Socio-Economic Assessment for the Prescott National Forest

Prepared for the Southwest Region
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Socioeconomic Assessment of the Prescott National Forest

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Abstract

This report presents a socioeconomic assessment of the two-county area surrounding the Prescott National Forest. The assessment is based on analysis of secondary data and is designed to inform forest staff, stakeholders, and communities of trends in seven topics: 1) demographic patterns and trends; 2) economic characteristics and vitality; 3) access and travel patterns; 4) land use; 5) forest users and uses; 6) designated areas and special places; and 7) community relationships. Findings from the analysis of socioeconomic data are consistent with those from similar studies throughout the region showing significant increases in population and housing, substantial economic shifts from extractive industries toward the service and professional sectors, and a land use policy environment largely affected by an abundance of public land and increasing urbanization. In addition to revealing differences in the demographic, economic, and land use patterns of both counties, it also discusses issues of natural and cultural resource protection common to the entire region.

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Acronyms

AADT	Average Annual Daily Traffic
ADOC	Arizona Department of Commerce
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AMA	Active Management Area
AP	Associated Press
ASNF	Apache-Sitgreaves National Forests
ATR	Automatic Traffic Recorder
AUM	Animal Unit Month
AZOT	Arizona Office of Tourism
AZSLD	Arizona State Land Department
BEA	Bureau of Economic Analysis
BLM	Bureau of Land Management
CAAG	Central Arizona Association of Governments
CDP	Census Designated Places
CIP	Capital Improvement Plan
CLIMAS	Climate Assessment for the Southwest
COF	Coconino National Forest
CRWUA	Colorado River Water Users Association
CVSD	Camp Verde Sanitary District
CYMPO	Central Yavapai Municipal Planning Organization
DEIS	Draft Environmental Impact Statement
DN	Decision Notice
EIS	Environmental Impact Statement
FHWA	United States Department of Transportation Federal Highway Administration
FMPO	Flagstaff Metropolitan Planning Organization
FS	Forest Service
FSH	Forest Service Handbook
GIS	Geographic Information System
IMI	Inventory and Monitoring Institute
IRA	Inventoried Roadless Areas
ITS	Intelligent Traffic Systems
KNF	Kaibab National Forest
MCD	Minor Civil Division
MIG	Minnesota IMPLAN Group
NACOG	Northern Arizona Council of Government
NAGPRA	Native American Graves Protection and Repatriation Act
NAICS	North American Industry Classification System
NFMA	National Forest Management Act
NRIS	Natural Resource Information System
NSRE	National Survey on Recreation and the Environment
NVUM	National Visitor Use Monitoring
OHV	***Off-Highway Vehicle***
PAG	Planning Analysis Group
PILT	Payments in Lieu of Taxes
PNF	Prescott National Forest
PPI	Per-Capita Personal Income
PRIA	Public Rangelands Improvement Act

Acronyms

RAP	Roads Analysis Process
RARE	Roadless Area Review and Evaluation
ROS	Recreation Opportunity Spectrum
SOPA	Schedule of Proposed Action
TDR	Transfer of Development Rights
TEIM	Tourism Economic Impact Model
USFS	United States Forest Service
VMT	Vehicle Miles Traveled
WMA	Waste Management of Arizona

Executive Summary

The purpose of this assessment is to profile the social and economic environment surrounding the Prescott National Forest. The collection and analysis of quantitative and qualitative socioeconomic data in this report will serve as a baseline by which the Prescott National Forest and the wider public can assess management alternatives developed through the process of forest plan revision. It will do so by 1) facilitating a better understanding of the relationship between public lands and surrounding communities, 2) aiding in the identification of specific forest plan elements capable of responding to socioeconomic trends, and 3) assembling a wide array of information needed to evaluate trade-offs between various forest management alternatives.

Multi-county areas of assessment provide the framework for compiling social and economic data for this report. The boundaries of the Prescott National Forest extend into Coconino and Yavapai Counties in northern and central Arizona. The methods of inquiry for this assessment were described in an initial work plan that was reviewed and approved by the Southwest Regional Office of the USDA Forest Service and by Forest Planners from each of the six national forests in Arizona. The plan identifies socioeconomic indicators, the geographic and temporal scale of analysis, and potential sources of information for each assessment topic. This Executive Summary highlights collected information pertaining to each of these seven topics.

Demographic Patterns and Trends

Total 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 in Yavapai County far exceeded the rate of increase in overall state population over the same period (146% versus 89% respectively). Population growth between 1980 and 2000 was considerably less in Coconino County (55%). Among individual cities, Prescott Valley, Chino Valley, and Camp Verde experienced the greatest increases in total population between 1980 and 2000.

Population age

The two counties within the area of assessment demonstrated divergent trends with respect to the population of individuals age 65 and over and those under age 18. Amid strong overall population growth in Yavapai County, the population of individuals 18 and under grew much more than the 65 and over population between 1990 and 2000. The opposite was true in Coconino County which reported an even greater disparity between the growth of the 65-and-over and under-18 populations over the same period. The cities of Prescott Valley, Cottonwood, Chino Valley, and Camp Verde reported the most significant increases in 65-and-over populations among selected cities within the area of assessment.

Racial / ethnic composition

Yavapai County reported a dramatic increase in the number of individuals of multiple race and Hispanic origin between 1990 and 2000, clearly outpacing increases in the same categories at the state level over the same period. Despite substantial increases in individuals of multiple-race and Hispanic ethnicity, whites remain the predominant racial group in both counties within the area of assessment. As of 2000, Coconino County was the most racially diverse due to its considerable Native American population.

Housing

Increases in total housing and housing density were greatest in Yavapai County between 1990 and 2000, mirroring similar growth in the overall population. Although increases in seasonal housing within the area

of assessment were less than that for the state, increases in median home values between 1990 and 2000 were greater than the average for Arizona.

Economic Characteristics and Vitality

Employment

Economic growth for the area of assessment was significant between 1990 and 2000. Yavapai County reported the strongest gains in total full- and part-time employment with especially strong increases in the construction, manufacturing, and wholesale trade sectors. Yavapai also reported rates of unemployment that were lower than the state average, while those in Coconino County were considerably higher.

Occupational structure

The occupational structures within Coconino and Yavapai Counties closely resembled those of the state overall. The management, professional, and related occupations grouping is the dominant occupational category for Arizona followed by sales and office occupations and finally by service occupations. For both counties within the area of assessment, construction, extraction, and maintenance, along with production, transportation, and material moving was also among the five most dominant occupational categories.

Income

As of 2000, both Coconino and Yavapai Counties maintained levels of per capita and median family income that were lower than average for Arizona. Coconino County saw the greatest increases in per capita income while Yavapai County reported the strongest gains in median family income between 1990 and 2000. Both counties also saw substantial declines in individual and family poverty that were greater than reductions in poverty at the state level over the same period. Nonetheless, as of 2000, Coconino County maintained rates of poverty that were greater than average for the state of Arizona.

Natural resource dependent economic activity

Changes in income from natural resources were particularly dramatic in Coconino County between 1990 and 2000. Data for the county show a precipitous decline in income from wood products and processing and a substantial increase in income from special forest products and processing over the period. Yavapai County reported an especially strong increase in tourism employment between 1990 and 2000.

Access and Travel Patterns

Existing federal and state highway conditions

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, 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).

Modes of travel and seasonal flows

Travel by motorized vehicle is by far the most 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 (VMT) was greatest in Yavapai County between 1990 and 2000—an expected result of population increases over the same period. Peak traffic flow for the area of assessment 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 (OHVs).

Planned improvements

The Arizona Department of Transportation currently has relatively few plans for road improvements in proximity to the Prescott National Forest over the next five years. Although county governments throughout the area of assessment envision improvements to arterial road networks to accommodate expected population growth, implementation of plans is dependent upon the pace of development and the level of infrastructure funding. There are currently no plans to expand the existing network of internal roads in the Prescott National Forest.

Barriers to access

On external road networks, the greatest barrier to access is likely poor road maintenance resulting from constrained county transportation budgets. Internally, the most common barrier to access in the Prescott National Forest is the proximity of forest roads and trails to private property. Information obtained from forest personnel suggests that private land owners have increasingly sought to limit passage through their property for the purpose of accessing public lands.

Land Use

Land ownership

As a whole, land ownership within the area of assessment closely resembles overall ownership patterns for the state of Arizona. Coconino County has the greatest amount of Native American lands whereas Yavapai County reported the greatest amounts of private and State Trust land, both of which are likely to influence future development patterns.

Land coverage and land use

Evergreen forest constitutes the predominant land cover in Coconino County whereas shrub, brush, and mixed range land is predominant in Yavapai County. Within the area of assessment, Yavapai County reported the highest percentage of residential and industrial land cover while Coconino County reported the greatest amount of commercial and services land cover.

Long range land use plans and local policy environment

County land use within the area of assessment ranges from traditional uses such as ranching in rural areas to denser concentrations of residential, industrial, and commercial uses in and around urban centers. Preservation of open space is a particularly important 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. The provision of adequate, affordable infrastructure and sufficient water supplies is also a growing concern for planners, residents, and land managers throughout the region.

Forest Users and Uses

Extractive uses

Historically, extractive uses have played a major role in public land management throughout the area of assessment. National studies show, however, that land uses such as livestock grazing, timber cutting, and mining are being slowly succeeded in policy and management by an emphasis on non-extractive uses. Available information from the Prescott National Forest only partly substantiates these national trends, demonstrating consistent grazing activity and a slight decrease in timber extraction from forest lands.

Non-extractive uses

Although recreation use has increased steadily since the establishment of the National Forest Service, the increase in recreation over the past few decades has been particularly dramatic. According to National Visitor Use Monitoring data, the Prescott National Forest received approximately 772,000 visits during fiscal year 2001—a majority of which were male, white, and between the ages of 31 and 70. A significant increase in the use of off-highway vehicles (OHVs) has been identified by the Forest Service as a major component of unmanaged recreational use.

Special uses

A number of special user groups were identified for the Prescott National Forest including Native American tribes, OHV users, wildlife users, and wilderness users. The management and accommodation of these and other special user groups have involved increasing administrative and political implications in recent years.

Designated Areas and Special Places

Natural, recreational and interpretive resources

The Prescott National Forest encompasses considerable natural, recreational, cultural, and interpretive resources including over 100 dispersed sites, campgrounds, picnic areas, scenic areas, and administrative sites.

Issues surrounding identification of cultural resources

Due to the cultural, emotional, and spiritual bonds formed between individuals and specific environments, the identification and management of special places can be rather contentious. Making these tasks more difficult is the fact that the relationships people form with special places often cut across traditional boundaries dividing liberal and conservative political ideologies, extractive and environmentalist interests, and urban and rural user groups. Ultimately, incorporation of “special places” into revised Forest Plans is best supported by a commitment to primary research and participatory decision making.

Community Relationships

Community involvement with natural resources

The communities surrounding the Prescott National Forest have long been dependent upon natural resources for commodity production, tourism, and aesthetic enjoyment. A review of state and local newspapers reveals a general interest in the use and management of forest resources with particular attention paid to regional water sources and issues surrounding hunting, fishing and management of wildlife.

Communities of interest and historically underserved communities

The management activities of the Prescott National Forest must take into account the interests of a growing number of community groups and forest partners. Organizations and individuals influencing forest planning and management represent government agencies, Native American tribes, special advocacy groups, business interests, educational institutions, and the media. Meanwhile, the Forest Service is making a concerted effort to address the needs and desires of historically underserved communities, a fact that is increasingly important to the Prescott National Forest given the rates of demographic change in the region.

Community/forest interaction

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. 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 relationships.

Key Resource Management Topics

In addition to the initial seven topics of socioeconomic assessment, forest planners identified several issues of growing importance to the management of natural resources within Arizona's national forests. Although these issues are identified throughout previous chapters, this section provides greater detail on the status of policy debates as well as potential implications for forest planning and management.

Findings suggest that susceptibility to catastrophic wildfire and invasive species, the environmental and economic sustainability of livestock grazing on public lands, and the effects of human land use on existing open space will likely continue to have a strong impact on future management activities of the Prescott National Forest.

Similarly, changing demographic patterns and forest user trends will surely affect the alternatives considered in the process of Forest Plan revision. In particular, a significant increase in recreational forest uses and the ongoing concern the economic and environmental sustainability of livestock grazing and timber harvesting will continue to be important issues for the Prescott National Forest.

Given rates of population growth and urban expansion in northern and central Arizona, the Prescott National Forest stands to be affected by ongoing debates regarding the management of public land and regional water supplies. Reforms proposed by lawmakers and the Arizona State Land Department are likely to have a significant impact on the forest given the abundance of State Trust land within the area of assessment. Likewise, the role of managing regional watersheds places the Prescott National Forest at the center of contentious debates over water provision, particularly in light of the ongoing regional drought.

Finally, specific issues under the heading of forest access and travel will undoubtedly affect the future management activities of the Prescott National Forest. Recent reinterpretation of the "Roadless Rule" has been a particularly controversial issue involving extractive business interests, environmental advocacy groups, and the general public at the local and state level. Additionally, the effort on the part of the Forest Service to respond to a dramatic increase in OHV travel promises to raise concerns from various user groups and affect natural resource management in the Prescott National Forest over the coming years.

1. Introduction

1.1 Statement of purpose

The purpose of this assessment is to characterize the social and economic environment of the Prescott National Forest (PNF) by showing the relationship and linkages between National Forest System land and communities. The information contained in the assessment is intended to help the Forest Service (FS) and the public to do the following:

- Better understand the relationship between public lands and communities,
- Aid in identifying specific elements of the current forest plans that may need to be changed, and
- Assemble information needed to evaluate trade-offs between options for future forest management.

Finally, this assessment is intended to be broadly useful as a basis for well informed consideration of future alternatives within and beyond the planning process. It does so by clarifying relationships between various socioeconomic characteristics of local communities and natural resource management activities of the PNF.

1.2 Assessment methodology and topics

This assessment of the social and economic environment surrounding the PNF is based entirely on the analysis of secondary research. Secondary research is defined as data which have already been collected and published for different purposes but which may prove useful in any number of other inquiries or applications. Examples of secondary data include demographic and economic information compiled by the United States Census Bureau as well as information contained in FS documents.

Specific lines of inquiry were identified in the initial Project Work Plan agreed to by the University of Arizona and Region 3 of the USFS in Albuquerque, New Mexico. This document prescribes the methods of assessment of socioeconomic trends for each of Arizona's six national forests. In addition to individual information elements for each assessment topic, this document identifies the desired geographic and temporal scales of analysis as well as potential sources of information.

In accordance with the Work Plan, and following the example of similar socio-economic assessments, this study uses counties as the primary unit of analysis for social and economic data. For each of the national forests in Arizona, the area of assessment consists of all counties adjacent to particular forest boundaries. For the Prescott National Forest, this includes Coconino and Yavapai Counties in the northern and central portions of the state.

In addition to analyzing information at the county and regional levels, this assessment includes data on individual communities of interest to PNF. The Work Plan defines communities of interest as those that are proximate to forest boundaries, those which share a stake in the management of the forest, and those communities of access and egress. During the collection of demographic and economic data, the decision was made to collect information on selected Census Designated Places (CDPs) as well as the more commonly used Minor Civil Divisions (MCDs). Inclusion of CDPs provides data for settled population concentrations that are identifiable by name but are not legally incorporated under the laws of the state in which they are located (U.S. Census Bureau 2005).

The report provides a profile of socioeconomic conditions and trends deemed most relevant to natural resource policies in general and the management of Arizona's national forests in particular. Secondary demographic, economic, and social data have been drawn from readily available sources, including the U.S. Census Bureau, the USFS Natural Resource Information System (NRIS), and the Minnesota

IMPLAN Group (MIG). The information contained in this report is well-suited to serve as a comparative baseline for each of the counties, presenting descriptive data to assist the PNF and local communities analyze and monitor trends most likely to influence the management of forest resources throughout the region.

Specific variables used to profile existing socioeconomic conditions and trends within the geographic area of assessment are based on both explicit and implicit assumptions about relationships between various forest management alternatives and affected communities. The individual topics of assessment and specific variables have been identified in conjunction with regional and local FS administrators and are similar to measures used in other social assessment studies (Adams-Russell 2004; Leefers, Potter-Witter, and McDonough 2003). The profiles, generated through collection of secondary data, will serve as valuable tools for estimating the potential impact of policy changes, resource management activities, and development trends for each of the assessment topics.

1.3 Report organization

The organization of this assessment is based on the collection and analysis of data pertinent to each of seven individual assessment topics. Following this introductory chapter, collected data on selected socioeconomic indicators are provided for each topic. Additionally, each topic is discussed in its historical context as well as its potential implications for forest planning and management. Chapters 2 and 3 provide information on demographic trends and economic characteristics of counties and selected cities within the area of assessment. Chapter 4 discusses the access and travel patterns within the area of assessment and Chapter 5 examines land use patterns and policies. Chapter 6 uses available secondary data to discuss trends for current forest users and uses. Chapter 7 identifies designated areas and known special places within the PNF and discusses their importance in forest management. Chapter 8 assesses relationships between the PNF and various communities at the local and regional levels. Chapter 9 offers a brief analysis of key management topics identified by forest planners at the inception of this assessment. The final chapter summarizes major trends within each topical area and discusses their combined relevance to Forest Plan revision. A list of works cited is included in this assessment and a fully annotated bibliography will be presented to individual forests.

2. Demographic Patterns and Trends

This section discusses historic and current conditions affecting local populations and illustrates demographic trends for both counties within the area of assessment for Prescott National Forest (PNF). Data on selected cities within the area of assessment are also included in order to illustrate important factors contributing to demographic change for specific populations. Indicators used to assess demographic patterns and trends include total population, racial/ethnic origin, urban and rural populations, age structure, educational attainment, and housing density.

A review of secondary social data for area of assessment shows divergent trends, with Yavapai County growing much faster than Coconino County and at a greater rate than the entire state over the same twenty-year period. Substantial growth in total and seasonal housing units as well as the under-18 and 65-and-over populations was driven largely by the rapidly expanding cities of Prescott Valley, Chino Valley, and Camp Verde. The last twenty years have also seen Yavapai County shift from a largely rural population to one that is predominantly urban. Differences are additionally seen in the racial and ethnic diversity of the two counties. Although Yavapai County experienced enormous increases in both multiple race and Hispanic populations between 1990 and 2000, it remains much less diverse than Coconino County due primarily to the latter's relatively large Native American population.

2.1 Historical context and social characteristics

Human interaction with the lands including and surrounding the Mogollon Rim has been continuous for at least 5,000-6,000 years. The first communities in the region were highly mobile hunting and gathering camps that had only a light effect on the landscape. During the period of time between C.E. 100 and C.E. 900, the resident populace established a more sedentary lifestyle. This transition was typified along the Arizona highlands by cultures such as the Anasazi and the Hohokam. There was an increased use of ceramics, development of more complicated architecture, and the beginnings of horticulture and domesticated livestock. This more sedentary lifestyle led to an associated rise in human population. By the periods encompassing C.E. 900-1200, more long-term human effects were noticeable on the environment, including a depletion of wild game, the institution of standing agricultural fields, and the resultant diversion of water sources (USFS 1999a).

The entrada of Francisco Vasquez de Coronado in 1540 marked the first significant Spanish interest in the Arizona highlands. On a route that led from western Mexico to central Kansas, Coronado's explorations were primarily motivated by a search for silver and gold. He failed to find it in Arizona, and Spanish interest in the area was largely quelled until the discovery of mineral wealth at the turn of the 17th century (Sheridan 1995). Athapaskan (Apache and Navajo) groups played a major role during this time. In fact, the mountainous regions of Arizona were often referred to as the Apacheria. Apaches formed loosely confederated groups based on matrilineal kinship and thrived on a combination of agriculture, hunting, trade, and raiding. Both Navajos and Apaches absorbed skills and traits from neighboring groups, including the Pueblo peoples and the Spaniards. Through most of Spanish and Anglo colonization, Apache raiders were seen as a major threat to settlers. Nonetheless, by the 1700s, Spanish explorers and missionaries routinely made the trip between Tucson and Santa Fe. The area became, by the 1800s, a driving route for livestock, specifically sheep, primarily by Mormon settlers. Due to limited water sources, overgrazing occurred primarily near standing aquifers. However, with the spread of standing agriculture, the pressures of grazing began to spread across the range (USFS 1999a).

In 1864, Yavapai County became one of the first created by the Territorial Legislature. It covered an enormous amount of space and would later be divided into six separate counties. In its original borders, Yavapai County spanned from the New Mexico state line to its current western boundary, and from the Gila River up to the Utah state line. For much of the latter half of the 19th Century, the city of Prescott

served as the capital of the territory. In the final decade of the 1800s, Coconino County was established from lands formerly of Yavapai County. Flagstaff won a landslide vote over Williams to become the county seat and remains so today (Coconino County Website, Yavapai County Website, Baker et al. 1988). When gold was first discovered on the land, large numbers of Euro-Americans came to the area, settling in the present-day chaparral forest area (Huebner et al. 1999). This led to the development several mining towns including Prescott, Crown King, Walker, and Jerome (Baker et al. 1988).

The Prescott Forest Reserve, later to become the Prescott National Forest, was established in 1898 by presidential proclamation—the second such reserve in Arizona after the Grand Canyon Forest Reserve. The Prescott reserve consisted of sixteen sections of land located south and west of the town of Prescott. One of the primary purposes for the formation of the reserve was to protect the community's domestic watersheds (USFS 2005l).

The PNF currently covers 236,902 acres across central Arizona. The majority of the forest lies in Yavapai County, with a small portion located in Coconino County. The forest was initially created in 1908 from the Verde and Crown King Forest Reserves. Additional acreage came from the Tusayan National Forest, which is no longer in existence (Baker et al. 1988). The forest is located both north of Phoenix and is composed of two distinct divisions. The eastern portion of the forest comprises the headwaters of the Verde River and borders the Kaibab National Forest on the north, Coconino National Forest on the east, and the Tonto National Forest on the south. The western portion of the forest includes the Bradshaw and Santa Maria mountains and is separated from the eastern portion by state, private, and BLM land (Baker et al. 1988).

Climate within the forest varies with elevation. Annual precipitation ranges from eight to twenty-five inches with the majority occurring from July-September. Runoff from the forest land flows into the Verde, Agua Fria, Hassayampa, and Bill Williams Rivers. Elevations from 3,000 to 8,000 feet offer a variety of vegetation, including mixed conifer, ponderosa pine, chaparral, pinyon-juniper, open grassland, and desert shrub. Recreation opportunities offer year-round possibilities. Major vegetation changes have been observed in the area, due to both climatic and anthropogenic causes. In the PNF area, livestock grazing, fire, and conversion of woody plants to available forage for cattle have all been cited as major disturbances (Baker et al. 1988, Huebner et al. 1999).

The demographic history of the area surrounding the PNF, and the region as a whole, represents one of sustained and rapid growth. In the period since 1930, the Mountain West has doubled its share of the U.S. population, from 3% to 6.5%. This growth increased dramatically in the 1950s and then reduced again in the 1960s. The pattern was repeated for the next forty years, with alternating decades of intense growth followed by decades of slower growth (Otterstrom and Shumway 2003). Yavapai County has, in general, grown steadily over the past ninety years with the exception of fluctuations during the 1940s and 1950s. The state has grown from 120,000 residents to well over 5 million: along with Washington, one of only two states to show such a startling demographic expansion (U.S. Census Bureau 2005). Yavapai County itself has grown from 13,799 residents at the turn of the 20th Century to 68,000 in 1980 to nearly 170,000 today (Forstall 1995, U.S. Census Bureau 2005). The average age in the state has been steadily increasing: 31% of the state was under 15 in 1950, but only 22.4% is in the under-15 bracket today. Some of these shifts can be attributed to Arizona's amenable climate, relatively affordable property values, and the continued importance of area military bases. Long-term population increases are also supported by seasonal visitors wishing to permanently relocate to environs with increased outdoor opportunities (McHugh and Mings 1996).

The past fifty or sixty years have seen only moderate racial diversification in the state. While the Hispanic population has increased from 20.4% to 25.2% of the population since 1940, African Americans, despite an especially rapid influx in the two decades following WWII and an average population growth rate of 49% per decade, remained static at 3.1% of the population in 2000, only 0.1% above their relative numbers in 1940. The Native American population as a percentage of the total, by contrast, has declined

significantly over the past five or six decades, falling from 11% in 1940 to 5% in 2000 (U.S. Census Bureau 2005)[1].

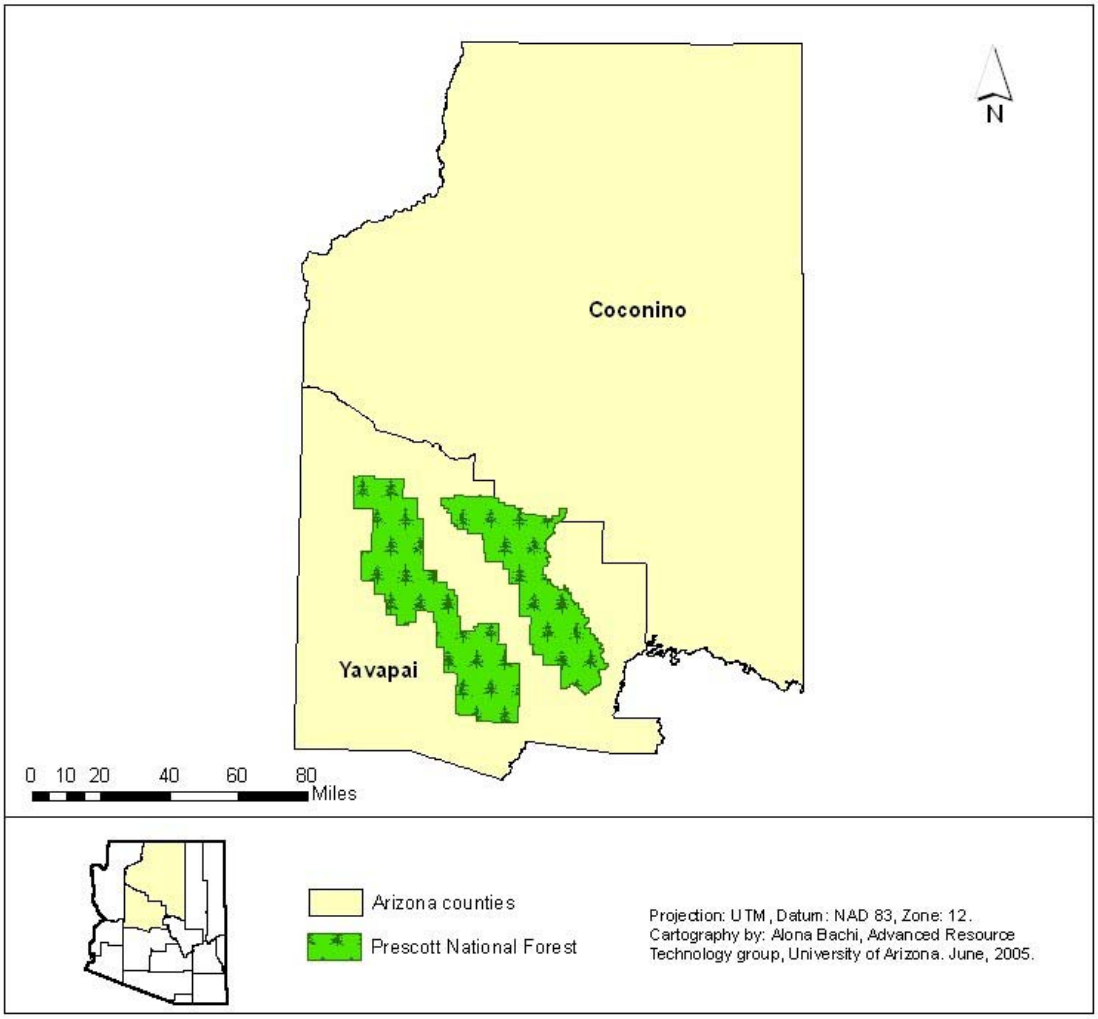


Figure 1. Map of Forest Boundaries and Counties in Area of Assessment

[1] 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.

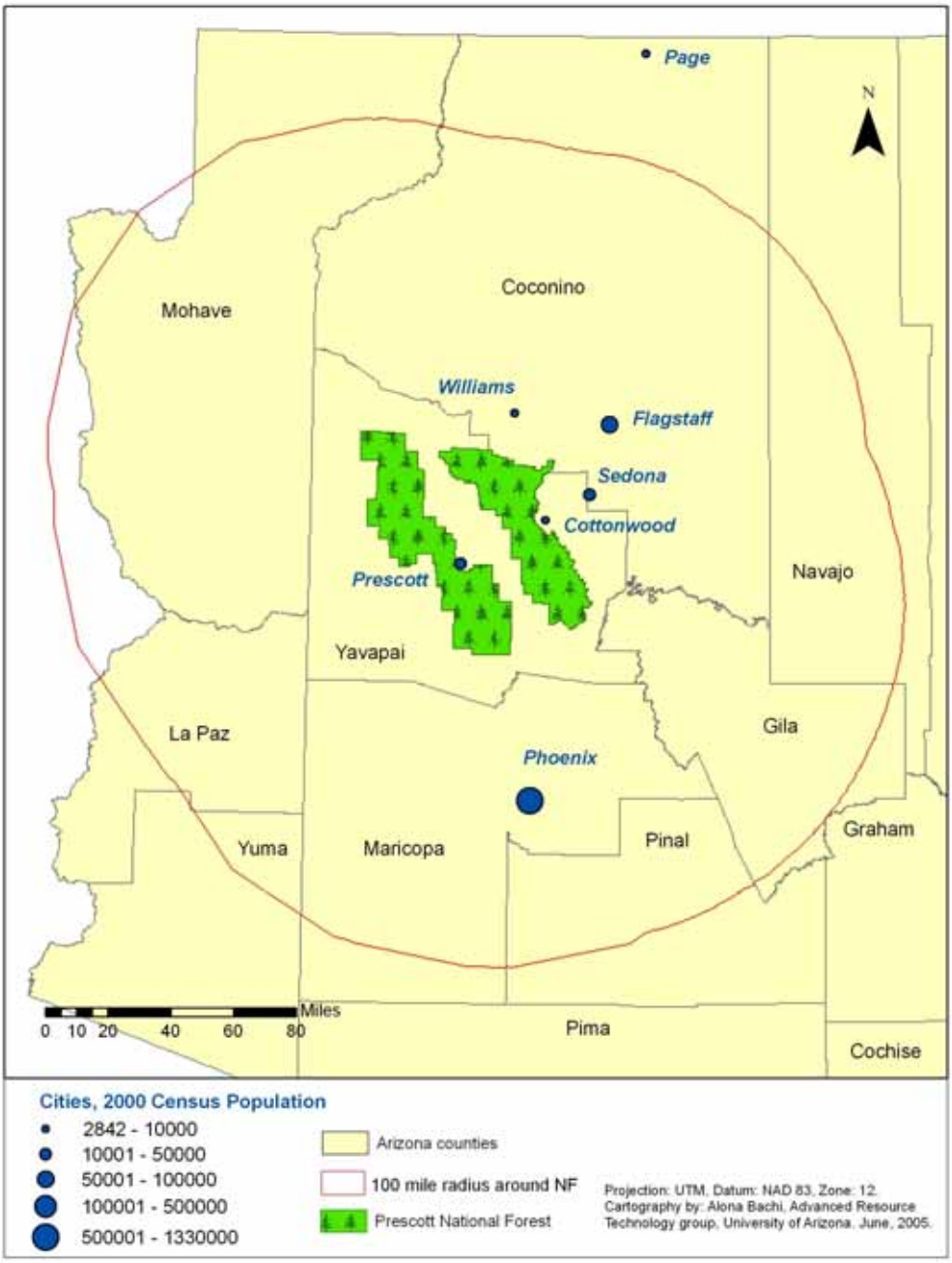


Figure 2. Proximity of Population—MCDs within 100-Mile Radius

2.2 Population, age structure, net migration, and tourism

Information concerning total land area, USFS acreage, total population, and population density for each of the counties is presented in Table 1. Data show that Coconino County is much larger in total area than Yavapai County and contains more FS land than any other county in the state with well over 3 million acres. Yavapai County, however, hosts a larger population within this smaller area, resulting in a substantially higher population density than that of Coconino County. According to Table 1, Flagstaff is the most populous city within the area of assessment with a population of 52,894 in 2000. All other towns throughout the region support much smaller populations, the smallest being Fredonia, which, according to the 2000 census, had a population of 1,036.

