, 1990 and 2000

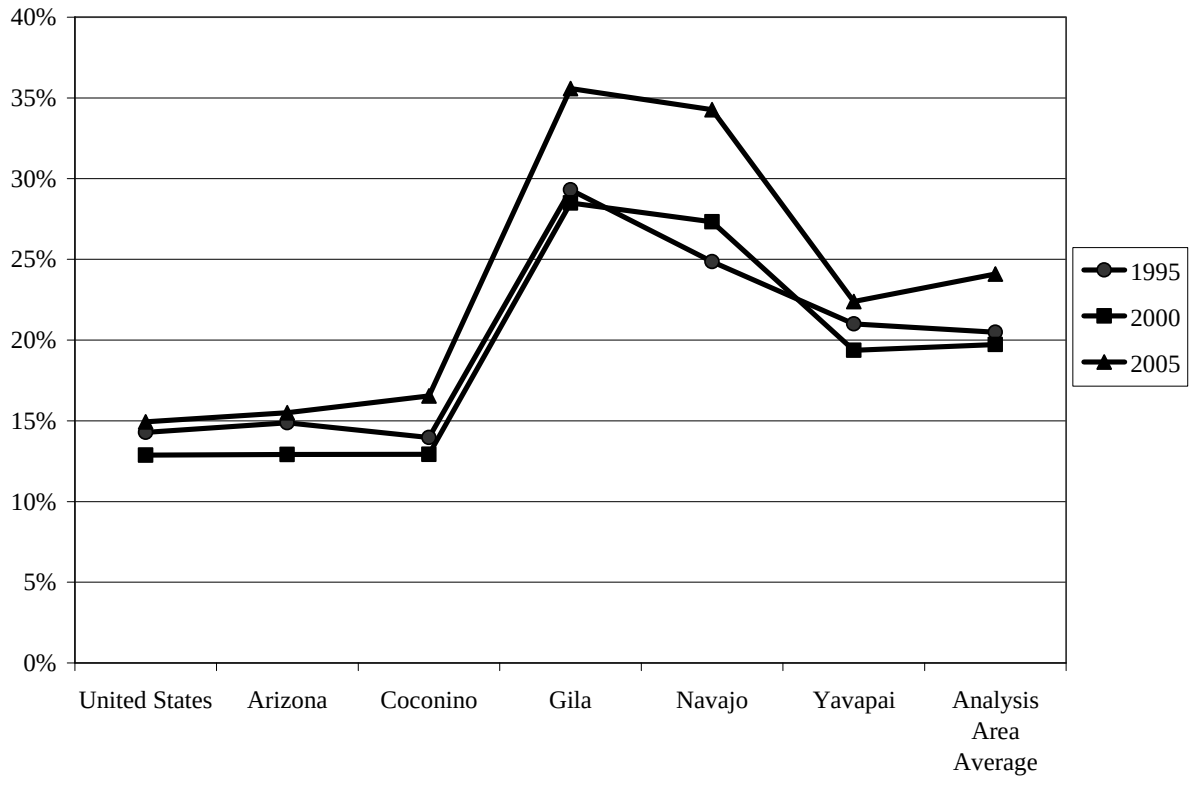


Figure 8. Transfer Payments as a Percent of Total Personal Income, 1995, 2000, and 2005

Trends

Figure 6 (page 32) displays the per capita income and median family income for each county in the assessment area and for the state. Relative increases in per capita and median family incomes were greater in each county than in the state from 1990 to 2000. Despite these increases, however, per capita and median family incomes remained below the state average in all counties. Yavapai County was only 2.7 percent below the state average. Coconino, Navajo, and Yavapai counties had greater relative decreases in poverty over the ten year period from 1990 to 2000 than across Arizona as a whole. Decreases in the rate of individual poverty ranged from 15 percent to 21 percent in Coconino, Navajo, and Yavapai counties (Figure 7, Page 33). The rates of families in poverty in these same counties showed decreases ranging from 19 percent to nearly 23 percent. Arizona individual and family poverty was decreased by 10.8 percent and 12.3 percent respectively during the same period. While Gila County also had decreased poverty rates from 1990 to 2000, the improvement was less pronounced at 4.9 percent and 6.7 percent.

Figure 8 (Page 33) displays total personal transfer receipts as a percentage of total personal income for each of the counties in which the assessment area is located compared to the State of Arizona and the United States. The Bureau of Economic Analysis defines personal transfer receipts as "…income payments to persons for which no current services are performed and net insurance settlements. It is the sum of government social benefits and net current transfer receipts from business." It includes a variety of receipts including retirement, medical, unemployment, and veteran's benefits. Transfer receipts as a percent of the total personal income is significantly higher in the analysis area than the state or national averages. The average across the analysis area in 2005 was 24 percent compared to 15 percent for the nation and the state in 2005. Transfer payments are particularly high in Gila and Navajo Counties at 36 and 34 percent respectively of total personal income. The rate of increase is also much higher in the counties of the analysis area. While the proportion of personal income from transfer payments for the nation and the state have remained relatively constant over the last ten years, the proportion has increased by 3 percent in Coconino County and by a maximum of 9 percent in Navajo County over the same period.

Risk Assessment:

Table 4. Description of Trends, Risks, and the Effects to Management of Income.

Trend	Risks	Effects to management
Non-labor income increases	May create higher demand for recreation opportunities, water, and amenity-related services; less public emphasis on commodity-related jobs.	Potential shift in recreation management to adjust to needs of public. Public outreach efforts may be necessary if there is a lack of organizational capacity if needs/wants are unable to be met. Increase volunteer programs and community involvement to meet public needs.
Coconino, Gila and Navajo counties have a continued trend of both individual and family poverty rates higher than the state average	Lack of funds and leisure time to recreate or use the Coconino National Forest. Lack of transportation to access Coconino National Forest.	Increase outreach and accessibility of forest activities and education. Educate regarding firewood permits, costs, and accessibility.

Payments to States

Current Condition

Counties receive Payment in Lieu of Taxes (PILT) to replace tax revenue lost due to the public nature of lands administered by federal agencies (1976 Payments in Lieu of Taxes Act). The amount is based on the amount of acreage administered by certain federal agencies, population, a schedule of payments, the Consumer Price Index, other federal payments made in the prior year, and the level of funding allocated by Congress. These payments are not affected by changes in the Forest Plan.

In addition to PILT payments, counties receive a portion of the revenues generated on National Forest System lands. Historically, counties have received 25 Percent Fund payments. These payments returned 25 percent of all revenues generated from forest activities, with the exception of certain mineral programs, and were paid based on the amount of National Forest System lands within each county. These funds are used for the upkeep and maintenance of public schools and roads. These payments are affected by changes in resource output levels as a result of direction provided in the Forest Plan, funding levels, and results of litigation.

In 2000, Congress enacted the Secure Rural Schools and Community Self-Determination Act (SRSCS). This Act was designed to stabilize annual payments to states and counties beginning in 2001. The formula for computing annual payments is based on averaging a state's three highest payments between 1986 through 1999 to arrive at a compensation allotment or "full payment amount." The act also created citizen advisory committees and gave local communities the choice to fund restoration projects on federal lands or in counties. The SRSCS required a county that elected to receive its share of the full payment amount to spend no less than 80 percent and no more than 85 percent of the funds in the same manner as the 25 Percent Fund payments are expended. The balance of the payment must be reserved for special projects on federal lands or for county projects, or the reserved fund must be returned to the General Treasury. If a county's share of the full payment amount is less than $100,000, all of the funds may be spent in the same manner as the 25 Percent Fund payments. Counties could choose to continue to receive payments under the 25 Percent Fund or to receive the county's proportionate share of the state's full payment amount under SRSCS. All counties within the assessment area elected to receive its proportionate share of the State's full payment amount.

The SRSCS legislation expired on September 30, 2006, and was reauthorized for one year; however, funding for 2007 payments has yet to be authorized by Congress. If no legislation is enacted to further reauthorize this act; payments to the counties under the Twenty-Five Percent Fund Act would resume.

Trends

Table 5 (page 36) displays the PILT and SRSCS payments to each county from 2002 through 2006 that were associated with National Forest System lands administered by the Coconino National Forest. Payments under PILT have tended to fluctuate more as these payments are dependent on annual Congressional allocations. Payments under SRSCS were relatively stable as intended. If the SRSCS act is not reauthorized, counties will receive the 25 Percent Fund payments. Payments to the counties under the 25 Percent Fund were highly variable (Table 6) because of the annual variability in authorized livestock or timber sold. These payments would most likely be less than the payments under the SRSCS payments.

Table 5. Estimated Coconino Associated PILT and SRSCS Payments by County, 2002–2005

	2002	2003	2004	2005
Coconino County, AZ				
PILT	$400,210	$257,934	$269,023	$280,702
SRSCS	$1,669,126	$1,689,156	$1,711,112	$1,749,995
Total	$2,069336	$1,947,090	$1,980,135	$2,030,697
Total Coconino County Budget	$110,700,000	$119,922,561	$134,042,506	$139,322,712
Percent of Total County Budget	1.9%	1.6%	1.5%	1.5%
Gila County, AZ				
PILT	$6,236	$6,116	$6,286	$6,435
SRSCS	$1,107	$1,121	$1,135	$1,366
Total	$7,343	$7,237	$7,421	$7,801
Total Gila County Budget	$54,650,185	$60,430,241	$61,458,094	$61,937,191
Percent of Total County Budget	0.01%	0.01%	0.01%	0.01%
Yavapai County, AZ				
PILT	$264,265	$242,631	$213,431	$238,360
SRSCS	$190,536	$192,844	$195,384	$199,888
Total	$454,801	$435,475	$408,815	$438,248
Total Yavapai County Budget	$148,034,705	$176,649,116	$176,480,644	$181,741,859
Percent of Total County Budget	0.3%	0.3%	0.2%	0.2%

Source: (USDA Forest Service 2006b)

Table 6. 25 Percent Funds per County from 1986 to 1999

	Coconino County	Yavapai County	Gila County
1986	$3,418,800	$610,900	$172,800
1987	$3,991,300	$806,900	$158,300
1988	$4,208,300	$787,500	$234,100
1989	$3,671,300	$837,500	$216,800
1990	$3,218,200	$664,500	$270,500
1991	$2,839,200	$729,200	$245,600
1992	$3,256,800	$732,200	$211,400
1993	$2,817,300	$498,800	$231,900
1994	$1,566,200	$538,700	$391,300
1995	$1,534,200	$378,700	$314,500
1996	$584,400	$219,400	$188,500
1997	$969,900	$382,300	$178,400
1998	$1,058,500	$249,500	$206,300
1999	$735,300	$210,800	$197,600

Although Navajo County is impacted by activities occurring, none of the Forest's lands are located within the county, therefore the County does not receive payments associated with the Coconino National Forest directly. However, the Chevelon Butte School District does receive some of these funds through Coconino County for the education of many children from places such as Winslow and Heber.

Risk Assessment:

Table 7. Description of Trends, Risks, and the Effects to Management of Payments to States.

Trend	Risks	Effects to management
Decrease in predictability and stability of amount of federal funding to Coconino, Yavapai, and Gila counties as a result of expiration of SRSCS and a return to 25 percent.	County may reduce amount of assistance with road maintenance and other forest-related assistance.	Effects to management are unknown.

Coconino National Forest Economic Contribution Analysis

Methodology for Analysis

The purpose of a contribution analysis is to determine how much local economic activity is currently associated with Forest Service management. In contrast to an impact analysis, a contribution analysis is not a measure of change. It is a descriptive analysis of the current economy and the jobs and income supported by current management of the Forest. Impact analysis traces the increase or decrease in local economic activity spurred by change. Contribution analysis, on the other hand, simply quantifies what proportion of the local economic activity is supported through the current management of the Forest.

The analysis does not attempt to quantify the economic contribution of non-market benefits or costs of forest management activities such as effects to watershed values, wildlife, viewsheds, and the value placed on a forested environment as a place to live. This is not to imply that such values are not significant or important, however non-market values are difficult to represent with appropriate dollar figures. They are not included in this analysis because there is no generally agreed upon methodology, nor is there a Forest Service approved methodology, for quantifying the economic value of these benefits and costs. These values are discussed qualitatively below in the section entitled "Current Conditions and Trends of Forest Contribution to Social Systems."

Estimates of the economic contribution of Forest programs and activities were developed through the use of IMPLAN, using data for 2003. IMPLAN is an economic modeling program originally developed by the Forest Service in cooperation with the Federal Emergency Management Agency and the Bureau of Land Management. IMPLAN has since been privatized and is now provided by Minnesota IMPLAN Group (MIG). IMPLAN uses a database of basic economic statistics constructed by MIG. Information for this database was obtained from major government sources such as the Bureau of Economic Analysis, County Business Patterns, REIS, Bureau of Labor Statistics, U.S.

Census, etc., and converted to a consistent format using widely accepted methodologies (Minnesota IMPLAN Group 1999).

The IMPLAN database breaks the economy down into 509 economic sectors[7] based on the North American Industrial Classification System (NAICS)[8]. The 509 IMPLAN sectors were aggregated in order to summarize the data. The aggregation scheme that was used grouped sectors by the first two digits of the NAICS code. This initial aggregation was further refined to better identify areas of particular interest relative to Forest Service management activities. The result was a total of sixteen aggregated sectors. The sectors identified that relate to Forest Service activities are wood products and processing, grazing, mining, and tourism. For the purposes of this assessment, the portion of labor income and employment associated with tourism were estimated based on percentages derived from the Travel Industry Association of America Tourism Economic Impact Model and used in the Arizona Tourism Statistical Report issued by the Arizona Office of Tourism as cited in the Socio-Economic Assessment for the Coconino National Forest (University of Arizona School of Natural Resources 2005). Data for the assessment area as a whole are summarized below.

To estimate job and labor income impacts of current Forest Service activities, an IMPLAN model was used to estimate "response coefficients" or rates of economic activity for the following Forest-related activities. A response coefficient, sometime referred to as a "multiplier" is the ratio of income or employment supported relative to an increase in the value of final sales of an output or to units of physical output itself such as an MBF of timber or AUM's of grazing:

- Recreation: Local economic activity generated per million dollars of visitor expenditures while visiting the Coconino National Forest.

- Wildlife and Fish: Local economic activity generated per million dollars of visitor expenditures for hunting, fishing, and wildlife viewing while visiting the Coconino National Forest.

- Grazing: Economic activity per million dollars of value added to the sales price of cattle grazed on Forest Service allotments.

- Timber: Economic activity per thousand cubic feet of stumpage flowing through logging companies, sawmills, post and pole operations, and firewood sales.

- Minerals: The existing level of minerals activity is very small; therefore no estimates were made for economic impacts of the current program.

- Payments to States: Returns to counties under the "Secure Rural Schools Act" can foster major economic activity at the local level. This response coefficient is a prediction of the local economic activity per million dollars returned to the counties.

- Forest Service salary and non-salary expenditures: Economic activity per million dollars of wages (disposable income spent locally by Forest Service employees, and economic activity per million dollars spent locally on materials, contracts, and services by the Forest Service).

[7] Business sector. All corporate and non-corporate private entities organized for profit and certain other entities that are treated as businesses, including financial institutions, private noninsured pension funds, cooperatives, nonprofit organizations that primarily serve businesses, Federal Reserve banks, federally sponsored credit agencies, and government enterprises.

[8] NAICS (North American Industrial Classification System). A classification system developed jointly by the U.S., Canada, and Mexico to provide improved comparability in industrial statistics across North America. NAICS divides the economy into twenty broad sectors. This classification system is helpful for giving detailed breakdown of the fastest growth areas in a nation's economy.

These response coefficients, as well as baseline economic data, were exported from IMPLAN models and read into "FEAST,"[9] a spreadsheet designed to pair IMPLAN response coefficients with resource data to generate an economic contribution report.

The following data was used in "FEAST" to generate an estimate of the Forest's economic direct, indirect, and induced contribution to the local economy.

- Recreation and Wildlife and Fish:
    - Annual local and non-local visitor use numbers came from the National Visitor Use Monitoring (NVUM) survey for the Coconino National Forest (USDA Forest Service 2006a).
    - Expenditure profiles for different types of recreation/wildlife visitor activities were also derived from the NVUM survey and processed for use with IMPLAN (Stynes 2005).
    - A spreadsheet was used to process visitor numbers into numbers compatible with the IMPLAN expenditure profiles (USDA Forest Service 2006c).
- Range:
    - Inventory, marketings, and income data came from the Arizona Agricultural Statistics Bulletin.
    - National Forest permitted Animal Unit Months (AUMs) came from a spreadsheet provided by Forest Service Southwest Region 3.
    - Conversion from AUMs to Headmonths came from the Rangeland Management website (USDA Forest Service 2006d).
- Timber:
    - Volume (hundred cubic feet) (CCF) cut information was obtained from the Forest Service Southwest Region 3 Cut and Sold Report for the Coconino National Forest.
    - Direct effects response coefficients came from Timber Mill Survey from Chuck Keegan at the University of Montana (Direct jobs and income per thousand cubic feet of stumpage harvested) (Gerbert, Keegan, Willitis, and Chase 2002).
    - Indirect and induced employment and income effects come from the IMPLAN model.
- Forest Service salary and non-salary expenditures:
    - Budget expenditure data were obtained from the USDA National Finance Center (USDA Forest Service 2006e).
    - The data were split into salary and non-salary expenditures.

[9] FEAST (Forest Economic Analysis Spreadsheet Tool) Is an MS-Excel 2000 workbook designed to support forest planning by streamlining data entry and generating economic impact tables for use in Forest Plan Revision Environmental Impact Statements.

- Non-salary information was bridged to IMPLAN economic sectors.
- Salary expenditures were converted to disposable income.
- Employment levels were obtained from Region 3 personnel data.

- Restoration and Stewardship projects:
  - The budget expenditure data contain expenditures for contracting services, i.e. for thinning operations and for force account expenditures related to these projects.
  - FEAST models the economic impact of these expenditures in the local economy. Budget data for Fiscal Year 2004 was used as it reflects the increasing emphasis (expenditure) on restoration and stewardship projects.

Current Conditions of Forest Economic Contribution

The following two pie charts display the relative size of the natural resource-related sectors to the economy of the assessment area as a whole in 2003. All of Coconino County is included in the following analysis. Zip code data was used to assess the contribution of the Forest to only those portions of Gila, Navajo, and Yavapai counties where the effects of Forest Service activities fall. Figure 9 (page 41) displays labor income and Figure 10 (page 41) displays employment. Labor income from natural resource related sectors represents 6 percent of the totals for the assessment area and approximately 9 percent of employment. It should be remembered that the contributions of the Coconino National Forest represent only a portion of the economic activity reflected in the natural resource-related sectors.

The information in these figures reflects only the direct effects of a given sector. Direct impacts are the response of an industry to demand for the goods or services it produces. The employment and labor income that result from the production of output to meet demand are direct effects. However, direct effects are only a part of the picture. The dynamics of a regional economy can be more fully understood by looking at the complex linkages and interdependencies among businesses, consumers, and the natural resources on which economic activity depends. IMPLAN modeling allows a more complete examination of these complex linkages. In addition to direct effects, each sector also has indirect and induced effects. Indirect effects are produced when a sector must purchase supplies and services from other industries in order to produce output sufficient to meet demand. The employment and labor income generated in other industries as a result are referred to as indirect effects. Induced effects represent the employment and labor income stimulated throughout the local economy as a result of the expenditure of new household income generated by direct and indirect employment.

Another factor considered when estimating economic impacts is commonly referred to as “leakage.” Part of the monies spent by businesses and individuals is spent within the local economy, while a portion of those monies is exported, or spent outside of the local economy. The money expended outside of the local economy is referred to as leakage. By the same token, economic activity is introduced or imported when those from outside the area purchase goods and services within the local area, thereby introducing new money into the local economy.

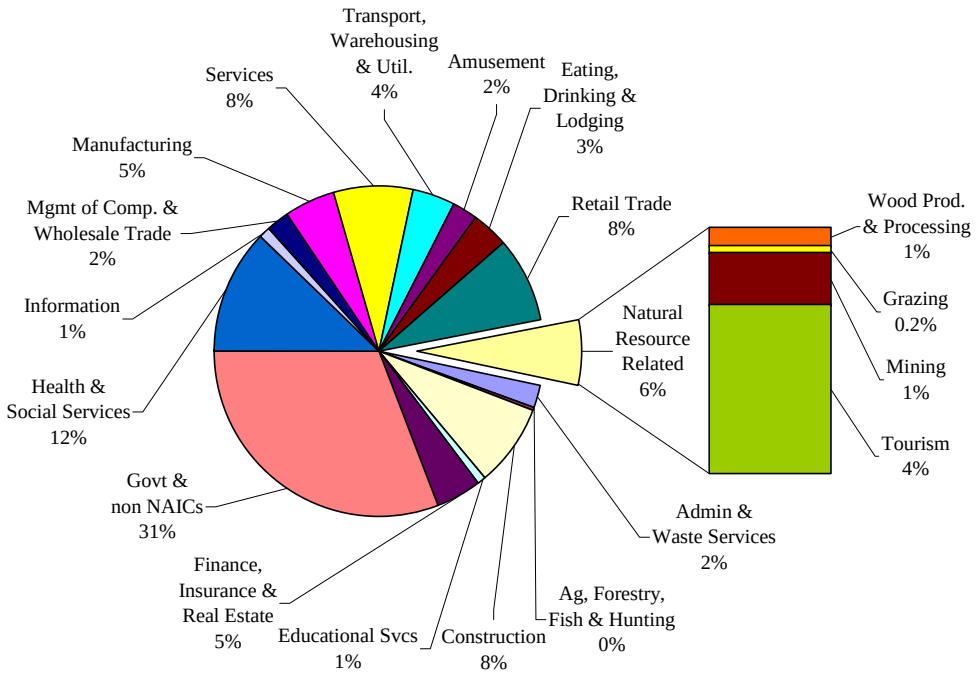


Figure 9. Assessment Area Labor Income Distribution by Industry, 2003 (IMPLAN)

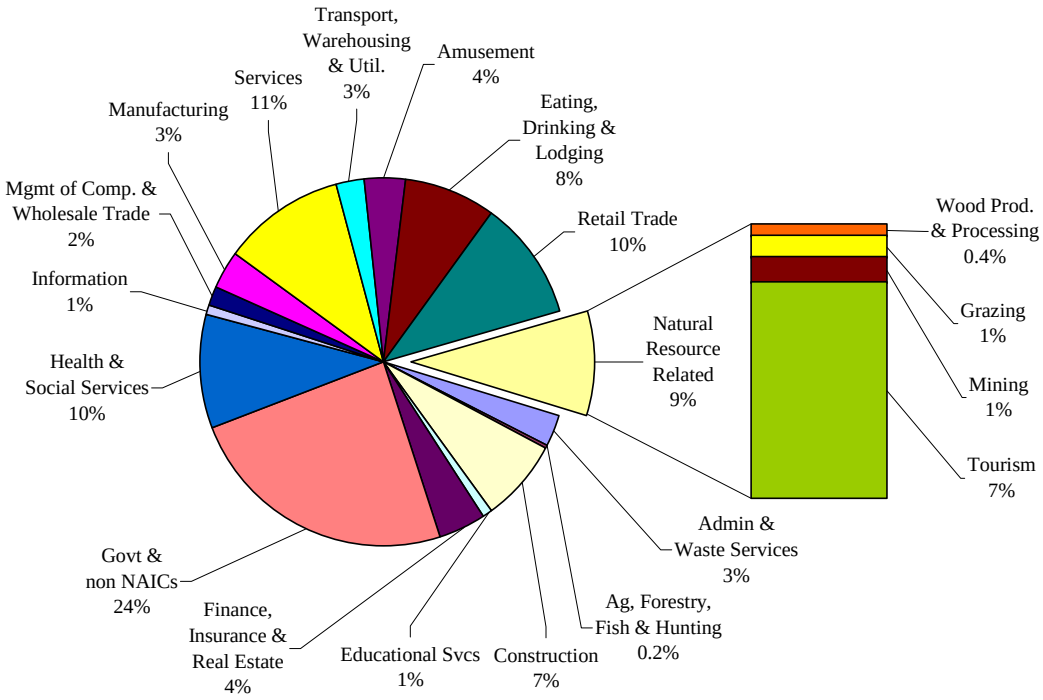


Figure 10. Assessment Area Employment Distribution by Industry, 2003 (IMPLAN)

IMPLAN attempts to estimate these complex economic relationships in order to approximate the effect of each sector on the economy as a whole. Multipliers[10] are developed as a means to estimate the change in direct, indirect, and induced effects as a result of an adjustment in the level of final demand for the goods or services provided by a given sector of the economy. These multipliers also take into account the effects of leakage and imports. Some sectors may have a large multiplier, while others may have a very small one. The size of a sector's multiplier, however, is not a direct indicator of the significance of its economic impact.

Tables 8 and 9 display the total estimated direct, indirect, and induced labor income and employment contributions of current activities on the Coconino National Forest.

Table 8. Coconino National Forest Estimated Labor Income Contribution by Resource Program

Forest Economic Contribution Source	Thousands of 2006 Dollars		
	Total Forest Contribution	Estimated Contribution of the Recreation Activities of Local Residents	Amount of Forest Contribution that Represents the Introduction of New Money into the Local Economy
Recreation	$53,984.90	$10,433.50	$43,551.4
Wildlife and Fish	$5,839.40	$1,339.60	$4,499.8
Grazing	$793.20	$0.00	$793.2
Timber	$827.20	$0.00	$827.2
Minerals	$0.00	$0.00	$0.0
Payments to States/Counties	$2,170.80	$0.00	$2,170.8
Forest Service Expenditures	$24,031.20	$0.00	$24,031.2
Total Forest Management	$87,646.60	$11,773.00	$75,873.6
Percent of Total Labor Income	100.0%	13.4%	86.6%

[10] Multipliers or response coefficients are the ratio of income or employment supported relative to an increase in the value of final sales of an output or to units of physical output itself such as an MBF of timber or AUM's of grazing.

Table 9. Coconino National Forest Estimated Employment Contribution by Resource Program

Forest Economic Contribution Source	Number of Jobs Contributed		
	Total Forest Contribution	Estimated Contribution of the Recreation Activities of Local Residents	Amount of Forest Contribution that Represents the Introduction of New Money into the Local Economy
Recreation	1,982	346	1,636
Wildlife and Fish	211	44	167
Grazing	54	0	54
Timber	31	0	31
Minerals	0	0	0
Payments to States/Counties	64	0	64
Forest Service Expenditures	469	0	469
Total Forest Management	2,811	390	2,421
Percent of Total Employment	100.0%	13.9%	86.1%

The employment estimated in Table 9 (page 43) is defined as any part-time, seasonal, or full-time jobs in the given category. The recreation program area stimulates the greatest level of employment and labor income of the Forest programs. However, 13.9 percent of the estimated employment and 13 percent of the estimated labor income are attributed to recreation activities of local residents. While providing recreation opportunities to local residents is an important contribution, the recreation expenditure of locals does not represent new money introduced into the economy. If National Forest-related opportunities were not present, it is likely that residents would participate in other locally based recreation activities, and this money would remain in the economy.

Approximately 86 percent of the jobs and 87 percent of the labor income are generated from expenditures by non-local visitors, bringing new money into the area. Forest Service operations themselves are the second largest generator of jobs and labor income.

The estimates of labor income generated by sector are displayed in Table 10 (page 44). The largest amount of labor income is generated in the government sector, followed by the accommodation and food services.

Table 10. Coconino National Forest Estimated Labor Income Contribution by Industry

Forest Economic Contribution Source	Thousands of 2006 Dollars		
	Total Forest Contribution	Estimated Contribution of the Recreation Activities of Local Residents	Amount of Forest Contribution that Represents the Introduction of New Money into the Local Economy
Agriculture	$1,249.10	$105.30	$1,143.8
Mining	$3.80	$0.30	$3.5
Utilities	$289.40	$29.20	$260.2
Construction	$1,242.10	$74.20	$1,167.9
Manufacturing	$1,582.90	$310.10	$1,272.8
Wholesale Trade	$5,163.00	$1,248.90	$3,914.1
Transportation & Warehousing	$2,340.20	$389.10	$1,951.1
Retail Trade	$8,221.50	$1,654.40	$6,567.1
Information	$881.90	$145.40	$736.5
Finance & Insurance	$1,175.60	$151.50	$1,024.1
Real Estate & Rental & Leasing	$2,459.70	$255.40	$2,204.3
Prof. Scientific & Tech. Services	$2,549.90	$356.10	$2,193.8
Mgmt. of Companies	$138.50	$23.40	$115.1
Admin., Waste Mgmt. & Rem. Service	$1,213.80	$158.30	$1,055.5
Educational Services	$470.30	$72.10	$398.2
Health Care & Social Assistance	$5,075.90	$660.30	$4,415.6
Arts, Entertainment, & Rec.	$3,385.80	$626.10	$2,759.7
Accommodation & Food Services	$17,483.60	$2,055.60	$15,428.0
Other Services	$2,210.20	$252.70	$1,957.5
Government	$30,509.30	$3,204.70	$27,304.6
Total Forest Management	$87,646.60	$11,773.00	$75,873.6
Percent of Total	100.0%	13.4%	86.6%

Table 11. Coconino National Forest Estimated Employment Contribution by Industry

Forest Contribution Source	Total Number of Jobs Contributed		
	Total Forest Contribution	Estimated Contribution of the Recreation Activities of Local Residents	Amount of Forest Contribution that Represents the Introduction of New Money into the Local Economy
Agriculture	78	3	75
Mining	0	0	0
Utilities	5	0	5
Construction	32	2	30
Manufacturing	49	10	39
Wholesale Trade	108	26	82
Transportation & Warehousing	58	9	49
Retail Trade	289	57	232
Information	25	4	21
Finance & Insurance	29	4	25
Real Estate & Rental & Leasing	68	8	60
Prof. Scientific & Tech. Services	74	11	63
Mgmt. of Companies	4	1	3
Admin., Waste Mgmt. & Rem. Service	51	7	44
Educational Services	16	3	13
Health Care & Social Assistance	125	16	109
Arts, Entertainment, & Rec.	148	27	121
Accommodation & Food Services	1,053	135	918
Other Services	112	13	99
Government	488	55	433
Total Forest Management	2,811	390	2,421
Percent of Total	100.0%	13.9%	86.1%

Table 11 (page 45) shows the Coconino National Forest's contribution to employment by sector. Forest Service activities generated the most jobs in the accommodations and food sector, followed by government job sector. The large number of jobs relative to labor income generated reflects lower paying service industry jobs. These numbers are consistent with National Forest System lands that are primarily used for recreation and wildlife viewing. Timber and grazing activities are associated with jobs generated in the agriculture and manufacturing sectors.

Table 12 (page 46) shows the estimated employment and labor income generated by activities on the Coconino National Forest relative to the assessment area's economy as a whole. Currently the largest single industry is government, which includes public education and civil servants. This is followed by accommodation and food services, retail trade, and health care and social assistance sectors. The government sector and health care and social assistance sectors produce a higher proportion of labor income relative to employment, indicating higher paying jobs.

Coconino National Forest activities are estimated to be responsible for 1.9 percent of jobs and 1.8 percent of labor income within the assessment area's economy. The sector that is most dependent on the contributions of the Coconino National Forest is agriculture for 6.4 percent of the jobs and 6.1 percent of the labor income in this sector. Accommodation and food services; arts, entertainment, and recreation; and the wholesale trade sectors also benefit from Coconino National Forest contributions to a greater extent than other sectors.

Within individual counties and communities, dependency on natural resource industries may be greater. Small changes in Forest activities have the potential result in more noticeable localized effects. Because Forest outputs could not be attributed to each county, it is not possible to analyze the county by county contributions to jobs and labor income.

Table 12. Current Role of Coconino National Forest Contributions to Local Economy

Industry	Employment (jobs)			Labor Income (Thousands of 2006 Dollars)		
	Area Totals	Coconino National Forest Related	% of Total	Area Totals	Coconino National Forest Related	% of Total
Agriculture	1,210	78	6.4%	$20,602.70	$1,249.10	6.1%
Mining	1,784	0	0.0%	$134,239.20	$3.80	0.0%
Utilities	317	5	1.6%	$19,280.30	$289.40	1.5%
Construction	12,570	32	0.3%	$482,887.20	$1,242.10	0.3%
Manufacturing	6,824	49	0.7%	$339,461.80	$1,582.90	0.5%
Wholesale Trade	3,034	108	3.6%	$144,030.90	$5,163.00	3.6%
Transportation & Warehousing	3,371	58	1.7%	$166,207.40	$2,340.20	1.4%
Retail Trade	17,048	289	1.7%	$477,109.40	$8,221.50	1.7%
Information	1,507	25	1.7%	$56,074.20	$881.90	1.6%
Finance & Insurance	3,071	29	0.9%	$110,758.00	$1,175.60	1.1%
Real Estate & Rental & Leasing	3,880	68	1.8%	$144,120.50	$2,459.70	1.7%
Prof. Scientific & Tech. Services	5,766	74	1.3%	$215,201.30	$2,549.90	1.2%
Mgmt. of Companies	292	4	1.4%	$9,680.10	$138.50	1.4%

Industry	Employment (jobs)			Labor Income (Thousands of 2006 Dollars)		
	Area Totals	Coconino National Forest Related	% of Total	Area Totals	Coconino National Forest Related	% of Total
Admin., Waste Mgmt. & Rem. Service	4,953	51	1.0%	$121,777.50	$1,213.80	1.0%
Educational Services	1,907	16	0.8%	$53,955.90	$470.30	0.9%
Health Care & Social Assistance	15,627	125	0.8%	$623,314.70	$5,075.90	0.8%
Arts, Entertainment, & Rec.	2,850	148	5.2%	$61,784.20	$3,385.80	5.5%
Accommodation & Food Services	18,080	1,053	5.8%	$289,191.60	$17,483.60	6.0%
Other Services	11,446	112	1.0%	$210,992.50	$2,210.20	1.0%
Government	30,532	488	1.6%	$1,300,134.40	$30,509.30	2.3%
Total	146,068	2,811	1.9%	$4,980,803.80	$87,646.60	1.8%

Source: IMPLAN

Risk Assessment:

Table 13. Description of Current Condition, Risks, and the Effects to Management of the Coconino National Forest's Economic Contribution.

Current Condition	Risks	Effects to management
Natural resource dependent industries such as timber, mining, and ranching, are decreasing.	There may be job losses in associated industries.	Management activities associated with timber management, mining, and grazing permits could greatly affect the labor income and jobs for these industries. A long-term out-migration of skilled labor may result in a shortage when a project arises.
Labor income and jobs related to the recreation-based service industry is growing. Recreation is the highest contribution that the Coconino National Forest makes to the assessment area.	Moderate- to low-pay jobs related to recreation reliant service industry. Industry based upon year-round access to Coconino National Forest at risk due to recent fire restriction and closure trends.	Management activities associated with recreation greatly affects the contribution to the economic sustainability of the assessment area. Lack of organizational capacity may result in not meeting public and industry demand.
Forest Service jobs and expenditures are the second highest contribution that the Coconino National Forest makes to the assessment area.	Annual fluctuation in budget results in unpredictability for projects and Forest Service jobs.	Management limited to long-term planning due to unknown budgets for future years. Less staff and funding could result in fewer goods and services provided to the public from the Forest.

Implications for Forest Management

Of the jobs currently generated by the Coconino National Forest, most are in the accommodations and food sector, followed by government (administration). The large number of jobs relative to labor income generated reflects a trend in lower paying service industry jobs. These numbers are consistent with National Forest System lands trends that are primarily used for recreation and wildlife viewing. Timber and grazing activities are associated with jobs generated in the agriculture and manufacturing sectors.

The Coconino National Forest contributes 2 percent of jobs and around 2 percent of labor income to the surrounding area, mostly in the recreation, accommodation and food services, and arts and entertainment sectors. Forest programs that contribute the greatest economic stimulus are recreation and Forest Service expenditures. The recreation program and then Forest Service expenditures were the Coconino National Forest management activities that stimulated the highest employment numbers. In this current trend, the largest single industry is government, which includes public education and civil servants. This is followed by accommodation and food services, retail trade, and health care and social assistance sectors. The government sector and health care and social assistance sectors produce a higher proportion of labor income relative to employment, indicating higher paying jobs.

Agriculture; arts, entertainment, and recreation; accommodations and food services; and wholesale trade are the industries most dependent on the management activities and uses of the forests. Associated labor income and jobs would be most closely connected to activities associated with the timber management, grazing, recreation, and fish and wildlife economic contribution areas.

Under current economic trends, approximately 86 percent of the jobs and 87 percent of the labor income are generated from new money coming into the area. To summarize, the Coconino National Forest economic contribution areas that contribute the greatest amount of economic stimulus are recreation and Forest Service expenditures. These areas represent approximately 87 percent of the Coconino National Forest's total contribution.

Labor income and jobs closely connected to natural resource management activities are decreasing. Decreases in management activities associated with timber management, grazing, and outfitter and guide permits could greatly affect the labor income and jobs for these industries. Some communities in the assessment area are more dependent than others and could be negatively affected by such decreases. Labor income and jobs related to the service industry are growing. Recreation is the highest contribution that the Coconino National Forest makes to the assessment area; it is associated with service industry. However, without recreation maintenance and management activities, the Forest could lose vital opportunities to provide new or maintain existing recreation developments and contribute jobs to the communities. Management activities associated with recreation could greatly affect the contribution to the economic sustainability of portions of the assessment area. Recreation draws new money and local expenditures into the area. The Coconino National Forest could prioritize management areas and projects that support the community.

SOCIAL CONDITIONS AND TRENDS

Forest planning and management occurs in the context of social, economic, political, cultural, and ecological conditions and trends. The configuration of these factors can influence what topics are identified as requiring management attention, desired solutions to identified issues or problems, and how members of the public choose to participate or not in planning and collaboration activities. Identifying the configuration of socioeconomic and cultural issues particular to the Coconino National Forest can assist planning and management staff to assess likely areas of public concern in future discussions about Plan revision needs. The Social Conditions and Trends section considers the area defined in (1) University of Arizona Socio-Economic Assessment for the Coconino National Forest and includes all of Coconino, Yavapai, and Gila counties and does not include Navajo County.

Identifying Relevant Categories of Social Data

This portion of the sustainability assessment focuses on broad-scale, strategic topics that may be directly linked to desired conditions and an anticipated need-for-change. The information categories used here to identify and understand sustainability at the Forest level address strategic issues that are relevant to National Forests in the Southwestern Region. These category indicators are relevant for identifying historical and existing conditions, trends, and need-for-change analysis.

The **information categories** used here correspond to SEA chapters as well as information in Attitude, Beliefs, and Values (ABV) Focus Group studies, and include:

- Demographics
- Land Use and Land Users
- Forest Access and Travel Patterns
- Community Relationships

Demographics

Population

Data from the 1980, 1990, and 2000 censuses show that total population growth was greatest in Yavapai County over the twenty-year period. In fact, population growth trend in Yavapai County far exceeded the rate of increase in overall state population over the same period (146 percent versus 89 percent respectively). Population growth between 1980 and 2000 was considerably less in Coconino and Gila counties (55 percent and 38 percent respectively). Among individual cities, Prescott Valley, Payson, Chino Valley, and Camp Verde experienced the greatest increases in total population between 1980 and 2000.

U.S.Census data show that Coconino County has both the largest area of the three counties as well as the greatest amount of Forest Service (FS)[11] land with well over 3 million acres. Flagstaff is by far the most populous city in the assessment area followed by Prescott/Prescott Valley and Payson. At the county level, total population ranges from 167,517 people in Yavapai County to 51,335 in Gila County.

[11] In this document, Forest Service (FS), United States Forest Service (USFS), and the National Forest System (NFS) are used interchangeably as caretakers of the lands on the national forest. Therefore, "FS lands" implies that the lands are part of the overall National Forest System as overseen by the USFS.

Total land area, total population, population density, and Forest Service acreage is shown for each of the three counties and selected places in Table 14 (page 50). Coconino County has by far the smallest population per total land area resulting in a population density of 6.2 individuals for every square mile. In contrast, Yavapai County is the most densely populated of the five counties with 20.6 people per square mile.

	Total Acres	2000	Pop. Density	USFS
County/Place	Sq. Miles	population	per sq. mile	Acres
Coconino County	18,661	116,320	6.2	3,275,320
Gila County	4,796	51,335	10.8	1,704,652
Yavapai County	8,128	167,517	20.6	1,968,976

* Cottonwood/Verde Village is an unincorporated Census Designated Place (CDP)

Source: NRIS - Human Dimensions

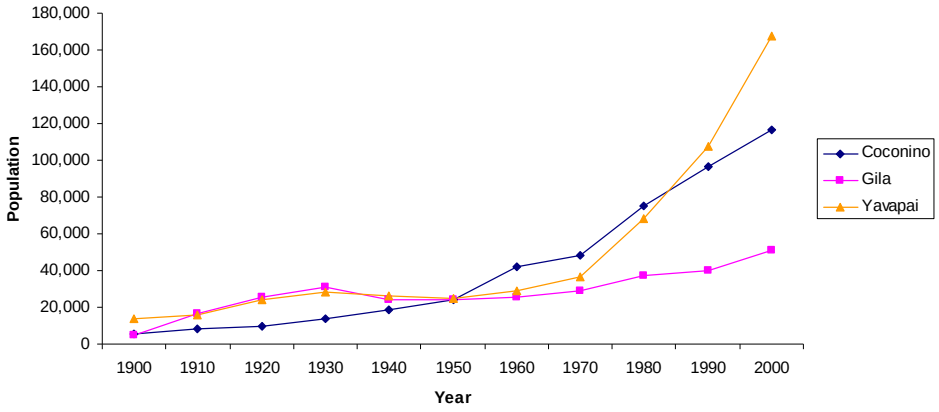
http://www.city-data.com/city/Arizona.html

Table 14. Total Area, Total Population, Population Density, and Forest Service Acreage by County and Place

The recent demographic history of the area surrounding the Coconino National Forest, and the assessment area as a whole, represents one of sustained and rapid growth. Coconino County has grown at an average of just above 3 percent per year over the past fifty years (Morton 2003, Forstall 1995), and over the past century, the counties surrounding the Coconino National Forest have grown from 25,000 residents to 335,000. The state itself has grown from 120,000 residents to more than 6 million during the past fifty years (U.S. Census Bureau 2005, Forstall 1995). Washington and Arizona are the only two states to show such startling demographic expansion. Long-term population increases are also supported by aging seasonal visitors wishing to permanently relocate to environs with increased outdoor opportunities (McHugh and Mings 1996).

Population growth in each of the counties has continued throughout the last two decades, mirroring population trends for the state as a whole. Growth in Yavapai County has outpaced the state average, sustaining a growth rate of more than 50 percent for the last two decades. Growth of individual cities within Yavapai County has mirrored this trend, consistently outpacing population growth rates of most other cities in the assessment area. In particular, Camp Verde and Prescott Valley witnessed dramatic increases between 1980 and 1990 with growth rates of 454 percent and 287 percent respectively. While the rate of increase slowed considerably for Camp Verde between 1990 and 2000, population growth in Prescott Valley remained well above county and state averages for the same period. Figure 11 shows the increase in population growth by counties.

Trends show an overall decline in rural populations for each of the three counties with the most dramatic changes in urban and rural composition occurring in Yavapai County. In 1980, the majority of the population of Yavapai County lived in rural areas (55 percent). By 2000, a nearly 20 percent increase in urban population as a percentage of total population and a commensurate decline in the rural population had reversed this relationship, altering the residential characteristics of the county.