While both counties have experienced consistent population growth over the past two decades, they exhibit opposite trends when viewed in comparison to the state as a whole. Since 1980, growth within Coconino County has slowed and remains well below state growth rates reported over the same time period. Yavapai County, on the other hand, has continued to experience population growth rates that far outpace those for the state of Arizona over the last twenty years (Table 2). Within Coconino County, Sedona and Page experienced significant population growth between 1980 and 1990 while the population of Williams decreased by more than half over the same period. Of the selected cities in Coconino County, Page is the only one that continued to exceed county population growth rates between 1990 and 2000. In Yavapai County, Camp Verde and Prescott Valley both experienced dramatic population growth between 1980 and 1990 (454.93% and 287.83% respectively). While growing at a much slower pace, the population of Chino Valley has also increased considerably during the same period, exceeding county-wide population growth over the entire twenty-year period.

Table 3 displays the overall decline in rural populations for both 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 (54.43%). By 2000, an increase in urban population as a percentage of total population of nearly twenty percent and a commensurate decline in the rural population had reversed this relationship, significantly altering the residential characteristics of the county.

Table 1. Total Area, Total Population, Population Density, and Forest Service Acreage by County and Place

County/Place	Total Area Sq. Miles	2000 population	Pop. Density per sq. mile	USFS Acres
Coconino County	18,661	116,320	6.23	3,275,320
Flagstaff	63.6	52,894	831.67	n/a
Sedona	18.6	10,192	547.96	n/a
Page	16.6	6,809	410.18	n/a
Williams	43.5	2,842	65.33	n/a
Fredonia	7.4	1,036	140.00	n/a
Yavapai County	8,128	167,517	20.6	1,968,976
Prescott	37.1	33,938	914.77	n/a
Prescott Valley	31.7	23,535	742.43	n/a
Cottonwood - Verde Village*	8.8	10,610	1205.68	n/a
Sedona	18.6	10,192	547.96	n/a
Camp Verde	42.6	9,451	221.85	n/a
Cottonwood	10.7	9,179	857.90	n/a
Chino Valley	18.6	7,835	421.24	n/a

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

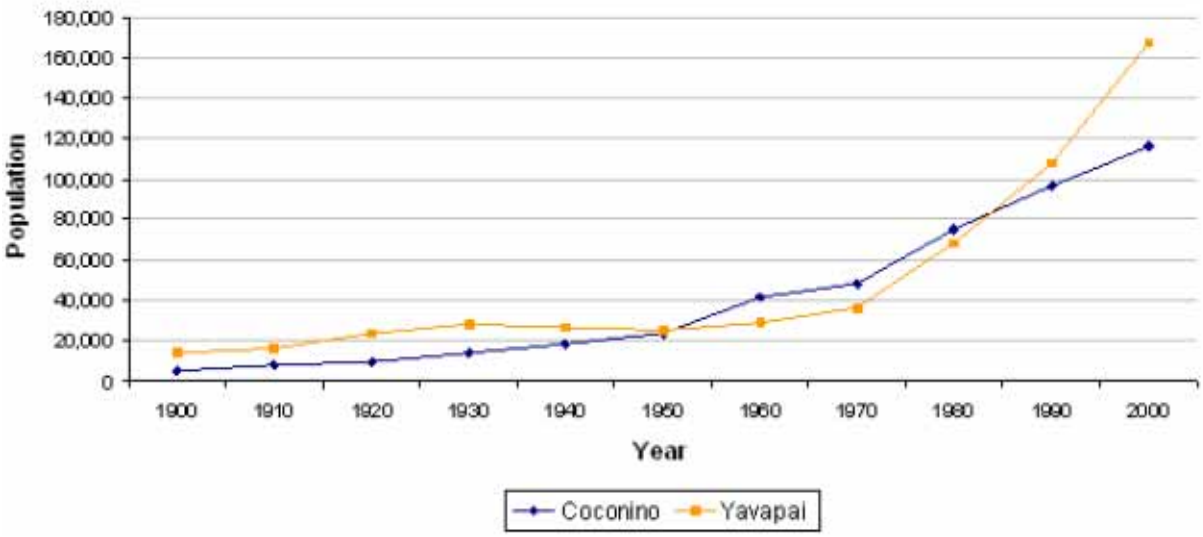
Source: NRIS - Human Dimensions

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

Table 2. Decennial County, Place, and State Populations, 1980-2000 and % Change

County/Place/State	Total Population 1980	1990	2000	1980-1990 % Change	1990-2000 % Change
Coconino County	75,008	96,591	116,320	28.77%	20.43%
Flagstaff	34,743	45,857	52,894	31.99%	15.35%
Sedona	2,266	6,598	6,809	191.17%	3.20%
Page	4,907	7,645	10,192	55.80%	33.32%
Williams	5,368	2,461	2,842	-54.15%	15.48%
Fredonia	1,040	1,197	1,036	15.10%	-13.45%
Yavapai County	68,145	107,714	167,517	58.07%	55.52%
Prescott	20,055	26,427	33,938	31.77%	28.42%
Prescott Valley	2,284	8,858	23,535	287.83%	165.69%
Cottonwood - Verde Village	n/a	7,037	10,610	n/a	50.77%
Sedona	4,907	7,645	10,192	55.80%	33.32%
Camp Verde	1,125	6,243	9,451	454.93%	51.39%
Cottonwood	4,550	5,918	9,179	30.07%	55.10%
Chino Valley	2,858	4,837	7,835	69.24%	61.98%
Arizona	2,718,215	3,665,228	5,130,632	34.84%	39.98%

Source: NRIS - Human Dimensions



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

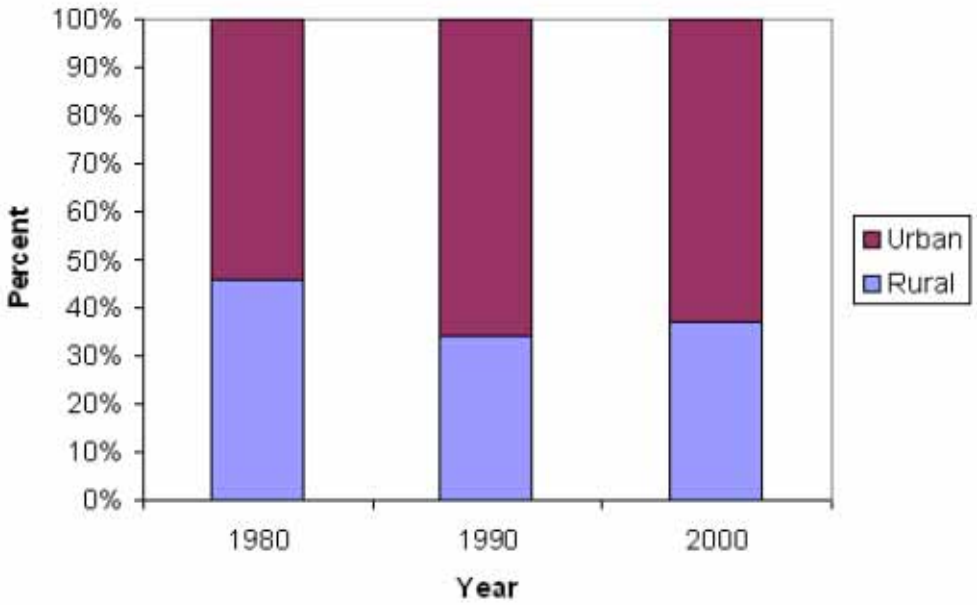
Figure 3. Two-County Assessment Area Population Change, 1900-2000

Table 3. Urban and Rural County Populations, 1980-2000 and % Change

County		1980 Population	1980 % of Total	1980 % Change	1990 Population	1990 % of Total	1990 % Change	2000 Population	2000 % of Total	2000 % Change
Coconino	Urban	46,473	61.96%	n/a	63,988	66.25%	37.69%	74,462	64.01%	16.37%
	Rural	28,535	38.04%	n/a	32,603	33.75%	14.26%	41,858	35.99%	28.39%
Yavapai	Urban	31,053	15.68%	n/a	70,641	65.58%	127.49%	104,862	62.60%	48.44%
	Rural	37,092	18.73%	n/a	37,073	18.62%	-0.05%	62,655	37.40%	69.00%

N.B.: % Total is the percentage of total population. % Change is the percentage of change from prior census year

Source: NRIS - Human Dimensions



Source: NRIS - Human Dimensions

Figure 4. Two-County Assessment Area Urban/Rural Composition, 1980-2000

The age structure of populations in Coconino and Yavapai Counties as well as selected cities and the state of Arizona is presented in Table 4. Data show that the percentage of individuals 65 and over grew considerably between 1990 and 2000 for both counties. In fact, the increase in retirement-age populations for both counties (45.80% and 44.28% respectively) exceeded the rate of growth for the same cohort within the state as a whole, which was nearly 40% over the same period. Other noteworthy changes in the age structure of the population within the area of assessment include a significant increase (54.20%) in the under-18 population within Yavapai County and a relatively low increase in the same age group for Coconino County. Among the cities, Prescott Valley experienced the largest gains in both its under-18 and 65-and-over populations with increases of 183.23% and 122.13% respectively.

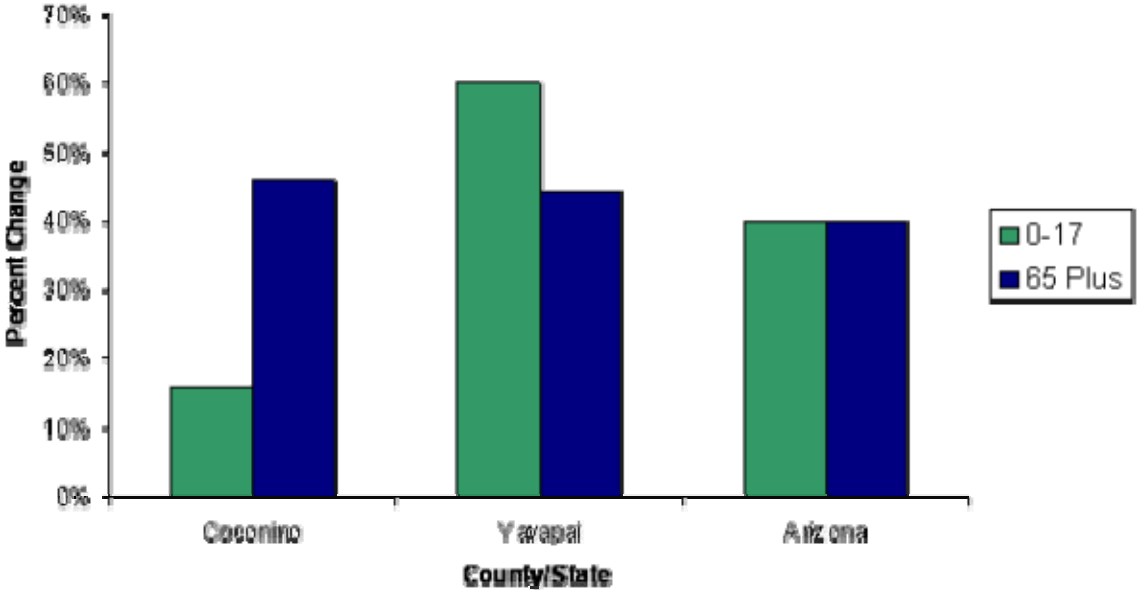
Table 5 presents data on net migration for each county for the years 1990 and 2000 as well as the percent change. The data represent numbers of individuals who reported living in a different location five years previously. As such, the 1990 data provide information on location of residence in 1985 and the 2000 data indicate location of residence in 1995. Once again, net migration data show that population growth in Yavapai County has been especially strong, fueled by in-migration of individuals previously living

outside the county. 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 significant increase in the number of migrants from the Northwest between 1990 and 2000. Finally, Yavapai County also reported significant increases in the number of individuals migrating from "elsewhere" (different countries) over the same period.

Table 4. Age Structure of County, Place, and State Populations (Under-18 and 65+), 1990-2000 and % Change

	Under 18			65 And Over		
County/Place/State	**1990**	**2000**	**% Change**	**1990**	**2000**	**% Change**
Coconino County	29,624	33,425	12.83%	5,585	8,143	45.80%
Flagstaff	11,321	12,834	13.36%	1,988	2,826	42.15%
Sedona	2,559	2,178	-14.89%	351	432	23.08%
Page	1,098	1,401	27.60%	2,456	2,605	6.07%
Williams	743	847	14.00%	323	316	-2.17%
Fredonia	470	335	-28.72%	72	115	59.72%
Yavapai County	22,959	35,403	54.20%	25,517	36,816	44.28%
Prescott	4,645	5,387	15.97%	6,894	9,085	31.78%
Prescott Valley	2,224	6,299	183.23%	1,821	4,045	122.13%
Cottonwood - Verde Village	1,782	2,610	46.46%	1,711	2,324	35.83%
Sedona	1,098	1,401	27.60%	2,456	2,605	6.07%
Camp Verde	1,527	2,265	48.33%	1,365	1,936	41.83%
Cottonwood	1,450	2,149	48.21%	1,478	2,184	47.77%
Chino Valley	1,295	2,079	60.54%	887	1,273	43.52%
Arizona	978,783	1,366,947	39.66%	477,200	667,839	39.95%

Source: NRIS - Human Dimensions



Source: NRIS - Human Dimensions

Figure 5. Percent Change in under-18 and 65+ Populations by County, 1990-2000

Table 5. Net Migration by County, 1990-2000 and % Change

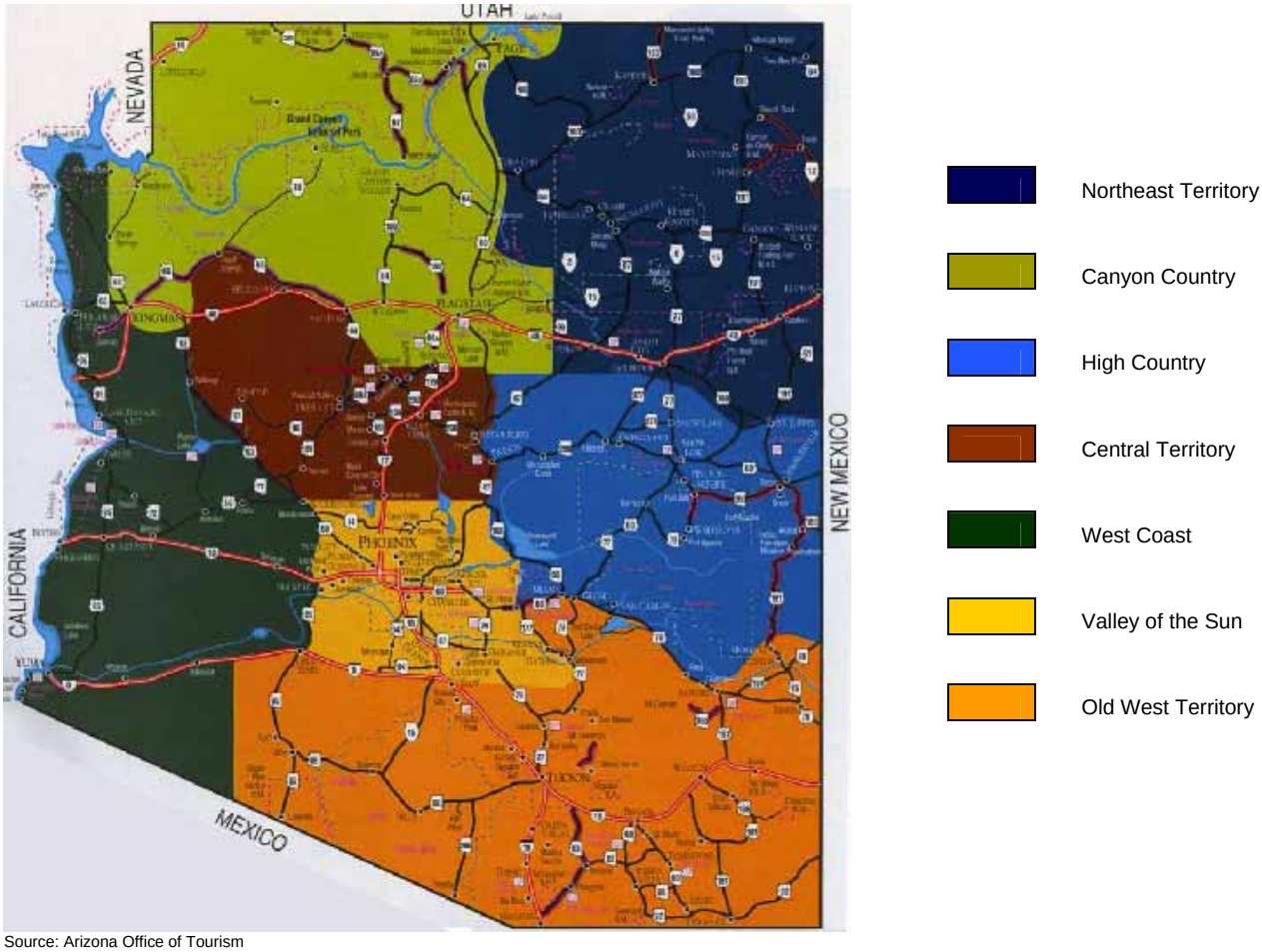
	Coconino County			Yavapai County			Arizona		
	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
Total*	88,003	107,775	22.47%	101,667	158,931	56.33%	3,374,806	4,752,724	40.83%
Same House	36,558	49,841	36.33%	42,240	70,108	65.98%	1,454,319	2,103,907	44.67%
Different House	51,445	57,934	12.61%	59,427	88,823	49.47%	1,920,487	2,648,817	37.92%
In United States	50,117	56,247	12.23%	58,759	86,079	46.50%	1,840,216	2,465,345	33.97%
Same County	21,006	24,801	18.07%	21,154	34,448	62.84%	1,026,332	1,456,345	41.90%
Different County	29,111	31,446	8.02%	37,605	51,631	37.30%	813,884	1,009,490	24.03%
Same State	13,634	14,870	9.07%	14,513	20,461	40.98%	164,063	213,070	29.87%
Different State	15,477	16,576	7.10%	23,092	31,170	34.98%	649,821	796,420	22.56%
Northwest	927	1,658	78.86%	1,522	2,997	96.91%	63,950	84,288	31.80%
Midwest	2,373	3,055	28.74%	4,374	6,359	45.38%	179,202	190,720	6.43%
South	2,755	2,856	3.67%	3,422	4,419	29.14%	118,041	140,608	19.12%
West	9,422	9,007	-4.40%	13,774	17,395	26.29%	288,628	380,804	31.94%
In Puerto Rico	0	7	n/a	21	12	-42.86%	665	1,745	162.41%
Elsewhere	1,307	1,680	28.54%	637	2,732	328.89%	78,618	181,237	130.53%

* Totals do not include persons under the age of 5
Source:1990- US Census of Population- Social and Economic Characteristics
2000- US Census American Factfinder- http://factfinder.census.gov

Figure 6 displays the seven distinct tourism regions designated by the Arizona Office of Tourism (AZOT). AZOT has traditionally gathered and reported visitation statistics within these regions rather than by counties. The area of assessment of the PNF is located primarily within the region referred to as the "Central Territory." The 2003 profile for the Central Territory reported 1.9 million domestic overnight leisure visitors, representing a 40.7% increase over the 1.35 million domestic overnight leisure visitors a decade earlier. This placed the Central Territory as the fifth most visited region in the state in terms of the number of domestic overnight visitors. Approximately 77% of Central Territory visitors came to the area for leisure while the remaining 23% were visiting on business (AZOT 2004b).

In 2002, 39.9% of domestic visitors to the Central Territory came from within Arizona while 24.9% were visitors from California. New Mexico, Nevada, Texas, Washington, and Florida also contributed significant numbers of tourists. AZOT data confirm that the Central Territory is a predominantly outdoor-based activity destination with 59% of visitors engaging in sightseeing and 52% participating in nature activities (camping, eco-travel, visiting national and state parks). The flow of visitors is greatest during spring and summer with 55% of FY2002 visits taking place between the months of April and September (AZOT 2004a).

Statistics for overseas visitors are not made available for individual tourism regions; however, AZOT reports that the state of Arizona experienced a 15.3% decline in overseas visitors in 2003 (dropping to 544,000 from 636,000 in 2002) while the U.S. as a whole saw a decline of 4%. The primary countries of origin for overseas visitors to Arizona were the U.K. (18.4%), Germany (16.4%), Mexico (11.0%), Japan (9.1%), and France (8.5%) (AZOT 2004a).



Source: Arizona Office of Tourism

Figure 6. Map of Arizona Tourism Regions

2.3 Racial/ethnic composition and educational attainment

Tables 6 and 7 present collected data on the racial and ethnic composition of the population in the four counties as well as the state of Arizona. Table 6 presents reported numbers and percentage change in individuals of specific racial and ethnic categories between 1990 and 2000. Table 7 represents 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 a separate group and may be of any race (Hobbs and Stoops 2002; Leefers, Potter-Witter, and McDonough 2004).

Reported census data may indicate the possibility of 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 significant increases in both segments of the population for Coconino and Yavapai Counties as well as for the state as a whole (Table 6). Yavapai County experienced a dramatic increase in individuals of multiple races (350.75%) as well as in the population of Hispanic origin (138.93%). Although much

less dramatic than those of Yavapai County, increases in the multiple race and Hispanic populations for the state of Arizona demonstrate a similar trend.

Although the counties did experience significant 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 of the state as a whole (Table 7). The data also show that Native Americans 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.

Educational attainment for the population 25-years of age and older is shown for both the counties and the state in Table 8. Data show that recipients of high-school diplomas and Bachelor's degrees within both Coconino and Yavapai Counties are near or above state averages. In contrast, both counties fall well short of the state average in percentages of the 25-and-over cohort with graduate or professional degrees.

Table 6. Racial/Ethnic Composition of County and State Populations, 1990-2000 and % Change

	Coconino County			Yavapai County			Arizona		
Race/Ethnicity	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
American Indian or Alaska Native	28,270	33,161	17.30%	1,764	2,686	52.27%	204,589	255,879	25.07%
Asian or Pacific Islander	724	1,018	40.61%	492	861	75.00%	54,127	98,969	82.85%
African American or Black	1,255	1,215	-3.19%	244	655	168.44%	110,062	158,873	44.35%
Multiple Races	4,086	7,545	84.65%	2,053	9,254	350.75%	328,768	743,300	126.09%
White	62,256	73,381	17.87%	103,161	153,933	49.22%	2,967,682	3,873,611	30.53%
Hispanic	9,768	12,727	30.29%	6,854	16,376	138.93%	680,628	1,295,617	90.36%

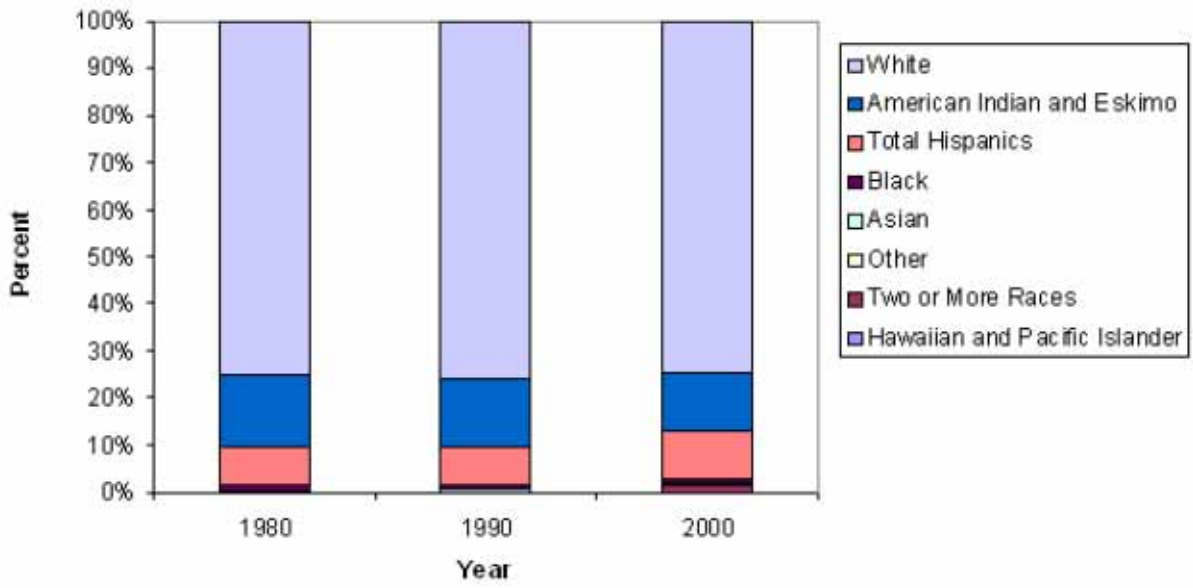
Source: NRIS - Human Dimensions

Table 7. Racial/Ethnic Composition of County and State Populations by Percentage, 1990-2000 and Change

	Coconino County			Yavapai County			Arizona		
Race/Ethnicity	1990	2000	Change	1990	2000	Change	1990	2000	Change
American Indian or Alaska Native	29.27%	28.51%	-0.76%	1.64%	1.60%	-0.03%	5.58%	4.99%	-0.59%
Asian or Pacific Islander	0.75%	0.88%	0.13%	0.46%	0.51%	0.06%	1.48%	1.93%	0.45%
African American or Black	1.30%	1.04%	-0.26%	0.23%	0.39%	0.17%	3.00%	3.10%	0.10%
Multiple Races	4.23%	6.49%	2.26%	1.91%	5.52%	3.62%	8.97%	14.49%	5.52%
White	64.45%	63.09%	-1.37%	95.77%	91.89%	-3.88%	80.97%	75.50%	-5.47%
Percent Non-white	35.55%	36.91%	1.37%	4.23%	8.10%	3.88%	19.03%	24.50%	5.47%
Hispanic	10.11%	10.94%	0.83%	6.36%	9.78%	3.41%	18.57%	25.25%	6.68%

N.B.: 1990 and 2000 data expressed as a % of total population. Change simply illustrates the trends in proportional representation of various racial/ethnic groups in the overall population.

Source: NRIS - Human Dimensions



Source: NRIS - Human Dimensions

Figure 7. Two-County Assessment Area Racial/Ethnic Composition, 1980-2000

Table 8. Educational Attainment of County and State Populations 25-Yrs. Old and over

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

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

2.4 Housing characteristics and population projections

Housing characteristics for the area of assessment supply further evidence of a trend towards rapid growth throughout the region, particularly in Yavapai County (Table 9). In that county, the decade between 1990 and 2000 saw significant increases in total housing units (49.13%), seasonal housing units (39.84%), and median home value (61.78%). Given the disparity between housing gains in both counties, the data clearly point towards Yavapai County as the primary center of growth for the area surrounding the PNF. Data again point towards the cities of Prescott Valley, Cottonwood, and Chino Valley as leading areas of growth with each experiencing substantial gains in total housing units between 1990 and 2000. The cities

of Flagstaff, Prescott, Prescott Valley, Camp Verde, and Chino Valley saw especially strong gains in median home value during the ten-year period.

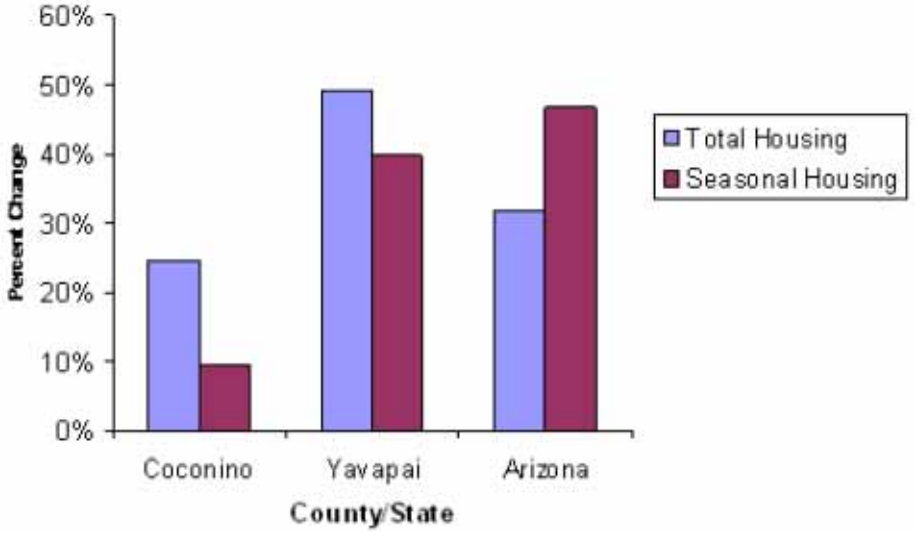
Table 10 suggests that population growth at the county and state level is expected to continue although at somewhat lower rates than were experienced over the last two decades. For example, while Yavapai County experienced a fifty-five percent increase in population between 1990 and 2000, ADOC estimates that the population of Yavapai County will have increased by only slightly over eighteen percent by 2010.