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

Figure 11. Three-County Assessment Area Population Change, 1900–2000

Migration

Migration data has shown that population growth in Yavapai County has been especially strong, fueled by in-migration of individuals previously living outside the county. Gila County also reported a major increase in new residents/visitors from outside the county, most of whom moved from different counties within Arizona. The greatest numbers of individuals moving from out-of-state came from the West and the Midwest; however, both Yavapai and Coconino Counties reported a major increase in the number of migrants from the Northwest over the period. Finally, Yavapai County also reported major increases in the number of individuals migrating from "elsewhere" (different countries) over the period.

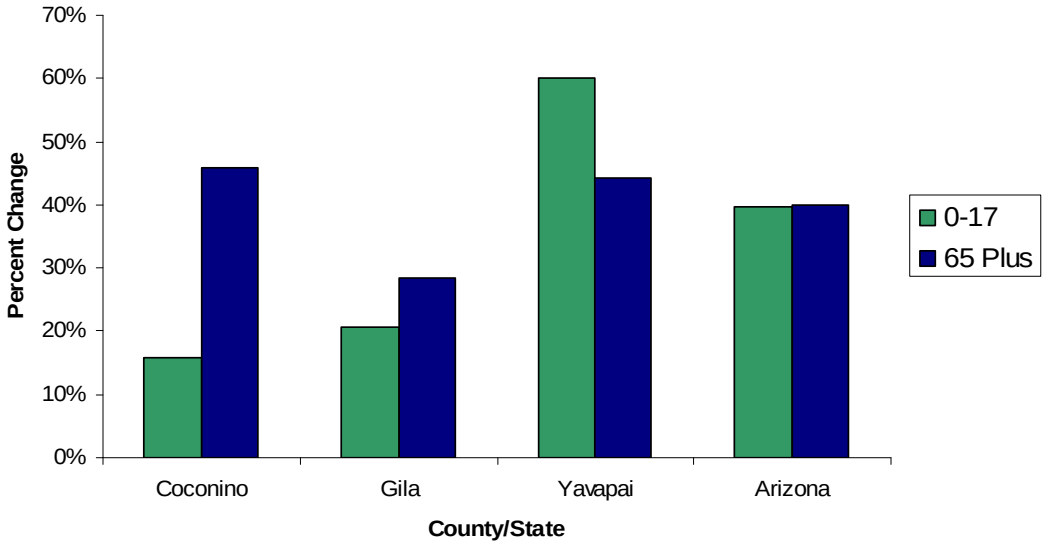
Age Distribution

The average age in the state has also been steadily increasing: 31 percent of the state was under age 15 in 1950, but only 22 percent are in the under-15 bracket as of the last census (U.S. Census Bureau 2005). Some of these shifts can be attributed to Arizona's amenable climate, relatively affordable property values, and the continued importance of military bases.

The age structure of populations within the three counties and selected places is presented in Figure 12 (page 52). Data show that the percentage of individuals age 65 and over grew considerably between 1990 and 2000 for both Coconino and Yavapai Counties. In fact, the increase in retirement-age populations for both counties (46 percent and 44 percent respectively) exceeded the rate of population growth for the state as a whole, which was nearly 40 percent for the same period. Other noteworthy changes in the age structure of the population within the assessment area include a major increase (54 percent) in the under-18 population within Yavapai County and a relatively low increase in the same age group for Coconino County. Mirroring a similar trend in overall population growth, under-18 and 65-and-over populations grew dramatically in Prescott Valley and made major gains in Cottonwood and Chino Valley. Gila County, Payson, and San Carlos experienced substantial increases in both cohorts between 1990 and 2000.

Within the assessment area, the population of individuals age 65 and over grew at a considerably higher rate between 1980 and 2000 than that of those under age 18. The exception to this trend was

seen in Yavapai County, which reported increases greater than those for the state as a whole in both categories. The greatest disparity between the growth of the 65-and-over and under-18 populations was reported in Coconino County. The cities of Prescott Valley, Cottonwood, Chino Valley, and Camp Verde reported the most major increases in 65-and-over populations among selected cities within the assessment area.



Source: NRIS - Human Dimensions

Figure 12. Percent Change under-18 and 65+ Populations by County, 1990–2000

Race and Ethnic Distribution

Figure 13 (page 54) and Figure 14 (page 55) present data collected on the racial and ethnic composition of the population in the three counties as well as the state of Arizona. Figure 13 presents reported numbers and percentage change in individuals of specific racial and ethnic categories between 1990 and 2000. Figure 14 gives these racial and ethnic categories according to their proportional representation in the overall county and state populations. As a point of clarification, race and ethnicity are defined as separate concepts by the federal government. People of a specific race may be of any ethnic origin, and people of a specific ethnic origin may be of any race. Race in this section covers the following five groups: White, Black or African American, American Indian and Alaska Native, Asian and Pacific Islander, and Multiple Races. The population of Hispanic origin is defined for federal statistical purposes as another group and may be of any race (Hobbs and Stoops 2002; Leefers, Potter-Witter, and McDonough 2004).

The reported census data may indicate an increase in individuals who identify themselves as being both of multiple racial backgrounds and of Hispanic origin. Notably, the decade between 1990 and 2000 saw major increases in both segments of the population for Coconino and Yavapai Counties as well as for the state as a whole (Figure 14). Multiple racial background change between 1990 & 2000 is tied to change in census procedures—multi race was not a valid choice prior to 2000. Yavapai

County experienced a dramatic increase in individuals of multiple races (351 percent) as well as the population of Hispanic origin (139 percent). Although much less dramatic than those of Yavapai County, increases in the multiple race and Hispanic populations follow a similar trend for the State of Arizona. While the counties did experience major increases in the number of individuals within certain racial and ethnic groups, data show that overall, the counties' white and non-white populations fluctuated less than those for the state as a whole (Figure 14).

The past fifty or sixty years have seen only moderate racial diversification in both Arizona and New Mexico. While the Hispanic population in Arizona has increased from 20 percent to 25 percent of the population since 1940, the African American cohort, despite an especially rapid influx during the two decades following World War II and an average population growth rate of 49 percent per decade, has remained static, sitting at 3 percent of the population in 2000. The American Indian population as a percentage of total population, by contrast, has declined over the past five or six decades, falling from 11 percent in 1940 to 5 percent in 2000 (U.S. Census Bureau 2005)[12].

Between 1940 and 2000, the Hispanic population of Arizona rose from 221,331 to a high of 822,224, growing from 37 percent of the total population in 1940 to 44 percent in 2005. Between 1940 and 2005, the American Indian population in Arizona grew from 44,076 in 1940, to 275,321 in 2005. During that same time, the percentage of American Indians as part of Arizona's total population declined from 11 percent in 1940 to 8 percent in 2005. Although the percentage of American Indians in the Arizona population has decreased, the absolute number is now greater than six times the 1940 figure. What makes the percentage appear to decrease is the fact that Arizona's total population has grown from 499,261, in 1940, to an estimate of more than 6 million in 2006. While American Indian populations represent a relatively small percentage of the state's population, the tribal populations are important factors in local northern Arizona communities and counties. The Navajo Tribe is the most populous in the U.S.[13]. As the largest representative of American Indian populations, statistics from the Navajo Nation will be presented here as an example of some of the challenges that may face tribal communities. The population on the Navajo reservation was 80,462 in 2000; the tribe estimates the population to be growing at a rate of 2 percent annually. Unemployment using the U.S. Department of Labor calculations is 43 percent, although the tribe estimates it at about 67 percent. Calculation of an accurate number is difficult because the Department of Labor compares employed versus unemployed persons. In tribal communities this is more complicated, as there many people don't work full-time, there is unreported income that is not counted (craft and art sales, food vendors at celebrations, etc.), and there is a segment of the population who work outside the Navajo Nation but maintain a residence on the reservation. While the per capita income has increased in the Navajo Nation, the tribe estimates 71 percent of the income of tribal members is spent in off-reservation communities. This is due to a lack of retail businesses on the reservation, necessitating travel to surrounding locales for groceries, clothing, and other purchases.

The data also show that American Indians continue to represent a considerable portion of the population of Coconino County and that, while those of multiple race and Hispanic origin make up an increasing portion of county populations, they remain well below state averages.

Yavapai County reported a dramatic increase in its population of individuals of multiple race and Hispanic origin between 1990 and 2000, clearly outpacing increases in the same categories at the state

12 The specific numbers for these historical comparisons are found at http://www.census.gov/population/documentation/twps0056/tab17.pdf in the U.S. Census Bureau website and are juxtaposed with the Census 2000 findings.

13 2005-2006 Comprehensive Economic Development Strategy of the Navajo Nation. Support Services Department, Division of Economic Development. Navajo Nation. Window Rock, AZ.

level over the same period. The exception to this trend was Gila County, which saw increases in the multiple-race and Hispanic populations that were much lower than overall population growth for the county within the same period. Despite substantial increases in individuals of multiple-race and Hispanic ethnicity, whites remain the predominant racial group in each county within the assessment area. As of 2000, Coconino County was the most racially diverse within the assessment area due to its considerable American Indian population.

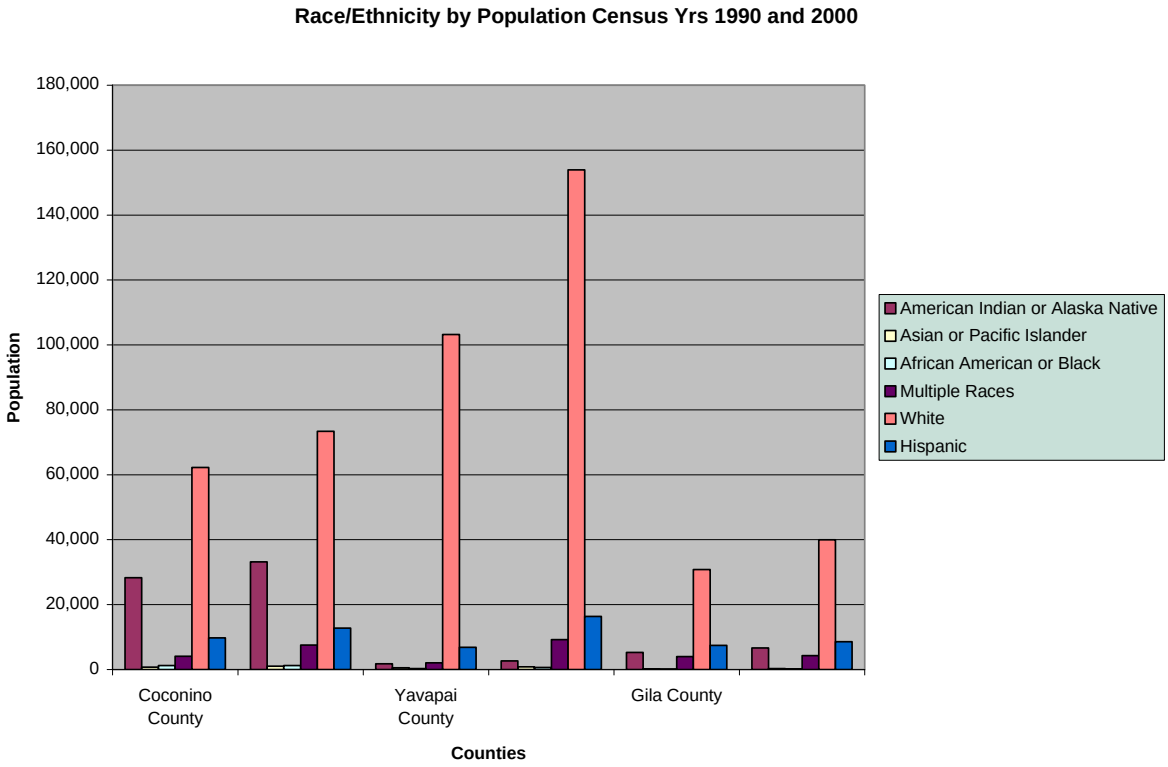


Figure 13. Race/Ethnicity by Population Numbers from Census Years 1990 and 2000

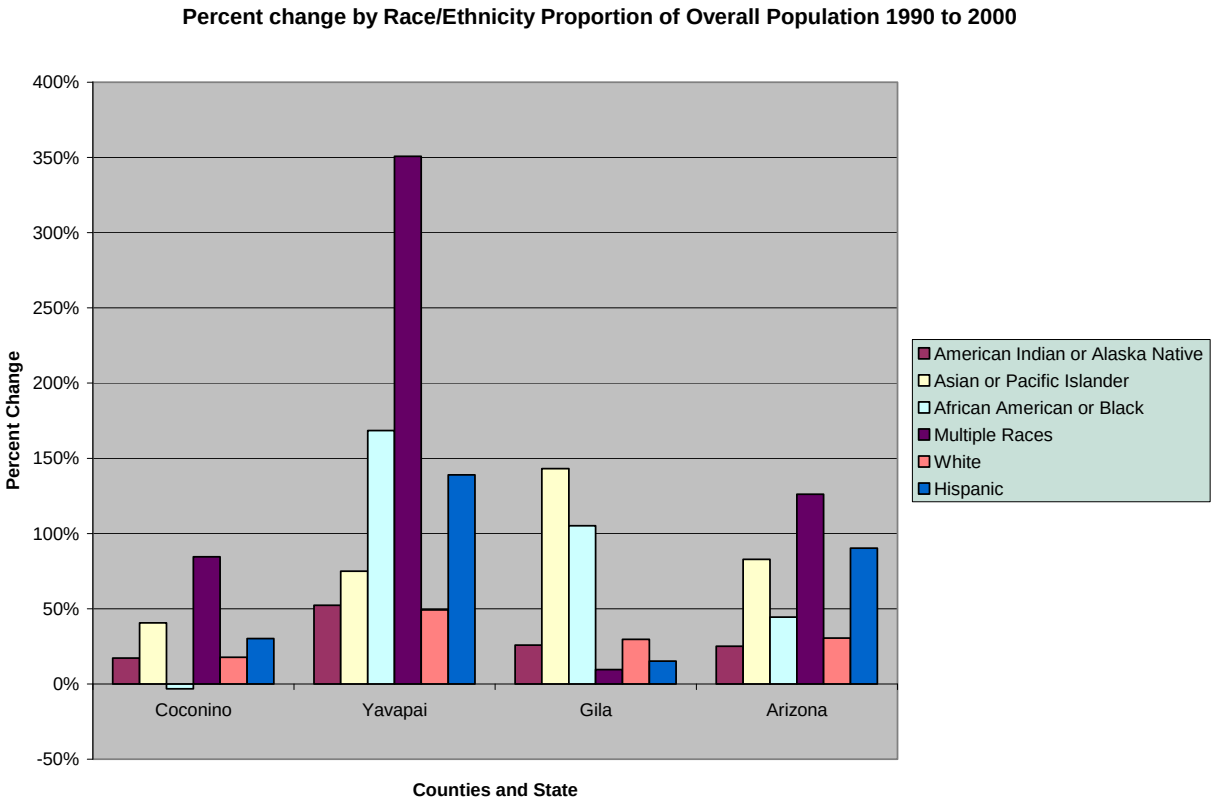


Figure 14. **Percent Change by Race/Ethnicity Proportion of Overall Population 1990 to 2000**

Educational Attainment

Data in Table 15 (page 56) shows that recipients of high school diplomas and Bachelor's degrees within both Coconino and Yavapai Counties are near or above state averages. In contrast, educational attainment within Gila County falls below the state average in both categories. In fact, the percentage of the 25-and-older population with Bachelor's degrees in Gila County (9 percent) is far below the state average (15 percent). Similarly, each of the three counties fell well short of the state average in percentages of the 25-and-over cohort (age group) with graduate or professional degrees. Overall, the trend of increasing education continues across the nation, as well as the state of Arizona. While some counties remain behind, Gila County for example, remain at a lower percentage of Bachelor's degrees, the numbers of high school and college graduates in the assessment area continue to rise (US Census, American Communities Survey Data, 2000 and 2005).

Table 15. Educational Attainment for County and State Populations 25-Yrs. Old and Over. (X) in the table, below, indicate missing data.

	Coconino County		Yavapai County		Gila County		Arizona	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Population 25 years and over	65,976	100%	120,223	100%	35,150	100%	3,256,184	100%
Less than 9th grade	4,596	6.97%	5,547	4.61%	2,257	6.42%	254,696	7.82%
9th to 12th grade, no diploma	6,108	9.26%	12,829	10.67%	5,397	15.35%	364,851	11.20%
High school graduate (includes equivalency)	14,279	21.64%	33,877	28.18%	10,087	28.70%	791,904	24.32%
Some college, no degree	12,159	18.43%	23,660	19.68%	6,824	19.41%	859,165	26.39%
Associate degree	3,891	5.90%	7,940	6.60%	2,199	6.26%	219,356	6.74%
Bachelor's degree	12,316	18.67%	15,685	13.05%	2,971	8.45%	493,419	15.15%
Graduate or professional degree	1,090	1.65%	2,021	1.68%	431	1.23%	272,793	8.38%
Percent high school graduate or higher	(x)	83.80%	(x)	84.70%	(x)	78.20%	(x)	81.00%
Percent bachelor's degree or higher	(x)	29.90%	(x)	21.10%	(x)	13.90%	(x)	23.50%

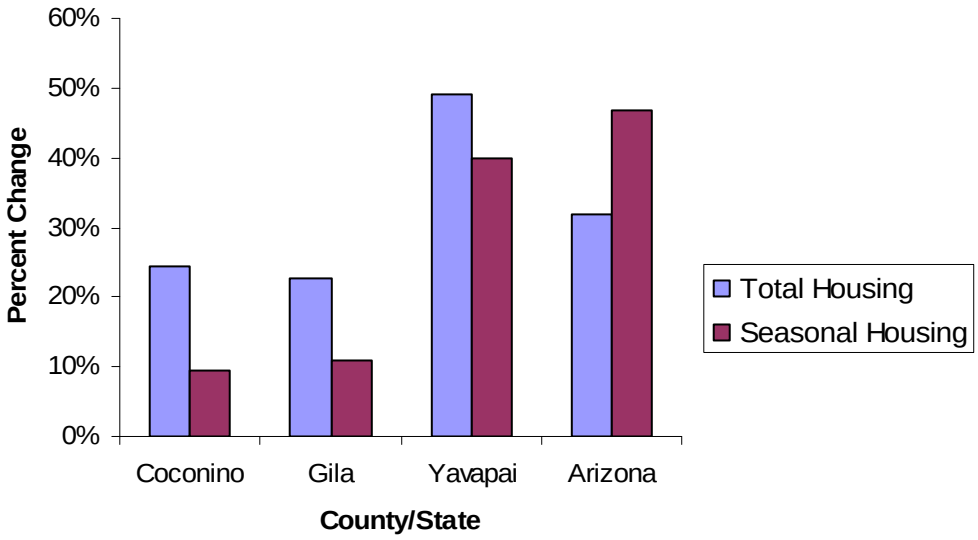
Source: U.S. Census Bureau, Census 2000 Summary File http://www.census.gov/census2000/states/az.html

Housing

Housing characteristics for the assessment area add further evidence of a trend toward rapid growth throughout the assessment area, particularly in Yavapai County (Figure 15, page 57). In that county, the decade between 1990 and 2000 saw major increases in total housing units (49.13 percent), seasonal housing units (39.84 percent), and median home value (62 percent). Given that Coconino and Gila counties generally experienced smaller increases in each of the same categories, the data clearly point toward Yavapai County as the primary center of growth for the area surrounding Coconino National Forest. Data again point toward the cities of Payson, Prescott Valley, Cottonwood, and Chino Valley as leading areas of growth with each experiencing substantial gains in total housing units between 1990 and 2000.

While housing density for all three counties remained well below the state average, median home values in Coconino and Yavapai Counties were higher than those for the State of Arizona as a whole. The cities of Flagstaff, Payson, Prescott, Prescott Valley, Camp Verde, and Chino Valley saw especially strong gains in median home value during the ten-year period.

Although increases in seasonal housing within the assessment area were less than that for the state, increases in median home values between 1990 and 2000 were greater than the average for Arizona.



Source: NRIS - Human Dimensions

Figure 15. Percent Change in Total and Seasonal Housing Units by County, 1990–2000

The Verde Valley (Yavapai County) is experiencing an increasing gap between local wages and housing costs. An example is Camp Verde where median house prices have increased from $79,000 in 1990 to $130,000 in 2000 and to nearly $400,000 by the end of 2006. Camp Verde median household incomes are $32,000 annually compared with Yavapai County median annual household income of $46,000 annually. At the end of 2006, the average cost of a house in Sedona was over $600,000 up from the median of $500,000 in 2003. Cottonwood, Verde Village, and the Lake Montezuma/Rimrock areas have also seen a doubling of house prices from 2001 to the end of 2006.

As stated in the Verde Valley Regional Plan, the county foresees a major housing issue, as a need for a quality mix of shelter options that is affordable to various population groups to correct the housing imbalance. The Verde Valley saw a 51 percent increase in population from 1990 to 2000, which translated to a 36.7 percent increase in total dwelling units in the incorporated communities of the Valley. This has been captured by the Verde Valley Regional Land Use Plan as a reflection of a robust second home market along with replacement housing, which means many substandard units are unoccupied. The plan also predicted a complex set of issues including land demand coupled with shrinking land supplies; lack of infrastructure capacity, especially water and wastewater systems: and the demand for larger lots that miss opportunities for savings from the clustering of utilities and other infrastructure. These increased costs are passed along to the buyer, which further exasperates the problem of unaffordable housing for much of the population.

Coconino County is the second largest county in the contiguous 48 states, but it also has one of the highest ratios of public and reservation lands in comparison to private lands. This combination, coupled with remoteness and limited infrastructure, traditionally has kept land and home values above the national average and often out of the reach of working-class families. However, housing opportunities in the county generally offer better pricing, but with more limited services, than what is found in incorporated communities within the county. The Coconino County Comprehensive Plan addresses this issue and has identified steps to ensure a range of housing alternatives. The remoteness, lack of infrastructure, water availability, land ownership, and the importance of preserving large tracts of land all point to a continuing affordable housing issue.

The City of Flagstaff has a long history of wrangling with the affordable housing issue. The availability of affordable housing in Flagstaff is generally influenced by a long-term booming rental business fueled by housing needs for NAU students and others who can't afford to enter the housing market; a robust second home market; a long history of imbalance between high-end housing and affordable housing; and a housing market that is generally above the national average in price and activity. The City of Flagstaff has several programs aimed at attempting to alleviate the affordable housing issue.

According to Northern Arizona Multiple Listing Service (MLS) data, median home prices have increased steadily. In 2000, the median price of a three bedroom single home was $152,000, and increased to $185,000 in 2003, and in 2006 the median price was $300,000[14] (Zanotto, 2007). During the same time frame, income only increased by 15 percent, making housing unaffordable.

Historic, current, and future predictions all point to a consistent affordable housing problem across Northern Arizona. This is especially true in and around the population centers of the area. There are different pricing structures depending on location, but the general long-term trend and future outlook identify difficulty in finding sufficient affordable housing to house an increasing population with a major workforce component.

Risk Assessment:

Table 16. Description of Trends, Risks, and the Affects to Management of Demographics.

Trend	Risks	affects to management
Increased population.	Potentially higher demand on Forest resources.	There is an anticipated increased demand on forest resources, especially recreation. If not properly managed, overcrowding and resource damage could occur in some areas.
Increases in retirement age and seasonal populations.	Potentially higher demand on forest resources and amenity service.	Management challenges to meet community desires for more water use, forest access, and recreation opportunities.
Increased diversity of interest and ethics regarding natural resources.	Demographic changes could cause a variety of interests in natural resources.	Potential conflicts in value systems between established community interests and recently arrived residents/visitors may cause friction over natural resource management.
Increase in the Hispanic demographic.	None.	Forest Service may not be prepared to provide bi-lingual employees and services to communicate and enforce rules and regulations. Demands for different types of recreation and Forest opportunities could arise.
Increase in unaffordable housing.	Potential for less migration into the area and the area becoming unaffordable for residents. Potential for a less diverse culture and economy.	Potential need for the Forest Service to maintain low-cost or free recreational opportunities. Potential for difficulty in hiring staff for the Coconino National Forest because of the high cost of living.

[14] This data is based on the median price of a three bedroom home listed and sold on the Northern Arizona MLS. It does not include for sale by owner or any other home trades or other transactions outside of MLS.

Current Conditions and Trends of Forest Contribution to Social Systems

Data in Table 17 suggests that population growth at the county and state level is expected to continue although at somewhat lower rates than were experienced over the last two decades. For example, Yavapai County experienced a 55 percent increase in population between 1990 and 2000. The Arizona Department of Commerce (ADOC) estimates that the population of Yavapai County will have increased by slightly more than 18 percent by 2010.

Table 17. County and State Population Projections, 2010–2030 and Percent Change

	Total Pop.	Projected		Projected		Projected	
County/State	**2000**	**2010**	**% Change**	**2020**	**% Change**	**2030**	**% Change**
Coconino County	116,320	147,352	26.68%	169,343	14.92%	189,868	12.12%
Yavapai County	167,517	198,052	18.23%	240,849	21.61%	278,426	15.60%
Gila County	51,335	54,603	6.37%	60,757	11.27%	66,378	9.25%
Arizona	5,130,632	6,145,108	19.77%	7,363,604	19.83%	8,621,114	17.08%

Source: Arizona Department of Commerce - Arizona County Population Projections: 1997-2050

http://www.azcommerce.com/prop/eir/population.asp

Over the past two decades, continued population growth in predominantly rural areas has brought about major changes in the dynamic relationships between human communities and publicly administered lands throughout Arizona. These changes have occurred amid ongoing resource policy debates concerning fire suppression, forest restoration, water allocation, road construction, and other economically and environmentally pressing issues. Increased population growth has the potential to put a higher demand on Forest resources. With an increasing population, there is anticipated increased demand on Forest resources, especially recreation. If not properly managed, overcrowding and resource damage could occur in some areas. Displacement of recreation users could occur, and wilderness use could increase. Increases in retirement age and seasonal populations may, in turn, increase demand for age-specific recreation opportunities. Increases in population could enlarge the WUI and demands for access, water, and recreation. With increases in the Hispanic population, and other segments of the population, there may be more demands for recreation experiences that reflect the outdoor values and activities of diverse ethnic groups. The Forest Service may not be prepared for such multi-cultural and multi-language needs. An influx in retirement-age people into communities within the assessment area will likely bring an increase in changing values toward natural resources. . Additionally, this age group is itself diverse in its values and activity interests. This may indicate an increase in potential conflicts between established community interests and recently arrived residents/visitors causing friction over natural resource management. Finally, as housing prices increase, and commuting distance for low-paying service jobs increase, wages may increase with associated travel costs. Gentrification of local housing may also present a plethora of challenges to management of WUI areas.

Although the potential for population growth can enhance the economic vitality of rural areas through greater employment opportunities and an expanding tax base, it can also challenge the capacity of rural communities and public land managers to provide for the wide array of services. This is particularly true in areas where potential conflicts in value systems between established community interests and recently arrived residents can create friction over natural resource management. For example, the growth in populations seeking natural amenities from forest lands may pit them against traditional commodity interests. Likewise, the dramatic growth in multiple race and Hispanic populations may force different demands for public services as they may interact with natural

resources in fundamentally different ways than have been the historic norm for the resident population (McCool and Kruger 2003).

Population growth between 1980 and 2000 in the assessment area for the Coconino National Forest was only slightly less than that for the entire state (86 percent and 89 percent respectively). This trend suggests major changes in the human populations surrounding the forest that are likely not only to affect the quantity of goods and services demanded from public lands but also to influence the character, or quality, of those goods and services. Research shows that areas with an abundance of natural-resource-based amenities (mild climate, forested mountains, rivers, lakes, access to hiking and camping, presence of clean air and water) are increasingly attractive to retirement-age populations and others seeking to take advantage of the quality of life offered by small, rural communities. In particular, migrants are increasingly attracted to smaller communities with relatively affordable housing, low crime rates, and cultural traditions associated with small, rural towns throughout the Mountain West (Booth 2002, McCool and Kruger 2003, Bodio 1997, McHugh and Mings 1996). These demographic shifts are borne out by collected data for Coconino National Forest, which shows substantial increases in population and housing in Yavapai County as well as increases in both the retirement-age population and the number of seasonal housing units throughout the areas characterized by small, rural towns.

Attitudes, Values, and Beliefs Focus Group Results

Diversity characterizes both the forest and social environment of the Coconino National Forest. The social environment ranges from small rural mountain communities to the urban areas of Flagstaff and tourist destinations such as Sedona. Phoenix and other urban communities are also a source of second home owners who are seasonal residents. Forest lands range from the highest snow capped peaks in Arizona to the verdant desert valleys in the southern portions of the forest. Participants in the Attitudes, Values, and Beliefs (ABV) Focus Groups expressed particular views about the existing social environment and characterizations of National Forest System lands and resources that structure the planning environment for revision of the existing Forest Plan. There are two prominent themes regarding the changes in the social environment and their influences on forest use and resources: (1) overall population growth and (2) changes in values, some of which are related to population growth and composition (Russell 2006).

Population Growth

The Coconino National Forest has collected information from the public in a variety of manners and methods: letters, public meetings, emails, and the (ABV) Focus Group. Several prominent themes are found throughout public comments and ABV group: concern about population growth in Arizona and how it will affect the management, use, and accessibility of the Coconino National Forest. Below are a compilation of comments and information received through the above methods.

The population growth throughout Arizona is creating an increased demand for the use of Forest lands and resources. It was perceived by the ABV group that this growth is inevitable because of the lifestyle benefits offered by the natural resources of Forest lands and resources, which is support by many of the public meeting comments by residents stating that the nearby open spaces and natural environment of the Coconino National Forest adds to their quality of life. Population growth has resulted in more development, which affects the WUI around the communities. Phoenix area growth is affecting local communities because some of those residents are migrating to northern Arizona; and, Phoenix area residents use the environs of the Coconino National Forest for recreation. Recreation use of the Coconino National Forest has increase exponentially. The amenity and lifestyle benefits are an important aspect of the social environments that are affecting population change with the Coconino National Forest.

Population diversity is more apparent in urban areas, although the land ethic of visitors from the greater Phoenix area and environs contribute to the perceived diversity of users of forest resources. There are distinct differences within communities adjacent to the Forest, varying from communities adjacent to Forest lands show distinct differences, varying from urban Flagstaff, rural Blue Ridge, tourist-oriented Sedona, and the growing environs of Verde Valley. Most of these communities perceive that they are "surrounded" by National Forest System lands, which they are. The ratio of public to private lands appears to focus attention to public lands management issues and to the needs for cooperation and partnerships between the Coconino National Forest and adjacent communities.

Some communities have higher proportions of seasonal residents, including Blue Ridge, whose population fluctuates with residents who summer in the mountains and winter in the greater Phoenix area. The ratio of permanent residents is increasing in the mountain communities. With increased use and residence, some participants fear that the rural character of these communities is being compromised. Both Sedona and Blue Ridge experience "churning," or population turnover, attributed to those who move to rural areas and find that the reality of rural lifestyles is not consistent with their expectations or needs, and these individuals and families then move on and are replaced by new residents.

Changing Cultural Values

The public and ABV participants also describe changes in values as an important characteristic of the social environment. Some of these changes are associated with overall population growth, while others are attributed to generational differences or the values of newcomers to the area.

There is strong concern regarding a change in land ethics and values regarding stewardship of the natural resources. The change in land ethics is perceived to result in an increased potential for problem behavior. The changes are perceived to be generational and associated with the increased use from urban areas. There are also values and attitudes perceived to be associated with younger generations and newcomers to the area that are described as problematic (Russell 2006). These are issues such as the influx of newcomers to the area wanting to bring all the accoutrements of the city, which are perceived to be problematic. Newcomers are perceived as not having an established land ethic for the Coconino National Forest. Perceived land ethics are different for the baby-boomer generation and the younger generation for the Coconino National Forest.

Together, these shifts in the community demographics within and adjacent to the Coconino National Forest implies a need to develop good working relations between management agencies and their local publics. For example, how might agencies contribute to the maintenance of viable resource economies given increasing demands for non-commodity Forest resources? Similarly, how does expansion of the WUI issues such as forest access, water quality, habitat fragmentation, or fire management? Finally, demographic change within forest communities may influence not only the management of natural resources, but also the social and political acceptability of processes used to develop management plans. Land management objectives of new property owners may lead to demands to change how adjacent federally administered land is managed. In addition, new resident/visitor populations may lack a thorough understanding of underlying community values while at the same time acting on an incomplete understanding of planning regulations and methods of influencing political processes (McCool and Kruger 2003, Booth 2002, Wilkinson 1992).

Tribal Values

The Coconino National Forest regularly consults with thirteen tribes about activities proposed on the Forest that may be of interest or concern to them. These include 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. Seven Navajo Chapters in proximity to the Forest—the Cameron, Coalmine Canyon, Dilcon, Gap-Bodaway, Leupp, Tolani Lake, and Tuba City Chapters—and the Dine' Medicine Man's Association are also included in the Forest Service's consultations process. Recently, the Forest Service has also assembled a Tribal Relations Task Force, composed of American Indian employees of the Forest, to provide Forest managers with their perspectives about Forest programs and activities.

Although the thirteen tribes often share the same perspectives on many Forest-related issues, it is important to remember that each group has its own unique set of beliefs and values that are different from those of mainstream America. To traditional practitioners, spiritual values are placed on events, people, places, and things that are often difficult to understand or quantify from the dominant culture value system that is based on Euro-American perspectives. For example, traditional tribal values typically do not make a distinction between what is secular and what is religious. Those values are intertwined as a foundation of their culture and beliefs. Traditionalists perceive all actions and events as inter-related and believe that individuals have personal responsibilities to perpetuate all life and the harmony of the universe. Many places and sites on the Forest are considered "traditional cultural properties" that are formally recognized as physical manifestations of the values and beliefs that give tribal people their identity as a people. These special places are considered to be a living cultural landscape that are testaments to the tribal histories, values, and beliefs that must be sustained if their cultures are to survive into the future.

Each tribe has its own traditional cultural properties, but San Francisco Mountain is a pre-eminent place that figures prominently in the cultures of all thirteen tribes and is respected by many other tribes throughout the United States and Mexico. Forest Service activities and permitted uses of the mountain are of special concern to tribes. The development of the Arizona Snowbowl for skiing and winter sports has been a particularly contentious issue since the 1970s. Most recently, a proposal by the Snowbowl to allow artificial snow-making using reclaimed water resulted in a lawsuit, still under litigation, that may be appealed to the U.S. Supreme Court (USFS 2005k). This has severely strained the relationships that had developed over the years between the Forest Service and the tribes.

Because of this, the Hopi have stated that the manner of consultation used in the past needs to be changed. This will likely result in modifications to the Memorandum of Agreement the Forest Service has with the Hopi Tribe and future Memorandae with other tribes. However, efforts are ongoing to rebuild relationships. The Hopi still look to the Forest to help them obtain trees from the general area of the Peaks that can be used to rebuild their kivas, and local Navajo Chapters obtain firewood from the Forest to warm their hogans in the winter months. Special-use permits continue to be provided at no charge for the collection of boughs and plants for medicinal and ceremonial uses. The Forest Service is working closely with the tribes on two major initiatives, the Forest Plan Revision and the implementation of the 2005 Travel Management Rule, as a way to better understand tribal needs and strengthen relations. Consultations on these two items is confirming past uses of the Forest by the tribes and focusing attention to their continued needs for access and use of the Forest. With the proposed travel restrictions being considered by the Travel Management Rule, several tribes are particularly concerned about its potential effect on firewood collecting and access to collect special plants for ceremonial and medicinal use. This is particularly important for elderly people, the main collectors of plants, whose age and physical condition makes vehicular access a considerable concern.

Risk Assessment:

Table 18. Description of Trends, Risks, and the Affects to Management of Tribes.

Trend	Risks	Effects to management
Decline of traditional cultural values.	There could be a decline in cultural vitality.	Even though the decline of traditional values is not under Forest Service control, the Coconino National Forest could contribute to sustaining these values. This could be done in a variety of ways such as allowing access to traditional plant gathering areas and restoring native plants used by tribes.
Increase in efforts to work with the tribes by the Coconino National Forest.	If these efforts do not continue to expand then negative reactions from the Arizona Snowbowl case could increase.	If communications and relationships with the tribes weaken, the Coconino National Forest will risk subsequent legal and Congressional action to change the working relationship.
Tribes are more frequently expressing a desire to collect forest products for food, medicine, and traditional practices. As interest in collecting forest products increases, it is evident that many people do not understand different governmental land jurisdictions, different agency permit requirements, or when and how to obtain permits. Legal and illegal tribal collecting of firewood is increasing as populations around the margins of the Forest increase. Tribes are concerned that they have to travel further distances in order to collect firewood.	Concern that some desired plants, such as pinyon and native tobacco, are at risk, and becoming more difficult to find. Travel Management Rule implementation will restrict access to the forest for gathering. Not enough information reaching the local native communities on how to obtain a permit.	Tribal relationships with the Coconino National Forest could suffer from lack of information about differing agency jurisdictions, permitting requirements, and plant protection policies. Illegal plant and firewood gathering could occur from lack of information. Law enforcement contacts and possible issuance of citations could further erode agency and tribal relationships.

National Forest Land Use Trends

Land-Ownership, Open Space, Land Exchanges, and other Land-ownership Adjustments

The Coconino National Forest is primarily located within two large counties: Yavapai and Coconino. Yavapai County is one of Arizona's original territorial counties formed in 1864 and currently encompasses 8,122 square miles (5,198,912 acres). Thirty-eight percent of the land is administered by the U.S. Forest Service, 11.6 percent by the Bureau of Land Management, 24.6 percent by the State of Arizona, 25 percent is held privately by individuals or corporations, and 0.5 percent is Native American Reservations.

Coconino County, carved out of the previously designated Yavapai County in 1891, is the second largest county in the United States and the largest County in Arizona encompassing 18,617 square miles (11,915,148 acres). Thirty-eight percent of Coconino County is Native American Reservation, 27.5 percent is administered by the U.S. Forest Service, 4.8 percent by the Bureau of Land Management, 9.5 percent by the State of Arizona, other public lands comprise 6.8 percent, and 13.3 percent is held privately by individuals or corporations. Totaling approximately 1,842,700 acres applicable portions of the Coconino National Forest comprise about 12 percent of Coconino County and 8 percent of Yavapai County, respectively. There are also approximately 6,063 acres of the Coconino National Forest within Gila County.

As a whole, land ownership within the assessment area involves large amounts of American Indian and National Forest System land and relatively small amounts of private land. The relative lack of private land has caused greater demands to be placed on the National Forests, in particular, to accommodate many needs that in most areas of the nation are provided for by private lands. County land use within the assessment area ranges from traditional uses such as ranching in rural areas to concentrations of residential, industrial, and commercial uses 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. For example, the population of Yavapai County increased rapidly in the last thirty-eight years—from 31,000 inhabitants in 1962 to 62,300 in 1978 to 107,714 in 1990 to 167,517 in 2000. The population increase of 56 percent from 1990 to 2000 made Yavapai the second fastest growing county in Arizona. The provision of adequate, affordable infrastructure as well as sufficient water supplies is a growing concern for planners, residents, and land managers throughout the assessment area.

Included in the 2007–2012 Forest Service Strategic Plan is a goal to conserve open space. The Coconino National Forest has been involved with various local community planning efforts that have acknowledged open space needs including the Coconino County Comprehensive Plan, Regional Land Use and Transportation Plan, and the Open Space and Greenways Plan. The Greater Flagstaff Area Open Spaces and Greenway Plan define goals for open space, which is acknowledged as contributing significantly to the quality of life in the greater Flagstaff landscape. This plan set some direction as to where and how much of the existing open space will continue into the future with an increasing population and demand for development. The Regional Land Use and Transportation Plan and the Coconino County Comprehensive Plan talk about areas that are appropriate for certain kinds of development and areas that should be kept as open space. These plans generally make an effort to provide for a non-residential buffer in new developments adjacent to Coconino National Forest lands.

The Forest Service may acquire lands through exchange, purchase, donation, or condemnation. Land exchange and land purchase have been, and will continue to be, the means by which the Coconino National Forest acquires key wildland resources and open space areas. It should be noted that land

exchanges are invariably controversial, complex and, unless the case processing is funded by the proponents, are not considered a high priority for Forest funding. Most of the federal lands exchanged are within or near existing communities. Conversely, the majority of land acquired by the Forest Service is located in more remote portions of the Forest. On a per-acre basis, lands near existing communities and related infrastructure are valued higher than those acres in more remote acreages. Because of this difference in value, land exchanges on the Coconino National Forest 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 National Forests. The Coconino gained 8,528 acres and 3,262 acres went into private ownership. Land purchases on the Forest during an eight-year period between 1998 through 2005 acquired 7,139 acres for a cost $43,661,000, which came from a variety of funding sources but primarily from the national Land and Water Conservation Fund.

Only about 13 percent of the land in Coconino County is privately owned, limiting land available for development. Nine large ranch holdings account for approximately 71 percent of the private land, which has limited the available land base for development even further. Population growth has surpassed predictions written into the county plans. As a result, within Coconino County there is support for both private and public agency land exchanges and other types of land-ownership adjustments with the Forest Service, which result in additional private land to accommodate future development.

Some individuals and groups have opposed land exchanges, particularly in specific areas of the Forest. The general public sentiment in the areas of Sedona and the Village of Oak Creek is opposition to land exchanges near these communities. Amendment 12 to the current Forest Plan outlined restrictive land exchange direction Sedona and Village of Oak Creek areas. The Walnut Canyon Management Area near Flagstaff is another location where there has been opposition to land exchange. This restrictive sentiment was documented as a standard in Amendment 17 to the current Forest Plan. There is a segment of the public who want to carry the Sedona and Walnut Canyon direction forward into the Forest Plan Revision. The opposition to exchange is specific to land disposal, as acquisition of lands in these respective areas by exchange or purchase remains acceptable.

Recent trends, over the past five years, have included a significant increase in requests by other governmental entities to acquire Forest land by purchase under the authority of specific sale or grants such as the National Forest Townsite Act or the Education Land Grant Act. Another trend has been for land exchange proponents to lobby for and obtain special legislation for their exchange in an attempt to circumvent portions of the administrative process and/or to get their proposal priority through Congressional mandate.

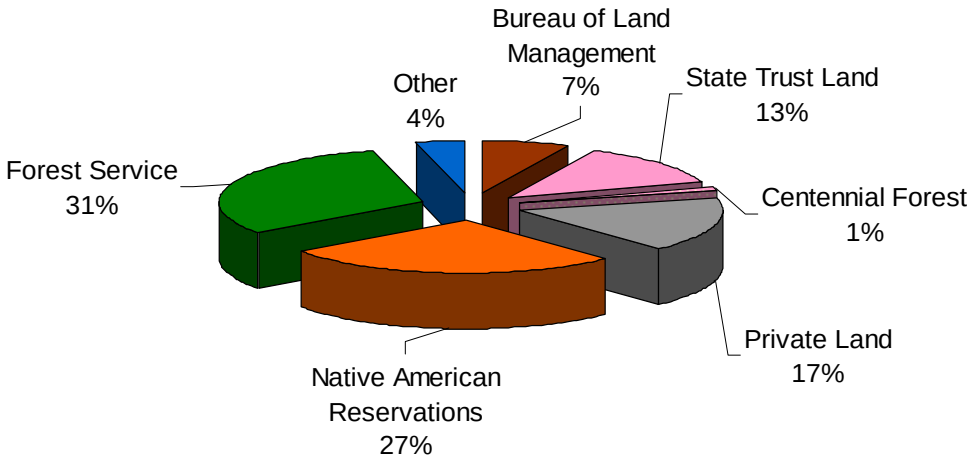


Figure 16. Percent Ownership of Major Landowners in Coconino and Yavapai Counties. Sources: Coconino County Comprehensive Plan and Yavapai County Profile (Arizona Dept. of Commerce)

Risk Assessment:

Table 19. Description of Trends, Risks, and the Effects to Management of Land Ownership, Open Spaces, Land Exchanges, and other Land Adjustments.