Table 9. County, Place, and State Housing Characteristics, 1990-2000 and % Change

County/Place/ State	Total Housing Units			Seasonal Housing Units			Housing Density per Sq. Mile			Median Home Value		
	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
Coconino County	42,914	53,443	24.54%	8,361	9,155	9.50%	2.30	2.87	24.55%	$82,600	$142,500	72.52%
Flagstaff	16,313	21,430	31.37%	925	977	5.62%	258	337	30.62%	$90,300	$161,000	78.29%
Sedona	2,307	2,606	12.96%	33	76	130.30%	139	157	12.95%	$91,700	$138,600	51.15%
Page	4,658	5,709	22.56%	430	446	3.72%	237	307	29.54%	$159,600	$253,700	58.96%
Williams	1,118	1,224	9.48%	40	52	30.00%	39	28	-28.21%	$64,800	$100,300	54.78%
Fredonia	464	428	-7.76%	7	18	157.14%	91	58	-36.26%	$54,300	$77,900	43.46%
Yavapai County	54,805	81,730	49.13%	4,325	6,048	39.84%	7.00	10.00	42.86%	$85,300	$138,000	61.78%
Prescott	13,393	17,431	30.15%	787	1,026	30.37%	414	470	13.53%	$93,400	$162,700	74.20%
Prescott Valley	3,913	9,481	142.29%	134	162	20.90%	237	299	26.16%	$64,500	$108,100	67.60%
Verde Village*	3,200	4,327	35.22%	84	43	-48.81%	376	493	31.12%	$78,000	$114,900	47.31%
Sedona	4,658	5,709	22.56%	430	446	3.72%	237	307	29.54%	$159,600	$253,700	58.96%
Camp Verde	2,839	3,988	40.47%	179	136	-24.02%	67	94	40.30%	$75,900	$129,600	70.75%
Cottonwood	2,768	4,386	58.45%	31	55	77.42%	525	411	-21.71%	$61,600	$106,800	73.38%
Chino Valley	2,156	3,251	50.79%	24	56	133.33%	116	175	50.86%	$76,400	$135,500	77.36%
Arizona	1,659,430	2,189,189	31.92%	96,687	141,965	46.83%	15.00	19.00	26.67%	$79,700	$121,300	52.20%

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

Source: NRIS - Human Dimensions



Source: NRIS - Human Dimensions

Figure 8. Percent Change in Total and Seasonal Housing Units by County, 1990-2000

Table 10. County and State Population Projections, 2010-2030 and % Change

County/State	Total Pop. 2000	Projected 2010	% Change	Projected 2020	% Change	Projected 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%	240849	21.61%	278,426	15.60%
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

2.5 Key issues for forest planning and management

Over the past two decades, continued population growth in predominantly rural areas has brought about significant 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.

Significant changes in the human populations surrounding the forest are likely to affect not only the quantity of goods and services demanded from public lands but also significantly 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 in addition to 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). These demographic shifts are borne out by collected data for the PNF which show 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.

Although population growth can potentially 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 immigrants 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 (sometimes referred to as “hidden populations”) may force different demands for public services and may interact with natural resources in fundamentally different ways than has been the historic norm for the resident population (McCool and Kruger 2003).

Together, these shifts in the demographic makeup of communities surrounding the PNF carry important implications for the development of good 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 amenities? Similarly, how does expansion of the wildland-urban interface influence issues such as forest access, water quality, habitat fragmentation, or fire management? Finally, demographic change within forest communities may not influence 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 for change in how adjacent federally administered land is managed. In addition, immigrant populations may lack a thorough understanding of underlying community values while at the same time acting on a thorough understanding of planning regulations and methods of influencing political processes (McCool and Kruger 2003, Booth 2002, Wilkinson 1992).

3. Economic Characteristics and Vitality

In this section, historic and current economic conditions within the two counties surrounding the Prescott National Forest (PNF) are examined. One primary purpose of this analysis is to determine trends in the economic dependency of communities on certain industries and forest resources. Data on selected cities within the area of assessment are also included in order to illustrate trends that may signal associations between forest management alternatives and economic change affecting specific populations. Indicators used to assess economic characteristics and vitality include major employers within the region, employment by industry, per capita and household income, portion of income derived from natural resources, and federal-lands-related payments based on forest resource use.

Data show that the area of assessment for the PNF has experienced significant economic growth over the past two decades. Yavapai County has been the center of much of this growth with substantial gains in total part- and full-time employment, particularly in construction, manufacturing, and wholesale trade. In general, employment grew much more slowly in Coconino County despite specific gains in the wholesale trade, finance, and real estate sectors. The occupational structures within Coconino and Yavapai Counties closely resembled those of the state overall with management, professional, and related occupations maintaining primary importance over sales and office and service occupations. Though both counties reported significant increases in per capita and median family income, data show that Yavapai County had substantially lower rates of unemployment and poverty, both of which were also below state averages for the same period. Yavapai County also reported relatively strong gains in total labor income from wood products and processing along with decreases in income from special forest products and processing while Coconino County demonstrated opposite trends. On the whole, the area of assessment saw significant increases in tourism employment between 1990 and 2000. In terms of federal-lands-related revenue, Yavapai County has consistently been the largest recipient of PILT payments over the last several years whereas Coconino County has reported the greatest amount in forest receipts or "twenty-five percent monies."

3.1 Historical context and regional economic conditions

Arizona's economy has undergone dramatic changes over the past century. Originally a territory isolated on the borders of a cohering nation, Arizona, and the West in general, is quickly becoming more metropolitan, and economic realities have shifted to reflect this change. For the first half of the century, Arizona's economy was dominated by the mining, agricultural, and ranching industries. Following World War II and a dramatic increase in population which continues to the present, Arizona shifted away from a dependence on these earlier industries and diversified into a mix of urban and rural industries that cover nearly every sector. Industrial diversity showed some increases after 1971, but reached a peak in the mid-80s and has now fallen well below other states to between .45 and .5 on the Industrial Diversity Index[2] (Sheridan 1995, Canamex 2001, ADOC 2002a). Per capita personal income (PPI) in Arizona has, in a general sense, followed the national trends although it has often fluctuated more dramatically in the short term. Labor force growth has been in the process of slowing since the 1970s when it reached a peak of 2.7% per annum. It afterwards slowed to 1.7% in the 1980s and to 1.2% in the 1990s. The relation and impact of education on economic standing has also heightened, with the salary ratio of college-educated workers to high-school-educated workers increasing dramatically since 1975, up to above 1.85:1 from 1.55:1. Poverty rates have shifted only slightly in the past three or four decades, remaining between 14-16% (ADOC 2002a).

[2] Where 1.0 represents a state of industrial diversity equal to the U.S. as a whole. While no longer limited to agricultural and mining interests, Arizona is still restricted in its industrial array. By contrast, states like Texas and Illinois have IDIs near 0.8 which suggests a much broader industrial foundation.

Over the past thirty to thirty-five years, the primary locus of economical advancement has shifted. Mining, which represented 3% of the state's per capita income in the late 1960s, had dropped to a mere fraction of a percent by 2002. Agriculture, too, remained beneath 1%. While the manufacturing and trade/utilities areas of the economy have either remained static or dropped slightly in the second half of the past century, the service industry has skyrocketed, topping 20% by 2002, up from 13% in 1969 (BEA 2002). This trend is partially due to the fact that Arizona has become an increasingly urbanized state with 88.2% of the population living in urban areas according to the 2000 census. Recent PPI also reflects this disparity, with the 2002 metro figure being $27,285 as compared to the non-metro amount of $18,992—a differential of 30.4%, up from 23.3% in 1970.

The counties surrounding the PNF are collectively the most economically successful when compared to those counties bordering and containing other forests in the state. The 2002 PPI of the two U.S. counties abutting PNF land is $23,240[3], representing a -11.7% differential from the state average at that time, nearly identical to the discrepancy in 1969. This figure remains low in the national context. Compared to the national averages, the PPI of the counties containing the Prescott represents only 75.4% of the national total, down nearly 5.1% over the past thirty years (BEA 2002). The thirty-year average rate of income growth in this region, however, is 10.5%, above the 10.1% state average and, after the Kaibab NF, the second strongest growth rate of all the forest areas in the state. These figures suggest a healthy and robust future for the economy in Yavapai and Coconino Counties and imply a different economic context in forest management than might apply to less economically sound forest assessment areas like the Coronado NF and the Apache-Sitgreaves NF.

3.2 Income and employment within key industries

Table 11 presents employment by industry at both the state and county levels for the years 1990 and 2000. Economic data confirm earlier findings of relatively strong growth of Yavapai County when compared to state averages. In fact, the increase in total full- and part-time employment in Yavapai County (65.17%) significantly outpaced job growth at the state level between 1990 and 2000 (47.62%). Data show that job growth in Yavapai County was especially strong for wage and salary employment while Coconino County made substantial gains in proprietor's employment. Table 11 demonstrates that much of the growth in jobs for Yavapai County was fueled by significant increases in employment in construction, manufacturing, and wholesale trade. In general, employment grew much more slowly within Coconino County during that period although it too experienced considerable job growth within the finance/insurance/real estate and wholesale trade sectors. Both counties experienced substantial growth in government employment at the federal, state, and local levels when compared to the state overall.

Table 12 displays the percentage of employment in each industry at the state and county levels as well as the percent change between 1990 and 2000. Despite a decline in the percentage of proprietor's employment in Yavapai County, both it and Coconino County maintained percentages of proprietor employment that were higher than average for the state. Table 12 shows that despite strong job growth in wholesale trade and financial services, both of the counties remain below the state average in percentage of total employees within these sectors. Alternatively, as of 2000, both counties maintained a relatively high percentage of workers in the government and government enterprise sector when compared to the state as a whole.

[3] N.B.: Discrepancies between these figures and the PPIs listed in Table 16 stem from the latter having been adjusted for deflation in order to calculate % change. The salaries listed in this section represent current PPIs in non-adjusted dollars.

Table 11. Employment by Industry, County, and State, 1990-2000 and % Change

	Coconino County			Yavapai County			Arizona		
	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
Employment by place of work									
Total full-time and part-time employment	48,977	70,286	43.51%	42,555	70,286	65.17%	1,909,879	2,819,302	47.62%
By type									
Wage and salary employment	41,079	55,639	35.44%	29,717	51,881	74.58%	1,607,628	2,355,299	46.51%
Proprietor's employment	7,898	14,647	85.45%	12,838	18,405	43.36%	302,251	464,003	53.52%
Farm proprietor's employment	276	204	-26.09%	509	527	3.54%	8,027	7,572	-5.67%
Non-farm proprietor's employment	7,622	14,443	89.49%	12,329	17,878	45.01%	294,224	456,431	55.13%
By industry									
Farm employment	313	254	-18.85%	598	752	25.75%	19,297	19,842	2.82%
Non-farm employment	48,664	70,032	43.91%	41,957	69,534	65.73%	1,890,582	2,799,460	48.07%
Private employment	36,864	54,305	47.31%	35,585	59,510	67.23%	1,583,146	2,410,566	52.26%
Ag. services, forestry, fishing and other	(D)	510	n/a	531	1,017	91.53%	27,817	46,873	68.50%
Mining	(D)	159	n/a	1,107	1,184	6.96%	15,475	12,607	-18.53%
Construction	2,363	4,014	69.87%	3,877	7,302	88.34%	108,918	200,373	83.97%
Manufacturing	3,562	2,985	-16.20%	2,847	4,189	47.14%	194,529	225,767	16.06%
Transportation and public utilities	1,979	1,957	-1.11%	1,454	1,866	28.34%	84,360	124,954	48.12%
Wholesale trade	801	1,378	72.03%	895	2,031	126.93%	82,812	122,582	48.02%
Retail trade	10,862	15,266	40.55%	9,168	13,592	48.25%	344,297	484,207	40.64%
Finance, insurance, and real estate	2,052	4,674	127.78%	3,431	6,216	81.17%	170,005	281,675	65.69%
Services	14,837	23,362	57.46%	12,275	22,113	80.15%	544,933	911,528	67.27%
Government and government enterprises	11,800	15,727	33.28%	6,372	10,024	57.31%	307,436	388,894	26.50%
Federal, civilian	3,054	3,322	8.78%	1,076	1,198	11.34%	45,843	48,135	5.00%
Military	378	283	-25.13%	414	394	-4.83%	38,197	33,258	-12.93%
State and local	8,368	12,122	44.86%	4,882	8,432	72.72%	223,396	307,501	37.65%
State government	3,560	(D)	n/a	652	(D)	n/a	61,595	81,026	31.55%
Local government	4,808	(D)	n/a	4,230	(D)	n/a	161,801	226,475	39.97%

(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

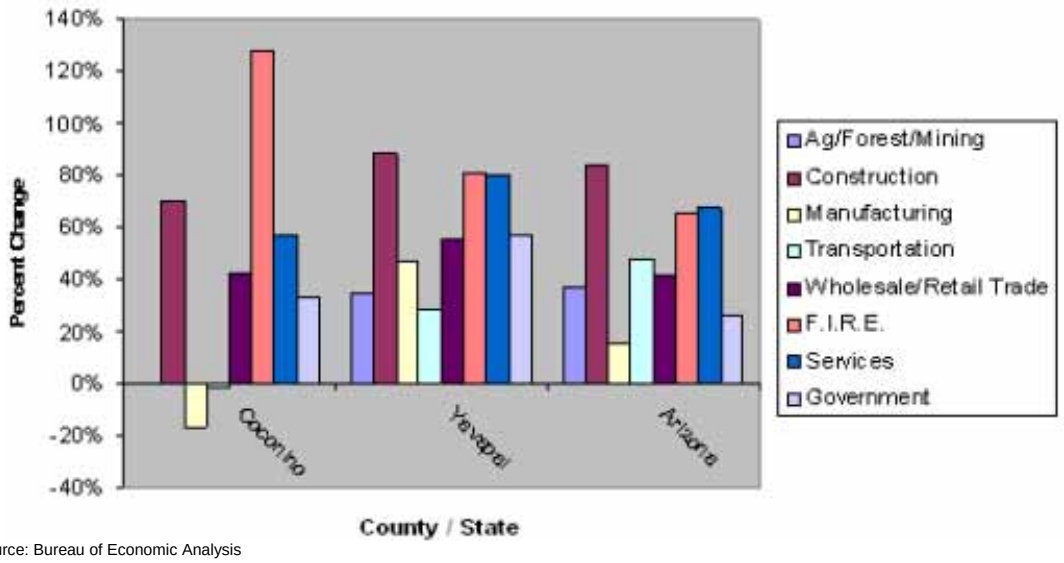
Source: Bureau of Economic Analysis

http://www.bea.doc.gov/bea/regional/reis/action.cfm

Table 12. Employment by Industry Percentages, County, and State, 1990-2000 and % Change

	Coconino County			Yavapai County			Arizona		
	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
Employment by place of work									
Total full-time and part-time employment	100.00%	100.00%	0.00%	100.00%	100.00%	0.00	100.00	100.00	0.00
By type									
Wage and salary employment	83.87%	79.16%	-5.62%	69.83%	73.81%	5.70%	84.17%	83.54%	-0.75%
Proprietors employment	16.13%	20.84%	29.23%	30.17%	26.19%	-13.20%	15.83%	16.46%	4.00%
Farm proprietors employment	0.56%	0.29%	-48.50%	1.20%	0.75%	-37.31%	0.42%	0.27%	-36.10%
Non-farm proprietors employment	15.56%	20.55%	32.04%	28.97%	25.44%	-12.20%	15.41%	16.19%	5.09%
By industry									
Farm employment	0.64%	0.36%	-43.45%	1.41%	1.07%	-23.86%	1.01%	0.70%	-30.34%
Non-farm employment	99.36%	99.64%	0.28%	98.59%	98.93%	0.34%	98.99%	99.30%	0.31%
Private employment	75.27%	77.26%	2.65%	83.62%	84.67%	1.25%	82.89%	85.50%	3.15%
Ag. services, forestry, fishing and other	n/a	0.73%	n/a	1.25%	1.45%	15.96%	1.46%	1.66%	14.15%
Mining	n/a	0.23%	n/a	2.60%	1.68%	-35.24%	0.81%	0.45%	-44.81%
Construction	4.82%	5.71%	18.37%	9.11%	10.39%	14.03%	5.70%	7.11%	24.62%
Manufacturing	7.27%	4.25%	-41.61%	6.69%	5.96%	-10.91%	10.19%	8.01%	-21.38%
Transportation and public utilities	4.04%	2.78%	-31.09%	3.42%	2.65%	-22.30%	4.42%	4.43%	0.34%
Wholesale trade	1.64%	1.96%	19.88%	2.10%	2.89%	37.39%	4.34%	4.35%	0.28%
Retail trade	22.18%	21.72%	-2.06%	21.54%	19.34%	-10.24%	18.03%	17.17%	-4.73%
Finance, insurance, and real estate	4.19%	6.65%	58.72%	8.06%	8.84%	9.69%	8.90%	9.99%	12.24%
Services	30.29%	33.24%	9.72%	28.85%	31.46%	9.07%	28.53%	32.33%	13.32%
Government and government enterprises	24.09%	22.38%	-7.13%	14.97%	14.26%	-4.75%	16.10%	13.79%	-14.31%
Federal, civilian	6.24%	4.73%	-24.20%	2.53%	1.70%	-32.59%	2.40%	1.71%	-28.87%
Military	0.77%	0.40%	-47.83%	0.97%	0.56%	-42.38%	2.00%	1.18%	-41.02%
State and local	17.09%	17.25%	0.94%	11.47%	n/a	n/a	11.70%	10.91%	-6.75%
State government	7.27%	n/a	n/a	1.53%	n/a	n/a	3.23%	2.87%	-10.89%
Local government	9.82%	n/a	n/a	9.94%	n/a	n/a	8.47%	8.03%	-5.18%

Source: Bureau of Economic Analysis
http://www.bea.doc.gov/bea/regional/reis/action.cfm



Source: Bureau of Economic Analysis

Figure 9. Percent Change in Industry by County and State, 1990-2000

Table 13 presents a list of major employers throughout the region which has been adapted from the ADOC Community Profiles. Dominant occupations, as determined by number of employees and percentage of total employment, are shown for each county in Table 14. Data show that both counties within the area of assessment have maintained occupational structures similar to that of the state of Arizona as a whole. "Management, professional, and related occupations" is the dominant occupational category for both counties and the state followed by sales and office occupations and, finally, by service occupations. For both the state of Arizona and for each of the counties within the area of assessment, construction/extraction/maintenance and production/transportation/material moving were also among the five most dominant occupations as of 2004.

Table 15 presents annual unemployment rates for counties, the state of Arizona, and the United States as well as for selected cities within the area of assessment. Within the area of assessment, average unemployment ranges from 7.2% in Coconino County to 4.2% in Yavapai County, placing the counties in opposite relation to the statewide unemployment rate of 5.2% over the same period. Among selected cities within the area of assessment, average unemployment ranged from a high of 6.6% in Fredonia to a low of 2.2% in Sedona. Both Flagstaff and Chino Valley reported relatively high unemployment averages of 5.7% over the period.

Per capita and median family incomes, as well as rates of individual and family poverty, are provided in Table 16. Data demonstrate increases in per capita and median family income that were well above increases at the state level for both counties within the area of assessment. Despite these increases, however, per capita and median family income in both Coconino and Yavapai Counties remained lower than the state average as of 2000. A similar trend is evident in individual and family poverty between 1990 and 2000. While both counties saw a reduction in poverty that was greater than that of the state over the ten-year period, Coconino maintained rates of individual and family poverty that were greater than those for the state of Arizona as of 2000. Among individual cities within the area of assessment, Williams reported negative trends in both per capita and median family income between 1990 and 2000. Both Williams and Page saw significant increases in individual and family poverty over the same ten-year period. While the city of Camp Verde reported a reduction in per capita income between 1990 and 2000, rates of individual and family poverty were significantly reduced over the same period. The city of Cottonwood demonstrated perhaps the most significant change with substantial increases in income and decreases in poverty over the ten-year period.

Household income distribution for each county is presented in Table 17. The economic status of households in both counties appears to be limited with over 30% of households earning less than $25,000 per year. Coconino County appears to be the more affluent of the two counties with a higher median household income ($38,256) and 8.5% of households earning $100,000 or more as of 2000.

Table 13. Major Employers by County, 2004

Coconino County	Yavapai County
ARA Leisure Services, Page	Ace Hardware, Prescott Valley
City of Flagstaff	APS, Prescott
Coconino Community College, Flagstaff	The Arbors, Camp Verde
Coconino County, Flagstaff	Atria & Kachina Point Assisted Living, Retirement, Sedona
Flagstaff United School District, Flagstaff	Camp Verde Public Schools, Camp Verde
Flagstaff Medical Center, Flagstaff	Caradon Better Bilt, Prescott Valley
Grand Canyon Railway, Williams	China Valley Unified Schools District # 51
Kaibab National Forest, Williams	Cliff Castle Casino
National Park Service, Page	City of Cottonwood
Navajo Generating Station, Page	Cottonwood/Oak Creek Schools
Navajo Government Executive Branch, Navajo Nation	Cyprus Bagdad Copper Corporation, Bagdad
Navajo Tribal Utility Authority, Navajo Nation	Double Tree Sedona Resort, Sedona
Northern Arizona University, Flagstaff	Embry-Riddle Aeronautical University
Pittsburg & Midway Coal Mining Co., Navajo Nation	Enchantment Resort, Sedona
Nestle Purina Petcare, Flagstaff	Humboldt Unified School District
Samaritan Family Health Center, Grand Canyon	Exsil, Inc.
Tooh-Dineh Industries, Leupp	Los Abrigados Resort, Sedona
Tuba City Indian Medical Center	Mingus Union High School District
Tuba City Unified School District #15	Phelps and Sons Trusses, Cottonwood
Walgreens Distribution	Phoenix Cement Company, Clarkdale
Wal-Mart, Flagstaff and Page	City of Prescott
Window Rock Unified School District	Prescott College
SCA Tissue, Flagstaff	Prescott Resort
W.L. Gore and Associates, Inc., Flagstaff	Prescott Unified School District
	Price Costco Store, Prescott
	Ruger Investment Castings, Prescott
	Safeway, Chino Valley
	Sedona/Oak Creek Unified School District
	Sturm Ruger & Company, Prescott
	Target Store, Prescott
	Town of Prescott Valley
	U.S. Forest Service
	Veterans Administration Medical Center, Prescott
	Verde Valley Medical Center, Cottonwood
	Wal-Mart, Cottonwood and Prescott
	West Yavapai Guidance Clinic, Prescott
	Wulfsburg Electronics, Prescott
	Yavapai Community College
	Yavapai County
	Yavapai Gaming Agency
	Yavapai Regional Medical Center, Prescott

Source: Arizona Department of Commerce, County Profiles
http://www.azcommerce.com/Communities/community_profiles.asp

Table 14. Dominant Occupations of State and County Populations, 2000

County/State	Number	Percent
Coconino County		
Management, professional, and related occupations	19,309	38.4%
Sales and office occupations	14,240	25.7%
Service occupations	10,610	19.1%
Construction, extraction, and maintenance occupations	5,548	10.0%
Production, transportation, and material moving occupations	5,529	10.0%
Yavapai County		
Management, professional, and related occupations	13,125	26.7%
Sales and office occupations	13,012	26.4%
Service occupations	8,697	17.7%
Production, transportation, and material moving occupations	5,989	12.2%
Construction, extraction, and maintenance occupations	5,289	10.7%
Arizona		
Management, professional, and related occupations	730,001	32.70%
Sales and office occupations	636,970	28.50%
Service occupations	362,547	16.20%
Construction, extraction, and maintenance occupations	245,578	11.00%
Production, transportation, and material moving occupations	244,015	10.90%

Source: U.S. Census Bureau, American Fact Finder
http://factfinder.census.gov

Table 15. Average Annual Unemployment Rates by County, State, Place, and U.S., 1980-2004

Area	1980	1990	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Average
Coconino County	7.7%	7.8%	9.2%	7.8%	8.7%	8.4%	7.3%	6.7%	5.8%	5.4%	5.9%	6.4%	6.1%	7.2%
Flagstaff	7.0%	6.1%	7.3%	6.1%	6.9%	6.6%	5.8%	5.3%	4.6%	4.3%	4.6%	5.1%	4.8%	5.7%
Sedona	5.3%	2.1%	2.5%	2.1%	2.4%	2.3%	2.0%	1.8%	1.6%	1.5%	1.6%	1.8%	1.6%	2.2%
Page	4.8%	6.1%	7.3%	6.1%	6.9%	6.6%	5.8%	5.3%	4.6%	4.2%	4.6%	5.0%	4.8%	5.5%
Williams	n/a	3.7%	4.4%	3.6%	4.1%	4.0%	3.4%	3.2%	2.7%	2.5%	2.7%	3.0%	2.9%	3.4%
Fredonia	n/a	7.2%	8.6%	7.2%	8.1%	7.8%	6.8%	6.3%	5.3%	5.0%	5.4%	5.9%	5.7%	6.6%
Yavapai County	8.0%	4.7%	5.4%	4.8%	4.8%	4.0%	3.3%	3.4%	2.8%	3.0%	3.7%	3.3%	2.9%	4.2%
Prescott	7.3%	5.3%	6.0%	5.4%	5.3%	4.5%	3.7%	3.8%	3.2%	3.3%	4.1%	3.7%	3.3%	4.5%
Prescott Valley	n/a	4.1%	4.8%	4.2%	4.2%	3.5%	2.9%	3.0%	2.5%	2.6%	3.3%	2.9%	2.6%	3.4%
Cottonwood - Verde Village	n/a	4.8%	5.5%	4.9%	4.9%	4.1%	3.4%	3.5%	2.9%	3.0%	3.8%	3.4%	3.0%	3.9%
Sedona	5.3%	2.4%	2.8%	2.4%	2.4%	2.0%	1.7%	1.7%	1.4%	1.5%	1.9%	1.7%	1.5%	2.2%
Camp Verde	n/a	4.2%	4.8%	4.2%	4.2%	3.5%	2.9%	3.0%	2.5%	2.6%	3.3%	2.9%	2.6%	3.4%
Cottonwood	n/a	6.1%	7.0%	6.2%	6.2%	5.2%	4.3%	4.4%	3.7%	3.8%	4.8%	4.3%	3.7%	5.0%
Chino Valley	6.6%	6.9%	7.9%	7.0%	7.0%	5.8%	4.9%	5.0%	4.2%	4.4%	5.4%	4.8%	4.3%	5.7%
Arizona	6.7%	5.5%	6.4%	5.1%	5.5%	4.6%	4.1%	4.4%	4.0%	4.7%	6.2%	5.6%	4.9%	5.2%
United States	7.1%	5.6%	6.1%	5.6%	5.4%	4.9%	4.5%	4.2%	4.0%	4.7%	5.8%	6.0%	5.5%	5.3%

* 1980 and 1990 unemployment data unavailable for towns with a population of less than 2,500 individuals

Source: Arizona Department of Commerce, Arizona Workforce Informer

http://www.workforce.az.gov/cgi/dataanalysis/?PAGEID=94&SUBID=142

U.S. Bureau Of Labor Statistics

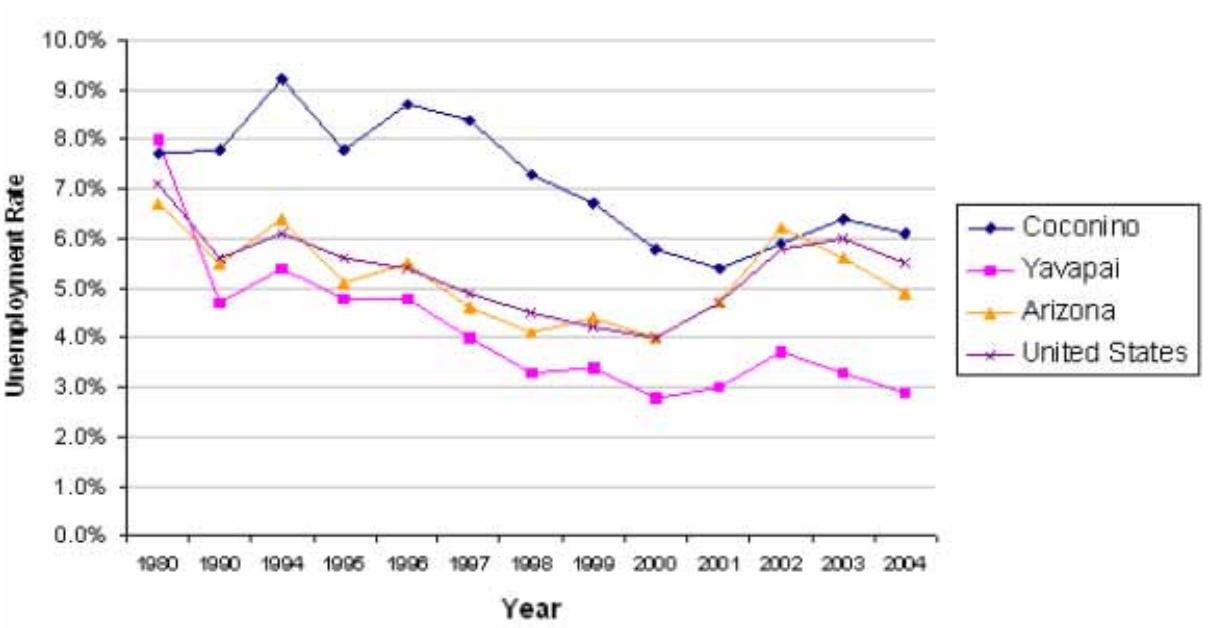
http://www.bls.gov/cps/prev_yrs.htm

Table 16. Per Capita and Family Income by County and State, 1990-2000 and % Change