Trend	Risks	Effects to management
Demand for more land from the Forest to keep up with private and community growth.	Limited private land for development is leading to an increased demand for Forest lands to accommodate growth.	By prioritizing land exchanges and sales, the Coconino National Forest could help contribute to the growth of the assessment area, while still providing for open space, recreation, and other Forest amenities.
Increase in community and private development within the Forest.	With an increase in development there will be a loss of open space.	Working with the counties, towns, and cities the Coconino National Forest can provide and/or acquire critical or preferred areas of open space. Municipalities need to acknowledge that some types of development adjacent to the Forest can have an adverse effect on the character of the adjacent Forest, which may make those lands undesirable for National Forest purposes.
Increased Forest involvement with county, town, and city planning for both open space and development needs of communities within the Coconino National Forest.	This is a positive trend. Lack of cooperation and involvement would lead to conflicting goals and management actions.	If the counties, towns, and cities and the Coconino National Forest work together key Forest lands adjacent to towns and cities can be maintained to provide critical open space. Appropriate lands can be exchanged or sold to accommodate desired development.

Fire Effects and Management

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 National Forest is a fire-adapted ecosystem. The vegetation on 68 percent, or 1,489,087 acres of the 1,842,700 total acreage of the Coconino National Forest, has evolved with a frequent fire return interval. Very few of the natural vegetation types that occur on the Coconino National Forest are experiencing fire at their historic return interval. Social attitudes that accept more frequent burning would help regain and then maintain forest health.

Current scientific research indicates that fire exclusion eventually results in greater fire hazard and unhealthy forests, which is the current trend. The increased vegetation and fuel buildup due to the lack of low-intensity fire, the decline in thinning treatments, and tree mortality from insect infestation, and prolonged drought could be addressed to some degree by the increased use of fire (Wildland Fire Use and prescribed burning).

Many comments received from the public on the Forest Plan revision support the return of natural fire to the forest. However, other comments received, while supporting the return of natural fire, do not

like the smoke generated from any fire. The Coconino has several hundred miles of boundary where private property owners have built homes. Additionally, the population of these developed areas adjacent to the Forest has increased significantly along with the associated homes, businesses, and infrastructure. This has increased the priority of treating hazardous fuel accumulations in the WUI before non-WUI areas.

Across the western United States, wildfires are trending to be larger in size and with a greater burn severity. This has increased the potential fire impact to communities and their associated infrastructure. Current wildfire trends show the acreage of devastating wildfire has significantly increased while the number of fires occurring has decreased. The Forest is positioned to follow the trend of larger, more severe wildfires that is occurring across the western United States, and the threat of impacts to the WUI because of dense development is increased. The vegetative conditions and fuel accumulation are conducive to larger, more severe wildfires than could have occurred historically.

Mitigating these conditions and educating the public are goals for the cities and counties, as well as state and federal land management agencies within the assessment area. Fire prevention efforts by the Forest Service and cooperating agencies are having an impact. While the number of wildfires started by lightning is relatively stable, the number of human-caused wildfires has been decreasing, even though the population has increased since the creation of the Forest Plan in 1987.

Projects that reduce the risk of severe fire effects and provide long-term Forest health are greatly supported. Public support for restoring fire-adapted ecosystems by managing fire from natural ignitions (Wildland Fire Use) and treatment of hazardous fuel accumulations with prescribed fire on Coconino National Forest is mixed. Community Wildfire Protections Plans (CWPP) are considered as Forest program priorities and treatment decisions are made. Flagstaff has recently completed a CWPP, and the Blue Ridge area is currently creating one.

The large acreage of the Coconino National Forest requiring thinning coupled with the low market value of the small-diameter trees removed during treatments and limited utilization facilities has resulted in these treatments progressing slowly in comparison to the identified need. Prescribed burning, particularly in the WUI, has increased since completion of the Forest Plan.

Risk Assessment:

Table 20. **Management of Fire and WUI, Description of Trends, Risks, and the Effects**

Trend	Risks	Effects to management
Increased vegetation and fuel accumulation on the Coconino National Forest.	Larger unwanted fires. More severe fire effects. Reduced watershed function. Smoke impacts to human health. Increased cost to taxpayer.	Greater cost of watershed rehab and restoration following more destructive fires. End of the fiscal year borrowing from other funds to cover fire-fighting costs can create deficit in other funds types.
The focus of hazardous fuel treatment has shifted from non-urban interface to WUI.	Reduced treatments and fire protection of non-WUI areas could lead to more damaging fires in those areas. Delay in shifting some of the burden of treatment and protection responsibility to private landowners.	Increased costs of hazardous fuel treatments. Increased need for Wild Fire Use in non-WUI. Greater dependence on fire departments with WUI responsibility. Educate private landowner on their responsibility for fuel treatments.

Trend	Risks	Effects to management
Public education and collaboration need has changed with population.	Insufficient without complimentary treatment on Forest lands.	Involve all fire protection partners. Education burden will increase; fire-adapted ecosystems, human-caused fire prevention. Shift responsibility for education, treatments, and fire protection in the WUI to communities and private landowners.
The rate of hazardous fuel treatment has increased since the last planning cycle.	Smoke impacts to communities and air sheds. Costs of fuel treatment and suppression consuming greater % of limited resources funded. Increased risk of escaped fire.	Larger treatment acreage in non-WUI areas needed. Smaller project treatment acreage in WUI due to cost and smoke impacts. Increase in cost of implementation due to smoke management requirements. Increased monitoring of smoke impacts.

Water and Watersheds

Water Supply and Demand

Forest water supplies are drawn from surface and groundwater. Surface water and groundwater use and demand has increased since 1971 indicating upward trend in water use and demand. Groundwater (wells, seeps, and springs) use now satisfies a very large portion of overall water demand Forest-wide from domestic to livestock and wildlife watering. Much of Forest groundwater use comes from seeps, springs, and to a lesser extent, wells. These seeps and springs are widely scattered throughout the Forest, are limited in number, and generally do not produce much water. The groundwater supply associated with springs and seeps has been observed (Forest water right file documentation and anecdotal information) to vary over time from static to slightly downward during periods of drought. Forest wells have not been intensively monitored, and therefore trend in groundwater supply is unknown. Flagstaff domestic supply well field monitoring indicates static to slightly fluctuating water levels with decreased water levels during periods of drought and high use.

The City of Flagstaff, Coconino, and Yavapai counties are increasing in population, causing increasing water demand. Flagstaff draws its water supply from the Upper Lake Mary reservoir and a series of wells located in the Lake Mary and Woody Mountain well fields and the San Francisco Mountain's Inner Basin, which is the only designated municipal supply watershed on the Forest. Forest management of the municipal supply and Lake Mary watersheds has a large affect on domestic water quality and supply. Therefore, collaborative, Interagency Agreements and Special-Use permits have been crafted to guide appropriate management in these watersheds. Increased water demand in Flagstaff will necessitate additional well drilling. Additional well drilling and pumping adjacent to Forest lands could tap into local groundwater, reducing spring, seep, or stream riparian habitat and negatively affect those species that rely on it for their survival. Additional riparian conservation measures may be needed to protect these areas. While overall groundwater supply remains static to slightly declining during periods of drought and high use over time, increasing demand poses risk to groundwater supply and those plants and animals that rely on it for their survival.

A recent water supply and demand study spearheaded by the Bureau of Reclamation determined that water supply would not meet domestic water demand in the area by about 2040. Therefore, the Colorado Plateau Water Advisory Committee formed a collaborative group to analyze alternatives for supplying water to the area from the Colorado River. Currently, a feasibility study proposed to Congress may analyze alternatives, including cost to supply the Colorado Plateau water users.

Palmer Drought Index data (National Drought Mitigation Center Drought Impact Report) indicate that from 1985–1995 the assessment area was under conditions of severe or extreme drought only 5–10

percent of the time. Since about 1996, data indicate conditions of abnormally dry to extreme drought have prevailed resulting in reduced groundwater recharge, decreased surface water flows, and water supply. This has impacted ecosystems, landscapes, and caused high wildfire risk in untreated areas. Conservation and protection of domestic water supplies, wetlands, and riparian areas are important values for the communities in the assessment area. This has impacted ecosystems, landscapes, and caused high wildfire risk in untreated areas. Conservation and protection of domestic water supplies, wetlands, and riparian areas are important values for the communities in the assessment area.

Forest surface water is limited and found in several small, perennial streams, human-made reservoirs, and earthen stock tanks. Most perennial streams occur in the southern half of the Forest while most reservoirs are found in the northern portion and stock tanks scattered throughout.

Perennial streams and reservoirs offer opportunity 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 while livestock, wildlife, and fish water use has remained static resulting in a trend of overall higher use while supply remains static to slightly downward during periods of drought. Additionally, recent trend has been to reduce livestock access to riparian areas and wetlands or pipe water away from sources into troughs.

Increased recreation presence and continued grazing has resulted in reduced availability of water resources for wildlife, fish, and livestock. Sensitive watersheds, streams, wetlands, and riparian areas could experience resource damage from over use and cause management to limit livestock access. Fewer water access points could limit and reduce overall grazing carrying capacity and permittee profits might decline.

Additional concern has been expressed from the National Park Service and the City of Flagstaff over the management of the Walnut Creek Watershed, which includes the Lake Mary domestic supply reservoir. The Technical Advisory Committee (TAC) was recently formed between the City of Flagstaff, National Park Service, and Coconino National Forest as stipulated in the settlement of the General Adjudication of All Rights to Use Water in the Little Colorado River System. The purpose of the TAC is to provide multi-agency guidance for the protection and management of the Walnut Creek Watershed and its associated values.

Water Rights

All water in Arizona belongs to the state, but people can own the right to use surface and groundwater. Early in its history, Arizona adopted the doctrine of prior appropriation to govern the use of surface water. This doctrine is based on the tenet of “first in time, first in right,” which means that the person who first puts the water to a beneficial use acquires a right that is better than later appropriators of the water. Prior to June 12, 1919, a person could acquire a surface water right simply by applying the water to a beneficial use and posting a notice of the appropriation at the point of diversion. On June 12, 1919, the Arizona Surface Water Code (now known as the Public Water Code) was enacted.

Due to the limited supply and increasing demand for water, the State of Arizona requires water rights be filed for any individual or entity desiring to use surface water. It is important to protect established water rights because total claims to water far exceed the supplies. Major Forest uses filed for include domestic, livestock, recreation, and wildlife and fish. This has resulted in thousands of filings by hundreds of individuals and government entities, and in many cases there are duplicate claims on the same water source. The State of Arizona has divided portions of the state into adjudication areas roughly equivalent to large watersheds. Adjudications are court determinations that will determine who will be granted what water and for what use and how much for each filing. The Coconino

National Forest is contained in the Little Colorado River (LCR) and the Gila River (Verde River portion) adjudication areas.

Determining Indian water rights is amongst the most important water resource issues in all of Arizona. In general, Indian water rights are senior to non-Indian users. Granting water rights to the Navajos and other tribes could reduce the amount of water adjudicated to junior water rights holders including most LCR claims on the Coconino National Forest and would have major implications for future water use. Active settlement discussions have been ongoing since the 1970s and continue in the LCR adjudication area today between tribal and non-tribal users. To date, no final settlement has been reached in either adjudication area.

The Salt River Project (SRP) claims water rights with a priority date of 1910 in the Verde watershed as a result of the Kent decree settlement of 1910. It established who had the water rights in the Salt River watershed above Joint Head Dam (near the current Sky Harbor Airport) but never addressed water rights along the Verde River. SRP's request to determine the water rights of both the Salt River and Verde River watersheds has grown into what is now called the Gila River General Stream Adjudication covering about two-thirds of the state. Either future settlements or adjudication will decree who has the right to use the water, how much, and for what purpose. Arizona courts have long recognized SRP as a senior water rights holder in the Verde watershed. Therefore, SRP protests all Forest Verde watershed water rights claims with a priority date later than 1910 on the grounds that the normal and flood flows of the Verde River have been already appropriated by SRP and others. Existing water rights claims in the Verde and LCR watersheds still have unresolved protests and are at risk of being lost, which could result in loss of water supply for Forest uses.

Water rights continue to be a big issue on the Forest and adjoining lands because they determine who has the right to use the water, how much, and for what use. The trend continues to be a reliance on negotiated water rights settlement agreements in lieu of court adjudications that determine and decree who has the right to use the water. Adjudication may award some water rights to non-Forest Service claimants. Water rights settlements between affected parties have a greater chance to procure and protect necessary waters required for domestic use, livestock, and wildlife watering. Adjudication in favor of Forest Service claims would result in no change to Forest management. Adjudication resulting in favor of non-Forest Service claimants would restrict water use to conditions in the claim and may cause loss of water sources or access for wildlife or cattle. Settlements would allow continued wildlife and livestock watering similar to current management and would not require changes in management.

CC Cragin Dam and Reservoir: C.C. Cragin reservoir, with a storage capacity of 15,000 acre-feet, is located in Coconino County about twenty-five miles north of Payson near Clint's Well atop the Mogollon Rim in the Coconino National Forest. The dam was built in 1965 and stores East Clear Creek water. Salt River Project (SRP) acquired C.C. Cragin (formerly Blue Ridge) reservoir from Phelps Dodge Corporation in February 2005 as part of the Gila River Indian Water Rights Settlement approved by the Arizona Water Settlement Act. In addition to satisfying obligations to the Gila River Indian Community, C.C. Cragin could be used to supplement SRP shareholders' water supply and to assist in improving the water supply situation in northern Gila County in accordance with the Arizona Water Settlements Act. In addition, Phelps Dodge and SRP agreed that if SRP acquired the reservoir, a portion of the water would be delivered to the Gila River Indian Community as part of the Comprehensive Gila River Settlement. Future use of the reservoir water by Gila County may partially satisfy increased domestic water demand for Pine, Strawberry, and Payson but further reduce water levels in reservoir storage.

Water Quality

The Forest contains streams, lakes, and human-made reservoir lakes with variable water quality. Maintenance of clean water remains an important issue on the Forest and continues to affect Forest management. Five lakes are Impaired (Category 5 and EPA 303d/Impaired list) for mercury in fish tissue (Long, Soldiers, Soldiers Annex Lake, Upper and Lower Lake Mary). ADEQ recently classified about forty-two miles of Oak Creek and Spring Creek as Category 5 for exceeding E. coli pathogens and recommends adding them to EPA's 303d list. About twenty-four Forest stream miles are listed as Category 4, and about 240 miles of Category 3 (Inconclusive) occur on the Forest (see Ecological Sustainability Report for more details).

Future water quality trend is projected to be similar to trend since 1989 (Static to Slightly Upward) under continued, similar management except downward for listed lakes and streams. Impaired water quality will continue to affect recreational water use and pleasure on the five lakes, including fishing and fish consumption and swimming in Oak Creek and Slide Rock. Reduced recreational pleasure may cause fewer people to visit Flagstaff and negatively affect local economy. Impaired waters will necessitate improved Forest management and require additional funding.

Watershed and Soils

The health of soil and watersheds affects the health of other resources including wildlife and fish, range, timber, and recreation and their associated uses. Forest-wide, about 62 percent of the soils are in satisfactory soil condition while about 20 percent are impaired, about 7 percent are in unsatisfactory condition, and about 11 percent are inherently unstable (see Ecological Sustainability Report of Soils and Terrestrial Ecosystems, Steinke, 2007 for definitions and details). Most areas that are currently in impaired and unsatisfactory soil condition would probably have historically been in satisfactory soil condition for a combined total of about 89 percent of the Forest (1,631,680 acres) in satisfactory soil loss condition. About 11 percent of the Forest (207,076 acres) would have been unsuited or inherently unstable historically.

There has been increased recreational use including camping and OHV use in wetlands, montane meadows, and aspen stands causing impairment of watershed function where use occurs. There is a downward trend comparing historic pre-European settlement condition to current condition. More recent trend is not largely quantified, but substantial portions of the Forest continue to have impaired and unsatisfactory soil conditions.

Maintaining satisfactory soil condition is important in maintaining long-term soil productivity, which is key to sustaining ecosystem diversity and sustained yield of Forest products. Unsatisfactory and impaired soil conditions (about 27 percent of Forest) have resulted in the reduced ability of the soil to grow plants and sustain productive, diverse vegetation and sustain those species that rely on its habitat for survival. These soils have reduced productivity; most have accelerated erosion that may lead to sedimentation and reduced water quality. Reduced water quality can cause higher maintenance costs to the city for domestic water treatment and limit swimming and fishing opportunities in the Forest, affecting recreation opportunity

Reduced soil productivity decreases the amount of commodity items that can be produced on the land including timber products and livestock production resulting in decreased timber volumes and profits to the timber and ranch industry. Reduced soil productivity may also result in loss in the quality and quantity of wildlife species. The loss of wildlife directly affects the number of big game permits that can be issued by the AZG&FD as well as the opportunity for wildlife watching. That loss may directly affect the local and state economy.

Wild and Scenic Rivers

Nine Forest rivers (sixteen segments) have been inventoried for Wild and Scenic River eligibility, and thirteen segments were determined to be potentially eligible (a preliminary Eligibility Classification, 1993). In 1984, Verde River segments were congressionally designated as Wild and Scenic and now have a Comprehensive Management Plan to preserve the free-flowing condition. Currently, only two segments of Fossil Creek have had proposed legislation for Recreational and Wild classification. The purpose of designation is to protect these rivers from development that could substantially change their wild or scenic nature.

These rivers are designated and preserved for possessing outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. Rivers, or sections of rivers, are preserved in their free-flowing condition and are not dammed or otherwise improved. Designation as a Wild and Scenic River is not the same as designation as a National Park and does not confer the same level of protection as a Wilderness designation. Instead of enacting strict and mandatory conservation measures, the goal is often to preserve the character of a river. The Verde Wild and Scenic River is managed by the Coconino, Tonto, and Prescott National Forests

Oak Creek and West Fork of Oak Creek were designated as a State Unique Water (Outstanding AZ Water) in 1991. It is free flowing and of exceptional recreational and ecological significance because of its unique attributes including geology, flora and fauna, water quality, and aesthetic values (AZ Surface Water Quality Standards R18-11-112).

Risk Assessment:

Table 21. Description of Trends, Risks, and the Effects to Management of Water and Watersheds.

Trend	Risks	Effects to management
Domestic city water supply is static to declining during periods of drought while population and demand are increasing.	Inadequate domestic water supply to meet demand. High probability of city drilling new wells and pumping groundwater adjacent to the Forest.	Limited water availability will cause water shortages, increased water conservation measures, and may eventually limit growth. A large portion of surface water and subsurface water in Arizona originates on Forest-managed land, and therefore, the role of the Forest in protecting the integrity of area watersheds will become increasingly important. New wells dug adjacent to Forest lands could tap into local groundwater reducing connected spring, seep, or stream riparian habitat and negatively affect those species that rely on it for their survival. Additional riparian conservation measures may be needed to protect these areas.

Trend	Risks	Effects to management
Increased Forest recreation use in streams, riparian areas, seeps, springs, wetlands, and meadows while livestock, wildlife, and fish use and demand for water remains static. Recent trend has been to reduce livestock access to riparian areas and wetlands. Surface and groundwater supply is limited and static to declining during periods of drought.	Reduced availability of water resources for wildlife, fish, and livestock due to recreation presence, grazing strategy, and drought. Sensitive watersheds, streams, riparian areas could experience resource damage from over use.	Diversity and populations of wildlife and fish species could decline. Fewer water access points could limit and reduce overall grazing carrying capacity and permittee profits might decline.
Overall water quality continues to vary by water. Overall remains static to slightly upward under continued, similar management except downward trend on mercury impaired lakes and Oak Creek and Spring Creek.	Impaired lake waters reduce fish consumption, fishing, and recreational pleasure. An impaired stream limits recreation swimming opportunities in Oak Creek. Other static streams may contribute excessive sediment to streams. Excessive sediment may reduce aquatic and fish health causing decline in populations.	Impaired lake water will necessitate improved Forest management and require additional funding. Reduced recreational experience may cause fewer people to visit Flagstaff and negatively affect local economy. Declined aquatic and fish populations may require additional conservation measures to be implemented by the Forest and may include the potential for loss of fishing opportunites.
LCR and Verde stream adjudications continue. Future reliance on negotiated water rights settlements in LCR and Verde stream adjudications to procure Forest water rights claims.	Adjudication may award some water rights to non-Forest Service claimants. Settlements would reduce risk of losing important water sources required for livestock and wildlife watering.	Adjudication in favor of Forest Service claims could result in no change to management. Adjudication resulting in favor of non-Forest Service claimants could restrict water use to conditions in their claim and may cause loss of water sources or access for wildlife or cattle. Settlements would allow continued wildlife and livestock watering similar to current management and would not require changes in management.

Trend	Risks	Effects to management
Watershed and soil conditions declined since pre-European settlement. Recent trend is unquantified but substantial portions remain impaired and unsatisfactory.	Continued impaired and unsatisfactory soil conditions signify reduced soil productivity and conditions of accelerated erosion, sedimentation and reduced water quality.	Reduced soil productivity and accelerated erosion decreases the amount of commodity items that can be produced on the land including timber products, livestock production and wildlife and fish species productivity, resulting in decreased timber volumes and profits to the timber and ranch industry and decreased opportunities and local economy revenue from hunting, fishing and wildlife watching activities. Reduced water quality can cause higher maintenance costs to the city for domestic water treatment and limit swimming and fishing opportunities in the Forest affecting recreation opportunity.

Dark Skies

Flagstaff has been designated the world's first International Dark Sky City by the International Dark Sky Association. The night sky makes a major contribution to northern Arizona's economy. Beginning with the arrival of Percival Lowell in 1894, Flagstaff has become one of the premier deep space research sites in the world. The community of Flagstaff has embraced the opportunity to have leading astronomical research and training opportunities in the area. The U.S. Naval Observatory, Lowell Observatory, Discovery Channel, and Northern Arizona University all look to the cosmos in quest of knowledge from the Flagstaff area. In doing so, they have contributed millions of dollars to the local economy every year for decades. The importance of dark skies has required the City of Flagstaff , the City of Sedona, and both Yavapai and Coconino County to enact a lighting code to protect this valuable resource. If predicted trends of increased development occur in the area, there could be a loss of dark skies.

Risk Assessment:

Table 22. Description of Trends, Risks, and the Affects to Management Dark Skies.

Trend	Risks	Effects to management
Increase in light pollution from development.	Reduction of dark skies for viewing night skies. The Coconino National Forest may become a more important place for viewing night skies.	The Coconino National Forest may need to respond to more demand for more night sky viewing opportunities.

Invasive Species

Invasive species are considered one of the four threats to National Forest System lands (USFS 2005j). Thousands of non-native invasive plants, invertebrates, vertebrates, and disease-causing pathogens are infesting millions of acres of land and water across the nation. These invaders cause massive disruptions in ecosystem function, reduce biodiversity, and degrade ecosystem health in our nation's forests, prairies, mountains, wetlands, rivers, and oceans. Invasive species affect the health of not only the nation's forests and rangelands, but also the health and survival of wildlife, livestock, fish, and

humans. The financial impact from invasive species infestations in the United States has been estimated at $138 billion per year in total economic damages and associated control costs. Locally the San Francisco Peaks Weed Management area was established in 1999 as a multi-agency entity to focus on reduction of invasive weeds. The Verde Valley Weed Management Area was created in 2001 and covers the remainder of the Coconino National Forest as well as other ownerships.

Existing conditions on the Coconino, Kaibab, and Prescott National Forests[15] indicate that invasive weeds have expanded to 242,000 acres or 4 percent of the land area. [16] In general, infestation rates are similar across each National Forest with the highest concentrations near travel-ways and developed private lands. There is public desire to stop the spread of invasive non-native weeds. Through education efforts, people are realizing the detrimental effects of these types of weeds. An Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds (USDA FS 2005) was completed for all three National Forests and a decision was made to treat and control this problem. The decision also amended each of the unit's Forest Plans.

The Coconino National Forest is situated at the junction of two interstate highways and several long distance corridors (highway, railroad, and utility) that are conduits for the spread of weeds. In addition, construction projects for home developments in satellite communities of Flagstaff and smaller communities throughout the adjacent counties are creating major disturbances where weeds can become easily established. The residential development of private in-holdings is creating more dispersed disturbance areas throughout the Forest. The associated roads and utility infrastructure with these activities act as conduits for the spread of invasive weeds. Off-highway vehicles, mountain and trail bikes, and pack stock also carry non-native invasive plants into the backcountry of the Forest. Continued education is needed to prevent the spread of these species within the National Forest.

Diseases and Invasives

A new species, Chytrid fungus, was discovered in 1999 and is thought to have originated in South Africa. It is nearly always fatal to amphibians and is known to have infected native frogs on the Forest. Bullfrogs, an introduced predator of native frogs and some native fish, apparently are less affected by the fungus. These two factors can act in concert to make rare animals rarer. Brown-headed cowbirds are an example of a bird that has expanded its range over time, responding positively to Forest fragmentation (e.g. development) and increasing food supply (livestock on the Forest). Because cowbirds lay their eggs in the nests of other birds, such as the endangered southwestern willow flycatcher, the new "parents" raise the fast-growing cowbird young at the expense of their own, resulting in lowered reproduction of the host. This contributes to making rare birds rarer. The cost of maintaining or restoring habitat for rare species can be much higher and result in more restrictions to management than in non-rare species. This may result in higher costs to government in terms of planning, implementing, or monitoring the project. It may also result in higher costs or additional restrictions on a livestock permittee in the circumstances when timing restrictions might be placed on livestock use near southwestern willow flycatcher habitat.

On the Coconino National Forest, several invasive aquatic species are having detrimental impacts, including crayfish and bullfrogs. Arizona is the only state in the lower 48 that does not have a native crayfish. Crayfish were introduced into Arizona for weed control and as fish bait. They are omnivores that eat almost anything and are voracious predators on a wide variety of invertebrates and

[15] In late 2004 these three forests decided to amended their plans to include management direction for invasive weeds. There are Best Management Practices (BMPs) included in the appendix for the EIS used to disclose the effects. Effects were described by watersheds, which go beyond Forest boundaries. It is difficult to extract Forest specific data.

[16] The data was analyzed by watersheds and cannot be easily broken out by individual National Forest.

vertebrates. Crayfish are dramatically altering aquatic habitats. They remove large amounts of vegetation, affecting habitat and food sources for native species. Non-native bullfrogs eat almost anything they can swallow and are a serious threat to many native species, including native leopard frogs and garter snakes. Both crayfish and bullfrogs have had economic effects, as money is spent by federal, state, and private entities to reduce the spread of these species or limit their localized effects. Additionally, due to the role these species have played in the reduction and loss of native aquatic species in the Southwest, actions taken to protect these imperiled species often negatively affect the economics of an area by restricting the activities of ranchers, mining operations, private developers, and forest managers. Recently, the highly invasive and habitat-altering Quagga mussels have been introduced into Arizona. The Quagga mussel is a close relative of the Zebra mussel. Both species have already infested numerous North American water bodies. These mussels are having huge economic impacts in the Great Lakes region nationally, an estimated $6.5 billon will be spent over the next ten years to clean and maintain intake pipes, water filtration equipment, and power plants. Quagga mussels have been spread unintentionally by boaters who visit contaminated areas; currently they are present in Lake Mead and Lake Powell. Once these mussels become established they are impossible to remove. Quagga mussels are not found on the Coconino National Forest yet, but if they become established, their social and economic effects could be great.

The introduction of non-native sportfish has had social and economic impacts. The Forest's only native trout has been extirpated, and the roundtail chub, another native sportfish, has declined. Numerous non-sport fish have been federally listed as endangered or threatened. Although many Arizona residents have little specific knowledge of native fish, they are valued with respect to contributions to future generations and ecosystem diversity (Cote et. al 1997). Angling is an important economic activity in the state, but the associated economic impacts are not usually considered. Stream restoration including removal of non-natives to restore native aquatic species can cost hundreds of thousands of dollars. Additionally, once species are federally listed, regulatory constraints are put in place on land-use activities where the species or its habitat is still present. These constraints can have an economic affect on a diverse group of people and businesses.

There is public desire to stop the spread of invasive and non-native species. Through education efforts people are realizing the detrimental effects of these types of species. Continued education is needed to prevent the spread of these species into the National Forest System.

Risk Assessment:

Table 23. Description of Trends, Risks, and the Effects to Management of Invasive Species.

Trend	Risks	Effects to management
Increase of invasive weeds on the Coconino National Forest.[17]	Continued decline in some native plant species.	An increase in invasive weeds could cause massive disruptions in ecosystem function, reducing biodiversity, and degrade ecosystem health that could in turn affect the presence of plants and animals that many people value both socially and economically.
Increase in aquatic invasives including	Continued decline in native species and their aquatic habitats.	Need to continue to work with state and federal partners to restore aquatic habitats and remove

[17] The rate increase is currently unknown, as it is dependent upon many variables beyond the Forest Service's control, such as climate and the potential for changing rates of infestations due to people traveling from infested sites beyond the Forest's boundaries. .

Trend	Risks	Effects to management
both plants and non-plant species.	Economic impacts from costs to restore ecosystems and potential restrictions placed on land-use activities to protect natives.	aquatic invasives.

Special-Use Permits

Overall, the trend is an increasing demand for all permitted activities. As Forest uses, development of lands within and around the Forest, and the need to cross the Forest all increase, the need for special-use permits will also increase.

The term or authorized use period of a special-use permit is variable depending primarily on the type of use. Most of the land permits and facility-related recreation use permits are issued for multiple years. The Forest, as of 2007, has total of 580 long-term permits of which 194 are focused on recreation and the remaining 386 are non-recreation permits. All of these permits are issued for more than one year. These numbers do not include short-term or special-product permits issued for one year or less, such as filming or firewood collection. Special forest products are discussed in the subsequent Forest Products section. Annual or shorter-term permits have ranged from 120 to 150 per year over the past few years. In the last few years there has been an increase in the development of energy-related permits to accommodate new sources such as wind development, as well as new energy corridors. It is expected that this trend will continue

While research is not often considered to be a major use of federal lands, the Coconino National Forest issues a number of special-use permits for research purposes. Research on flora, fauna, water quality, seismic activity, weather, and wildland fire effects is conducted by universities, private institutions, and other federal, state, and local agencies. Due to the volume of requests for research permits, the Coconino National Forest has an agreement with Northern Arizona University to review research proposals and coordinate the location of the activities.

The Coconino National Forest permits include a permit for the Snowbowl ski area, one of four ski areas in the state of Arizona.

Outfitter and guide special-use permits are in high demand on the Coconino National Forest. The Red Rock Ranger District is currently completing a capacity analysis for outfitter and guide permits. A moratorium is in effect at the Peaks Ranger District on new outfitter and guide permits until funding is available to complete a similar study to determine levels of use. With the projected population increase, the demand for outfitter and guide permits will continue to increase.

Forests also commonly allow communities, industry, and other entities to use public lands for infrastructure, including power lines, rights of way, telecommunications, and the like. Special-use permits for developments such as cell towers have increased over the past twenty years. With the changes in technology, the trend will be an increased need for more of these types of developments. The increased demand for energy has generated increased emphasis on the management of utility corridors to provide additional service. The Forest has been increasingly involved in activities to accomplish this objective. There are social and aesthetic concerns related to how these types of uses are designed and built on public lands. The Coconino National Forest will create desired conditions and guidelines to help ensure reduced visual and resource impacts of these developments.

Risk Assessment:

Table 24. Description of Trends, Risks, and the Effects to Management of Special-Use Permits.

Trend	Risks	Effects to management
Increase in demand for all types of special-use permits.	Demand for special-use permits could outgrow capacity.	Demands for most types of special use-permits are likely to increase. Acceptable resource and social capacities for permit uses, such as outfitter-guide must be determined. Permit holders will play an important role in deterring resource damage from their use.
Increase in demands to use public lands for infrastructure, including power lines, rights of way, telecommunications, and the like.	Permitted uses can have significant impacts to natural resources and to other Forest activities, sometimes on a landscape scale.	Difficult decisions will have to be made between conflicting demands to facilitate infrastructure for growing populations and communities and the need to protect the resources and desirable attributes of the National Forest.

Livestock Grazing

Livestock grazing has occurred on the Coconino National Forest since it was established. This use has changed dramatically in the last sixty-five years. During World War II and in the years following, there was substantially more livestock permitted to graze on the Forest than there are today, as well as there were many more ranchers with permits on the Forest. In 1940, permitted use on the Forest consisted of 19,073 cattle and horses, 40,789 sheep, and 42 hogs for a total of 333,733 animal months of use. In 2006, the permitted use was 23,584 cattle and horses and 6,555 sheep for a total permitted use of 158,786 animal months.

The most significant change has been in sheep numbers. In 1940, there were 40,789 sheep permitted on 16 permits. This dropped to 23,000 sheep on 8 permits by 1949 and to 11,000 sheep on 3 permits in 1965. In the mid-1980s the numbers dropped again, and in 2006 there were 6,500 sheep permitted on 1 permit.

Besides the large reduction in sheep permits and numbers, the number of cattle permits has declined from 103 in 1940 to 30 in 2006. This is reflective of a reduction in the number of ranches in the area and the combination of allotments (93 allotments in 1940 to 33 in 2006). These combinations have been made to improve management and make the remaining allotments more economically viable.

The total permitted use on the Forest has decreased by half in the past sixty-five years. The reductions occurred prior to the Forest Plan being implemented. Since the Forest Plan was signed, the number of permitted livestock on the Forest has increased slightly

While permitted use has increased slightly in the last twenty years, the number of animals authorized to graze in any given year has varied based on the conditions of each allotment. Continued drought conditions have resulted in authorized numbers Forest-wide to be about 70 percent of the permitted numbers, with some allotments fully stocked and some not stocked at all.

While there is concern over the environmental impacts of grazing from several people in the assessment area, ranching is looked at as a way of life for many people. In addition to the way of life, ranches provide open spaces and habitat for wildlife. According to the Coconino County Comprehensive Plan, about 75 percent of the private land in the county consists of large ranches (Coconino County Comprehensive Plan, page 85). Many of these ranches rely on the National Forest for grazing at least part of the year. Without these Forest permits, the ranches would most likely not be viable and could be subject to development and a loss of open space.

The ranches with the largest amount of open space adjacent to the Coconino National Forest are the Babbitt Ranches north of the Peaks and the Hopi Ranches, Flying M Ranch, and Bar T Bar Ranch east of the Forest boundary. There are numerous smaller ranches around the Forest that also provide open space. Currently there are conservation easements on Babbitt Ranch's Cataract Canyon Ranch, which protects approximately forty thousand acres from development. The County is currently exploring other options for the protection of open space, such as transfer of development rights. If ranchers take advantage of these options to protect the open space on their private lands, the Forest grazing permit will become more important in maintaining the viability of the ranch.

Risk Assessment:

Table 25. Description of Trends, Risks, and the Effects to Management of Livestock Grazing.

Trend	Risks	Effects to management
Permitted livestock numbers are relatively stable, while authorized use fluctuates from year to year.	If numbers fluctuate too greatly from year to year, the ranches may not be viable.	The effect to management would be fewer permits to administer. This would result in a reduction in maintenance of stock tanks and fences, which would require the agency to either maintain them or remove them. The social risk is a direct impact on the people employed by the ranch and indirect and induced impacts on the larger community. It also reduces the number of people and places that are sustaining of the ranching way of life. If ranches go out of business, there is also the potential fragmentation of habitat and/or loss of open space if the private lands are developed.
Ranches rely on the National Forest for grazing.	If grazing is eliminated from areas due to environmental impacts or social pressure, the ranch may no longer be viable.	Same as above.

Forest Products and Timber Production

Forest product output has changed during the past twenty-year planning cycle. The greatest change has been in timber products. Firewood production has remained constant, while special Forest products (poles, firewood, ferns) demand has increased.

During the first five years of the planning cycle, annual timber production averaged 61 million board feet. The annual production dropped to 10 million board feet the last fifteen years. Likewise, acres treated for ecosystem management objectives dropped from approximately 25,000 to 4,000 acres annually. Manufacturing facilities in Flagstaff, Payson, Williams, and Winslow closed, while a small facility opened in Ashfork. No local biomass or specialty product market exists for small-diameter trees (< 6 inches diameter) and logging residue products.

The proposed Mexican Spotted Owl (MSO) Threatened and Endangered listing and subsequent Recovery Plan impacted timber sales from 1993 to 1995. The MSO guidelines impose a maximum tree diameter of 24" for harvest in mixed conifer, ponderosa pine/Gambel oak, and on steep slopes. The 1996 Coconino National Forest Land Management Plan Amendment changed management objectives for forested lands to implement the MSO Recovery Plan and goshawk guidelines. The recommended goshawk management guidelines emphasize uneven-aged rather than even-aged management. Current harvest activities are just beginning to implement uneven aged management guidelines on limited acreage. Current focus includes reducing overstocking of trees, primarily 6 to 15 inches in diameter, and regenerating 20 percent of the groups/clumps.

The public perception of timber harvest is mixed. The short-term effects of ground disturbance and presence of slash cause concern for some, while others question the long-term Forest Plan direction and changing landscape. Prior to the 1996 Plan Amendment, yellow pine harvest was controversial. Since the amendment, some have become concerned with the implementation of Forest management that causes an open-grown, clumpy, unevenly aged forest.

The Coconino National Forest offers permits for collection of firewood and an assortment of other forest products, which fall under the category Special Forest Products, and include posts and poles, edible plants, wildings, medicinal herbs, mushrooms, mistletoe, pine cones, grass seeds, and many other products. Firewood collection permits are the most common issued. There is a large demand for firewood permits, and each year the Forest Service issues approximately 2,500 to 3,500 permits, equaling approximately 8,000 cords of firewood. Demand for Special Forest Products has increased slowly but steadily in recent years. An average of approximately 1,250 permits are issued for Special Forest Products with Christmas trees (1,000 permits), poles (10 permits), and wildings (25 permits) being the most popular and a variety rounding out the remainder for pine cones and grass seed to boughs and limbs. Ceremonial permits are issued to tribal members for the collection of firewood, boughs, herbs, small-diameter oak stems for bows, and several other products. Approximately 500 to 700 ceremonial firewood permits are issued per year, averaging 1,000 cords of oak and approximately 400 cords of various other species.

Risk Assessment:

Table 26. Description of Trends, Risks, and the Effects to Management of Forest Products and Timber Production.

Trend	Risks	Effects to management
Decrease in timber harvesting.	Loss of local manufacturing facilities.	Reduced acres treated for ecosystem management and increased costs.
Continued no	No utilization of small trees for	Increased fuel loadings, smoke, and cost.

Trend	Risks	Effects to management
demand for small diameter (< 6" diameter) timber.	biomass or specialty products.	
Continuing controversy about timber harvest.	Reduced acreage of vegetative treatments.	Failure to implement Forest Plan Direction.

Minerals Management

Mining activity on the Coconino National Forest falls into two categories: locatable materials (which are subject to claim) and saleable (permitted) mineral activities. The Forest Service's role in locatable mineral management is limited to overseeing rules and regulations applicable to surface resources. The Bureau of Land Management is the responsible authority for managing locatable minerals on public lands, including the National Forests. Mining claims are managed under the General Mining Law of 1872, which allows individuals and corporations reasonable access to prospect and mine on National Forest System lands. Upon discovery of a significantly valuable mineral resource, an individual or corporation may patent it to claim full title to the land for the extraction of the mineral deposit. Small fees are generally required to stake, maintain, and patent a claim (Humphries and Vincent 2004). Historically there has been limited mining activity for locatable minerals on the Forest. Currently, there are only a few active mining claims, and the expected trend is for minimal development. To protect key developments, several areas across the Forest have been withdrawn from mineral entry. Given the limited amount of mineral potential on the Forest these withdrawals do not present an economic impact to mineral development on the Forest.

Mineral authorizations on the Coconino National Forest are largely comprised of mineral materials permits for saleable decorative rock and cinders. Malapai rock, red rock, and red cinder permits are readily available to the public. In 2002, the Forest collected $166,972 in permit fees for 170,811 tons of crushed stone, cinders, and landscape rock. The trend for mineral materials is likely tending toward an increase, based on historic activity; however, mineral materials demand and development are not major factors in Forest planning needs. Leasable activity on the Forest is regulated by the Department of the Interior. There has been limited leasable activity on the Forest because the potential for oil, gas, and other leasable material is very limited.

Because mining activity on the Forest is primarily tied to permits for mineral materials, and locatable mineral mining claims are limited, there is little impact to the Forest. In 2005, 176 mineral material permits were issued, while only one mining plan of operations was issued for a locatable mineral.

Risk Assessment:

Table 27. Description of Trends, Risks, and the Effects to Management of Mining and Minerals.

Trend	Risks	Effects to management
Continued limited locatable mining activity and active mineral materials program.	Mining activity level affects jobs and income related to that industry. Impacts from large-scale mining can adversely affect other resources.	Minimal effects. The Coconino National Forest will continue to issue mineral material permits and support the industry where possible.
Slight increase in demand for salable	If forest cannot supply these materials, the need will have to be	There will be more requests for permits and the need to locate additional sources that the public

Trend	Risks	Effects to management
material.	met on private land, which will provide an economic opportunity within the counties, but the public will have to spend more to acquire the materials.	can use, but these effects will be minimal.

Recreation

National Forest System lands generally have experienced increasing demand for non-commodity uses and, in many cases, decreasing support and demand for historical commodity industries over the past twenty years. Although recreation use on National Forest lands has increased steadily since the establishment of the U.S. Forest Service, reports showed a decline in recreation participation nationally beginning in 2001. Reasons suggested for this trend include travel concerns following the September 11, 2001 attack on the World Trade Center and the expansion of indoor recreation opportunities through the growth of computer games, the Internet, and television (Roper ASW 2004). Cordell and others (2004) also note slight decreases in several categories of outdoor recreation following September 11. Recreation use on the Coconino National Forest for calendar year 2000[18] was estimated at 1.89 million, 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 (NVUM 2001 and NVUM 2006a).

The primary factors driving this steep increase in recreation visits to the Forest, in contrast to the national trend, appear to include the rapid increase in the population of Arizona (Maricopa and Yavapai counties in particular), the ongoing improvement of transportation infrastructure that enables rapid transportation of people from the lower elevations of the state and region onto the higher elevation, and the cooler climate of the Colorado Plateau. The upward trend in recreation use on the Forest is expected to continue commensurate with state and regional population growth. A comparison of the National Visitor Use Monitoring (NVUM) data for 2000 and 2005 shows large increases in visitation to the Forest from the Phoenix metropolitan area and from Yavapai County and less of an increase from the Flagstaff area.

According to the 2005 NVUM data, the five main activities drawing visitors to the Coconino National Forest were hiking/walking (40.5 percent of participants), viewing natural features (21.2 percent of participants), relaxing (8.2 percent of participants), driving for pleasure (6.9 percent of participants), and downhill skiing (5.3 percent of participants). Bicycling, visiting historic sites, and viewing wildlife were also very popular main activities for participants (USDA Forest Service 2006a). The 2005 NVUM showed that 48.9 percent of visitors spent at least one night away from home on their visit for an average of 4.8 nights per visit. Of that group, 45 percent stayed within fifty miles of the survey site, and of those that stayed within fifty miles of the survey site, 64.7 percent "rented (a) home, condo, cabin, lodge, or hotel room not on Forest Service land." The 2000 NVUM study showed a nearly equal split between use of developed day-use and overnight campsites and use of undeveloped areas of the Forest, a trend that appears to have continued into the present.