	Per Capita Income			Median Family Income			% Individuals in Poverty			% Families in Poverty		
County/Place	**1990**	**2000***	**% Change**	**1990**	**2000***	**% Change**	**1990**	**2000**	**% Change**	**1990**	**2000**	**% Change**
Coconino County	$10,580	$13,004	22.91%	$30,648	$34,805	13.56%	23.1%	18.2%	-21.21%	16.9%	13.1%	-22.49%
Flagstaff	$11,517	$14,140	22.78%	$34,952	$36,743	5.12%	17.2%	17.4%	1.16%	10.4%	10.6%	1.92%
Sedona	$19,893	$23,786	19.57%	$35,559	$39,954	12.36%	8.9%	9.7%	8.99%	6.3%	4.7%	-25.40%
Page	$12,352	$14,181	14.81%	$42,068	$41,216	-2.02%	9.2%	13.9%	51.09%	8.5%	12.8%	50.59%
Williams	$10,121	$10,098	-0.23%	$26,524	$23,454	-11.57%	11.7%	15.0%	28.21%	8.0%	12.3%	53.75%
Fredonia	$8,185	$12,309	50.38%	$27,065	$29,638	9.51%	13.5%	12.8%	-5.19%	11.1%	9.9%	-10.81%
Yavapai County	$12,657	$14,967	18.25%	$26,238	$31,039	18.30%	13.6%	11.9%	-12.50%	9.8%	7.9%	-19.39%
Prescott	$13,851	$17,121	23.61%	$29,473	$35,266	19.66%	13.3%	13.1%	-1.50%	8.1%	7.4%	-8.64%
Prescott Valley	$9,848	$12,328	25.18%	$23,947	$28,268	18.04%	9.6%	10.9%	13.54%	7.3%	7.8%	6.85%
Cottonwood - Verde Village	$10,328	$12,697	22.93%	$25,089	$29,284	16.72%	11.3%	8.7%	-23.01%	9.1%	6.7%	-26.37%
Sedona	$19,893	$23,786	19.57%	$35,559	$39,954	12.36%	8.9%	9.7%	8.99%	6.3%	4.7%	-25.40%
Camp Verde	$19,514	$11,436	-41.40%	$21,865	$28,110	28.56%	20.3%	14.0%	-31.03%	13.2%	9.5%	-28.03%
Cottonwood	$9,235	$13,291	43.92%	$18,932	$28,675	51.46%	22.7%	13.5%	-40.53%	20.5%	8.9%	-56.59%
Chino Valley	$8,821	$11,802	33.79%	$21,972	$26,565	20.91%	17.0%	15.5%	-8.82%	13.3%	12.6%	-5.26%
Arizona	$13,461	$15,383	14.28%	$32,178	$35,450	10.17%	15.7%	14.0%	-10.83%	11.4%	10.0%	-12.28%

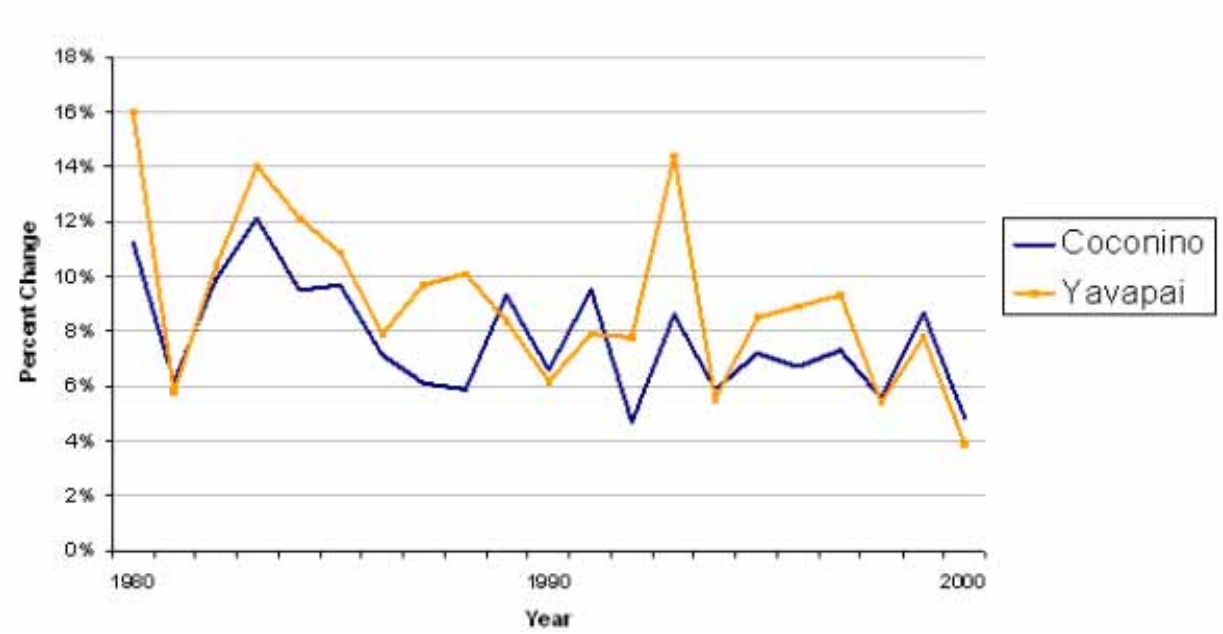
*2000 Income data adjusted to reflect 1990 constant dollars by applying deflation factor calculated by Consumer Price Index

Source: NRIS - Human Dimensions



Source: Arizona Department of Commerce, Arizona Workforce Informer

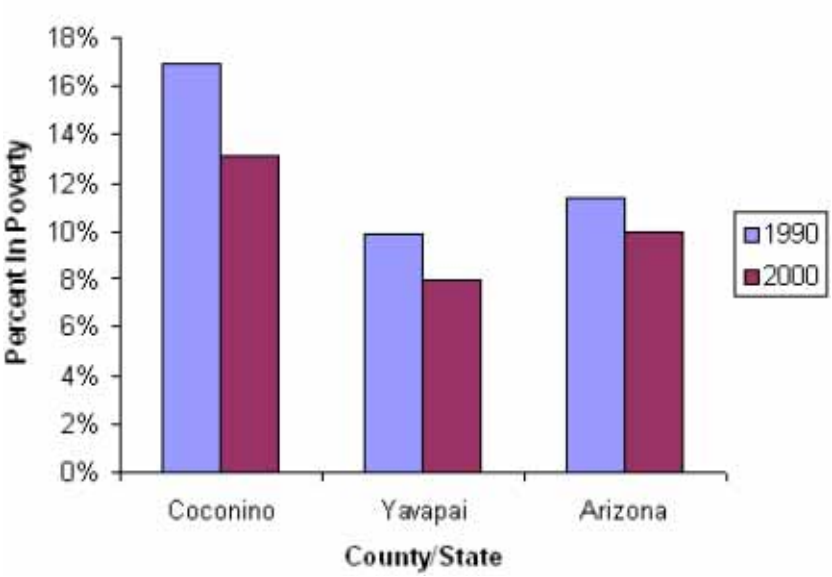
Figure 10. Unemployment Rates by County and State, 1980-2004



Source: Bureau of Economic Analysis

*** Annual percent change in per capita personal income based on mid-year Census Bureau estimates of county population**

Figure 11. Annual Percent Change in Per Capita Income by County, 1980-2000



Source: NRIS – Human Dimensions

Figure 12. Percent of Families in Poverty by County, 1990-2000

Table 17. Household Income Distribution by County, 2000

	Coconino County		Yavapai County	
	Number	Percent	Number	Percent
Less than $10,000	4,285	10.60%	6,298	9.00%
$10,000 to $14,999	2,838	7.00%	5,692	8.10%
$15,000 to $24,999	5,670	14.00%	12,019	17.20%
$25,000 to $34,999	5,542	13.70%	11,115	15.90%
$35,000 to $49,999	7,018	17.40%	13,098	18.70%
$50,000 to $74,999	7,661	19.00%	11,709	16.70%
$75,000 to $99,999	3,950	9.80%	4,924	7.00%
$100,000 to $149,999	2,349	5.80%	3,285	4.70%
$150,000 to $199,999	555	1.40%	762	1.10%
$200,000 or more	518	1.30%	1,167	1.70%
Median household income ($)	$38,256	(x)	$34,901	(x)

Source: U.S. Census Bureau, Profile of Selected Economic Characteristics: 2000
http://www.census.gov/census2000/states/az.html

3.3 Forest and natural resource dependent economic activities

Data on natural-resource dependent economic activities are comprised of available information on income from wood products and processing, income from special forest products and processing, and tourism employment. Analysis is based on IMPLAN data provided by the USFS Planning Analysis Group and Inventory and Monitoring Institute in Fort Collins, Colorado. IMPLAN is a form of input-output analysis developed specifically for the unique needs of the Forest Service. Input-output analysis (I-O) is used to quantify linkages among the structural parts of an economy. Given a particular economic impact, for example a public lands management decision, I-O analysis generally calculates the overall effects resulting from a direct impact on the economy. This mathematical model accounts for a variety of employment, income, and output effects including both direct effects (i.e. wages) and indirect effects (i.e. the stimulation of local economy to supply inputs and processing). Some I-O analyses also model induced effects, the additional economic effects of household spending of increased wages within the community. The secondary (indirect and induced) effects are often described as "ripplelike" effects of spending throughout other sectors of a local economy (Loomis 2002). IMPLAN data are tabulated for 525 distinct industries according to the North American Industry Classification System (NAICS). A list of industries used to calculate income from wood and special forest products and processing as well as tourism employment is included in Appendix A. It should also be noted that analysis of IMPLAN data in this assessment is based solely on the direct economic impacts of selected industries and does not include indirect or induced economic impacts. Appendix B addresses some of the indirect economic effects of forest-related industries.

Total labor income from forest resources for the years 1990 and 2000 is shown in Table 18. Total labor income is commonly defined as the sum of employee compensation and proprietor's income. Data show divergent trends among the two counties during the ten-year period. While Coconino County reported a dramatic decrease in total labor income from wood processing and products between 1990 and 2000 (-87.65%), Yavapai County reported a relatively large increase in the category over the same period (nearly 40%). Meanwhile, a dramatic increase in total labor income from special forest products and processing in Coconino County (1,755%) was offset by income losses in the same category for Yavapai County over the decade. Coconino County suffered substantial losses in income from paper mills, logging, and sawmills and saw significant gains in agriculture and forestry services between 1990 and 2000. Alternatively, Yavapai County reported sharp decreases in income from agriculture and forestry services and considerable increases in income from wood office furniture, wood partitions, and structural wood members over the same period.

Information on tourism employment for both counties within the area of assessment as well as the state of Arizona is provided in Table 19. Calculating the direct impact of tourism is made particularly difficult given the fact that a limited percentage of business activity in any given industry can be considered the result of tourism. For the purposes of this assessment, analysis of tourism employment is based on percentages derived from the Travel Industry Association of America's Tourism Economic Impact Model (TEIM). This is the same model used in the Arizona Tourism Statistical Report issued by the Arizona Office of Tourism (AZOT). Table 19 suggests that the strongest gains in tourism employment between 1990 and 2000 occurred in Yavapai County. In fact, Yavapai County reported the strongest increases in each category, exceeding the overall increase in tourism employment at the state level by over seventy percent. Coconino County also saw an increase in tourism employment between 1990 and 2000 that was slightly greater than that for the state as a whole.

Table 18. Total Labor Income from Forest Resources by County, 1990-2000 and % Change

County / State	Income from Wood Processing and Products			Income from Special Forest Products and Processing		
	1990	2000*	% Change	1990	2000*	% Change
Coconino County	$30,558,827.28	$3,773,587.94	-87.65%	$78,834.20	$1,462,922.56	1,755.70%
Yavapai County	$4,044,339.13	$5,661,275.33	39.98%	$2,229,247.46	$975,280.64	-56.25%
Assessment Area Total	**$34,603,166.41**	**$9,434,863.27**	**-72.73%**	**$2,308,081.66**	**$2,438,203.20**	**5.64%**
Arizona	$263,558,989.17	$369,474,538.71	40.19%	$175,994,086.50	$137,825,248.28	-21.69%

*2000 Income data adjusted to reflect 1990 constant dollars by applying deflation factor calculated by Consumer Price Index

Source: IMPLAN 2000 data

Table 19. Tourism Employment by County, 1990-2000 and % Change

	Coconino County			Yavapai County			Arizona		
Industry Sector	1990	2000	% Change	1990	2000	%Change	1990	2000	%Change
Retail	562	896	59.47%	514	828	60.96%	21,655	30,376	40.28%
Restaurant/Bar	1,054	1,451	37.69%	747	1,241	66.24%	26,393	38,395	45.47%
Lodging	3,812	4,831	26.73%	839	2,157	157.09%	47,848	56,848	18.81%
Amusement	60	121	101.21%	26	112	324.04%	1,442	3,462	140.05%
Total	**5,488**	**7,299**	**33.00%**	**2,126**	**4,338**	**104.02%**	**97,338**	**129,081**	**32.61%**

Source: IMPLAN data

3.4 Government earnings from federal-lands related payments

Federal lands support the fiscal management of local governments through Payments in Lieu of Taxes (PILT) and what are commonly referred to as “Payments to States” or “Secure Schools and Roads” funding. PILT funds derive from a 1976 law (Public Law 94-565) that provides funds to local governments based on the amount of federal lands within their jurisdiction. These payments are affected by federal funding limitations, prior year “Payments to States,” and formulas derived from county populations. Based on annual congressional appropriation decisions, PILT payments may not always be fully funded. Initially counties received monies based on a 1908 law that allocated to them ten percent of the gross revenues generated from timber harvest, grazing, mining, and all other uses from the federal lands within their jurisdictions.

The Weeks Law of 1911 increased the amount of forest receipt payments from ten to twenty-five percent. These “twenty-five percent monies” were mandated for use in schools and on roads. With recent diminishing commercial uses of federal lands, the President, in 2000, signed the Secure Rural Schools and Community Self Determination Act (PL 106-393). The purpose of the Act was to address the diminishing amounts of the twenty-five percent monies. This new law provides counties with the option of continuing to receive the twenty-five percent amount or to elect to receive a fixed amount based on the average of the three highest years between 1986 and 1999. In rural counties, these funds can be an important source of funding to maintain roads and provide support for schools. The law was originally scheduled to sunset in 2006, but a bill to reauthorize the Act and extend it through FY 2013 was, at the time of this report, being considered by Congress (S. 267, H.R. 517).

PILT entitlement acreage is presented for each county in Table 20. Coconino County holds, by far, the greatest entitlement acreage with over 4.7 million acres, 3.2 million of which are FS lands. Actual PILT payments for each county are presented in Table 21. Despite less entitlement acreage, Yavapai County

has consistently been the largest recipient of PILT payments, averaging $1.3 million over the last four years.

Annual forest receipts for the period spanning 1986-1999 are presented for each county in Table 22. Since 1986, Coconino County has reported much larger annual forest receipts, averaging over $2.4 million compared to an annual average of $546,200 for Yavapai County.

Table 20. Payment in Lieu of Taxes (PILT) Entitlement Acreage by County and Agency, FY 2004

County	BLM	FS	BOR	NPS	COE	ARMY	FISH	URC	TOTAL
Coconino	605,440	3,269,240	24,083	826,877	0	0	0	0	4,725,640
Yavapai	606,237	1,967,402	12,319	727	0	0	0	0	2,586,685
TOTAL	5,964,893	5,242,129	36,402	2,137,841	320	0	10,005	0	13,391,590

Source: U.S. Department of the Interior, Bureau of Land Management
http://www.blm.gov/pilt/search.html

Table 21. County PILT Payments, 2000-2004

County	2000	2001	2002	2003	2004	Average
Coconino	$820,879	$1,260,220	$1,329,731	$858,124	$896,233	$1,033,037
Yavapai	$973,796	$1,417,178	$1,473,737	$1,359,624	$1,280,574	$1,300,982
TOTAL	$1,794,675	$2,677,398	$2,803,468	$2,217,748	$2,176,807	$2,334,019

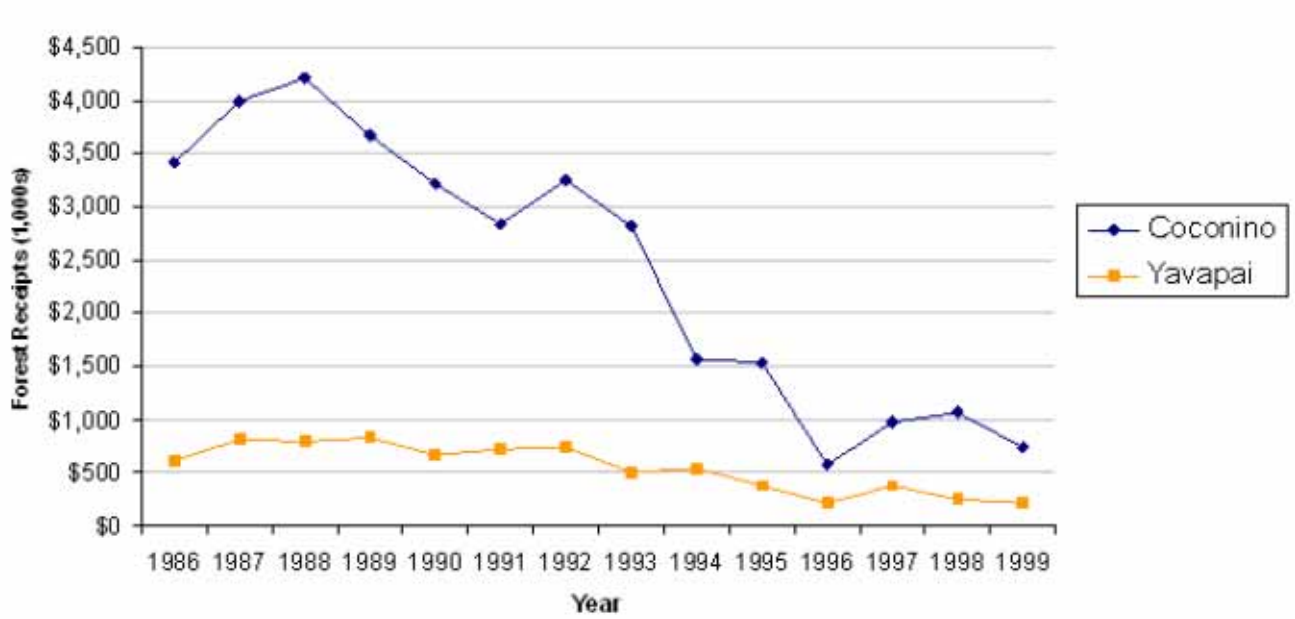
Source: U.S. Department of the Interior, Bureau of Land Management
http://www.blm.gov/pilt/search.html

Table 22. Forest Receipts by County, 1986-1999 (Amounts in 1,000s)

County	1986	1987	1988	1989	1990	1991	1992	1993
Coconino	$3,418.8	$3,991.3	$4,208.3	$3,671.3	$3,218.2	$2,839.2	$3,256.8	$2,817.3
Yavapai	$610.9	$806.9	$787.5	$837.5	$664.5	$729.2	$732.2	$498.8

	1994	1995	1996	1997	1998	1999	Average
Coconino	$1,566.2	$1,534.2	$584.4	$969.9	$1,058.5	$735.3	$2,419.3
Yavapai	$538.7	$378.7	$219.4	$382.3	$249.5	$210.8	$546.2

Source: NRIS- Human Dimensions



Source: NRIS – Human Dimensions

Figure 13. Forest Receipts by County, 1986-1999

3.5 Key issues for forest planning and management

In the early stages of Arizona's development, extractive industries such as mining, ranching, farming, and timber harvesting were the mainstays of local economies. For decades, these sectors provided the foundation for employment upon which the state's predominantly rural economy was based (Case and Alward 1997, Rasker 2000). In recent decades, however, Arizona has joined neighboring western states in experiencing a significant decline in extractive industries along with the employment and income traditionally provided by these sectors (Baden and Snow 1997, Booth 2002).

While these changes have undoubtedly had a negative impact on many local economies, the relative expansion of information- and service-based industries has led to a more diverse, and some say more sustainable, state economy (Baden and Snow 1997, Booth 2002). The economic data gathered for the area of assessment for the PNF illustrate this trend, evincing substantial growth in the F.I.R.E. (finance, insurance, and real estate), construction, and service sectors. When matched with a simultaneous decline in extractive and productive industries, these changes have made the composition of the area's rural economy similar to those of urban areas and the state of Arizona as a whole (Booth 2002, Case and Alward 1997).

Again, these changes are emblematic of those seen in recent decades throughout the Mountain West and signal important demographic and economic trends that are likely to shape the region's future development. As shown by the relatively strong population and economic growth centered in Yavapai County over the past decade, the area surrounding the PNF has seen the expansion of certain populations and industries that are increasingly important to the local economy. In particular, the increases in the retirement-age population and seasonal housing units, when combined with increases in the service/professional, wholesale trade, manufacturing, and construction industries, mirror a common trend in rural western economies (Booth 2002).

These trends support the notion that growth in many western communities is increasingly supported by individuals and households with the wherewithal to support non-extractive economies. Although the data show that per capita and median household incomes grew somewhat faster than the state average between

1990 and 2000, overall income levels remain below the state average for both counties in the area of assessment. This trend takes on increasing relevance when combined with observed demographic trends showing the aforementioned influx of retirement-age residents and seasonal homeowners. Several researchers have noted that while labor income is growing in the rural mountain west, it is growing more slowly than transfer (social security, pensions, retirement) and dividend income. In other words, growth of rural communities is being fueled, at least in part, by income that is not tied to local employment (Booth 2002, Rasker 2000).

The relative expansion of the service and professional industries is also facilitated by advances in transportation and information technology that increasingly allow urban populations to relocate to high-amenity rural communities while maintaining employment and income characteristics typical of more urban settings (Booth 2002, Rasker 2000).

Together, these trends signal a convergence of rural and urban economies that carries important implications for natural resource management. Many of the communities hardest hit by the transition away from extractive industries belong to traditional constituencies associated with the FS, the BLM, and other federal and state agencies. In many cases, these agencies are caught between the necessity of responding to market forces and those powerful interests determined to protect established industries from such changes (Baden and Snow 1997). Finally, data for the area surrounding the PNF demonstrate the reciprocal cause-and-effect relationships between economic and demographic trends. Although economic growth in many western communities may be fueled by households with relatively “footloose” income, potentially negative consequences include an increased demand for construction, schools, health care, and other services as well as undesirable side affects such as pollution, urban sprawl, and congestion (Rasker 2000, Case and Alward 1997).

4. Access and Travel Patterns

This section examines the historic and current factors affecting access patterns and transportation infrastructure within the two counties surrounding the Prescott National Forest (PNF). The information gathered is intended to assess current and future trends in forest access as well as potential barriers to access encountered by various user groups. Primary sources of data on access and travel patterns for the state's national forests include the Arizona Department of Transportation, the Arizona Department of Commerce, and the circulation elements of individual county comprehensive plans. Indicators used to assess access and travel patterns include existing road networks and planned improvements, trends in vehicle miles traveled (VMT) on major roadways, seasonal traffic flows, and county transportation planning priorities. Additional input on internal access issues has been sought directly from forest planning staff.

Various sources of information for the area surrounding the PNF cite the difficulty of transportation planning in the region given its vast geographic scale, population growth and pace of development, and constrained transportation funding. In an effort to respond effectively to such challenges, local and regional planning authorities stress the importance of linking transportation planning with preferred land uses. Data show that the area surrounding PNF saw relatively large increases in VMT between 1990 and 2000, mirroring the region's relatively strong population growth over the same period. Information gathered from ADOT and county comprehensive plans suggest that the current road network is relatively limited and that few significant improvements are currently scheduled for the region's transportation infrastructure.

4.1 Historical context and current access issues

Transportation infrastructure throughout the state of Arizona was initially developed to serve the needs of a predominantly rural population while supporting expansion of the state's largely agricultural economy. State, county, and city comprehensive plans reviewed for this assessment specifically mention economic influences such as logging, ranching, tourism, and recreation as having played a role in developing the region's circulation system (Coconino County 2003, ADOT 2004a).

Today, many regions of the state, including the area surrounding the PNF, are struggling to provide much-needed improvements to transportation networks in order to accommodate growing populations and changing local economies. Circulation planning throughout the area of assessment is challenging given the geographic scale of the area, the presence of private lands and development within the national forest boundaries, and the competing needs of rural and urban county residents. Each of the comprehensive plans further admits that current transportation networks have been developed as needs have arisen and are therefore inadequate for handling projected long-term growth (Coconino County 2003, Yavapai County 2003).

Despite a diverse array of transportation planning issues at the county and municipal level, planning agencies throughout the state express a common concern for the linkages between transportation and land use planning. In its current long-range plan, ADOT includes an appendix which analyzes broad transportation trends and issues as well as potentially significant implications for future transportation planning. In summary, ADOT identifies five large-scale issues that are most likely to influence transportation planning in the coming years: 1) Population growth and demographic change, 2) Economic growth and change, 3) Security concerns, 4) Energy supply and efficiency, and 5) Technological change and opportunities (ADOT 2004b). While the latter three issues are discussed in largely hypothetical terms and are at best indirectly linked to forest management, the first two identified issues are immediately relevant and directly pertain to other factors presented in this assessment.

Stressing the importance of demographic change for the future of transportation planning in the state, ADOT notes that Arizona's population is projected to double over the next forty years, from 5 to 10 million residents. In the agency's estimation, such changes 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). Specific concerns regarding the impact of population growth on state transportation planning include the cost of infrastructure surrounding sprawling metropolitan areas, traffic congestion and greater commuting distances within developed areas, and access to the state highway system for areas outside of major metropolitan centers.

In order to adequately prepare for future transportation needs, ADOT calls for greater coordination between state, regional, and local agencies in transportation and land use planning statewide. Strategies for doing so include the provision of education and technical assistance to local partners, enforcement of legal land use requirements, and the exercise of direct land use controls through state agencies such as the Arizona State Land Department (AZSLD). Through such efforts, ADOT hopes to play an important role in shaping the location of future development to ensure the maintenance of existing infrastructure while meeting the transportation needs of millions of new residents (ADOT 2004b).

Citing Arizona's transition from an agricultural- and extraction-based economy toward one where sales and services are increasingly important, ADOT addresses the consequent changes to transportation needs throughout the state. As a case in point, small parcel shipments and an increase in commuting that result from the growing information- and service-based industries result in different travel patterns and different types of vehicles on the road. ADOT suggests that increases in highway and freight rail capacity, development of intelligent traffic systems (ITS), expansion of intermodal facilities, and other related investments could help sustain Arizona's current industries and provide opportunities for new industries (ADOT 2004b).

4.2 Predominant transportation modes and seasonal flow patterns

A map of the roadway network within the area of assessment is presented in Figure 14. Interstates, U.S. and State highways, and Indian Routes within the area of assessment are presented in Table 23. The information shows a number of major roadways in close proximity to the PNF. The majority of major roads in Coconino and Yavapai Counties follow a north to south orientation. The lone exception is Interstate 40 which is oriented east to west through the area of assessment.

The vast majority of circulation corridors throughout the area of assessment provide infrastructure for a single transportation mode—travel by motorized vehicle. Currently, over ninety percent of daily person trips in the Flagstaff area utilize private motor vehicles whereas less than ten percent of mobility in the winter is accomplished via public transit, walking, and bicycling. Given the expense of developing infrastructure for alternative modes of transportation and patterns of development throughout rural areas of the state, the predominance of motorized vehicles is likely to continue for the foreseeable future. Nonetheless, counties and cities throughout the region have expressed a desire to reduce dependency on automobiles by enabling alternative modes—transit, walking, bicycling—thereby reducing the demand for expanded roadways (Coconino County 2003, Yavapai County 2003, FMPO 2001).

The Arizona highway system consists of over 58,000 miles of roadway, of which two percent are interstates, three percent are U.S. routes, and nearly six percent are state routes. Although only twelve percent of the total highway network is made up of state facilities, over fifty-seven percent of the VMT occurs on these roads. The Interstate System carries twenty-eight percent of all daily VMT (ADOT 2004c). Much of the Arizona state highway system passes through lands owned by federal agencies and federally recognized tribes. Federal agencies and federally recognized tribes own seventy percent of the land in Arizona. Federal lands agencies, including the USFS, the BLM, and others, own forty-two percent of the land in Arizona with over 2,000 miles of state highway passing through these lands. Arizona's

twenty-one federally recognized tribal nations own twenty-eight percent of Arizona land. An additional 1,200 miles of state highway pass through these lands, with over one-half of these road-miles in the Navajo Nation (ADOT 2004c).

Table 24 presents data on daily VMT for the years 1990 and 2000 as well as the percentage change. ADOT reported a dramatic increase in travel on non-state roads within Yavapai County over the ten-year period. Similar, though less substantial increases were seen for traffic counts on all roads within the county over the same period. In light of the significant increases in population and housing in Yavapai County between 1990 and 2000, the increase in travel on non-state roads likely points to significant increases in travel on county and private road networks. Coconino County also experienced increases in VMT on non-state roads that were much higher than those for the state over the same period.