National Forest lands are managed to provide a full spectrum of recreation opportunities through maintenance of diverse recreation settings. The Coconino National Forest Plan directs that the Recreation Opportunity Spectrum (ROS) system be used to qualify and guide management of the recreation resource in order to increase opportunities for a wide variety of developed and dispersed recreation experiences (Coconino National Forest Plan, page 22). Recreation settings are

[18] The Forest was closed approxiamtely 3 to 4 weeks in 2000 due to severe fire danger.

characterized by physical, social, and managerial attributes that define all National Forest lands along a spectrum of six classes: primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban. The lands within the outer boundaries of the Coconino National Forest contain all six ROS classes dispersed across the landscape. Most forest lands are in the primitive, semi-primitive non motorized, semi-primitive motorized, and roaded natural settings. With in these ROS classes a variety of recreational activities take place. These include: hiking, biking, birding, OHV use, back packing, developed camping, equestrian use, hunting and fishing, geo caching, paintballing, wildlife viewing, and visits to archeological sites.

Increased Forest visits and the increase in motorized uses (primarily 4-wheel drive and all-terrain vehicles) has resulted in somewhat less opportunity for some of the more "primitive" attributes, such as solitude and natural quiet in some areas, for example, near popular recreation sites and adjacent to Forest-bounded communities. Meanwhile, the decline in logging activity and funding has resulted in less maintenance of the existing road system, creating more "primitive" roads because of deterioration. The gradual conversion of formerly well-maintained roads into more primitive roads has resulted in more routes for those seeking primitive roads to drive on. Management of recreation area to ensure the presence of the more primitive settings in sufficient quantity to meet growing demand will be a challenge in the face of the growing population of visitors.

The Coconino National Forest and the Apache-Sitgreaves National Forest provide the majority of snow-play opportunities in Arizona. There is high demand for this type of use from visitors from the Phoenix metropolitan area when there is a sufficient amount of snow. These activities include, skiing, snow boarding, cross country skiing, snow shoeing, sledding, and general snow play. Arizona Snowbowl, the Flagstaff Nordic Center, and Wing Mountain and Cinch Hook Snow-Play areas are facilities on the Forest that supply much of the demand for developed snow-play facilities. Often, demand for snow-play opportunities exceed what the Coconino National Forest can provide.

There are a diverse group of recreational activities that take place, which have emerged only in the past decade. Some of these include rock climbing, geo-caching, and paint balling. Management direction for these kinds of growing recreational uses is needed to ensure opportunities for the future and protection from resource damage.

Bicycling is a recreation use that has increased in popularity since the last Land Management Plan. Sedona and Flagstaff are nationally known mountain biking destinations. Management direction for this increasing use is needed to ensure this opportunity.

On public lands throughout the country, the use of OHVs has increased in popularity and is now a major concern to many Forest managers. Between 1982 and 2000, OHV users increased more than 109 percent nationally (Cordell et al. 2004). In 1995, a General Accounting Office (GAO) study found that OHV use on federal lands to be generally under managed. The United States Forest Service devoted limited funding and staffing to managing OHV use, and forests relied heavily on state funding (GAO 1995). According to surveys conducted by the Arizona State Parks, most Arizonans consider the provision of OHV recreation opportunities to be a lower priority than other services, such as the preservation of cultural resources and natural areas. More Arizonans, however, considered management for OHVs to be important in a 1998 survey than in an earlier survey (Arizona State Parks 2003).

A popular and growing summertime use of the Forest is by people using OHVs. Many people who find the lower elevation areas too hot for their favored activity come to the relative comfort of the Colorado Plateau to ride OHVs. A study funded by Arizona State Parks in 2003 found that Coconino and Yavapai counties combined receive 2.36 million days of OHV recreation annually, much of that

occurring presumably on local National Forest land (Coconino, Kaibab, and Prescott National Forests). This use represents 26 percent of total OHV use recorded in Arizona annually; 80 percent of Coconino County OHV use and 35 percent of Yavapai county OHV use comes from areas outside those counties.

Unmanaged recreation (and specifically cross-country use by OHVs) has been declared as one of the four threats to the National Forest System by the Chief of the Forest Service (USFS 2005j). The 2005 Travel Management Rule provides regulations to help manage OHV recreation on the National Forest System lands. Implementation of the rule would establish a system of roads, trails, and areas designated for use of motorized vehicles and would prohibit the use of motorized vehicles that is off the designated system or inconsistent with the designations. This system would replace the previous policy that allowed cross-country travel unless specifically posted otherwise (USFS 2004j). Although the 2005 Travel Management Rule will designate motorized routes, it is unlikely that it will fulfill the demand for this recreational activity. Management direction for this increasing use should be included in the Forest Plan. According to the Coconino National Forest's 1987 Forest Plan, only 331,000 acres (including 150,000 of designated Wilderness) of more than 1,800,000 acres were closed to OHV use or were seasonally restricted (USFS 1987b). The 1987 plan also acknowledged that OHV use was increasing and that heavy use could damage the environment or lead to conflicts with other users.

Access to public lands is considered a major contributor to quality of life by many people in the assessment area, and many sites on the Coconino National Forest are experiencing very high recreation use even while urban expansion is decreasing the amount of available open space. As a result, this trend of increasing pressure on recreational resources can be expected to continue well into the future.

Risk Assessment:

Table 28. Description of Trends, Risks, and the Effects to Management of General Recreation.

Trend	Risks	Effects to management
Increased demand for recreation opportunities fueled by population growth.	Increased demand cannot be met due to limited recreation opportunities. These include facilities, developed campgrounds, trails, and dispersed camping opportunities.	Demand for recreation opportunities may not be met, and over-crowding could occur. As demand for recreation increases from the public, limited resources are available to provide it.
Increased unmanaged recreation.	Certain types of dispersed recreational activities have greatly increased or are relatively new and currently have little management, such as OHV use, rock climbing, geo-caching.	Unmanaged recreation could cause resource damage and disturbances, which could lead the Coconino to develop mitigation measures. It is also one of the Chief's four Risks (USFS 2005j) and is highlighted in the Updated Strategic Plan for the Forest Service for future action.

Wildlife

In the Coconino National Forest, wildlife viewing is important to Forest users and is consistently one of the top activities undertaken by Forest users (NVUM 2001, NVUM 2006; Arizona Hospitality Research and Resource Center and Bureau of Economic and Business Research 1990). People also appreciate and value rare or endangered species such as bald eagles and native fish (Driscoll 2001; Cote et. al 1997). Wildlife viewing is a more common activity than either fishing or hunting.

Wildlife viewing includes birders, and other types of wildlife viewing. NVUM data for the Coconino National Forest from 2005 show that 70 percent of the visitors interviewed participated in some sort of wildlife viewing activity; however, 40 percent described it as their primary activity. Approximately 5 percent of interviewed visitors fished (with about 2 percent describing it as their primary activity), and 2 percent hunted (USDA Forest Service 2006a).

Nationally, from 1996 to 2006, the number of anglers and hunters has declined 15 percent and their expenditures declined 16 percent, while wildlife watching participation has increase 13 percent, and expenditures have increased 19 percent (U.S. Fish and Wildlife Service 2007). In Arizona in 2006, 27 percent of the state's adult population participated in wildlife-associated recreation. Nine percent were sportspersons and 21 percent were wildlife watchers (U.S. Fish and Wildlife Service 2007). In Arizona, although the number of hunters and anglers has declined somewhat, while the demand for big game permits remains high. The number of applicants has increased, while the number of permits available to hunters has declined (T. McCall, personal communication).

The protection and restoration of wildlife and wildlife habitat is a strong social value for the assessment area. With increasing human populations, there are more opinions and more conflicting views. Conflict areas may be between native and non-native wildlife. Many people want to ensure the sustainability of popular species including game species. Conversely, many people are concerned with other native wildlife and feel there is competition for limited resources.

Risk Assessment:

Table 29. Description of Trends, Risks, and the Effects to Management of Wildlife.

Trend	Risks	Effects to management
Stable to increasing in wildlife viewing activities.	Unmanaged wildlife viewing may increase disturbance.	Opportunities to develop additional wildlife viewing areas.
Consumptive human uses declining and non-consumptive uses stable to increasing.	Fewer people with understanding and appreciation of wildlife resource. Decrease in partnership development opportunities.	Shifting expectations for Coconino National Forest management with a need to cultivate new partnerships. External partnerships and funding opportunities have become increasing important in carrying out both wildlife habitat improvement and wildlife viewing opportunities across the Forest.
Increasing human population resulting in increasing urbanization and more people using the Forest.	Reduction in habitat effectiveness and increased habitat loss by fragmentation and disturbance. Increase in wildlife-human interactions. Potential for conflicting ideas on wildlife habitat management.	Acceptable types of activities should be assessed to determine the ability of some areas to provide for both wildlife requirements and human desires. Continued need for coordination with Arizona Game and Fish Department to manage wildlife populations and habitat to reduce potential for negative interactions with wildlife. Education will become increasingly important to inform people about wildlife behaviors and requirements.

Wilderness

The Wilderness Act of 1964 established the National Wilderness Preservation System, the system for all of America's Wilderness Areas to "secure for the American people of present and future generations the benefits of an enduring resource of wilderness." Currently, the National Wilderness Preservation System is approximately 107 million acres and contains 702 Wilderness Areas. Wilderness Areas are managed by the four federal land management agencies: Bureau of Land Management, Fish and Wildlife Service, Forest Service, and National Park Service.

The 1984 Arizona State Wilderness Act established additional units of Wilderness in Arizona that added to the national system. Only nine of Arizona's ninety Wilderness Areas were designated under the 1964 Wilderness Act, the vast majority were designated with the 1984 Arizona Wilderness Act. Arizona contains the second highest number of Wilderness Areas, comprising 12.47 percent of the area's National Wilderness Preservation System. Arizona also contains 4,592,063 acres of Wilderness or 4.24 percent of the total acreage within the National Wilderness Preservation System. Approximately 6 percent of the total land acreage in the state of Arizona (72,731,000 acres) is designated as Wilderness.

The Coconino National Forest 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. Sycamore Canyon Wilderness was the only area designated under the 1964 Wilderness Act, with the remainder being designated by the 1984 Arizona Wilderness Act. Coconino National Forest's Wilderness Areas are found scattered across the landscape and are easily accessed by both nearby residents as well as visitors from the Phoenix metropolitan area. They encompass 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 semi-desert canyons. In the 1987 Coconino National Forest Plan, over half of the Wilderness was managed as primitive under the Wilderness Opportunity Spectrum (WOS), with an emphasis to provide a quality experience for people while protecting Wilderness resources. When not manage under primitive WOS, areas are guided by pristine, semi-primitive, and transition classes.

Wilderness Areas on the Coconino National Forest can be found adjacent to residential areas or within a couple hours' drive. Easy access and close proximity to local communities and other parts of Arizona can result in the perception that Wilderness Areas serve more as "urban parks" 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 may also create a challenge for management to retaining the wilderness experience, quality, and character of an area. Use of most Wilderness Areas on the Forest is seasonal, with spring, summer, and fall users, seekers of water-based recreation, fall foliage viewing, multi-day backpacking, and primitive hunting opportunities. Kachina Peaks Wilderness's close proximity to the urban city of Flagstaff and variety of user experiences result in high to very high year-round use levels. In addition to hiking, backpacking, and hunting, the Kachina Peaks receive a large number of snow seekers during the winter months. As a result of past and recent use trends, district recreation staff officers anticipate that as Arizona's population increases, so will use and pressure on all Wilderness Areas within the Coconino National Forest.

Wilderness provides social services to the public. Services include, but are not limited to, individual and social well-being such as air and water quality, cultural and historic preservation, spiritual values, and personal growth (Schuster, Tarrant, and Watson 2003). Intrinsic values are also placed upon wilderness, in that a person may never visit a Wilderness Area but may still find worth in its existence. Comments heard from public meetings held for the Coconino Forest Plan Revision convey these same values. Recent societal trends (urbanization, increased reliance on technology, increased awareness of

threats to the environment, the economic shift from dependence on commodity extraction) contribute to the comparatively high value that recent wilderness visitors place on keeping wilderness as "natural" as possible. The primitive character of wilderness will likely become more important if these trends continue.

Arizona's recent, and continuing, population growth, and easy access to Wilderness Areas may create greater future demand for recreational opportunities, particularly for Wilderness Areas. Increased number of people in Wilderness Areas may displace users who are seeking solitude as part of the wilderness experience. Most Wilderness users learn to cope with crowding by either adjusting the way they think or adjusting their behavior (Cole and Hall 2007). Example of behavioral changes could include changing routes, days of the week used, or season of use when visiting a Wilderness Area.

Users of Wilderness Areas fit a profile similar to other Forest users. They are white (95.0 percent) or Hispanic/Latino (3 percent), and often travel from Flagstaff, Sedona, and the Phoenix metropolitan area to use the Coconino National Forest Wilderness Areas. The National Visitor Use Monitoring (NVUM) data suggest that roughly 411,300 Wilderness visits were made during fiscal year 2005 (USDA Forest Service 2006a).

The Coconino National Forest includes nine inventoried roadless areas covering approximately fifty thousand acres. During the Forest Plan Revision process, the Coconino National Forest will be evaluating all nine of these areas, along with other areas for potential recommendations for inclusion in the National Wilderness Preservation System.

Risk Assessment:

Table 30. Description of Trends, Risks, and the Effects to Management of Wilderness.

Trend	Risks	Effects to management
Increased recreation use in Wilderness Areas.	Degradation of a quality wilderness experience. Loss of opportunities for solitude or unconfined recreation.	Shift management objectives to more actively maintain the wilderness character; this may include reducing the numbers of users in certain heavily used areas.
Increased awareness and appreciation for the primitive character of wilderness.	More public support and demand for wilderness.	Shift management priorities to maintain or ensure primitive character are retained in Wilderness Areas. Organizational capacity is limited to adequately manage new or existing Wilderness Areas.

Archaeology

During the ninety years of archaeological research on the Coconino National Forest, almost ten thousand archaeological sites have been recorded—80 percent of these since the Forest's archaeological program were created in 1975. Based on site distributions over various soil and vegetation units, an additional sixty thousand more sites are estimated to be present within the Forest. Although most sites are simple scatters of pottery sherds, flakes of stone, or inconspicuous field houses, many are impressive cliff dwellings, petroglyphs and pictographs, or large pueblos of thirty or more rooms. These sites are cultural resources that provide an unbroken record of human existence in northern Arizona for more than ten thousand years. Archaeologists have studied these sites since the late 1800s, and due to the long-term work of the Museum of Northern Arizona, the Flagstaff area is

considered to be one of the most intensively studied areas in the Southwest. In addition to the Museum of Northern Arizona, archaeological surveys and excavations have been conducted by many other universities and institutions throughout the United States.

Scientists are not the only people who have interests in the archaeological sites. With the development of environmental protection laws in the 1960s, archaeology also became a big business. Numerous contract firms provide archaeological services to assist developers and other Forest users meet legal requirements to locate and mitigate sites that might be impacted by their development or use of Forest land. About thirteen archaeological contract firms are currently under permit to work on the Forest.

American Indian tribes have lived on the land that is now the Coconino National Forest 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 under the American Indian Religious Freedom Act, the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act, to name a few.

Avocational archaeologists are people who are deeply interested in prehistory and are a highly organized group that work very closely with professional archaeologists in Arizona. A detailed training program has been developed by the Arizona Archaeology Society and professional archaeologists throughout the state to provide them with the skills to perform various aspects of the archaeological process. Courses in this program are taught at the society's annual field school, which the Forest has hosted at Elden Pueblo since 1980. The Verde Valley and Flagstaff Chapters of the Arizona Archaeology Society are particularly active in helping with archaeological survey and excavation projects, while volunteers with the Arizona Site Stewards Program and the Red Rock Ranger District's Friends of the Forest are integral to the Forest for protecting and interpreting archaeological sites on the Forest.

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, and the Arizona Department of Tourism considers prehistoric and historic sites to be one of the foundations of Arizona's tourism industry. With the Forest'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 of the Coconino National Forest. Forest archaeologists work closely with volunteers, avocational archaeologists, and actively participate in state-sponsored events to celebrate the rich cultural heritage of Arizona. The Coconino National Forest has also been a leader in developing archaeological sites to provide for this public interest. Elden Pueblo, on the outskirts of Flagstaff, was one of the earliest efforts to educate and inform the public about archaeology as a recreational activity. Since 1980, people have been able to participate in the excavation, analysis, and research of a major prehistoric pueblo under the supervision of professional archaeologists. Through a variety of partnerships and grants, programs have been developed for school children, avocationals, and the general public. The project has been the recipient of many local, state, and national awards for its innovative and long-standing contributions to promote public archaeology, which serves about 3,560 people each year.

Other sites on the Forest have been developed in a more formal way. With the assistance of the Arizona Natural History Program and the Friends of the Forest, the impressive cliff dwelling of Palatki, its associated "outdoor art gallery" of pictographs at Red Cliffs, and the V-V Petroglyph Heritage Site can be visited through the Verde Valley Fee Demonstration Project. On-site volunteer

guides are available to accompany and interpret the sites for the thirty thousand visitors they receive each year.

However, probably the largest user group of archaeological sites consists of the general public who encounter and visit archaeological sites as part of their recreational use of the Forest. While most of these visits are harmless, some people cause damage to sites out of lack of knowledge of how to properly visit a fragile archaeological site. Others intentionally vandalize sites or dig in them illegally to find artifacts to collect or sell.

As the population of Yavapai and Coconino counties continues to climb, there is a concern that damage to archaeological sites will increase. Children and teenagers have been found to be high-risk groups when it comes to graffiti and vandalism (Bell, Bell, and Godefroy 1992, Klippert 1992). Consequently, information on site etiquette, the importance of archaeological sites to the community, and the laws that protect archaeological sites need to be incorporated into the Forest's public information program. However, increased law enforcement efforts will also be needed, since various studies indicate that despite educational and law enforcement efforts, a certain percentage of the public will always commit acts of vandalism and destruction (Bell, Bell, and Godefroy 1992:146, Pilles and Boston 1999, Van D'Elden, 1992:167).

There is also an increased demand to have more sites developed for public use. Coming at a time when the Forest recreation budgets are shrinking, it will be a challenge for the Forest to meet this demand. Opportunities exist to develop partnerships with private tour companies, as the Forest has been doing for many years with Pink Jeep Tours at the large cliff dwelling of Honanki, near Sedona. With considerable assistance from Pink Jeeps, the Forest recently completed a stabilization and interpretive development project at Honanki through the Save America's Treasures grant program. However, how many sites can be developed for tourism? How many people can be accommodated at a site before the ambience, natural setting, and sense of discovery that people want when visiting Forest sites is destroyed? Archaeological sites are a finite resource, and there are only so many "crown jewels."

Decisions will need to be made to determine how many and which sites can be developed and how many must be preserved and protected for the future. But there are many different opinions on these points. Tribes, for example, are now active partners in making such decisions, and they have different attitudes and perspectives from other Forest users about site development. Balancing the different perspectives of the various archaeological user groups will be a complex process as decisions are made in determining the future for the past on the Coconino National Forest.

Risk Assessment:

Table 31. Description of Trends, Risks, and the Affects to Management of Archaeological Site Users.

Trend	Risks	affects to management
Through time, archaeological sites will continue to deteriorate due to natural forces.	Standing walls will collapse, log cabins will disintegrate, petroglyphs will erode, and pictographs will fade. Sites will become lost before their scientific, cultural, and recreational	More active management will be needed to determine priorities for preservation. New funding will be necessary for site protection and conservation, such as removal of brush and dead wood that present a fire threat, removal of vegetation causing site damage, stabilization of

Trend	Risks	affects to management
	values can be determined.	standing walls, formal evaluation of site conservation and stabilization needs, and professional conservation and evaluation work. Increased consultation with State Historic Preservation Office (SHPO), tribes, academics, avocationals, and other groups will be needed. Allowing sites to deteriorate by neglect is contrary to the requirements of the National Historic Preservation Act and other legislation.
Increased population will result in increased visitation to archaeological sites.	Increased visitation will cause more graffiti and unintentional impacts to the sites.	This trend has the potential to disturb archaeological sites with more visitations. Increased education and law enforcement would be needed. The Coconino National Forest may need to institute a permit system to regulate number of visitors to keep the desired recreation experience.
Increased vandalism, graffiti, and illegal digging at archaeological sites.	Irresponsible users and looters could cause more destruction to sites.	Archaeological sites could be vandalized or destroyed, which could lead to a need for more restrictive management.
Increased demand for visits to developed archaeological sites.	Sites could be loved to death and there is potential that the demand can't be met.	Unmanaged, unguided visitation could increase, which would cause site damage. Could present an opportunity to partner with outfitter/guides and increase public education, which would increase relationships with avocationals.

Current Conditions and Trends of National Forest Land Use Social Contributions

Historical commodity uses and non-commodity uses of National Forest System lands are often seen as competing with one another, and balancing the uses of different groups can be challenging. Livestock grazing is no exception. Overgrazing, especially on arid lands, can seriously damage ecosystems. Soil erosion, watershed destruction, and the loss of native plants are commonly cited as potential impacts. In the late 1980s, the most recent reports issued by the USDA and Department of Interior on the condition of grazing allotments showed that more than half of the public rangelands were in either poor or fair condition, and a GAO survey of range managers' professional opinions showed that the BLM and the USFS authorized grazing levels higher than the land could support on 19 percent of allotments (GAO 1988). Disagreements among citizen groups over the appropriate fee system for public-lands grazing, the refusal of some operators to pay grazing fees, the retirement of allotments, and calls for government buy-outs of permits are all key issues for both ranchers and other user groups (Vincent 2004).

The concept of multiple-use continues to organize much of public thinking about the use of forest lands and resources. Diverse perspectives support the idea of multiple-use, but there is a desire for a

return to "balance" and "the greater good" in decision making about resource use. ABV Focus Group Study participants also desire a renewed emphasis on public and agency partnerships to foster stewardship to address the consequences of increased use. ABV participants identified the Coconino National Forest as a "recreational forest" with limited commercial use, primarily timber harvesting, grazing, and commercial tourism. Recreational issues identified by participants focus on the effects of increased use by a growing and diverse public. Priority recreation issues include: trail maintenance, expansion of trail resources, accommodation of OHV uses that do not damage resources or disrupt other users, enforcement and education to address problem behavior associated with increased use, and streamlining of permitting to increase the accessibility of Forest resources. Participants also expressed a range of views about fees for use of Forest resources: fees are a necessary evil, fees are a viable means to ensure maintenance of heavily used resources, fees are double taxation, and fees can deter legitimate users from visiting forest lands.