Table 23. U.S., State, and Indian Routes by County

	Interstates / U.S. Highways	State Highways	Indian Routes
Coconino County			
	Interstate 40	State Highway 64	Indian Route 2
	Interstate 17	State Highway 66	Indian Route 15
	U.S. 89	State Highway 67	Indian Route 18
	U.S. 160	State Highway 87	
	U.S. 180	State Highway 89	
		State Highway 89A	
		State Highway 98	
		State Highway 99	
		State Highway 260	
		State Highway 264	
Yavapai County			
	Interstate 40	State Highway 69	
	Interstate 17	State Highway 71	
	U.S. 93	State Highway 89A	
		State Highway 96	
		State Highway 97	
		State Highway 169	
		State Highway 260	

Source: Arizona Department of Commerce: County Profiles

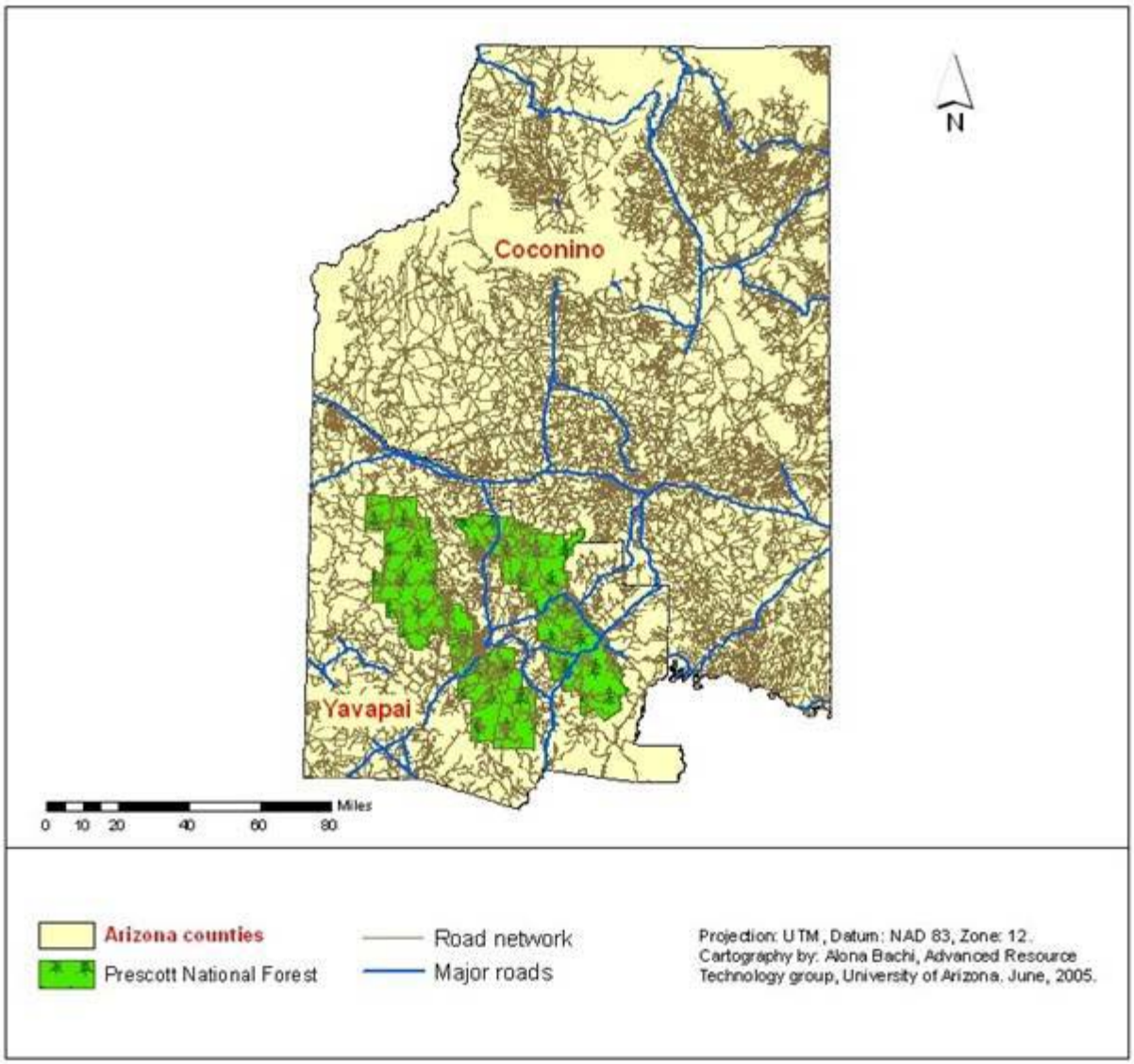


Figure 14. Road Network within Area of Assessment

Table 24. Daily Vehicle-Miles of Travel (VMT) by County, 1990-2000 and % Change

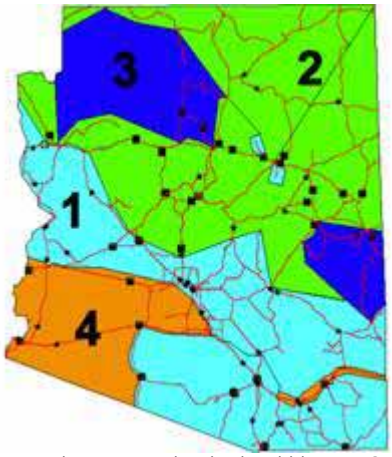
	Total VMT all roads (000s)			Total VMT state system (000s)			Total VMT non state (000s)		
Area	**1990**	**2000**	**% Change**	**1990**	**2000**	**% Change**	**1990**	**2000**	**% Change**
Coconino County	4,783	6,796	42.09%	3,646	5,211	42.92%	1,137	1,585	39.40%
Yavapai County	3,439	6,803	97.82%	3,182	4,776	50.09%	257	2,027	688.72%
Arizona	97,139	134,345	38.30%	40,252	66,671	65.63%	56,887	67,674	18.96%

Source: Arizona Department of Transportation, Transportation Planning Division

HPMS Data for the Calendar years 1990 and 2000

Seasonal Flow Patterns

The Data Section of ADOT's Transportation Planning Division has delineated four distinct "cluster areas" of traffic patterns throughout the state of Arizona. The clusters represent areas that are similar in terms of their variation with respect to Average Annual Daily Traffic (AADT) for the given area. Cluster areas are arranged hierarchically such that Area 1 demonstrates the least amount of monthly variation from the AADT whereas Area 4 experiences the greatest variation. Figure 15 shows the four cluster areas within the state of Arizona as well as the various Automatic Traffic Recorder (ATR) positions.



Source: Arizona Department of Transportation, Transportation Planning Division, Data Section

Figure 15. Traffic Pattern Cluster Areas

Table 25 provides daily and monthly factors for each of the four cluster areas collected during 2003. The factors below are presented as an inverse ratio of AADT to collected traffic counts. A factor of greater than one shows that traffic was less than average for the specific time period; less than one shows traffic as being greater than the AADT during the period.

Points of access to the PNF extend into the portions of the state designated as Area 2 by ADOT's Transportation Planning Department. Data in Table 25 show that peak traffic flow for this area occurs between the months of June and August. Traffic is lowest from November to February. This would confirm the logical notion that traffic in the region fluctuates primarily according to weather conditions and patterns of visitors from outside the region.

Table 25. Daily and Monthly Traffic Variation by Cluster Area, 2003

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Area 1	1.011	0.940	0.930	0.959	0.999	1.033	1.050	1.049	1.075	0.983	0.998	1.022
Sunday	1.109	1.076	1.067	1.109	1.104	1.066	1.043	1.111	1.086	1.062	1.116	1.095
Monday	1.029	1.016	1.045	1.021	1.011	1.019	1.032	1.039	1.034	1.024	1.012	0.981
Tuesday	1.041	1.040	1.049	1.056	1.044	1.044	1.054	1.040	1.047	1.068	1.046	0.978
Wednesday	1.074	1.058	1.031	1.049	1.062	1.050	1.033	1.027	1.047	1.056	0.952	1.003
Thursday	0.981	1.009	0.995	0.962	0.984	0.998	0.947	0.988	0.991	0.983	1.033	1.100
Friday	0.879	0.883	0.893	0.884	0.873	0.878	0.911	0.863	0.865	0.872	0.901	0.915
Saturday	0.958	1.000	0.996	1.055	1.046	1.038	1.058	1.040	1.047	1.069	1.047	1.012
Area 2	1.176	1.133	1.053	1.038	0.978	0.925	0.902	0.926	0.979	0.965	1.016	1.068
Sunday	1.008	0.972	1.029	1.039	1.065	1.001	1.005	1.055	1.058	1.021	1.043	1.061
Monday	1.066	0.996	1.086	1.039	1.027	1.059	1.052	1.061	1.024	1.064	1.073	1.009
Tuesday	1.163	1.123	1.12	1.083	1.084	1.114	1.099	1.083	1.087	1.102	1.052	1.008
Wednesday	1.098	1.138	1.067	1.05	1.067	1.088	1.063	1.051	1.062	1.062	0.962	1.01
Thursday	1.026	1.064	0.991	0.977	0.997	1.003	0.964	1.012	0.997	0.998	1.05	1.076
Friday	0.861	0.876	0.86	0.869	0.865	0.864	0.925	0.866	0.866	0.883	0.915	0.935
Saturday	0.914	0.971	0.981	1.047	0.998	1.012	0.991	0.974	1.015	0.996	0.993	0.983
Area 3	1.566	1.534	1.175	1.034	0.921	0.783	0.737	0.801	0.911	0.906	1.186	1.525
Sunday	1.05	0.966	1.164	1.079	0.944	1.048	1.019	0.931	1.02	0.943	1.091	1.051
Monday	1.099	0.907	1.073	1.049	1.026	1.046	1.04	1.089	1.008	1.067	1.058	1.037
Tuesday	1.119	1.071	1.005	1.088	1.065	1.04	1.052	1.118	1.105	1.1	1.047	1.007
Wednesday	1.158	1.159	0.929	1.052	1.087	1.056	1.04	1.105	1.091	1.112	1.069	1.049
Thursday	1.069	1.19	0.962	0.937	1.069	0.999	1.055	1.081	1.041	1.057	1.084	1.093
Friday	0.889	1.006	0.93	0.908	0.964	0.952	0.999	0.941	0.925	0.961	0.856	1.029
Saturday	0.823	0.897	0.992	0.939	0.897	0.892	0.839	0.844	0.876	0.845	0.889	0.851
Area 4	0.952	0.932	0.922	1.067	1.086	1.05	0.961	1.07	1.19	1.087	0.945	0.859
Sunday	0.962	1.026	0.971	0.948	1.032	0.964	0.886	0.985	0.985	0.938	0.927	0.981
Monday	1.111	1.021	1.091	1.054	0.982	1.058	1.077	1.079	0.961	1.043	1.129	1.052
Tuesday	1.131	1.074	1.079	1.115	1.114	1.108	1.133	1.108	1.083	1.104	1.108	1.017
Wednesday	1.095	1.049	1.057	1.082	1.096	1.075	1.083	1.063	1.089	1.077	0.942	1.041
Thursday	0.991	0.98	0.997	0.968	0.996	1.002	0.931	1.013	1.028	1.014	1.034	1.186
Friday	0.878	0.874	0.86	0.848	0.824	0.867	0.927	0.847	0.87	0.866	0.937	0.915
Saturday	0.905	1.027	1.01	1.059	1.032	0.983	1.046	0.966	1.05	1.027	0.993	0.889

N.B.: Factors listed represent a ratio of recorded traffic counts to the AADT

Source: Arizona Department of Transportation, Transportation Planning Division, Data Section

4.3 Regional transportation plans and roadway improvements

Each of the counties within the area of assessment shares common issues regarding transportation infrastructure. Nonetheless, various constraints and opportunities are discussed for individual areas in available ADOT documents as well as county and city comprehensive and transportation plans. This section examines both barriers to access and planned improvements for the state and county transportation networks surrounding the Prescott National Forest.

Planned improvements to the state highway system surrounding PNF are presented in Table 26. Although the data may not account for all ADOT projects within the area of assessment, they present a useful guide to the timing, nature, and extent of highway projects that are likely to influence travel to and from the forest.

Table 26. ADOT Current Five-Year Transportation Facilities Construction Program, Prescott National Forest

Year	Route	Milepost	County	Funding Source	Location	Length (miles)	Type Of Work	Cost ($1000)
2005	17	263	Yavapai	Interstate Maintenance	Cordes Junction - Orme Rd. Traffic Interchange	6.2	Resurface	$3,843
2005	89A	324	Yavapai	Surface Transportation Program	Coyote Springs - Forest Boundary	6.53	Resurface & Shoulder widening	$1,727
2008	260	208.6	Yavapai	Surface Transportation Program	Western Dr. To Hayfield Draw WB (SEGMENT 1A)	5	Construct New WB Roadway	$4,100

Source : Arizona Department of Transportation
http://tpd.azdot.gov/pps/searchprogram.asp

In an effort to facilitate coordination among various planning authorities throughout the state, ADOT has charged various regional planning bodies with responsibility for distributing federal transportation planning and construction funds to local agencies in their respective areas. Within the area of assessment for the PNF, the Northern Arizona Council of Government (NACOG), the Flagstaff Municipal Planning Organization (FMPO), and the Central Yavapai Municipal Planning Organization (CYMPO) share transportation planning responsibilities within their respective areas. Policy decisions regarding circulation infrastructure development and improvement within the regional planning area are influenced by both City and County provisions (Coconino County 2003, Yavapai County 2003). A brief description of access issues and planned improvements as discussed in regional, county, and city comprehensive plans is included below. It must be kept in mind, however, that the timing and implementation of these projects is subject to considerable funding constraints and an uncertain pace of future development.

Coconino County

Similar to other comprehensive plans, the circulation element of the Coconino County Comprehensive Plan claims that limited funding requires a continuing emphasis on maintaining existing systems rather than pursuing new roadway construction and other improvements. As with other elements in the comprehensive plan, the circulation framework for the county is grounded within an overall conservation framework. The plan explicitly states that circulation throughout the county will be planned in order to limit fragmentation or damage to habitat, disruption of wildlife movement, or introduction of pollutants and invasive species as a result of road construction (Coconino County 2003).

Two major highways serve crucial circulation roles for Coconino County—Interstate 17, which heads south to Phoenix, and Interstate 40, the only east-west roadway extending across the county. U.S.

highways in Coconino County primarily serve north-south traffic. Coconino County is responsible for maintaining the roads it owns as well as those managed through cooperative agreements with ADOT, the FS, and the Navajo Nation. The most pressing access issues occur on private, unpaved roads throughout the county. The county encourages the formation of improvement districts in order to ensure maintenance of private roads in previously developed areas. The Public Works Department is responsible for all roadway improvements. Projects are evaluated according to safety and efficiency and are prioritized in the county's Capital Improvement Plan (CIP). The most recently available CIP describes no major roadway improvements affecting forest access in Coconino County (Coconino County 2003).

Yavapai County

As with Coconino County, the transportation element of the Yavapai County General Plan calls for transportation planning that complements the overall vision for the county. As such, the transportation element calls for improved efficiency of limited transportation corridors, maintenance of scenic routes and the exercise of restraint in the construction of new routes in order to preserve the rural character and natural habitat of the county. Although Yavapai County measures over 100 miles in width and length at its extremes, there is a limited number of major transportation corridors within the county's large geographic area. Two major highway corridors running north/northeasterly through the county, SR 89 and I-17, serve the majority of Yavapai County communities, cities, and towns. Five other state highways, SR 179, SR 260, SR 89A, SR 69, and SR 169, provide connecting corridors for the Verde Valley area and the central Yavapai region (Yavapai County 2003).

Several large residential developments in Chino Valley and north of the Paulden community have been proposed and are expected to have a significant impact on SR 89 North, necessitating improvements. In the short term, ADOT proposes to complete the widening of SR 89 to a 5-lane section from the Prescott Lakes Parkway intersection to just north of the Willow Lake Road intersection. Following an inter-governmental agreement with the City of Prescott, ADOT planned to begin construction of the widening in 2004. Other improvements for North SR 89 and for the intersection area of SR 89 and SR 69, such as traffic roundabouts, are in long-range planning. In addition to these scheduled road improvements, the Yavapai County General Plan describes ongoing efforts by the towns of Prescott, Prescott Valley, and Sedona to develop alternative transportation networks in support of pedestrians and bicyclists (Yavapai County 2003).

4.4 Internal modes, barriers, and access issues

Currently, the primary access issues for the PNF concern private property owners in proximity to forest boundaries. As is the case with other forests in the state, individual owners and developers often expect unrestricted access to forest lands and sometimes create their own trails and access points. Prescott NF has tried to discourage such activity but given limited budgets and personnel, and in light of the current rate of development, enforcement is difficult, particularly surrounding the city of Prescott (Johnson, pers. comm.).

Another important issue concerns the number of county roads that provide access to forest lands. Many Yavapai County roads are used by individuals to access remote inholdings originally acquired through patented mining claims. Given the access afforded by these county roads, the PNF has had difficulty enforcing access restrictions, particularly during periods of high fire danger. Enforcement of these restrictions is largely the responsibility of Yavapai County, but they, too, are limited in terms of resources and personnel (Johnson, pers. comm.).

The PNF is one of the few forests in Region 3 to have completed a comprehensive roads analysis; however, given that it was completed in 1984, it is a bit dated. Since that time, cross-country travel,

including that for OHVs, has been restricted. Currently, roads maintenance funding is at one of its lowest levels over the past decade. The effects of this can be seen in deteriorating road conditions, particularly in the aftermath of the large storms occurring over the past several years. It has been noted that the PNF does not have a network of loop roads and trails, features that would be beneficial for access, especially for recreational users (Johnson, pers. comm.).

Finally, while there are not any distinct differences in access afforded to various user groups, the Hopi Tribe has successfully petitioned the PNF for the right to repatriate remains since the passage of NAGPRA (Johnson, pers. comm.).

4.5 Key issues for forest planning and management

The FS has long been aware of the considerable impact of internal roads 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 roadless areas and the perceived detrimental affects on wilderness due to resource extraction. Previous research on the impact of roads in forested environments tends 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 inholdings, 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; roadkill; invasion by exotic 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 physical and ecological impacts, 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 FS is required by law to permit access to private inholdings is increasingly important to the PNF 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 is 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 growing OHV use, an issue discussed in more detail later in this assessment.

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 PNF 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 VMT increased 31% on the national highway system between 1990 and 2000. By comparison, the state of Arizona reported a 38% increase in VMT over the same period. Both counties within the area of assessment for the PNF reported even greater increases, the highest of which was in Yavapai County (97.82%). 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 significant increases in both passenger and freight traffic on the interstate highway system between 2001

and 2010 (17% and 28% respectively) (Siggerud 2002). Given population projections for counties within the area of assessment, the PNF 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. Both of the county comprehensive plans reviewed for this assessment make specific mention of the link between transportation networks and land use. They 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).

5. Land Use

In this section, land ownership and use within the two counties surrounding the Prescott National Forest (PNF) are examined. Land ownership and use are both variables which can significantly influence the interaction of forests and surrounding communities. Regional patterns of major land uses vary from county to county, reflecting differences in soil, climate, topography, ownership, development patterns, and other cultural, social and economic trends. Individual counties must manage a range of land use issues including, but not limited to, water quality and availability, logging and mining activity, agricultural and recreational lands, access to state and federal land, transition of rangelands, open space preservation, and residential sprawl (Northern Economics 2002).

Collected land use and ownership data reveal that the area of assessment for the PNF contains considerable State Trust and Forest Service (FS) land, both of which stand to have a considerable impact on future forest planning. Yavapai County is particularly notable for its relatively high amounts of private and State Trust land. Each of these factors contributes to a land use policy environment that is increasingly focused on the economic and environmental sustainability of urban development in the face of continuing calls for the preservation open space. The proximity of private parcels and forest lands has also contributed to a number of significant land exchanges involving the PNF over the last several years.

5.1 Historical context and land use patterns

Since the federal government first began designating public-trust land in the late nineteenth century, the amount of national forest land in Arizona has remained remarkably steady. The concept of shared land has had a long history in the Southwest, mirroring Native American and Mexican American sensibilities (Baker et al. 1988). This, in part, may explain the relative stability of the use of these lands since their inception. The amount of land under public domain stood at 75% in Arizona in 1891, and by 1977, that number remained at over 70%. Today, the National Forest System itself accounts for about 15% of the land in Arizona. This small segment of the state's land represents a substantial portion of Arizona's natural resources, including 40% of the watersheds and nearly 60% of the timber. For this reason, maintaining the integrity of the forest boundaries by acquisition of land to form contiguous borders has historically been an essential objective of the USFS. Recently, trends have reflected the increasing importance of national forests as a resource for recreational use. The primary purpose of national forest land is for "multiple use" although certain elements of its subsidiary functions, like maintaining wilderness and species habitats, can limit this practice (Baker et al. 1988). The specific land use history of the Prescott National Forest is discussed in more detail in section 2.1.

The majority of NFS land is grassland, with about 20% being forested (Alig et al. 2003). In the latter areas, logging remains an integral and controversial element of national forest land use despite the fact that private owners contribute 90% of the timber harvest in the U.S. and control 60-70% of the timberland (Haynes 2003a, Alig and Butler 2004). Five years ago, Arizona national forests produced 13 million cubic feet of saw-timber, but over the past two decades, the amount of land devoted to timber uses has declined, and these lower levels are expected to remain stable for at least the next fifty years (Mills and Zhou 2003, Alig and Butler 2004, Johnson 2000). Nevertheless, a considerable amount of logging activity continues in PNF, with deals like the Lynx Lake Timber Sale, the project begun near Sevenmile Gulch trailhead, and the salvage logging contracts on FS lands burned during the Cerro Grande Fire being a few examples (USFS 2005l, Moote et al. 2003). While there is little argument that prescribed thinning is necessary in congested forest areas, true controversy arises regarding the specific trees removed and whether said trees are more or less valuable to the suppression of large wildfires. More on the financial liabilities inherent in FS logging policy is available in the section on Forest Users and Uses.

Although the total amount of land covered has remained consistent, the specific lands contained within the national forests have occasionally been juggled about. Forest and BLM lands can be traded or sold under a process that has been in place for over fifty years. These exchanges can attempt to redirect growth away from areas deemed environmentally sensitive toward communities with compatible infrastructures. Such transfers do not always pass without controversy, however. One recent example, the 21,000-acre Yavapai Ranch/Verde Valley transfer, has sparked angry letters to the editor and even led to the inception of a watchdog group named Taxpayers for Common Sense which lobbied before Congress against the land transfer (Roder 2003).

5.2 Land ownership and land use

There are over 17 million acres of land in the two-county area of assessment for PNF. Within this expanse, there are distinct patterns of land ownership and use, each of which carries important implications for current and future forest management. Figures 16 and 17 provide information on land ownership for the entire area of assessment while Table 27 provides more detailed land ownership data on a county-by-county basis. Figure 16 displays a considerable amount of Forest Service land in close proximity to private land as well as substantial State Trust land and Native American holdings within the area of assessment. Data in Figure 17 suggest that, as a whole, the area of assessment for the PNF closely resembles overall ownership patterns for the state of Arizona. For example, approximately 17% of the land within the area of assessment is under private ownership while 14% is State Trust land. Both of these factors exercise a great deal of influence on regional development patterns as is discussed later in this section (AZSLD 2004).

The more detailed data provided in Table 27 indicate important differences in ownership between the two counties within the area of assessment. Here again, Yavapai County is notable for its relatively substantial amount of private and State Trust land. Coconino County shows the highest percentage of land owned by Native American entities (38.13%) while Yavapai County reports the greatest amount of land held by the FS (38.17%).

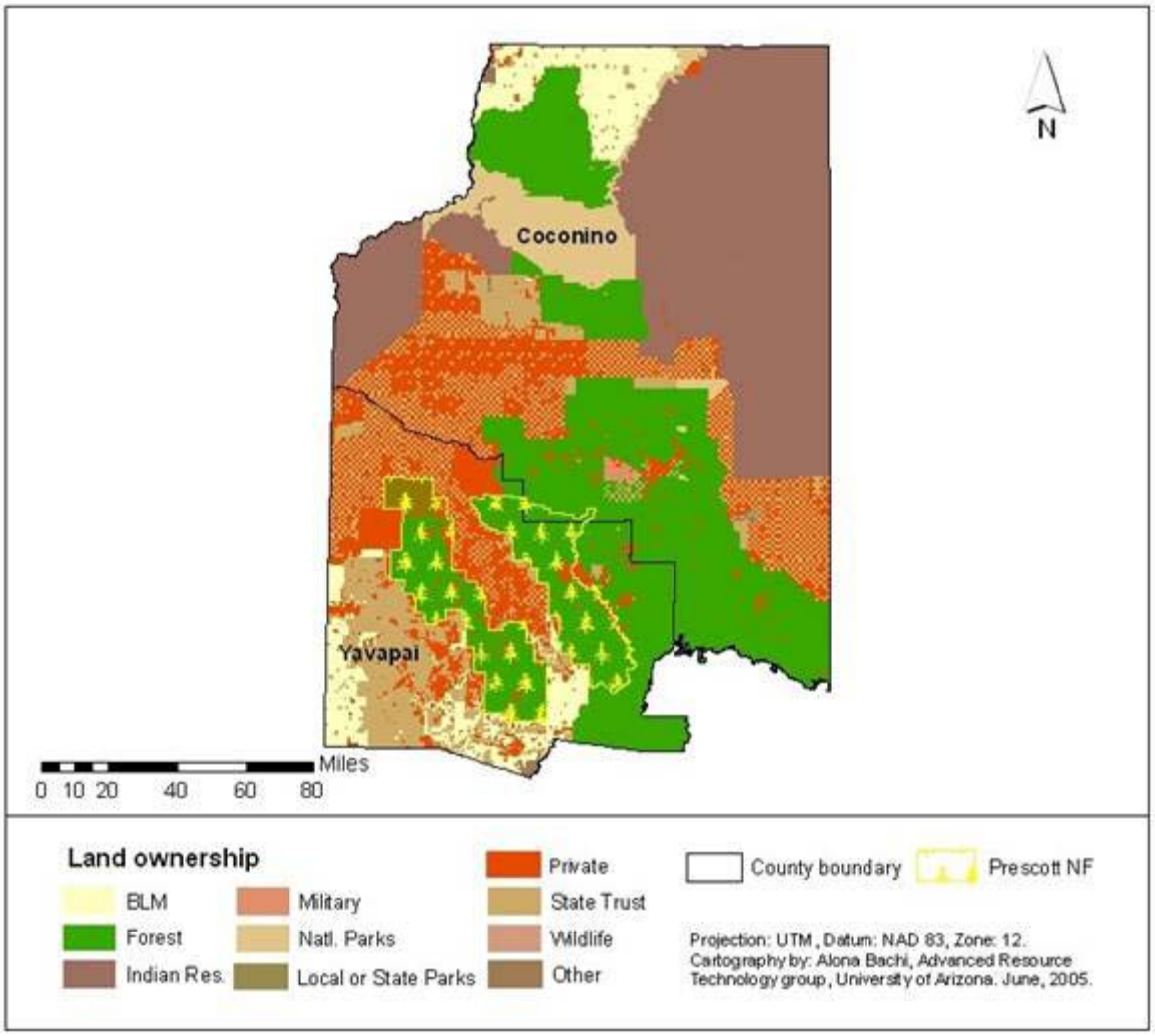
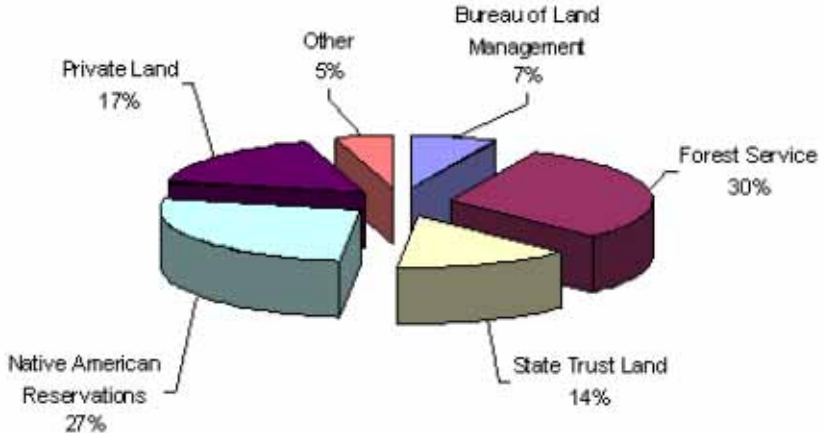


Figure 1. Land Ownership within Area of Assessment



Source: Arizona State Land Department

Figure 2. Percent Ownership of Major Land Owners in Two-County Area of Assessment

Table 1. Land Ownership by County, 2005

Land Ownership	Acres	Percent
Coconino County		
Apache-Sitgreaves NF	288,821.10	2.42%
BLM	605,491.35	5.08%
Coconino NF	1,399,784.27	11.73%
Game and Fish	10,073.02	0.08%
Glen Canyon NRA	40,657.72	0.34%
Grand Canyon NP	681,829.36	5.72%
Havasupai Indian Res.	171,918.92	1.44%
Hopi Indian Res.	493,566.28	4.14%
Hualapai Indian Res.	579,476.99	4.86%
Indian Allotments	4,625.05	0.04%
Kaibab Indian Res.	13,170.00	0.11%
Kaibab NF	1,510,895.79	12.66%
Marble Canyon NM	14,600.29	0.12%
Navajo Army Depot	25,752.93	0.22%
Navajo Indian Res.	3,166,147.29	26.54%
Navajo NM	39.18	0.00%
Navajo-Hopi Joint Use	123,966.85	1.04%
Prescott NF	43,592.26	0.37%
Private Land	1,587,305.56	13.31%
State Trust Land	1,125,427.03	9.43%
Sunset Crater NM	3,035.99	0.03%
Walnut Canyon NM	3,049.74	0.03%
Wupatki NM	36,478.85	0.31%
TOTAL	11,929,705.82	100.00%

Land Ownership	Acres	Percent
Yavapai County		
BLM	605,411.62	11.64%
Bureau of Reclamation	8,682.85	0.17%
Coconino NF	425,932.99	8.19%
County Land	5,784.83	0.11%
Game and Fish	1,033.74	0.02%
Hualapai Indian Res.	851.14	0.02%
Indian Allotments	254.12	0.00%
Kaibab NF	25,380.40	0.49%
Military Res.	257.75	0.00%
Montezuma Castle	534.34	0.01%
Montezuma Well	270.16	0.01%
Other	8.24	0.00%
Parks and Recreation	403.81	0.01%
Prescott NF	1,211,345.57	23.30%
Private Land	1,324,643.23	25.47%
State Trust Land	1,265,474.56	24.34%
Tonto NF	321,677.16	6.19%
Tuzigoot NM	43.24	0.00%
Yavapai Apache Ind. Res.	617.61	0.01%
Yavapai Prescott Ind. Res.	1,378.16	0.03%
TOTAL	5,199,985.52	100.00%

Source- Arizona Land Resource Information Service

Figure 18 depicts land cover within the entire area of assessment while Table 28 provides detailed data on land cover within each of the counties. As a point of clarification, cells with no data for a given category indicate that the land cover type does not exist within the county whereas a figure of 0.00% indicates that the cover type constitutes less than one-tenth of one percent of the county's total land area. Yavapai County reported the greatest amount of residential cover at .54% compared to .24% for the assessment area as a whole. Yavapai County also reported the greatest amount of industrial land cover while Coconino had the greatest amount of land dedicated to commercial and services uses. Evergreen forest was the predominant land cover in Coconino County (43.19%) while shrub, brush, and mixed range constituted the predominant land cover in Yavapai County (49.30%).