Several important management issues have arisen from demographic and use changes. As discussed above, recreation users represent a wide variety of uses, and their management priorities also differ significantly and sometimes come into conflict. National Survey of Recreation and the Environment (NSRE) surveys identify trends in the characteristics of outdoor recreation trips, wildlife as a component of recreation trips, service and accessibility issues for persons with disabilities, and user attitudes and opinions concerning site attributes, funding, and management policy. These data show that, nationally, large proportions of recreation users visit both more developed areas, such as developed campgrounds and restaurants, and less developed areas, such as primitive camping areas, trails away from roads, and Wilderness Areas. At the same time, major proportions of users prioritize such potentially contradictory values as accessibility and wilderness preservation or service provision and low use fees (Cordell, Teasley, and Super 1997). Striking an acceptable balance among these values will continue to be a major challenge for forest managers.

Under conditions of increasing recreation demand, simply maintaining services and facilities has become a challenge for many forests. Between 1989 and 1991, the GAO issued several reports on the condition of the National Forest Service's recreational sites and areas and found that funding levels were hundreds of millions of dollars short of what would be needed to complete backlogged maintenance and reconstruction for trails, developed recreation sites, and Wilderness Areas. Funding shortages and a lack of consistent, uniform monitoring data were sited as the primary roadblocks to recreation management (GAO 1991). However, the practice of increasing recreation fees to fill funding gaps has been contentious. In 1996, Congress authorized a recreation fee demonstration program, allowing land management agencies to institute new or increased fees to help address unmet needs for visitor services, repairs and maintenance, and resource management. Evaluations of fee demo programs have cited concerns about equity, administration, interagency coordination, and the use of fee monies but concluded that increasing fees have not negatively impacted overall visitor numbers (GAO 1998, 2001b). Conversely, the fees charged for recreational special-use permits, especially for large-scale commercial operations such as ski lodges, resorts, and marinas, have been criticized for remaining well below fair market value (GAO 1996).

Changes over time in Forest uses and user groups can and should help guide Forest managers in land-use planning. The need to balance the priorities and values of a wide variety of extractive and non-extractive users aptly demonstrates both the challenges and the benefits of multiple use doctrine. Not all uses are compatible, which may require some trade-offs in identifying management priorities. From the ABV Focus Group Studies, we can see that public priorities include issues about the character and quality of agency relationships with stakeholders and interested publics as well as resource and use issues concerning aesthetic and amenity resources, ecosystem benefits and resource conservation, fire and forest health, grazing management, land exchanges, OHV use and travel plans, management of special places and resources, timber management, trail management and improvement,

addressing increased recreation demand, and species conservation and wildlife habitat. Agency and public priorities overlap on most resource issues, but public priorities also emphasize public interface issues such as accountability, a more welcoming attitude to users, collaborative working relationships, desires for education and enforcement, and emphasis on stewardship and managing for "balance" and the "greater good," and a less onerous permitting process.

Motorized Access and Travel Management

The area of the Coconino National Forest has a substantial number of roads with a particularly dense road network in the northwest and southeast areas of the forest. Two major interstates meet near the center of the Coconino National Forest, I-17 and I-40. Most of the major roadways follow a north-south orientation, the lone exception being Interstate 40, which is oriented east-west.

In response to the tremendous nationwide increase in off-road motor vehicle use, negative effects to resources, and increased conflicts with non-motorized recreation uses, the Forest Service developed the National Travel Management Rule in 2005. The rule directs each National Forest to establish a system of roads, trails, and areas designated for motor vehicle use. By 2009, only those designated roads, trails, and areas will be available for motor vehicle use. The designations will impose restrictions as to the type(s) of motor vehicle and to the time of year a road, trail, or area may be used. The rule also prohibits motor vehicle use off the designated system. Public involvement in this process includes issue identification and the submission of proposed roads, trails, and areas for designation. National Environmental Policy Act, or NEPA, analysis will be done on a proposed action and alternatives. New designations will not take effect until a Motor Vehicle Use Map (MVUM) is published for a forest or district. Until the map is published, current travel management designations and prohibitions (including Forest Orders) will remain in effect. The Coconino National Forest's Travel Management designation process is occurring at the same time as the Coconino National Forest's Forest Plan Revision.

Existing Federal and State Road Networks

County and state transportation plans reviewed for this assessment acknowledge that current circulation networks have been developed as needs have arisen and are therefore inadequate for accommodating projected long-term growth. As such, these plans emphasize the need for improved planning through regional approaches linking transportation and land use. According to the Arizona Department of Transportation (ADOT), projected demographic changes throughout the state will require "major expansions of roadway capacity and the development of transportation options and alternatives to provide acceptable levels of service on Arizona's roadways and maintain circulation" (ADOT 2004b).

Currently ADOT is starting an I-17 Alternatives Study. It is a preliminary assessment of the need and feasibility for a new transportation corridor that would provide an alternative to I-17 between Phoenix and Flagstaff. ADOT has also been working on a Regional Transportation study for Northern Arizona and the Grand Canyon area to help determine long-term needs for highway improvements in the area, including highways 180, 67, 89, 89A, and 64.

Modes of Travel and Seasonal Flows

Coconino National Forest extends into portions of the state designated as Areas 1, 2, and 3 by ADOT's Transportation Planning Department. Peak traffic flow for areas 2 and 3 occurs between June and August while traffic is lowest from November to February. This would confirm the notion that traffic in the assessment area fluctuates primarily according to weather conditions and patterns of visitors from outside the assessment area.

Travel by motorized vehicle is the dominant mode of travel throughout the state of Arizona, a trend that is likely to continue given patterns of development in rural areas as well as the expense of developing infrastructure for alternative modes of transportation. Increase in vehicle miles traveled was greatest in Yavapai County between 1990 and 2000—an expected result of population increases over the same period. Peak traffic flow for the assessment area occurs between the months of June and August, and traffic is lowest from November to February. With respect to internal modes of travel, the greatest increases were reported for off-highway vehicles.

Planned Improvements

The Arizona Department of Transportation currently has plans for a number of road improvements in proximity to the Coconino National Forest over the next five years. Similarly, county governments throughout the assessment area envision improvements to arterial road networks to accommodate expected population growth. There are currently no plans to expand the existing network of internal roads in the Coconino National Forest, but rather to decrease the system open to the general public through implementation of the Travel Management Rule.

Barriers to access

On external road networks, the greatest barrier to access is likely poor road maintenance resulting from constrained county transportation budgets.

Internally, common barriers to access in the Coconino National Forest would be lack of easements through private property, low levels of maintenance of some roads, and the inability at current funding levels to repair or rebuild roads damaged by storms or wet weather use.

Information obtained from Forest personnel suggests that private landowners have increasingly sought to limit passage through their property for the purpose of accessing public lands.

Risk Assessment:

Table 32. Description of Trends, Risks, and the Affects to Motorized Access and Travel Management.

Trend	Risks	affects to management
Reduced allowable cross-country travel.	Reduced access to entire forest by motorized vehicles. Potential increase in violations of new or unpopular regulation. Displacement of travel to road system creates additional perception of crowding.	Increased need to effectively and efficiently enforce proposed travel restrictions. May need to develop additional resources or methods for enforcement/compliance. Recreation Opportunity Spectrum class may change due to increased levels of traffic. Resource damage, wildlife disturbance, and soil erosion expected to be reduced.
Reduced size of road system, including closure of user-created roads.	Reduced access to entire forest by motorized vehicles. Potential increase in violations of new or unpopular regulation. Displacement of travel to road system creates additional	Increased need to effectively and efficiently enforce proposed travel restrictions. May need to develop additional resources or methods for enforcement/compliance. Recreation Opportunity Spectrum class may change due to increased levels of traffic.

Trend	Risks	affects to management
	perception of crowding.	Resource damage, wildlife disturbance, and soil erosion expected to be reduced. Some increase to be expected in fire response time, as closed roads disappear.
Reduced levels of road maintenance.	Poorer road conditions as a result of constrained county and federal transportation budgets.	Increased safety risks, potential access reductions, and possible unauthorized use around hazards. Increased complaints from public. Increased fleet costs due to road-related vehicle damage.

Current Conditions and Trends of Sustainable Forest Travel and Access Contribution

The Forest Service has long been aware of the considerable impact internal roads have on Forest management. Increasingly, however, the short- and long-term effects of such roads have become highly controversial given the wider public's concern for maintaining roadless areas and the perceived detrimental affects on wilderness due to resource extraction. Previous research on the impact of roads in forested environments tended to focus on broadly defined positive and negative impacts of road networks. Positive impacts are generally considered to include improved access to Forest areas for the purpose of timber harvesting and the collection of special forest products, livestock grazing, mining, fire control, research and monitoring, access to private in-holdings, and the cultural value of the roads themselves. Potentially negative impacts of Forest roads include adverse effects on hydrology and geomorphic features; habitat fragmentation; predation; road kill; invasion by exotic or invasive species; degraded water quality and chemical contamination; degraded aquatic habitat; use conflicts; destructive human actions such as fire ignition, trash dumping, and illegal hunting; lost solitude; loss of soil productivity; and a decline in biodiversity (Gucinski et al. 2001).

Although much of the existing research on forest roads focuses on their physical and ecological impact, considerable attention has also been given to the direct and indirect socioeconomic consequences of road networks within the National Forests. For example, the fact that the Forest Service is required by law to permit access to private in-holdings is increasingly important to the Coconino National Forest given current access issues involving private property abutting Forest boundaries.

The indirect economic consequences of Forest roads (or the lack thereof) are also considerable for Forest managers and surrounding communities. For instance, the extent and quality of Forest roads are known to have a substantial impact on the economic costs and benefits associated with various user groups such as timber harvesters, energy and mining interests, fuels managers, and recreational users (Gucinski et al. 2001, Duffus 1992). Likewise, land managers in Arizona are increasingly aware of the potential economic and environmental impacts of OHV use.

This assessment, however, is primarily concerned with the socioeconomic status and trends among communities outside of the Forest, many of which are likely to directly affect future Forest management alternatives. The quantity and quality of road networks to and from the Coconino National Forest are no exception. A recent report to the United States Congress noted that while the

condition of our national interstate highway system has improved considerably over the last fifty years, traffic congestion has also increased. Daily vehicle miles traveled (VMT)—the principle measure of traffic density—increased 31 percent on the national highway system between 1990 and 2000. By comparison, the state of Arizona reported a 38 percent increase in VMT over the same period. Each county within the assessment area for the Coconino National Forest reported even greater increases, the highest of which was in Yavapai County (97.82 percent). The same study also found that while "the density of traffic on urban interstate highways is higher than on rural interstates, traffic on rural interstate highways is increasing at a faster rate than on any other class of road." Additionally, the Federal Highway Administration (FHWA) expects to see major increases in both passenger and freight traffic on the interstate highway system between 2001 and 2010 (17 percent and 28 percent respectively) (Siggerud 2002). Given population projections for counties within the assessment area, the Coconino National Forest is likely to be affected by increased traffic flow, congestion, and longer commute times.

Finally, current and projected trends in vehicular traffic are particularly relevant in that they are instrumental in determining local and regional land-use patterns. Each of the county comprehensive plans reviewed for this assessment makes specific mention of the link between transportation networks and land use. Some acknowledge that regional approaches to transportation development and financing likely offer the best chances of accommodating expected growth without compromising residents' quality of life. Indeed, research has shown that adequate highway systems and access to regional urban centers have a direct impact on population density, reflecting the importance of transportation on the location decisions for individual residents. Furthermore, studies have shown that transportation infrastructure is directly related to economic stability in that economic diversity, and therefore stability of local and regional economies, is dependent on an efficient highway system (Booth 2002, Case and Alward 1997).

Community Relationships

Community Involvement with Natural Resources

The Coconino National Forest, like all federal lands, has the challenge of maintaining relations and a level of involvement with both the national and local communities. While many of the below planning efforts are directed toward the local communities, they reflect national directives and emphasis that can be found in forest management throughout the country. The nature of the relationships between the Coconino National Forest and surrounding communities reveals a complex network of interests in a variety of issues that affect Forest management and planning. Through local and state newspapers and media, it is evident that there is a true interest by citizens in the use and management of Forest resources with particular attention paid to recreational uses such as hunting and fishing, as well as wildlife management, regional water sources, forest health, air quality, and fire and fuels management in the WUI. The Forest's website provides the local community and general public with up to date information regarding current Forest projects, plans, and policies that may affect nearby natural resources, as well as a venue for the public to ask questions or provide comments. Many of these outreach efforts are in response to an increase in community interest in participating in stewardship efforts of the Coconino National Forest.

Forest Service Chief Gail Kimbell has emphasized the importance of environmental education through supporting a Forest Service education program called "More Kids in the Woods". This is due to the fact that younger generations are becoming disconnected from nature. Under the program, the Forest Service is working with partners on dozens of projects around the country to get kids away from the TV, away from the computer, away from their video games, and out into the forest — face to face with nature, up close and personal. The greater use in technology, compounded with an increasingly urban population (80 percent) has resulted in fewer people becoming familiar with nature, and a decrease in

the passing on of outdoor traditions, such as hunting, to younger generations. There is an overall lack of exposure and interaction between today's youth and nature. Coined "nature deficit disorder" by one author (Louv 2005), this is occurring based on a variety of factors. There is a cultural shift resulting in unfamiliarity with nature, which has created a concern, and sometime fear, of going into the woods.

The Coconino National Forest has many existing education programs, events, and partnerships that are yet another way that the Forest Service and area citizens are directly involved in learning and sharing ideas about the natural environment. Camp Colton[19] provides area students with an outdoor classroom to learn about forestry, local wildlife, geology, and more. Interpretive walks and talks provided by the Forest Service and National Park Service occur regularly, teaching residents and visitors about area archaeology, forest health, wildlife, and area history. Three Environmental Study Areas (ESA's) have been established on the Coconino National Forest: Old Caves Crater, Griffiths Springs, and Mt. Elden. An ESA is an area that is recognized as providing a unique educational opportunity to the community, and a joint curriculum, by the Forest Service and local schools, has been created. Many local communities support current education efforts and would like to see an increase in Forest educational opportunities, outreach, and availability of information.

The communities within and surrounding the Coconino National Forest appreciate the natural resources of the Forest for their commodity production values, recreation opportunities, open space, wildlife values, scenery, and quality of life. The natural resources are also valued by residents for the firewood they provide, and the quiet and solitude of the natural environment. The appreciation of the natural resources by many residents transforms into action to assist in stewardship efforts or become involved in Forest policy, planning, and management efforts. Public comments reflect community recognition of the social and recreational impacts that are occurring on the Forest. A repeated public comment was a desire to see more on-the-ground law enforcement efforts to assist in mitigating those impacts and enforcing user etiquette.

Communities of Interest and Forest Partnerships

There is a strong sense of place affiliated with the Coconino National Forest. Many public comments expressed that it is because of the Forest and the recreational opportunities, quality of life, its resources and opportunities that make this part of Arizona so special. This connection with the Coconino National Forest results in a variety of communities of interest and Forest partnerships. These two categories encompass some of the spectrum of organizations, agencies, and groups involved with the Forest Service in the planning, management, and stewardship of the Coconino National Forest. These are grouped according to government agencies; special advocacy groups; and educational, business, and media organizations. Specific contact information and the names of principal individuals are available from the Coconino National Forest.

A community of interest is an entity that is influenced by the management of the Forest. Communities of interest may include residents of physical communities or members of an interest group, agency, or private organization. Consideration of a community of interest's stake in Forest management is important, but not specifically directed through formal partnership agreements. Some especially noteworthy communities of interest to the Coconino National Forest are the American Indian tribes. There are thirteen tribes for which the Coconino National Forest has consultation responsibilities Table 33 (page 27).

[19] An outdoor school exerience for 6th graders in the Flagstaff Unified School District located on the South Western slope of the San Francisco Mountains.

Table 33. Tribal Consultation Responsibilities for the Coconino National Forest

American Indian Tribes
Ft. McDowell Yavapai Nation
Havasupai Tribe
Hopi Tribe
Hualapai Tribe
Navajo Nation
Pueblo of Acoma
Pueblo of Zuni
San Carlos Apache Tribe
San Juan Southern Paiute Tribe
Tonto Apache Tribe
White Mountain Apache Tribe
Yavapai-Apache Nation
Yavapai-Prescott Indian Tribe

Forest partnerships are organizations that have a formal agreement with the Forest Service to assist in the on–the-ground stewardship efforts. Forest partnerships include organizations such as Sedona's Friends of the Forest, Arizona Natural History Association, and Flagstaff Biking Organization. Forest partnerships increase the Forest's capacity to provide the public with interpretative services, maintained trails, Forest closure efforts, and noxious/invasive weed control and recreation opportunities. Data from some of the Coconino National Forest's volunteers, not encompassing all partnerships, indicate that from 2003 through 2006 there has been an average of 1,836 volunteers per year, providing an annual average of 61,700 hours of service. While the Forest is already using partnerships in many areas, the public would like to see even more volunteer opportunities created.

Risk Assessment:

Table 34. Description of Trends, Risks, and the Effects to Management of Community Relationships.

Trend	Risks	Effects to management
Increase in community interest in participating in Forest stewardship efforts.	Lack of opportunities for communities to participate in Forest Stewardship efforts. Static or decreased levels of information on public desires for public management.	Lack of current organizational capacity to adequately foster community relationships. Community involvement in field projects may result in accomplishing more on the ground work, enabling more projects to be planned and completed.
Increase in desire for education and information.	Public disappointment that agency is not providing enough education and information to communities.	Limited organizational capacity staffing in education and information may result in services not meeting demand. Potential area for increasing educational and interpretative capacity by volunteers.
Decreasing interaction between people and the natural environment.	Lack of awareness and compassion for the natural environment and conservation efforts.	Need to increase education and outreach efforts to public, particularly youth.

Current Conditions and Trends of Sustainable Forest Community Relationships

Part of "serving people" is working with the people, and in recent years the Forest Service has placed increasing priority on the social relationships between National Forests and surrounding communities. As awareness and commitment to these processes grow, so does the need for Forest managers and planners to understand the dynamic linkages between the Forest and surrounding communities. The trend toward increased use and the need to provide for this use while protecting the resource values of the Forest creates a real need for partnerships and volunteers. It is anticipated that the retirement of the baby-boomers will generate an increased volunteer interest in land management.

Through media outreach, education, volunteer programs, and a continuously updated website, the Coconino National Forest and local communities are able to interact on a continuous basis. Although the concept of community relations is a relatively new component of Forest planning, frameworks exist to help planners develop a comprehensive strategy for monitoring and enhancing these community relationships. The Forest and community relationships will most likely continue to increase as both sides work toward a better understanding of how the social dynamics of local communities can be incorporated in management to better serve the social, economic, and ecological sustainability of the area.

GLOSSARY

ADOT—Arizona Department of Transportation.

Commodities—The goods and services produced by industries.

Communities—A social group of any size whose members reside in a specific locality, share government, and often have a common cultural and historical heritage.

Condition—Usually, conditions. Existing circumstances.

Direct Coefficient—For each dollar outlay for a given industry the amount used for purchase of goods and service from each industry sector modeled.

Direct Effects—The set of expenditures applied to the predictive model (i.e., I/O multipliers) for impact analysis.

Environs—Surrounding objects; surroundings; environment.

Ethnicity—Ethnic traits, background, allegiance, or association.

Indirect Effects—The inter-industry effects of input-output analysis. The impacts above and beyond the direct effects when applied to the Type I multipliers.

Induced Effect—-The impacts of household expenditures in I/O analysis.

Industries—The collection of businesses in an economy within a given region. Purchasing goods and services and paying workers.

Input-Output Accounts—The accounting of all current money flows from and to (outlays and outputs) industries located.

Input-Output Analysis—An economic model that allows the assessment of change in overall economic activity as a result of some corresponding change in one or several activities.

Institutions—Refer to the type of final demand sector. They are personal consumption expenditures, or purchases made by households, federal, state, and local purchases, investment purchases, and trade.

IRA--Inventoried Roadless Area

Labor Income—In general, it represents all forms of employment income. In I/O it is the sum of employee compensation and proprietor income (except for IMPLAN multiplier report 603 which includes only employee compensation).

Margins— Represent the difference between producer and purchaser prices.

Net Commodity Supply—Total value of a commodity produced by the region net of the value of foreign export.

NVUM—National Visitor Use Monitoring.

OHV—Off-Highway Vehicle.

Permitted Use—Any use on National Forest System Lands that is approved under a permit from the National Forest that the activity occurs on.

Predictive Model—The mathematical representation of the input-output multipliers. Mathematically it is: $X = (I - A)-1 * Y$.

Primary Commodity—Of the commodities produced by an industry, it has the greatest value. The industry is classified based on its primary commodity.

Purchaser Prices—Prices paid by the end user of the good or service at a retail store.

Race—A group of persons related by common descent or heredity.

Rural—Of, pertaining to, or characteristic of the country, country life, or country people; rustic.

Secondary Commodities— The commodities produced by a single industry which are of lesser value than the primary commodity (i.e. byproducts) produced by retail store.

Sustainability—To undergo, experience, or suffer (injury, loss, etc.); endure without giving way or yielding.

Total Regional Commodity Supply—Total value of locally produced commodity supply for a region. Includes industry and institutional sources.

Trend—The general course or prevailing tendency.

Urban—Of, pertaining to, or designating a city or town.

Use Table—The use of commodities by industry. It shows business purchases of goods and services for use in the production process.

Value-Added— Payments made by industry to workers, interest, profits, and indirect business taxes.

WUI—Wildland Urban Interface

Wildland Fire Use-- is the management of naturally-ignited wildland fires to accomplish specific resource management objectives in predefined designated areas outlined in Fire Management Plans.

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