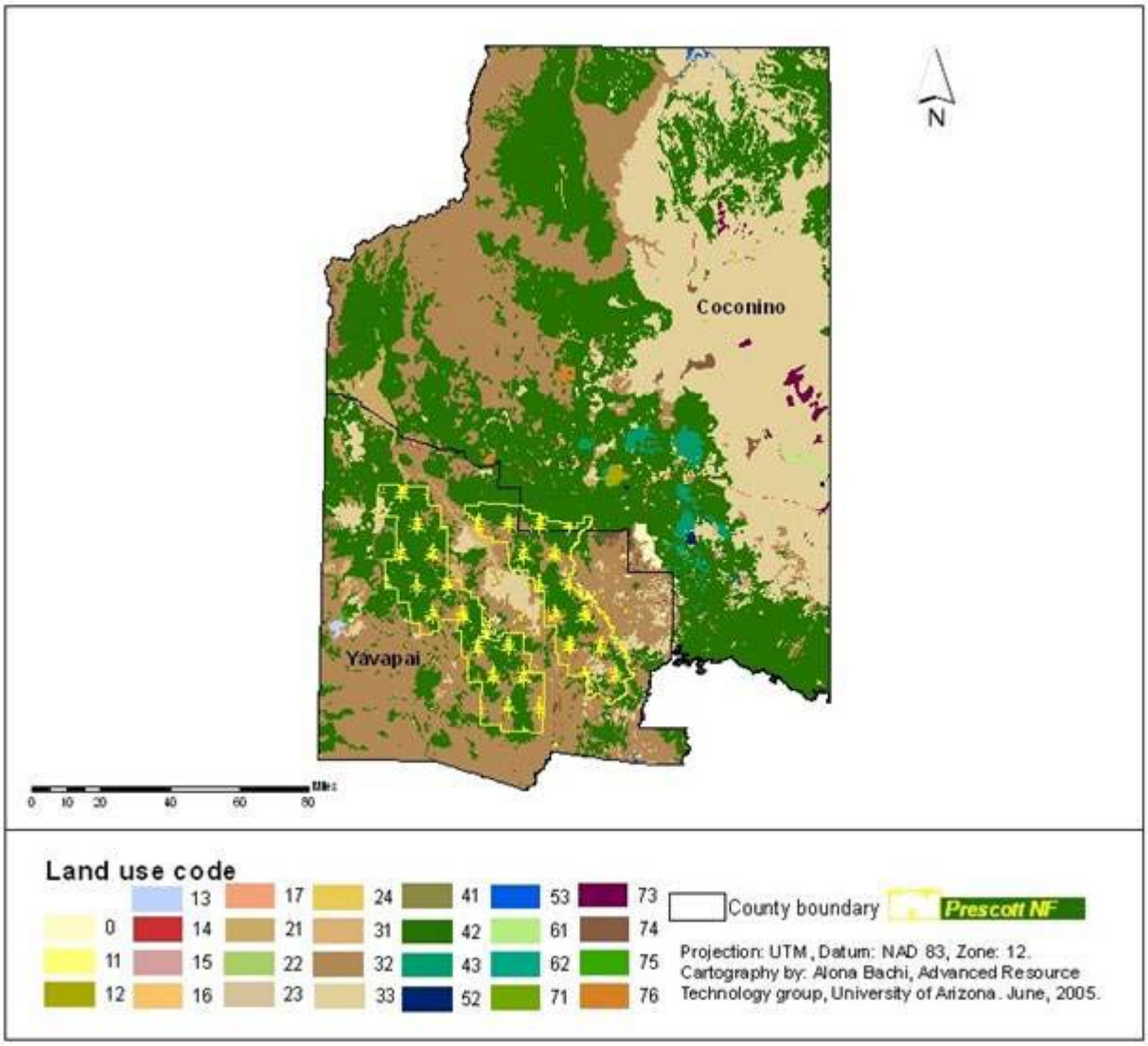


Figure 3. Land Cover within the Area of Assessment

Table 2. Land Cover by County and Assessment Area, 1990

Land Use Code	Coverage Type	Coconino County		Yavapai County		Assessment Area	
		Acres	Percent	Acres	Percent	Acres	Percent
0	Unknown / Background	26,569	0.22%	2,549	0.05%	29,118	0.17%
11	Residential	13,388	0.11%	28,107	0.54%	41,496	0.24%
12	Commercial and services	20,442	0.17%	3,431	0.07%	23,873	0.14%
13	Industrial	2,572	0.02%	10,397	0.20%	12,970	0.08%
14	Transportation, communication, utilities	14,942	0.13%	13,348	0.26%	28,290	0.17%
16	Mixed urban or built-up land	4,100	0.03%	1,610	0.03%	5,710	0.03%
17	Other urban or built-up land	1,442	0.01%	851	0.02%	2,293	0.01%
21	Cropland and pasture	130,213	1.09%	94,142	1.81%	224,355	1.31%
22	Orchards, groves, vineyards, nurseries and ornamental horticultural areas	0	0.00%	86	0.00%	86	0.00%
23	Confined feeding operations	79	0.00%	90	0.00%	170	0.00%
24	Other agricultural land	335	0.00%	1,412	0.03%	1,747	0.01%
31	Herbaceous rangeland	9,559	0.08%	54,394	1.05%	63,952	0.37%
32	Shrub and brush rangeland	2,384,941	19.99%	2,563,774	49.30%	4,948,715	28.89%
33	Mixed rangeland	3,831,908	32.12%	343,004	6.60%	4,174,913	24.37%
41	Deciduous forest land	740	0.01%	315	0.01%	1,055	0.01%
42	Evergreen forest land	5,152,147	43.19%	2,033,524	39.11%	7,185,671	41.95%
43	Mixed forest land	147,202	1.23%	1,214	0.02%	148,416	0.87%
51	Streams and canals	1,252	0.01%	0	0.00%	1,252	0.01%
52	Lakes	11,380	0.10%	216	0.00%	11,596	0.07%
53	Reservoirs	17,868	0.15%	4,441	0.09%	22,309	0.13%
61	Forested wetland	17,097	0.14%	0	0.00%	17,097	0.10%
62	Non-forested wetland	602	0.01%	0	0.00%	602	0.00%
73	Sandy areas not beaches	55,941	0.47%	1,585	0.03%	57,526	0.34%
74	Bare exposed rock	56,324	0.47%	13,536	0.26%	69,860	0.41%
75	Strip mines, quarries, gravel pits	6,094	0.05%	13,387	0.26%	19,480	0.11%
76	Transitional areas	21,834	0.18%	14,571	0.28%	36,405	0.21%
77	Mixed Barren Land	364	0.00%	0	0.00%	364	0.00%
85	Mixed tundra	369	0.00%	0	0.00%	369	0.00%
	Total	**11,929,706**	**100.00%**	**5,199,986**	**100.00%**	**17,129,691**	**100.00%**

Source: U.S. Geological Survey, 1990
Land use/ land cover digital data collected by USGS and converted to ARC/INFO by the EPA. Each quadrangle of land use data has a different representative date; however, dates ranging from mid-1970s to early 1980s are common.

Metadata can be found at http://www.epa.gov/ngispgm3/spdata/EPAGIRAS/meta/general-metadata.text

5.3 County land use plans and local policy environment

For the purpose of this assessment, county comprehensive plans have been used as a primary source of information on the history of land use within a region, the patterns of development, desired conditions, and current county land use policies. It must be noted, however, that county governments hold no legal authority over independent jurisdictions such as federal and state lands, incorporated cities and towns, or Native American tribal reservations. Additionally, the comprehensive plans reviewed for this assessment vary widely with respect to the date of their adoption, the nature of land use data provided, and the overall format of the documents. While some offer a broad, descriptive analysis of land use patterns and desired conditions, others present more detailed, prescriptive policies and guidelines for county land use. As such, information from the various comprehensive plans is discussed in terms of its potential for influencing land use patterns adjacent to the national forest.

Coconino County Comprehensive Plan

The Coconino County Comprehensive Plan estimates that nearly 60% of the county's population—an estimated 75,000 people—lives within the Flagstaff Regional Planning Area. All other residents of the county, approximately 40,000 individuals, live in unincorporated areas (Coconino County 2003). As noted earlier, Coconino County is the largest county in Arizona and the second largest in the United States, but it remains one of the most sparsely populated. Native American reservations (Navajo, Hopi, Kaibab-Paiute, Havasupai, and Hualapai) cover 38.1% of the land area. Federal and state agencies manage a combined 49% of the county's lands—the Forest Service (28.3%), the BLM (5%), the AZSLD (9.4%), and the Park Service (6.8%). Only 13% of the land in Coconino County is under private ownership (Coconino County 2003).

The Coconino County Comprehensive Plan, adopted in September 2003, is based in large part on a conservation framework that seeks to accommodate growth in existing communities while retaining their historic, natural, and cultural character (Coconino County 2003). The plan also claims that "conservation-based planning provides an equitable way to consider the varied interests of residents, developers, and conservationists in a cooperative manner" (Coconino County 2003). In order to facilitate implementation of the framework, the plan incorporates specific conservation guidelines into each of its elements.

The plan describes a rapidly decreasing private land base, limited water sources, and public concern over the impact of high-density development on the area's rural character as the primary planning challenges faced by the county. The majority of private land in the county is owned by ranchers and others with large holdings. Platted subdivisions are almost completely built out and development of inholdings is constrained by political pressure as a result of preference for open space. Although some growth has been facilitated through lot splits, the county's authority for reviewing such development does not extend to issues of drainage, utilities, and other infrastructure, often resulting in uncoordinated wildcat development in unincorporated areas (Coconino County 2003).

Water for residential use is either unavailable or difficult to obtain in unincorporated areas of Coconino County. The plan claims that groundwater depth typically exceeds 1,000 feet prompting residents to depend on shared wells, small public water supply systems, or the hauling of water from municipal standpipes. While the county does have the authority to require developers to reveal sources of water for planned subdivisions, it does not have the legal authority to evaluate the impact of proposed wells on neighboring water sources or the environment. The plan also alludes to the planning challenges posed by the reverence for the "rural" character of the county held by many residents in unincorporated areas. It explicitly states that the ultimate success of the conservation framework will depend on planners' success in redefining "rural character" from that of two- to five-acre lots with no protected open space to land use patterns that incorporate smaller individual lots and large areas of conserved open space (Coconino County 2003).

Land use patterns in Coconino County have historically been influenced by land ownership, topography, tourist attractions, Native American reservations, and railroad infrastructure. In the foreseeable future, demographic trends, employment growth, and the availability of water are likely to play increasingly important roles in determining patterns of development. In an effort to respond to these and other factors, the Coconino County Comprehensive Plan promotes mixed-use, infill development as the surest way of supporting a stable county economy while preserving healthy landscapes. The plan specifically mentions the acquisition of conservation easements and the use of Transfers of Development Rights (TDRs) as effective methods of preserving county open space. The plan cites the transfer of 40,000 acres of Cataract Ranch from Babbitt Ranches to The Nature Conservancy and Coconino County as an example of successful conservation easements (Coconino County 2003).

The plan also cites the importance of ranchlands in ensuring sustainable management of county land use, estimating that nine ranch owners with private land holdings each exceeding 10,000 acres collectively own 1.13 million acres—71% of the county's private land (Coconino County 2003). One means of doing so is by allowing ranchers to petition the Board of Supervisors for the formation of "rural planning areas" which provide incentives for large, private landholders to set aside portions of ranchland for purposes of conservation. The use of rural planning areas was specifically provided for under the state of Arizona's Growing Smarter legislation (Coconino County 2003).

- Residential land use

Residential areas in unincorporated Coconino County fall into various categories with most areas surrounding the cities of Flagstaff and Williams characterized as, and zoned for, agricultural-residential land uses. Exceptions include the Parks and Mormon Lake areas, several platted subdivisions, and rural ranchlands. The Coconino County Comprehensive Plan distinguishes between three residential development patterns: rural communities; remote subdivisions; and rural, large-parcel agricultural-residential lands. Rural communities, which may include some small-scale commercial development, include areas such as Doney Park, Parks, Pinewood, Kachina Village, Mountainaire, and Mormon Lake. Rural subdivisions in the area include Forest Lakes, Clear Creek Pines, Starlight Pines, Mogollon Ranch, Blue Ridge Estates, and Tamarron Pines. Many of the residential units in these areas are developed on lots ranging from two-and-a-half to ten acres and serve as second homes, a trend county planners expect will continue (Coconino County 2003).

The pace of residential development and the scarcity of available land have made the affordability of housing a growing issue in Coconino County. The Coconino County Comprehensive Plan asserts that median home prices in the county doubled between 1987 and 2000. Given a median household income of $38,256 in 2000, over one-half of residents in the Flagstaff area could not afford a median-priced home. In unincorporated areas of the county, higher development costs and land prices are due in part to large lot zoning and the fact that more accessible lands with existing infrastructure have already been developed. Attempts by the county to address the issue of housing affordability have included the amendment of the county subdivision ordinance to simplify the subdivision process, the encouragement of higher densities, the clustering of subdivisions, and the selection of locations for manufactured homes. A related trend in residential housing involves the proliferation of seasonal homes in Coconino County. Census data reveal that in 2000, 17% of all homes in Coconino County were used for seasonal occupancy. At issue is the fact that the costs to the county of providing second-home communities with services such as police protection, solid waste disposal, road maintenance, and snow removal typically exceed tax revenues from seasonal populations (Coconino County 2003).

Residential development in unincorporated Coconino County is also complicated by the common use of lot splits. State law allows owners to divide land into parcels of thirty-six acres or more with no county oversight. Similarly, subsequent owners can split property up to five ways without subdivision review until the resulting parcels reach the minimum zoned size. The Coconino County Comprehensive Plan

claims that, as of 2002, these types of developments contained approximately 3,200 forty-acre lots that covered 200 square miles (8%) of private land in the county.

Current land regulations also permit ranchers to sell their land for development as forty-acre "ranchettes," an increasingly attractive option for agricultural interests, particularly in light of the ongoing drought and diminishing grazing rights on state and federal land. The checkerboard pattern of development that results from this practice has the potential to affect state and federal lands by increasing pressure for consolidation of available sections. While residents and developers benefit from these practices in terms of lower density, lower initial land costs, and shorter times for approval, the county seeks greater control over lot splits and the purchase of "ranchettes" in order to mitigate some of the negative consequences. They include conflict over easements, substandard roads, inadequate drainage, and fragmentation of wildlife habitat (Coconino County 2003).

- Commercial and industrial land use

Commercial uses in unincorporated Coconino County typically are located on or near state highways and are characterized as neighborhood commercial or tourist/highway commercial uses. Common commercial land uses in the county include general retail and office facilities, grocery stores, gas stations, restaurants, post offices, and feed stores. Tourist/highway commercial uses typically include hotels, motels, campgrounds, RV parks, gift shops, and recreational facilities. Both county and municipal planners have attempted to maintain the rural character of low-density residential areas by encouraging the location of commercial development near major intersections and existing communities. The county has taken the further steps of amending the zoning ordinance to prohibit establishments of over 70,000 ft^2. in rural areas as well as adopting design guidelines from commercial and industrial uses through the Area Plan process in the communities of Tusayan, Doney Park, Oak Creek Canyon, Kachina Village, and Mountainaire (Coconino County 2003).

Due to the fact that most industrial facilities require municipal water, fire protection, and other services, relatively few are located outside of cities and towns in unincorporated areas of the county. As of 2002, the primary areas of heavy industrial zoning and development were located near Winona (seventy-two acres) and on Leupp Road (242 acres) in the Doney Park area. An additional 140 acres are industrially zoned in Bellemont and considerable additional development is possible at both Bellemont and Flagstaff Ranch Road. The Coconino County Comprehensive Plan states a preference for future industrial uses in the area that do not require large amounts of water such as warehouses, distributing, and light manufacturing (Coconino County 2003).

Yavapai County General Plan

Like that of Coconino County, the Yavapai County General Plan of 2003 states the overall objective of promoting development that maintains the region's traditionally rural character while adequately planning for expected growth. The challenge of doing so is heightened given the fact that Yavapai County's population growth over the last two decades has more than doubled that of Coconino County and has been nearly 20% greater than overall population growth for the state of Arizona over the same period. This substantial growth in the county's population has coincided with a decline in traditional land uses such as ranching, agriculture, and mining and has led to significant expansions of existing municipalities (Yavapai County 2003).

The majority of land in Yavapai County is publicly owned and managed by federal and state agencies. 38% of total county land is under the jurisdiction of the USFS, 24% is managed by the AZSLD, and 11.6% is controlled by the BLM. Approximately 25% of land in Yavapai County is privately owned. USFS lands are concentrated in the eastern and southern portions of the county, and BLM lands are

primarily located in the southwestern and south-central areas of the county. AZSLD holdings are also concentrated in the southern areas but are additionally present in checkerboard sections throughout northern Yavapai County.

In addition to Federal and State agencies, twelve other jurisdictions control limited portions of land within the county. Nine of these jurisdictions are incorporated cities and towns, and three are Tribal Reservations (Yavapai-Prescott Indian Reservation, Yavapai-Apache Reservation, and Hualapai Indian Reservation). As of 2002, these twelve jurisdictions held approximately 236 square miles of land, comprising 2.9% of the county's total land base (Yavapai County 2003).

Many of the county's current planning efforts are directed toward the designated "major growth areas." According to the Yavapai County General Plan, 2000 Census data suggest that 50% of the total county population lives in the Central Yavapai Region and another 32% lives in the Verde Valley area. The areas surrounding Prescott and Prescott Valley have grown dramatically since the 1970s, largely as a result of the sale and conversion of former Fain family ranch holdings. Additionally, planned area developments such as Yavapai Hills, Hidden Valley Ranches, and Sandretto Hills have been annexed into the City of Prescott. Similar conversions of ranch and farm properties have led to substantial residential development in the Verde Villages, Chino Valley, and along the State Highway 69 and Williamson Valley Road corridors. This trend is expected to continue as other large ranches in Yavapai County are currently being proposed as sites for future development (Yavapai County 2003).

- Residential land use

The Yavapai County General Plan states that approximately 96% of the land in unincorporated Yavapai County is zoned for residential land use. This land is subject to two-acre minimum zoning and comprises 3.7 million acres of government-owned property and over 1 million acres of private property. Land use referred to as Rural Residential is primarily located in the southern and western portions of unincorporated Yavapai County. Rapid growth has also been experienced in areas referred to in the plan as "municipal influence areas." These areas are primarily residential developments adjacent to, but outside, the boundaries of existing municipalities.

As is the case in Coconino County, effective planning is made more difficult by the prevalent practice of lot splitting. The plan states that between April 2000 and April 2001, 1,760 parcel splits were recorded in Yavapai County, accounting for 90% of home sites developed during the period. The result is that many large, private holdings have been continuously split into numerous two-acre parcels. Under current state law, the county has little authority to require infrastructure or dedication of open space for split parcels, nor does it review split properties for suitable access, water, sanitation, drainage, or available utilities. Importantly, state law also permits installation of "exempt wells." Wells qualify as exempt if they have less than thirty-five gallons per minute pumping capacity. This includes the vast majority of wells for residential consumption as wells with three- to ten-gallon-per-minute capacity are deemed sufficient for typical households. As a result of parcel splits and well exemption, the plan claims that a large percentage of current land development in unincorporated Yavapai County is "unplanned" (Yavapai County 2003).

- Commercial and industrial land use

The Yavapai County General Plan states a preference for general commercial- and tourist-related businesses to be located along the major intersections found on State Highways 69, 89, 89A, 179, 260 and Interstate 17. Although the mining industry has declined throughout the county, this land use continues in the community of Bagdad as well as various small mining entities in other parts of the county.

Local land use policy issues

The primary land use issues facing county residents within the area of assessment are the result of a transition from an area defined by its rural character to one facing increasing pressure for urban development. While residents and planners prefer to maintain a rural character throughout unincorporated county lands, rapidly increasing populations and expanding city boundaries represent some of challenges for doing so.

Preservation of open space is a particularly important land use issue among planners and property owners within the areas of assessment. Adequate open space is seen as a critical step towards protecting important watersheds, preventing fragmentation of wildlife habitat, and creating buffers between low-density rural development and higher-density uses within incorporated cities. Policies aimed at preserving open space have been mentioned in each of the county comprehensive plans. These methods include the encouragement of "clustered development," the purchase of development rights, and the dedication of land such as conservation easements. Although no such measures have been adopted, the Flagstaff Area Regional Land Use and Transportation Plan mentions the possibility of adopting rural and urban growth boundaries, outside of which future development would be discouraged or prohibited (Coconino County 2003, Yavapai County 2003).

In addition to the provision of open space, county land use planners also emphasize the need to ensure efficient and effective land use in areas suitable for development. A commonly mentioned policy for ensuring efficient land use is the encouragement of infill development. Infill development not only limits urban sprawl, it maximizes the efficiency of infrastructure and minimizes traffic congestion, thereby lowering the overall cost development. Policies aimed at encouraging infill include the provision of density transfers and zoning changes that allow for mixed uses in low-density areas (Coconino County 2003, Yavapai County 2003, FMPO 2001).

Another factor certain to influence the pattern of future development is the limited availability of private land within the area surrounding the PNF. In an effort to capitalize on the current land market and accommodate the need for residential and commercial development resulting from population growth, large property owners commonly engage in the practice of "lot splitting." Currently, county governments exercise little or no authority over this practice, resulting in developments that circumvent established density guidelines as well as avoiding the costs of installing critical infrastructure such as sewers, water, improved roads, and emergency access. In addition to advocating state legislation that would grant counties the power to regulate lot splitting, county planners propose sharing the cost of development with private interests through tools such as impact fees (Coconino County 2003, Yavapai County 2003). Proponents of development also advocate the consolidation and conversion of the current patchwork of trust lands currently managed by the AZSLD. They argue that the exchange and/or sale of these trust lands will alleviate land scarcity, provide much needed funds for the state educational system, and allow for protection of environmentally sensitive landscapes. A further discussion of the impact of State Trust Lands on Arizona's national forests is presented in the next section (Coconino County 2003, Yavapai County 2003). Undoubtedly, the availability of sufficient water supplies is a growing concern for Arizona communities, particularly those experiencing relatively high rates of population growth. Recently, Governor Napolitano cited the "one-two punch of record drought and record growth" as the greatest threat to the state's water supply and a serious concern for Arizona's future development (Napolitano 2004). One of the statewide policies enacted through the Arizona Department of Water Resources (ADWR) is to require developers in AMAs to identify a 100-year assured water supply, participate in banking water, expand use of effluent water, and convert homes and buildings to low-water-use fixtures. Currently, the Prescott Active Management Area in central Yavapai County is the only one within the area of assessment and measures 485 square miles (ADWR 2005). Additionally, the 1998 Growing Smarter legislation passed by the state congress requires the inclusion of a Water Resources element in the comprehensive plans of all counties with a 2000 population of 125,000 or greater. The current versions of the Yavapai and Coconino County comprehensive plans both contain Water Resources

elements which support making water availability a key consideration for all major developments and subdivision applications filed in conjunction with a rezoning for higher density. Policies for effectively managing future development with respect to projected water supplies include county support for the formation of water districts, incentives for low-water plumbing devices, drought-tolerant landscaping, and the identification and reuse of non-potable sources such as gray water (Coconino County 2003, Yavapai County 2003).

Finally, the proximity of many rural communities to large parcels of public land have prompted calls for greater collaboration on land use planning between county and municipal governments and their federal and state counterparts. In addition to the aforementioned issues, county residents are particularly interested in coordinating efforts on land acquisition and exchange as well as fire management and forest restoration (Coconino County 2003, Yavapai County 2003).

5.4 Changes in land ownership affecting Prescott National Forest

- Northern Arizona Land Exchange (2005)

On March 16, 2005, Arizona Senators John McCain and Jon Kyl introduced Senate bill S. 161, entitled the Northern Arizona Land Exchange and Verde River Basin Partnership Act. On the same date, the Deputy Chief of the National Forest System offered testimony before the Subcommittee on Forests and Forest Health on H.R. 410, the House version of the legislative bill. The proposed legislation is intended to provide for the exchange of 20,800 acres of land currently held by the Prescott, Kaibab, and Coconino National Forests for 35,000 acres owned and managed by Yavapai Ranch Limited Partnership and the Northern Yavapai, L.L.C. The proposed action would facilitate consolidation of approximately 15,000 acres in “checkerboard” parcels within the PNF while conveying conservation and development rights to Yavapai Ranch Limited Partnership and the cities of Williams, Flagstaff, Clarkdale, and Camp Verde. Six summer church camps would also obtain purchase rights for land they currently occupy under the proposed exchange. The land to be conveyed to the PNF is adjacent to the Juniper Mesa Wilderness Area in northwestern Yavapai County, an area described as having significant forest, wildlife, and recreation values. The proposed exchange is one of the largest exchanges of federal and private land in Arizona history and has garnered both considerable support and opposition from local governments, advocacy groups, and citizens. Proponents of the exchange claim that it provides for more effective administration of FS lands and delivers direct benefits to municipalities in the implementation of economic, growth management, and open space plans. Opposition to the exchange is largely based on the fact that the legislative process involved does not require the environmental assessments, public participation, or disclosure procedures involved in typical land exchanges. Additionally, many local critics are opposed to the retention of all water rights on exchanged parcels by the Yavapai Ranch Limited Partnership. They believe that retention of such rights is an extraordinary and irresponsible concession by the FS in light of Yavapai Ranch’s development plans and the area’s scarce water supply. Both S. 161 and H.R. 410 have been introduced in committee and are awaiting further action on the floor of U.S. Senate and the House of Representatives (Holtrop 2005, Olsen 2003, Rey 2003, Yavapai Ranch 2003).

- Tonto Apache Land Exchange (2005)

This proposal involves the exchange of a 278-acre parcel of land adjacent to the Tonto Apache Reservation for four privately held parcels within the Lakeside, Verde, Payson, Tonto Basin, and Red Rock Ranger Districts (PNF 2005).

- Gray Wolf Land Exchange (2005)

The current Statement of Proposed Action (SOPA) for the PNF states that this exchange is intended to provide land for the expansion of the Gray Wolf sanitary landfill site, approximately ten miles east of Dewey, Arizona in Yavapai County. As proposed by Waste Management of Arizona (WMA), the exchange calls for the acquisition of approximately 255 acres of national forest land on the Prescott National Forest (PNF) in Yavapai County, Arizona. In exchange, the PNF, Apache-Sitgreaves National Forest (ASNF), Kaibab National Forest (KNF), and the Coronado National Forest (CNF) would receive title to seven parcels of private land totaling approximately 872 acres. A final decision on the Gray Wolf land exchange was expected in February 2005 with implementation taking place in July 2005 (PNF 2005, PNF 2004).

- Ellison Creek Land Exchange (2004)

This proposal called for the exchange of a 142-acre federal recreation residence parcel on the Payson Ranger District for 521 non-federal acres located throughout the Alpine, Verde, Williams, Payson, Red Rock, and Pleasant Valley Ranger Districts. Implementation of the proposed land exchange was expected in September 2004 (PNF 2005).

- Verde District Office (2003)

The Arizona National Forest Improvement Act of November 2000 gives the FS the authority to exchange or sell these parcels to acquire, construct, or improve administrative facilities. The 213-acre Verde Ranger Station parcel is located along State Route 260, east of Camp Verde. The property was scheduled to be sold through a competitive prospectus process in mid-to-late 2004. Proceeds from the land sale will be used to construct a new facility in a location that better serves the public. Future use of these locations will be determined by the local community jurisdiction; however, it is expected that both sites will continue to have similar use as neighboring parcels (COF 2003b).

- Bellemont Land Exchange (2003)

In February 2003, the Director of Lands and Minerals for the Southwest Region of the Forest Service issued a Decision Memo approving the exchange of approximately 754 acres of federal land on the Coconino National Forest for approximately 1,160 acres of non-federal land located within the Coconino, Coronado, Kaibab, Prescott, Sitgreaves, and Tonto National Forests. The land exchange was processed by the State of Arizona through the Arizona Game and Fish Department and was intended to allow the department to directly develop and operate a permanent shooting facility in a safe and efficient manner. PNF lands involved in the exchange were limited to the “Verde River” parcel located eight miles north of Chino Valley in Yavapai County in management area 2 of the forest. The acquisition of this non-federal parcel was intended to reduce boundary irregularities while providing for key resource values of visual protection and critical wildlife habitat (USFS 2003g).

5.5 Key issues for forest planning and management

"A critical element in understanding the regional significance of national forest lands and resources in the Southwest is understanding the development and relationships of public and private land ownership and control."

- Timeless Heritage: A History of the Forest Service in the Southwest

Few, if any, of the topics included in this assessment have as direct an impact on forest management as land use planning. Although land ownership and use remained remarkably stable in the century following the founding of the Arizona Territory in 1863, recent shifts in the state's population and economic base have brought about dramatic trends in land use that are likely to influence forest management for decades to come.

Arizona has long maintained a relatively large percentage of lands under federal jurisdiction. In 1891, land held under the public domain accounted for approximately 75% of Arizona's total land base. By 1977, the proportion of federally controlled land had decreased but was still substantial at 71%. By comparison, federally controlled land accounted for 34% of New Mexico's land base in the same year. Alternatively, only 16% of land in Arizona was under private ownership in 1977 while private land constituted 45% of all land in New Mexico in the same year (Baker et al. 1988). When combined with demographic and economic trends discussed previously in this assessment, these ownership characteristics have placed increasing pressure on what has likely become one of Arizona's most valuable natural resources: land.

The current policy debate regarding transition of public and private lands in Arizona is rooted in a historic context that reflects significant economic change. Traditionally, sectors such as mining, ranching, and logging have been mainstays of the state's predominantly rural economy. In addition to owning substantial portions of Arizona's limited private land base, these interests have exerted considerable influence over the management and use of adjoining public lands. For example, private owners of scattered parcels on which springs and wells are located have typically enjoyed a certain amount of control over activities on surrounding dry areas. Likewise, large private landowners, such as railroads and mining companies, have also sought to influence access to the state's vast public lands. Although many of the industries associated with Arizona's early history have declined in recent decades, controversy between public and private land interests has steadily increased under the pressure for continued urban development. According to the Land and Water Law Review, "The proper allocation of rights to private landowners and federal land conservation interests has become one of the most contentious and emotional issues in public land law" (Stuebner 1998).

The area surrounding the PNF exemplifies many of the trends and controversial issues involving the economic stability and effective management of public lands. Within the area of assessment, Yavapai County serves as a particularly poignant example of an area engaged in vigorous debate over land management practices. Collected data show that over 87% of land within the county is controlled by the FS, the AZSLD, and private owners. Meanwhile, Yavapai County has seen considerable population and housing growth in recent decades, much of which is attributable to the area's wealth of natural resource amenities.

At issue is how, and whether, private owners and public land managers can come to an agreement on how best to 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."

Much of the current controversy involving land management is encapsulated in the debate over open space. Research shows that the rate of conversion of private parcels from farming, ranching, and forestry to more urban land uses has outpaced population growth over the last several decades (USFS 2005f). This trend has led to increasingly pointed exchanges between ranchers, farmers, seasonal residents, conservation interests, and homebuilders over the immediate and long-term value of open space. Meanwhile, all sides of the debate over management of public lands have become aware of the increasingly important role of Arizona's State Trust lands in conserving natural resources and sustaining urban growth. As such, proposed reforms of the current State Trust land system are likely to be highly relevant to future management plans of the PNF in light of the amount of State Trust lands within the area of assessment (c.f. Section 9.2).

Finally, all of the national forests in Arizona are likely to find themselves in the center of a growing debate over the management of the state's water resources. This is due to the fact that the forests share primary responsibility for the management of watersheds critical to environmental sustainability as well as residential and industrial growth. Studies have shown that approximately forty percent of surface and subsurface water in Arizona originates on lands administered by the Forest Service (USFS 1983). The role of the PNF in protecting the integrity of area watersheds is likely to become increasingly important given the rates of projected growth in Yavapai and Coconino Counties.

In order to facilitate resolution of current and future land use issues, the PNF should continue working in partnership with affected communities and landowners adjacent to forest boundaries and promote the efforts of county and city land use planners in the institution of sustainable regional approaches to urban development and resource conservation. In particular, the FS can use its technical and organizational strengths to help stakeholders make informed decisions about land ownership and use that will undoubtedly affect their future environmental and economic well being (USFS 2005f).

6. Forest Users and Uses

The purpose of this section is to describe various past and current uses of the Prescott National Forest (PNF) as well as the multiple groups that engage in these uses. This includes use for both extractive and non-extractive purposes as well as special uses and user groups. The following subsections include historical context and user groups, extractive users and uses, non-extractive users and uses (including recreation; recreation planning; special users and uses, such as Native Americans, wildlife, wilderness; and illegal uses).

A review of available data on users and uses within the Prescott NF is consistent with larger surveys of trends at the regional and national levels. These trends show a marked decline in extractive uses of national forests concurrent with an increase in recreational use, particularly in visitors to wilderness areas and users of off-highway vehicles (OHVs). These and other socioeconomic factors discussed in this section present significant challenges for multiple-use management of the PNF.

6.1 Historical context and user groups

Federal agencies often struggle to balance the needs and wishes of different users on public lands. Not long after the establishment of the first national forest reserves in 1891, Congress passed the Organic Act to help direct the management of those forests. The forest reserves, later to become the national forests, were to be used in a way that protected or improved the forest itself (including protection from fire), secured waterflows for use in other areas, and provided a reliable supply of timber. Public lands deemed to be more valuable for mineral extraction or agricultural uses were not to be included in the national forests, and individuals were allowed free use for certain extractive purposes. Essentially, all types of use were permitted, provided that the use was not destructive to the forest. At the time, this was considered to include grazing, recreation, the construction of homes and resorts, and use for rights of way. The essential aim of the policy was to use the forests wisely to support local, regional, and national development and growth (USFS 1993).

A practical doctrine of managing for multiple uses eventually developed out of the conflict and cooperation among competing users and user groups. This doctrine was formally expressed in the 1960 Multiple-Use Sustained-Yield Act (USFS 1993). Managers were directed to give equal consideration to all resource users, and national forest lands were to be used in the ways that best met the needs of the American people. They were specifically not to be managed with the singular goal of maximizing output or economic profit (Fedkiw 1998). Similarly, the National Forest Management Act of 1976 “reinforces the mission laid out in other governing statutes—that the agency will both provide goods and services, such as timber and recreation, and protect forest resources, such as clean air and water, aesthetics, and fish and wildlife habitat” (GAO 1999a). However, multiple-use laws generally provide little or no guidance as to how forests should balance conflicting or competing uses (GAO 1999a).

Fedkiw (1998) describes managing for multiple uses as, “the fitting of multiple uses into ecosystems according to their capability to support the uses compatibly with existing uses... in ways that would sustain the uses, outputs, services, and benefits, and forest resources and ecosystems for future generations.” From this perspective, forest users and uses are seen as the primary drivers of management. These ideas will be crucial in this section, which aims to describe how the Prescott National Forest is used, who uses it, and how trends in forest users and uses compare to historical and national trends.

Uses and users of the national forests can be defined roughly as being either extractive or non-extractive. Extractive uses include livestock ranching, timber cutting, and mining. While not strictly extractive, the use of public lands for infrastructure (such as power lines and communication sites) is also included in this group. Recreation is the most common non-extractive use although the national forests are also commonly used for research and tribal activities. Hunting, fishing, and gathering, though arguably

extractive, are included here because they are considered in recreation data. Notably, forest use can also be legal or illegal.

6.2 Extractive users and uses

Nationally, livestock grazing, timber cutting, and mining are the most common extractive uses on national forest land. Although extractive uses have historically played a major role in public-lands management, most recent evidence seems to suggest that they are being slowly succeeded in policy and management by an emphasis on non-extractive uses (Davis 2001). Also, environmental citizen groups and recreation users are increasingly challenging extractive uses.

In fiscal year 2002, 7,750 operators were permitted to graze livestock on a total of about 95 million acres of available FS-administered land (Vincent 2004).[1] As Davis (2001) notes, the number of permits issued for livestock grazing on public lands has decreased slightly overall in recent years. However, in 2000, the PNF issued fifty-one grazing permits. This number was unchanged from 1990.

The FS sells timber for a variety of reasons, most commonly to support local mills and communities that were, in some cases, built around a specific forest's timber supply and to modify forest structure or composition to meet a variety of management goals (Gorte 2004). Timber sales on national forest land have been steadily decreasing since the late 1980s, when total production reached 11 billion board feet annually (GAO 1999b). In contrast, just over 2 billion board feet were harvested during fiscal year 2004, at a total value of approximately $218 million. An additional $3.17 million in special forest products, including Christmas trees, fuel wood, mushrooms and berries, and the like, were harvested that year (USFS 2005g). In 1997, the FS timber sales program reported a loss of $88.6 million (GAO 2001a).

Timber cutting in the PNF includes sawtimber, small-diameter wood, and fuelwood. In 2000, the last year for which data are currently available, the forest issued permits for 1,295 mbf of sawtimber, which represented a slight decrease from 1990. Permits for both small-diameter wood (868 mbf in 2000) and commercial fuelwood (875 mbf in 2000) have increased since 1990. Illegal timber cutting and wood use are two of the most common infractions by forest users (see Illegal Uses below).

Mining in the national forests is directed by the General Mining Law of 1872, which allows individuals and corporations free access to prospecting on FS lands. Upon discovery of a mineral resource, an individual or corporation can then stake a claim, which allows full access to mineral development, and can in turn be patented to claim full title to the deposit. Small fees are generally required to stake, maintain, and patent a claim (Humphries and Vincent 2004). Nationally, mineral and energy production, from gravel to gold to carbon dioxide, totaled about $2 billion in fiscal year 2003 (USFS 2005i). In 2002, Region 3 issued $557,042 in sale permits and $1,773,756 in free use permits for mineral extraction (Jevons, pers. comm.). In 2002, Prescott issued a total of fifty-one permits for the sale and free use of nearly 50,000 tons of minerals (nearly all landscaping or decorative rocks, gravel, and cinders). The total value of these permits was approximately $98,000 (Jevons, pers. comm.).

Forests also commonly allow communities and other entities to use public lands for infrastructure, including power lines, rights of way, telecommunications, and the like.

6.3 Non-extractive users and uses

Non-extractive users, particularly recreation users, play a major role in forest use and planning. The national forests are mandated to provide outdoor recreation opportunities in natural settings, to maintain and enhance open spaces and public accessibility, and to maintain and enhance "cultural, wilderness,

[1] Data given are the most recent available.

visual, and natural resource values" through a variety of management tasks and activities (FSH 2302). However, unmanaged recreation has also been identified by the FS as one of four "key threats" to the nation's forests and grasslands. As participation in outdoor recreation increases, the FS predicts that recreation pressure on undeveloped areas in most of the Southwest and Rockies regions will be heavy. Much of this pressure can be traced back to population trends throughout the West. The use of OHVs (discussed below) is seen as a major component of unmanaged use (USFS 2005j).

Recreation use has increased steadily throughout the history of the national forests. Over the past few decades, the growth in recreation has been truly extraordinary. Participation in camping has increased from about 13 million people in 1960 to 19 million people in 1965 to almost 58 million people in 1994-95 (Cordell et al. 2004). The 2004 Roper Report estimated that nine in ten Americans had participated in some sort of outdoor recreation during the previous twelve months (RoperASW 2004). However, the same report showed a decline in recreation participation beginning in 2001. It attributes this trend in part to travel concerns following September 11, 2001 but also to the expansion of indoor recreation opportunities through Internet and television (RoperASW 2004). Cordell and others (2004) also note slight decreases in several categories of outdoor recreation following September 11. Nationally, there were 209 million national forest visits in 2001. The forests of the Southwest Region (region 3) received 19.5 million visits[2] (USFS 2001e).

Arizona in particular (but also the West and the nation in general) has experienced significant demographic changes in recent years, and these demographic trends have likewise influenced recreation trends. In Arizona, where more than 42% of the land base is managed by federal agencies for public use, the population has increased about tenfold since 1940 to more than 5 million people in 2000. The state had the second largest growth rate in the nation in the 1990s (Arizona State Parks 2003). Perhaps even more importantly, the proportion of Arizona residents living in urban areas has increased dramatically, so that more than 88% lived in urban settings by the year 2000 (Arizona State Parks 2003). In phone surveys conducted by the Arizona State Parks in 1994 and 1998, nearly 50% of Arizonans said that they had visited an Arizona national forest within the previous twelve months (Arizona State Parks 2003). Access to public lands is considered a major contributor to quality of life by many Arizonans, and many parks and forests are experiencing very high recreational 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.

According to National Visitor Use Monitoring (NVUM) data, the 1.25 million acres of the Prescott NF received approximately 772,000 visits during fiscal year 2002. A majority of visitors to PNF are male (67.3%). Visitors are predominately white (95.1%). Spanish, Hispanic, or Latino visitors make up approximately 3.5% of total visits. Most visitors, an estimated 76.2%, are between the ages of 31 and 70, and an estimated 24.8% are over the age of 50. None of the visitors interviewed in NVUM surveys were from a foreign country. The most frequently reported zip codes were from the Flagstaff area (Kocis et al. 2003a).

Recreation Planning

The Recreation Opportunity Spectrum (ROS) system provides a framework for understanding recreation users, their needs and wishes, and the abilities of forests to accommodate these (USFS 1982). As understood through an ROS lens, a recreation opportunity consists of three elements: the activities, the setting, and the experience. All land and water resources are classified in one of six categories, based on physical, social, and managerial criteria.

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[2] However, for the latter figure there is a 41.2% margin of error at the 80% confidence level.

Table 3. Description of ROS Classifications

Category	Description
Primitive	Setting is unmodified and remote and of a fairly large size. Users are generally isolated from one another, and typical activities include hiking and walking, viewing scenery, horseback riding, tent camping, and hunting.
Semi-Primitive Non-Motorized	The environment is predominately natural and of moderate to large size. Users' opportunities to experience solitude are less than in primitive areas, but user density remains low. Motorized activities are not permitted.
Semi-Primitive Motorized	Setting is similar to semi-primitive non-motorized, but off-road motor vehicles are permitted.
Roaded Natural	Setting is predominately natural but with a moderate level of human impact. There is a probability of contact with other users. Roads are present, and there may be substantial motorized use, including automobiles, buses, trams, and boats.
Rural	Setting is substantially modified. Facilities and management practices allow multiple uses and a large number of users and may be designed to facilitate specific activities. There is convenient access, and user density is moderate to high.
Urban	Levels of modification and user convenience are high and characteristic of urbanized areas. Opportunities to interact with other individuals and groups are emphasized.

Source: USFS 1982

Another important element of recreational setting is scenic integrity, or the visual quality of the landscape. The Scenery Management System guides forests in planning management activities that harmonize with existing natural landscapes (USFS 2001e).

The activities that recreation users prefer can also provide a guide for land management planning. The National Survey on Recreation and the Environment (NSRE), which tracks national outdoor recreation trends, lists the ten most popular recreation activities, summarized in Table 30 below for 2000-2001 (Cordell et al. 2004):

Table 4. Ten Most Popular Recreation Activities, NSRE 2000-2001

Activity	Percent of Population Participating
1. Walking for pleasure	83.0%
2. Family gatherings	73.5%
3. Visiting nature centers	57.1%
4. Picnicking	54.5%
5. Sightseeing	51.8%
6. Attending outdoor sports events	49.9%
7. Viewing historic sites	46.2%
8. Viewing/photographing wildlife	44.7%
9. Swimming (lakes, streams)	41.8%
10. Swimming (outdoor pools)	41.0%

Source: Cordell et al. 2004

As Table 30 illustrates, walking is currently the most popular outdoor activity. 83% of the adult population participates annually. Of the nearly 177 million people estimated to have walked outdoors for pleasure within the last year, an estimated 71 million did so in the form of a day hike or a visit to a wilderness or primitive area (Cordell et al. 2004). The most popular activities, such as picnicking, sightseeing, and swimming, tend to be available in a variety of settings and readily accessible to families and groups. Less popular activities, such as specialized hunting, rock climbing, and sailing, tend to require specialized equipment, specific skills and knowledge, and greater physical stamina (Cordell et al. 2004). Even activities that are only moderately popular, such as mountain biking, driving off-road, canoeing, or sledding, attract many millions of users annually (45.6 million, 37.2 million, 20.7 million, and 31.2 million, respectively). The three least popular activities, snowshoeing, orienteering, and migratory bird hunting, claim a combined total of approximately 13.1 million participants annually (Cordell et al. 2004). NSRE data for several general kinds of outdoor activities are summarized in Table 31 (Cordell et al. 2004):

Table 5. Participation in General Outdoor Activities, NSRE 2000-2001

Activity	Percent of Population Participating
Viewing/learning/gathering activities[3]	88.4%
Developed site activities	94.9%
Trail activities	40.4%
Swimming/surfing/beach activities	62.8%
Motorized activities	62.0%
Hunting and fishing	38.1%
Snow activities	19.3%
Risk activities	35.2%
Other non-motorized activities	22.8%

Source: Cordell et al. 2004

[3] Viewing/learning/gathering activities are defined as, "visits to… recreation sites, wildland, or open space sites… to watch study, identify, photograph, sample, observe, and learn about natural or cultural history, or to gather natural products" (121).

The PNF includes ten campgrounds, four group reservation campgrounds, seven picnic areas, and two group reservation picnic areas. Fishing is available in the Verde River and Lynx Lake, and both are stocked with rainbow trout by the Arizona Game and Fish Department. Nearly 450 miles of trails are available for hiking, backpacking, horseback riding, or mountain biking, and opportunities for hang gliding, rock climbing, and whitewater rafting are also available. The Chino Valley ranger district, which covers the northern parts of the forest, has no developed recreation sites and instead emphasizes dispersed recreation; fuelwood use; and watershed, wildlife, and range management.

The five most popular activities for visitors were hiking/walking (61.9% participation), viewing wildlife (60.1%), viewing natural features (57.5%), general relaxing (52.0%), and driving for pleasure (20.1%). Hunting, picnicking and camping at developed sites and the use of bicycles and OHVs were also very popular (Kocis et al. 2003a). While the most popular activities are generally similar among Arizona's six national forests, hiking and walking are more popular and driving on roads is less popular in Prescott NF than in most other Arizona forests.

6.4 Special users and uses

A number of special user groups merit attention in Arizona's national forests. They are unique in that they do not fit into the profile of the majority users described above. Some user groups need special accommodation, and this accommodation can at times become politically charged.

Tribes

Federally recognized American Indian tribes occupy about 53.5 million acres (7%) of land in the western states. These tribes are legally considered to be sovereign nations, so the relationship between the FS and tribes is a government-to-government relationship (Toupal 2003). Tribes that enter into contracts with the federal government do so just as state governments or sovereign nations do (NFF and USFS 2005). However, the federal government also holds a special responsibility to consult with tribes over management issues that may affect them. This process is governed by a variety of federal regulations and policies, including the Forest Service Handbook (FSH 1509.13), the National Environmental Policy Act, the National Indian Forest Resources Management Act, the Tribal Forest Protection Act, the Archeological Resources Protection Act, and several presidential executive orders.

Tribes' use of FS land includes free activities such as gathering boughs and basket materials for which permits are unnecessary as well as the use of products such as sawtimber, for which fees are charged (pers. comm.). In 2003, the National Tribal Relations Task Force recommended a legislative proposal that would authorize the USFS to allow federally recognized tribes to use forest products for traditional cultural purposes free of charge. In addition, many national forests contain traditional cultural places whose locations are known only to the tribes. Because the tribes cannot divulge the locations, they cannot apply for permits (personal communication).

OHV Users

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% nationally (Cordell et al. 2004). In 1995, a GAO study found OHV use on federal lands to be generally undermanaged. The FS, according to the study, devoted limited funding and staffing to managing OHV use and 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).

In 2004, the FS proposed a new rule to help manage OHV recreation in the national forests. Under the proposed rule, forests would establish a system of roads, trails, and areas designated for motor vehicle use and would prohibit the motor vehicle use that is off the designated system or inconsistent with the designations. This system would replace the previous assumption that all areas are open to OHV use unless specifically posted otherwise (USFS 2004j).

Wildlife Users

The National Survey of Hunting, Fishing, and Wildlife-Associated Recreation collects longitudinal data on anglers, hunters, and wildlife watchers in the United States (USFWS 2001). The 2001 survey found that 82 million U.S. residents 16-years and older participated in some wildlife-associated recreation during that year: 34.1 million fished, 13.0 million hunted, and 66.1 million engaged in some sort of wildlife watching activity (including photographing, observing, or feeding fish and other wildlife). Their spending totaled an estimated $108 billion, or 1.1% of the U.S. GDP. That year's 38.7 million hunters and anglers accounted for approximately $70 billion of that amount (USFWS 2001). Generally, the rate of growth in fishing participation has been greater than U.S. population growth since the survey began in 1955 whereas the growth in hunting participation has failed to keep up with population growth during that time. There has also been an overall decrease in wildlife-watching activities since 1980 (USFWS 2001). However, birding (viewing or photographing birds) has been the fastest growing recreational activity since the early 1980s, adding more than 50 million participants and growing 231% in just under twenty years (Cordell et al. 2004).

In the PNF, wildlife viewing is a more common activity than either fishing or hunting. NVUM data from 2002 show that 60.1% of the visitors interviewed participated in some sort of wildlife viewing activity; however, only 6.3% described it as their primarily activity.[4] Approximately 8.5% of interviewed visitors fished (with nearly all of those describing it as their primary activity), and about 6.0% hunted. 5% used a developed fishing site or dock (Kocis et al. 2003a).

Wilderness users

With the Wilderness Act of 1964, Congress laid the foundation for a National Wilderness Preservation System comprised of federal lands, "where the earth and its community of life are untrammeled by man, where man himself is a visitor and does not remain" (16 USC 1131 et seq.). Wilderness areas are designated by Congress and are generally protected from commercial enterprises, road construction, mechanical vehicles, and structural development. The Forest Service Handbook directs managers to minimize the impact of human use while protecting the wilderness character and public values of wilderness land (FSH 2320.2).

As a result of these management requirements, wilderness areas are open to some uses (e.g., primitive camping, backpacking, horseback riding, hunting, and fishing) and closed to others (many extractive uses, bicycling, and off-highway vehicles), and the decision to designate a roadless area as wilderness can be controversial. However, many forest users value the solitude and isolation, closeness to nature, and self-reliance experienced in wilderness areas. Activities available in wilderness or primitive areas attract millions of visitors nationally. For example, an estimated 34.1 million Americans participated in primitive camping in 2000-2001 while participation in backpacking and mountain climbing drew an estimated 22.8 million and 12.9 million visitors respectively (Cordell et al. 2004).

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[4] The NVUM definition of wildlife viewing appears to be somewhat broader than that used by the national survey discussed above.

The PNF includes 100,000 acres of wilderness, including all or portions of eight designated wilderness areas, and 140,000 acres of inventoried roadless areas (USFS 2001c). Users of designated wilderness areas fit a profile similar to other forest users. They are largely male (60.5%), white (97.4%), and generally travel from the Flagstaff and, to a lesser extent, Phoenix metro areas. NVUM data suggest that roughly 17,000 wilderness visits were made during fiscal year 2001 (Kocis et al. 2003a).

Special use permits

While research is rarely considered by the public to be a major use of federal lands, the Prescott, like most forests, issues special use permits for research purposes.

6.5 Key issues for forest planning and management

Extractive and non-extractive uses of national forests are often seen as competing with one another, and balancing the uses of different user 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 FS authorized grazing levels higher than the land could support on 19% 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 (c.f. Section 9.2) (Vincent 2004).

Timber harvesting in the national forests has declined since the late 1980s (GAO 1999b). Meanwhile, a new emphasis is being placed on the utilization of small-diameter fuels, which are increasingly being removed from western forests to manage fire frequency and behavior. As public concern over wildland fire grows, the FS and other federal agencies have emphasized the development of a market for these fuels to help mitigate the costs of removal. For example, the 2004 Healthy Forests Restoration Act provides direct subsidies for the development of industries that use previously unmarketable biomass from mechanical thinning projects (16 USC 6531).

The policies that govern mineral extraction in the national forests have also come under increasing scrutiny over the past two decades. Public concern over the Mining Law of 1872, under which about 3.2 million acres of public land had been sold by the late 1980s, was sparked in 1986 when the federal government, under the law's patent provision, sold 17,000 acres for $42,500 to patent holders who then almost immediately resold the land to oil companies for $37 million (GAO 1989). A GAO report called for substantial changes to the law. Many of these controversial aspects of mining law remain unchanged today, and calls for reform continue (Humphries and Vincent 2004).

Meanwhile, as the western United States becomes increasingly urbanized, national forests are experiencing an increasing demand for recreational uses and, in many cases, decreasing support and demand for extractive uses. While these trends generally have not caused a clear rise in environmental or pro-conservation politics and policy, the forces of supply and demand are changing the face of the national forests (Davis 2001). The following figure, provided by the USDA Forest Service to the General Accounting Office, clearly illustrates these changes (GAO 1999a).

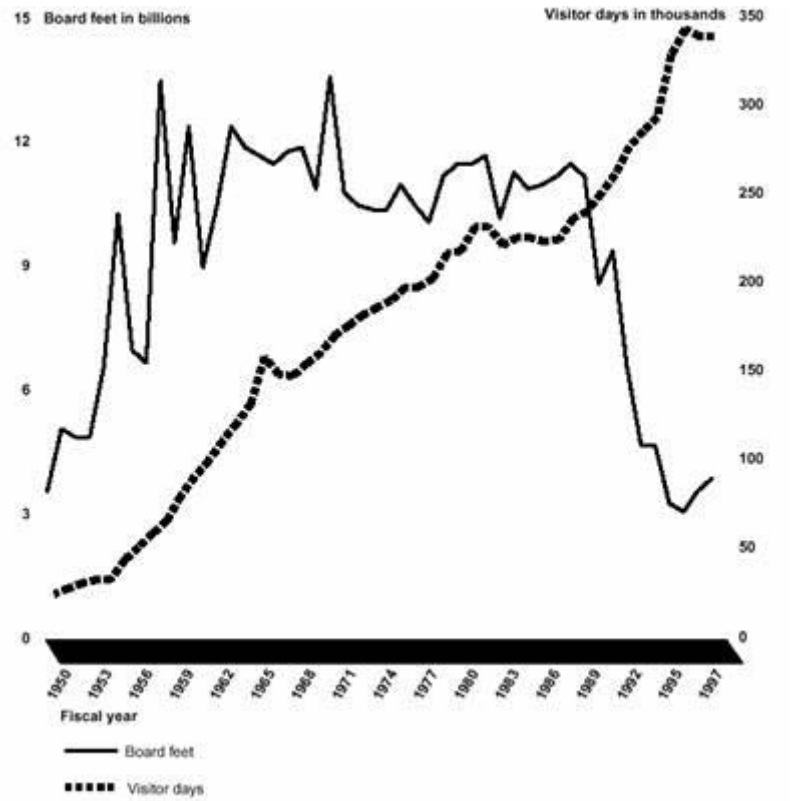

Figure 4. Visitor Recreation Days as Compared to Timber Extraction, 1950-1997

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. NRSE surveys identify trends in 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, significant 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 FS's recreational sites and areas and found that funding levels were hundreds of millions 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 test 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). For additional discussion regarding fees, see section 9.1

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.

7. Designated Areas and Special Places

This section describes those places in and around the Prescott National Forest (PNF) which have been designated for public uses, such as camping and picnicking, biking, hiking, OHV use, rock climbing, fishing, scenic drives and vistas, and so forth, or recognized as important to the public as so-called undesignated special places. An attempt was made to identify all designated areas and special places on the PNF. However, the nature of these resources makes this task difficult. As will be discussed in later subsections, some of these areas are held in secrecy by the parties who regard them as special (indeed that is why they are "special") and, thus, there is reluctance by these people to disclose these places and their locations.

A review of available information on designated areas and special places suggests that the PNF contains considerable recreational, interpretive, and cultural resources. Forest GIS Staff provided specific names and locations of 109 designated areas within the PNF, including dispersed sites, campgrounds, picnic areas, and scenic areas. Additionally, various mountain ranges, canyons, and water sources throughout the Prescott NF are home to numerous special places for Native Americans, descendents of settlers, recreational users, and wildlife enthusiasts in central Arizona.

7.1 Historical context and methods of designation

Although the concept of special places has existed in social science literature for decades, the idea of incorporating it into forest management plans is relatively new. Traditionally, forest professionals focused on science-based management policies rather than on the subjective, difficult-to-quantify issues of public values (McCool 2001, Mitchell et al. 1993).

Special places can be described as spaces that have been given meaning by the humans who have experienced them in a way that inspired an emotional response (Cheng, Kruger, and Daniels 2003). Although often unrecognized in any official way, special places are significant to visitors of our national forests; however, the FS also recognizes special areas for their "unique or special characteristics" (USFS 2005c) and for the contributions the areas make to our public lands. These areas are noted for generally agreed-upon attributes such as scenic qualities, habitat significance, and other virtues and are delineated on FS maps. But, as will be shown, the distinction between those designated areas and special places—the subject of this section—involves more than semantics and, thus, is worthy of discussion.

The key difference between the two terms is that areas are considered special for their own attributes whereas the value of places derives from the people who experience them. A pristine riparian area, for example, is not necessarily a special place until a person or group forms an emotional attachment to it. More detailed explanations emphasize place as the intersection and integration of "ecological, economic, and spiritual values" (Williams and Patterson 1996) or of "biophysical attributes and processes; social and behavioral processes; and social and cultural meanings" (Cheng, Kruger, and Daniels 2003). All of these definitions make it clear that the idea of special places is complex, subjective, and often exceedingly difficult to define in a concise manner.

The methods used to identify these places were as follows. For the first category (i.e., designated areas) the Forest GIS Coordinator was asked to query the INFRA data base in order to identify the designated areas. Furthermore, many of these areas are also identified on the Prescott National Forest website found at http://www.fs.fed.us/r3/prescott/recreation/. Maps, geographic coordinates and brochures for these designated places can be found at http://www.fs.fed.us/r3/prescott/maps/.

The method used to identify the more elusive second category (i.e., undesignated special places) was to contact the forest archeologist. This individual was given the opportunity to name and describe, to the best of his ability, the key special places in the forest. Also, he was asked to identify the key user publics

and, finally, to specify the main management issues associated with these special places. Native American tribes are a particularly important constituency in the designation and protection of special places. The involvement of area tribes with the PNF is discussed in greater detail in the following section, Community Relationships.

7.2 Designated areas

Table 32 provides information on the designated areas within the Prescott National Forest.

Table 6. Designated Areas on the Prescott National Forest

Site Type	Site Name
Boating Site	Granite Basin Boat Launch
Boating Site	South Lakeshore Boat Ramp
Boating Site	Horsethief Boating Site
Campground	Indian Creek Campground
Campground	White Spar Campground
Campground	Lower Wolf Creek Campground
Campground	Kentucky Springs Campground
Campground	Hazlett Hollow Camp Ground
Campground	Mingus Mountain Campground
Campground	Potato Patch Camp Ground
Campground	Yavapai Camp Ground
Campground	Punta Roca Proposed 25' Spur
Campground	Hilltop Camp Ground
Campground	Powell Springs Camp Ground
Campground	Lynx Camp Ground
Campground	Yavapai Area "B" 40' Spur Proposed
Horse Camp	Groom Creek Horse Camp
Campground	Descanso Proposed - 55'
Group Campground	Upper Wolf Creek Group Camp
Group Campground	Playground (Mingus Area)
Group Campground	Turkey Gulch Group Campground
Complex	South Lakeshore Day Use
Picnic Site	South Lakeshore Picnic
CUA Other	Horsethief Lake
Fishing Site	Clear Creek Fishing
Fishing Site	Prairie Lane Fishing
Fishing Site	Sheep’s Crossing
Fishing Site	Black Canyon Fishing
Playground Spec. Sport	Horsethief Community Center
Interpretive Site (Major)	Lions Accessible Nature Trail
Trailhead	Lynx Creek Ruin
Interpretive Site (Major)	Groom Creek School House
CUA Day Use Area	Taylor Cabin
CUA Other	Palace Station Historical Area
CUA Other	Alvarez Family Homestead Barn
CUA Other	Alvarez Family Rock House
CUA Other	Alvarez Family Adobe House

Table 32 (cont.). Designated Areas on the Prescott National Forest

Site Type	Site Name
CUA Other	Dar Plantation
CUA Other	Walker Town Site
CUA Other	Charcoal Kiln
CUA Other	Charcoal Kiln (D-1)
Interpretive Site (Minor)	Shurlett Spring Environment Prot.
CUA Other	Cleator
Interpretive Site (Minor)	Lynx Lake Amphitheater
Interpretive Site (Minor)	White Spar Amphitheater
Interpretive Site (Minor)	Sheldon Mine
Interpretive Site (Minor)	Henderson Cabin
Interpretive Site (Minor)	Abby Place
Interpretive Site (Minor)	Arnold Place
Interpretive Site (Minor)	Geronimo's Cabin
Observation Site	Mingus Overlook (C)
Observation Site	Mingus Vista A
Observation Site	Fire Center Observation Point
CUA Day Use Area	Mescal Canyon
CUA Day Use Area	Caldwell Canyon
CUA Day Use Area	Hells Hole Cr 59
CUA Day Use Area	Silver Mountain Observation Pt.
CUA Day Use Area	Maverick Overlook
Group Campground	Granite Group Camp
Group Campground	Granite Proposed Group Camp
Boating Site	Lynx Lake Marina & Store
Picnic Site	Thumb Butte Picnic Ground
Picnic Site	Lynx Lake North Shore
Picnic Site	Beasley Flat Picnic Ground
Picnic Site	White Bridge Picnic Ground
Picnic Site	Bignotti Picnic Ground
CUA Day Use Area	Mt. Union Picnic Ground
Picnic Site	Mingus Vista (B)
Picnic Site	Skidmore Day Use
Picnic Site	Playa Picnic Ground
Picnic Site	Wekuvde Picnic Ground
Picnic Site	Mingus Picnic
Picnic Site	Spruce Mountain Pg
Picnic Site	Wekuvde Pic/Day Use Area
Picnic Site	Playa Picnic Day Use "B" Proposed
Picnic Site	Lynx Creek Gold Pan
Group Picnic Site	Thumb Butte Picnic Reservation (A)
Group Picnic Site	Thumb Butte Picnic Reservation (B)
Group Picnic Site	Groom Creek Picnic Site
Group Picnic Site	Five Springs Proposed
Playground Spec. Sport	Mingus Hang Glider Launch
Playground Spec. Sport	Alto Pit OHV Day Use Site
Playground Spec. Sport	Hayfield Draw OHV Day Use Site
Playground Spec. Sport	Prescott Sportsmen’s Rifle Range
Snowpark	Mingus Summit/Rest Area

Table 32 (cont.). Designated Areas on the Prescott National Forest

Site Type	Site Name
Playground Spec. Sport	Horsethief Playground
CUA Day Use Area	Lynx Recreation Area
CUA Other	Horsethief Recreation Area
CUA Other	Granite Basin Recreation Area
Boating Site	Lynx Lake Reservoir
Boating Site	Horsethief Reservoir
Boating Site	Granite Basin Reservoir
Fishing Site	Mingus Lake
CUA Day Use Area	Coal Camp Trailhead
Trailhead	Woodchute Trailhead
Trailhead	Groom Creek Trailhead (307)
Trailhead	Ranch Trailhead (62)
Trailhead	Black Canyon Day-Use
Trailhead	Mingus Trailhead
Trailhead	Metate Trailhead
Trailhead	Cayuse Equestrian Trailhead
Trailhead	Grief Hill Day Use Area
Trailhead	Salt Flat Trailhead
Trailhead	Williamson Valley
CUA Day Use Area	Little Granite Trailhead
CUA Day Use Area	Hassayampa Trailhead And Overlook
CUA Day Use Area	Senator Trailhead
CUA Day Use Area	Horsethief Lookout Picnic Site

Source: T. Potter, GIS Coordinator, Prescott NF
INFRA Database

7.3 Special places

The concept of “Special Places” within the Prescott NF has never been treated in a focused or systematic manner. The only studies that marginally qualify are those that have dealt with tribal connections to the forest, but these are either outdated or too limited to provide broad-scale planning. To be sure, the information presented below is an informal “first attempt” toward providing some sort of basic information about “Special Places” and “Special Areas” within the PNF. Clearly, this effort is a work in progress.

Guidance for what will be presented about “Special Places” in the PNF will be based on the following parameters: 1) a description of all undesignated special areas on the forest, 2) description of the users of these areas, and 3) Forest Service views on the role of special places in the National Forest to the public. Because the information to be presented for these parameters has not been collected using any systematic or standard approach, the observations below are more like “impressions” rather than actual documentation supported by data.

Finally, the PNF acknowledges that many “Special Areas” and/or “Special Places” exist within the forest. The FS also recognizes that such places are not only historically based, but the selection of these places is an ongoing process that is determined by societal values. The challenge for the FS arises when competing values come into conflict over the use of these “Special Places or Areas.” However, through the process

of collaboration built on good information, understanding, and sensitivity, all parties can successfully navigate through competing values in hope of resolving issues related to Special Places and Areas.

Native American Special Places and Traditional Cultural Places

Ethnographic efforts to identify Native American special places in the Prescott area have been meager. The best-documented locations can be associated with Native American use, but this is strictly because early efforts were made to gather this kind of information.

The earliest and perhaps the most comprehensive study concerning Native American use of the area was done in the 1930s, focusing on the Yavapai. There were indeed 19th century references to Native Americans in the area provided by military personnel and travelers, and some even provided useful cultural information. Much of what is available today remains sketchy at best, and this pattern continues in contemporary reports.

With a better understanding of what tribes and nations can provide in terms of cultural histories and land-use patterns, a greater appreciation of tribal oral traditions has followed. In addition, the advent of legislation that supports the use of tribal traditional knowledge has provided researchers and land managers further support in tapping this unique and very useful resource.

Native American Indian tribes or Nations that have expressed cultural affiliation—at one time or another—to the lands within the PNF include the Yavapai, Yavapai-Apache, Tonto Apache, Fort McDowell Indian Community, Hopi, Navajo, Hualapai, and Zuni. Though these tribes and nations have expressed an interest in the lands administered by the PNF, there are actually few traditional cultural places or "special places" within the forest that have been actually identified. Though the locations of few of these places have been clearly defined, the reluctance to convey these locations can be partially understood within the framework of "protected" cultural knowledge. Clearly, while only a couple of such places within the forest have been alluded to, some are likely to include mountain tops; water sources such as rivers, springs, and seeps; transportation routes; former places of habitation; resource areas for hunting and gathering; and areas with cosmological importance. In the future, it would be most useful for land managers to develop a spectrum of ways to share information, information that benefits the management of resources as well as the protection of traditional cultural places.

Thus far, a limited number of areas have been designated as special by local tribes. The Yavapai Tribe has identified Granite Mountain, Sycamore Canyon, the Verde River area, and the Camp Verde Salt mine as special places to their community. The latter two sites have also been identified as special by the Yavapai-Apache and Hopi Tribes. Squaw Peak near the Verde River (Porcupine Mountain) is another special place for the Yavapai–Apache Tribe. Additionally, the Hopi Tribe has asserted that all archaeological sites are considered special.

Historic Special Places—Euro American

Historic use of the PNF and its nearby surroundings by Euro-American settlers began in the late 16th and early 17th centuries by Spanish explorers. It was not until the early 1860s that Europeans gained a strong and permanent foothold within the highlands of central Arizona through a focus on mining and services associated with mining. It was from that point on that "Special Places" for the historic period began to develop. In general, some of these places are connected to mountains, view sheds, water sources, rock formations, trails, roads, camping areas, health trends, summer homes, and their personal "feelings" about historic ties to the land.

Historic Areas and Uses of Local Interest

Communities in and around the PNF have developed close and long-lasting ties to the land. Mining—both placer and hard rock—was one of the earliest traditional uses in the Prescott NF. Today, this trend continues although not on the same scale as it did historically. Mining areas of special interest include Lynx Creek, Hassayampa River, Copper Basin, Big Bug Creek, Crown King, and a number of smaller areas and tributaries. Historic communities grew-up around areas such as Prescott, Walker, Groom Creek, Crown King, and many others. Today mining continues, mostly in the form of small-scale operations and recreational gold panning.

A small area in the PNF north of Chino Valley once supported three small, closely situated communities known as Puntenny and Drake/Cedar Glade. Puntenny was the earliest of the three, being established during the 1880s, followed by Cedar Glade (later named Drake) around the turn of the century. The history of these settlements is closely aligned with limestone quarrying and processing with the added advantage of having a rail line passing between all three settlements. Because of the availability of jobs, and perhaps some social or unknown reasons, these small settlements became a focal point for drawing young Hispanic workers and their families. This area remained active for some thirty years or so until limestone mining began to slow, causing the abandonment of Puntenny and Drake (Cedar Glade remained a Prescott National Forest District Office until 1963). Although the limestone industry and related employment has waned, Hispanics continue to be drawn to the area because of jobs associated with mining tabular sandstone that is used for decorative purposes in homes. The significance of the Puntenny/Cedar Glade/Drake area to the Hispanic population is probably associated with employment, yet there may be other social reasons why this area was favored by them as well.

Ranching was also an early use of the Prescott NF and remains so today. Ranches are closely tied to allotments, which are themselves historic areas located in the forest. The ranching lifestyle is expressed in ranches that are adjacent to the National Forest and their associated “improvements,” such as spring developments, “tanks,” fences, corrals, pastures, line shacks, and a myriad of cattle trails.

The Prescott area has always been viewed as place where those living in lower elevations can find climatic relief from the summer heat. Two developments—Iron Springs and the Horsethief Basin Resort—were built on national forest land specifically for that purpose as were a number of other summer home areas. PNF campgrounds and dispersed camping areas offer the same climate-relief opportunities as did earlier, more formalized developments.

Because the Prescott NF provided a cooler climate and contained numerous open spaces, organizations such the Boy Scouts, the YMCA, and churches constructed camps in the forest. These camps have been active for over fifty years, and they remain an important use by these organizations.

Scenic Special Use Areas

The characteristics that seem to draw people to scenic areas in the PNF appear to be associated water, view sheds, geology, wildlife, solitude, and vegetation. Special areas with these attributes are visited time and time again, stretching back to historic and, possibly, prehistoric timeframes. Some of these are very specific locations and are visited often while others are more general in nature. Areas and places in the Prescott NF that fit this category of use are Thumb Butte (Bradshaw Ranger District), Sycamore Canyon (Chino Valley Ranger District), Walnut Creek (Chino Ranger District), Camp Wood (Chino Valley Ranger District), Mingus Mountain (Verde Ranger District), the Hassayampa River (Bradshaw Ranger District), the Verde River (Verde Ranger District), Granite Mountain (Bradshaw Ranger District), Granite Basin Lake (Bradshaw Ranger District) and Lynx Lake (Bradshaw Ranger District), Sierra Prieta Overlook, the Yavapai Ranch area (Chino Ranger District), and the Cellars Basin/Southwest area of the Bradshaw Mountains (Bradshaw Ranger District).

Congressionally designated wildness areas in the forest include Juniper Mesa Wilderness (Chino Valley Ranger District), Apache Creek Wilderness (Chino Valley Ranger District), Sycamore Canyon Wilderness (Chino Valley Ranger District), Granite Mountain Wilderness (Bradshaw Ranger District), Castle Creek Wilderness (Bradshaw Ranger District), Woodchute Wilderness (Verde Ranger District), Cedar Bench Wilderness (Verde Ranger District), and the Pine Mountain Wilderness (Verde Ranger District).

Heritage or Historic Special Areas

Special heritage sites and areas in the PNF display unique characteristics absent from other areas and sites. However, while trying to avoid naming the entire forest as one enormous cultural area, which indeed has some merit to it, some of the more interesting and unique areas and sites include Walnut Creek (Chino Valley Ranger District), Hassayampa River Drainage (Bradshaw Ranger District), Verde Valley (Verde Valley Ranger District), Senator Highway mining associations (Bradshaw Ranger District), Crown King/Horsethief Basin area (Bradshaw Ranger District), Palace Station (Bradshaw), Historic Lookouts (All Districts), Prehistoric Defensive Sites (All Districts), Camp Wood/Yolo Ranch Area (Chino Valley Ranger District), the Walker Mining Area (Bradshaw Ranger District). There are also a number of historic railroads located in the forest that no longer operate but the railroad grade is still evident. These include the Bradshaw Mountain Railroad Company, the Santa Fe, Prescott, and Phoenix Railroad Companies, the Prescott and Eastern Railroad Companies, and the narrow gauge line that ran from Chino Valley to Jerome. All of these were extremely important to the historical development of the Prescott area.

"Special Interest" Areas

Finally, there are a number of places that are of value to more limited groups who use certain areas and develop emotional connections to them. The following is only a snapshot of the activities that be called Special Interests.

- Rock Climbing

  Granite Mountain (Bradshaw Ranger District)

- Water Rafting/Kayaking/Swimming

  Verde River (Verde Valley Ranger District), Hassayampa River (Bradshaw Ranger District), Wolf Creek (Bradshaw Ranger District), Yellow Jacket Wash (Verde Ranger District)

- Mountain Biking/Hiking

  Granite Mountain (Bradshaw Ranger District), Groom Creek (Bradshaw Ranger District)

- Off-Highway Vehicles

  Alto Pit (Bradshaw Ranger District), Hayfield Draw (Verde Ranger District), Camp Wood area (Chino Valley Ranger District), Bradshaw Mountains (Bradshaw Ranger District), Groom Creek (Bradshaw Ranger District)

- Hang Gliding

  Mingus Mountain area (Verde Ranger District)

- Fishing

  Granite Basin Lake (Bradshaw Ranger District), Lynx Lake (Bradshaw Ranger District), Mingus Lake (Verde Ranger District), Verde River (Verde Ranger District)

- Gold Panning

  Bradshaw Ranger District

The majority of the following special places in the PNF are organized by Ranger District. In some cases, special areas span several districts.

Table 7. Special Places by Geographic Area

Ranger District	Special Place
Chino Ranger District	Camp Wood area, Walnut Creek, Sycamore Canyon, and the Upper Verde River, Yavapai Ranch area, and three wilderness areas.
Bradshaw Ranger District	Thumb Butte area, Granite Basin area, Crown King/Horsethief Basin area, Hassayampa River, Lynx Creek area, Groom Creek, the Bradshaw Mountains, the Walker area, Sierra Prieta Mountains, Milk Creek, Cellars Basin, and two wilderness areas.
Verde Ranger District	Verde River, Mingus Mtn area, Woodschute Mountain area, Pine Mountain area, and three wilderness areas.

Source: James McKie
Archaeologist, Prescott National Forest

7.4 Scenery management

The USFS has explored the issue of scenery management on the national forests, and several publications have been written which can serve as guides to the forest manager for management of scenic resources. Some of the more important publications are available on-line at http://www.esf.edu/es/via/. Two of these publications which might be particularly useful are Our National Landscape: A Conference on Applied Techniques for Analysis and Management of Visual Resources (Elsner and Smardon 1979) and Landscape aesthetics: A handbook for scenery management (USFS 1995).

The latter deals with the character and nature of landscapes, the integrity of natural scenes, the means to obtain information from constituent publics regarding scenic preferences, the determination of landscape visibility, and application of the Scenery Management System. The appendices contain information about the history of the scenery management issue in the USFS. The scenery management issue, according to this handbook, arose during the 1960s as a result of public concern over the visibility of forest management activities, particularly timber cutting. This handbook provides a guide to practical methods for minimizing the impact of those activities on the user public, principally recreationists. The Forest Service also provides guidance to the national forests regarding landscape management in the Forest

Service Manual, Chapter 2380 –"Landscape management." Scenery management issues specific to the Prescott National Forest are addressed in section 7.3.

7.5 Key issues for forest planning and management

Special places exist because humans form emotional attachments to them based on sensory connections. Sometimes people are aware of this experience and the feelings they develop, but often, this is an unconscious process. The ability and opportunity to form these connections fulfills people's need to feel a part of something greater than themselves, which is "an essential aspect of human existence" (Brandenburg and Carroll 1995). Researchers advise that the recognition of unique and special places is of growing importance because people in today's age of cultural homogenization seek unique and special qualities in their public lands (Williams and Stewart 1998). This, in turn, places higher demands on public lands, particularly in a rapidly growing state like Arizona.

With the complexities of special places in mind, researchers like Williams and Stewart (1998) caution that it is unwise to reduce special places to "single attributes" as they are clearly a collection of values, contexts, and experiences. Consequently, it is not always possible to identify special places as discrete points on a map. The challenge of mapping special places is thus ideally accomplished in cooperation with the individuals that value the place, marking the general boundaries of the area (rather than a point) on the map (Richard and Burns 1998). Using a Geographic Information System (GIS) as a tool to combine the special place maps of different groups or individuals can be very helpful to forest planners seeking to identify overlapping areas that might indicate future sources of conflict (Brandenburg, Carroll, and Blatner 1995). Disputes can arise over the diverse place definitions people give the same physical space, and, given the subjective emotional nature of special places, these disagreements can be quite contentious. Forest professionals are advised that "various sentiments—whether local or non-local in origin, new or long established—are all legitimate, real, and strongly felt" (Williams and Stewart 1998).

Given that these places require sensory experiences, distant landmarks and conditions can affect one's experience of a particular special place and thus are a part of the place even if only to that person. Thus, management of forests for traditional extractive resources and the motorized vehicle use of some may have an impact on forest places that are considered special to others. These potential effects can generate conflict; therefore, a better awareness of the significance of special places can potentially enhance forest planning and management.

Researchers have recognized that the relationships people form with special places often cut across traditional categories of liberal/conservative, extractive/environmentalist, urban/rural, and so on (Brandenburg and Carroll 1995). Wondolleck and Yaffee (2000) advise that "places can be powerful symbols that encourage people…to interact with [others] that historically have been viewed as outside their geographic, interest-based, or perceptual boundaries." As a result, it can be difficult to pin down special places in public town-hall meetings—people who strongly identify with a particular lifestyle group are often reluctant to speak out in a way not supported by that group and yet may feel strongly about a very personal place relationship. Therefore, it becomes important to consider a combination of styles of data collection in order to represent all of these interests. Some findings have suggested that the traditional public meeting may serve to exclude some interested groups or individuals and to encourage a 'majority (or loudest) rules' mentality (Brandenburg and Carroll 1995; Brandenburg, Carroll, and Blatner 1995). The potential loss of social capital within the community when voicing a dissenting opinion in a public meeting may outweigh one's strong special place connection: "an individual may not share his or her emotive personal values regarding the place in a public or group setting because of the pressures of the primary social groups' common values" (Brandenburg and Carroll 1995). Thus, a mixture of town-hall meetings, surveys, and open-ended individual interviews and conversations may provide a more balanced and clearer picture of special places in the forest (Brandenburg and Carroll 1995; Brandenburg, Carroll, and Blatner 1995).

Cheng, Kruger, and Daniels (2003) emphasize the importance of understanding human-place relationships in planning for, anticipating, and mitigating potential conflicts in multiple-use public land (e.g. forests). These researchers propose that "a key goal of place-based inquiry is to foster more equitable, democratic participation in natural resource politics by including a broader range of voices and values centering around places rather than policy positions." Another study suggested that attention to stakeholders' place-value concerns could help avoid "continued acrimonious debate" (Brandenburg, Carroll, and Blatner 1995).

Often, decision makers lack the tools and training necessary to achieve a deeper understanding of social issues (McCool 2003). Nonetheless, studies have shown that by becoming more aware of community values, the FS shows good will toward the public and is better equipped to make management decisions that consider all of the potentially affected people (Mitchell et al. 1993, Richard and Burns 1998). In a recent social assessment prepared for two Idaho forests, researchers noted that "[s]entiments about attachment to place…result in a configuration of social life, individual life, and geographic space that is likely to influence how forest management issues will be evaluated [by the public]" (Adams-Russell 2004). Thus, it benefits the forest managers to know the local communities and consider their individual interests during planning. Increased and continued interactions between forest managers and the visitor public are interpreted as a sign of respect for local knowledge and culture (Mitchell et al. 1993, Williams and Stewart 1998).

Unfortunately, it is not safe to assume that visitors to public lands will recognize and share the values for that landscape that are in its best interest (McCool 2003). By encouraging special place relationships, the Forest Service stands to gain caring partners in the stewardship of forest resources. This occurs because when people develop a bond with a location, they become emotionally invested in the continued health and balance of the ecosystem (Mitchell et al. 1993, Wondolleck and Yaffee 2000).

Arizona is one of the fastest growing states in the country, and like many states in the Interior West, the majority of its population is concentrated in a few urban areas. The Forest Service should expect significant impacts on public lands near or adjacent to urban areas in Arizona. These stresses may come from increased day use, conflicts over traditional versus new uses, the desire of developers to build directly to the forest's edge, and more.

8. Community Relationships

The purpose of this chapter is to describe the relationship between the Prescott National Forest (PNF) and its neighboring communities. Knowledge of local communities is of interest to the Prescott due to the importance of the reciprocal relationship that exists between the forest and these communities. Also, in some instances, there are legal authorities that require interaction with external communities. The subsections of this chapter are as follows: historical context and methods of designation, community profiles and involvement with natural resources, communities of interest and forest partnerships, historically underserved communities and environmental justice, community/forest interaction, and key issues for forest planning and management.

Information gathered on the nature of the relationships between the PNF and surrounding communities reveals a complex network of interests involved in a variety of issues that affect forest management and planning. In addition to wider public concern for issues such as water provision, wildlife protection, and fire prevention, a growing number of local government organizations and special advocacy groups are seeking to participate directly with the PNF in the formation of policy. Although a comprehensive analysis of the social network surrounding the forest is beyond the scope of this assessment, this section provides insight into the roles and purposes of key stakeholders and establishes a framework for the development of a comprehensive community-relations strategy.

8.1 Historical context and methods of designation

The concept of community relations in a culturally diverse society is about working together as one, both respecting and valuing individual differences (McMillan 1999). It encourages a greater degree of acceptance and respect for, as well as communication between, people of different ethnic, national, religious, cultural, and linguistic backgrounds. Furthermore, it promotes notions of inclusiveness, cohesion, and commitment to the way we shape our future. Above all, a good community relations system ensures that people from all backgrounds have full access to programs and services offered by government service providers, recognizing and overcoming barriers faced by some groups to enjoy full participation in the social, cultural, and economic life of the community.

The act of understanding and maintaining good community relationships is one of the most central responsibilities of the National Forest System. Nonetheless, the importance placed on documenting and enhancing community relationships as part of the overall process of forest planning must be regarded as a relatively recent development. At the time of the creation of the national forest system through the Forest Reserve Act of 1891 and the Transfer Act of 1905, the principal community of concern to the agency was limited, consisting for the most part of a select group of forestry professionals, scientific and professional societies, special interests, and politicians. As such, the forest "community" of the late 19th and early 20th century was considerably less complex than the collection of interested stakeholders today.

However, following World War II, the general public began to show a greater interest in the activities of the national forests. By the late 1960s, with the advent of modern environmental concern, the forest community had expanded to include an extremely broad spectrum of the general public. Statutes such as the National Environmental Policy Act of 1969, the National Forest Management Act of 1976, and more recently, laws such as the Native American Sacred Lands Act of 2002, have officially recognized the array of publics and mandated that the USFS actively involve them in management decisions. In addition to these and other statute laws, there are other written authorities that require and provide direction for external contacts. These include 36 CFR 219.9 (Public participation, collaboration, and notification), the Forest Service Manual chapters 1500 (External relations) and 1600 (Information services), and the Forest Service Handbook chapters 1509 and 1609. Effective public involvement requires knowledge; thus, the purpose of this section is to assist in improving that knowledge base.

In this report, the term and concept "communities" received a broad interpretation and, hence, designation. In one sense, "communities" refers to the towns and cities located in the counties surrounding the PNF. In a broader sense, however, "communities" refers also to tribes, governments, the media, educational entities, partners, and special advocacy groups. Both of these types of "communities" are examined in this section.

8.2 Community profiles and involvement with natural resources

This section presents links to community profiles of the towns and cities surrounding the Prescott NF. It also provides information on local news sources as a gauge of community involvement with natural resources, including Arizona's national forests. Weblinks to community profiles for each of the counties and selected municipalities within the area of assessment are listed below in Table 34. These profiles generally contain the following information for each community: historical information, geographic/location information, population data, labor force data, weather data, community facilities (e.g., schools, airports), industrial properties, utilities, tax rates, and tourism information. They were developed by the Arizona Department of Commerce, which also provides data for many other communities outside of those listed in Table 34. Table 35 categorizes national forest acreage in Arizona according to current congressional districts.

Table 8. Weblinks to Community Profiles for Counties and Municipalities in the Area of Assessment

Coconino County	**http://www.azcommerce.com/doclib/COMMUNE/Coconino%20County.pdf**
Flagstaff	http://www.azcommerce.com/doclib/COMMUNE/flagstaff.pdf
Sedona	http://www.azcommerce.com/doclib/COMMUNE/sedona-oak%20creek%20canyon.pdf
Page	http://www.azcommerce.com/doclib/commune/page.pdf
Williams	http://www.azcommerce.com/doclib/commune/williams.pdf
Fredonia	http://www.azcommerce.com/doclib/COMMUNE/fredonia.pdf
Yavapai County	**http://www.azcommerce.com/doclib/COMMUNE/Yavapai%20County.pdf**
Prescott	http://www.azcommerce.com/doclib/commune/prescott.pdf
Prescott Valley	http://www.azcommerce.com/doclib/COMMUNE/prescott%20valley.pdf
Cottonwood - Verde Village	http://www.azcommerce.com/doclib/COMMUNE/verde%20village.pdf
Sedona	http://www.azcommerce.com/doclib/COMMUNE/sedona-oak%20creek%20canyon.pdf
Camp Verde	http://www.azcommerce.com/doclib/COMMUNE/camp%20verde.pdf
Cottonwood	http://www.azcommerce.com/doclib/COMMUNE/cottonwood.pdf
Chino Valley	http://www.azcommerce.com/doclib/COMMUNE/chino%20valley.pdf

Source: Arizona Department of Commerce

Table 9. Acreage of Arizona National Forests in Federal Congressional Districts

Congressional District	County	National Forest	Total Forest Service Acres
2nd			
	Pima	Coronado NF	42,961
	Santa Cruz	Coronado NF	418,879
			461,840
3rd			
	Coconino	Coconino NF	848,725
		Kaibab NF	1,528,594
		Prescott NF	43,695
	Mohave	Kaibab NF	5,487
	Yavapai	Coconino NF	431,119
		Kaibab NF	25,119
	Yavapai	**Prescott NF**	1,195,551
		Tonto NF	317,051
			4,395,341
5th			
	Cochise	Coronado NF	489,396
	Graham	Coronado NF	396,174
	Pima	Coronado NF	346,910
			1,232,480
6th			
	Apache	Apache NF	447,223
		Sitgreaves NF	45,591
	Coconino	Coconino NF	569,772
		Sitgreaves NF	285,693
	Gila	Coconino NF	6,063
		Tonto NF	1,698,631
	Greenlee	Apache NF	751,151
	Maricopa	Tonto NF	657,695
	Navajo	Sitgreaves NF	488,158
	Pinal	Coronado NF	23,331
		Tonto NF	199,558
			5,172,866
		State Total	**11,262,527**

Source: USFS Lands and Realty Management

http://www.fs.fed.us/land/staff/lar/LAR04/table6.htm

The communities surrounding the Prescott NF have a history of involvement with the national forests and with natural resource issues in general. Central Arizona, like the rest of the state, has long been dependent upon natural resources for commodity production, tourism, and aesthetic enjoyment. As a result, the public has frequently expressed intense interest in the use and management of these resources.

The best and most generally available record of community involvement and interest in the PNF and in natural resources is to be found in the state's newspapers. Journalists publish hundreds of articles each year dealing with almost every aspect of community involvement surrounding natural resources and the forest. Links to Arizona's major newspapers can be found at http://www.50states.com/news/arizona.htm.

A search of natural resource keywords was conducted for six state newspapers: The Arizona Daily Star (Tucson), The Arizona Daily Sun (Flagstaff), The Arizona Republic (Phoenix), The High Country Sentinel (Heber-Overgaard), The Prescott Valley Tribune (Prescott), and The Grand Canyon News (Williams). These newspapers were chosen because they represent the principal newspapers for cities located near each of the six national forests. In addition to the names of the six Arizona national forests, the keyword search included terms such as “forest,” “conservation,” “wildlife,” and “endangered” species. The results of this keyword search are presented in Table 36. The Prescott Valley Tribune (Prescott) is the newspaper most proximate to the PNF and thus will be of greatest interest to this assessment. However, the other five newspaper searches are also presented because journalism today has broad statewide and even national coverage that might reveal stories related to the Prescott in many of the state’s newspapers.

The keyword search (Table 36) indicated that the six newspapers have collectively published more than 100,000 articles potentially related to natural resources since 1999. This would indicate a tremendous public interest and opportunity for involvement with the state’s natural resources. Also, the data indicate that the PNF’s nearest paper, The Prescott Valley Tribune, is important in terms of natural resource news coverage. The keyword search found 2,852 natural resources-related articles. Please note that this was for a shorter period than was examined for most of the other newspapers due to the more limited database for The Prescott Valley Tribune. Furthermore, the search indicated that the PNF itself was the subject of 337 news articles during the period examined (approximately 1999-2005 although the exact period varied by paper).

Table 10. Natural-Resource Related Keyword Search of Six Arizona Newspapers

City:	Flagstaff	Phoenix	Williams	Heber-Overgaard	**Prescott**	Tucson		
Newspaper:	Arizona Daily Sun	Arizona Republic	Grand Canyon News	High Country Sentinel	**Prescott Valley Tribune**	Arizona Daily Star	Total	Percent of
Nearest National Forest:	Coconino	Tonto	Kaibab	Apache-Sitgreaves	**Prescott**	Coronado	Articles	Total Articles
Issues Searched:	1999-April 2005	1999-April 2005	2000-April 2005	2000-April 2005	**2003-April 2005**	1999-April 2005	Found	Found
Key Word Searched:								
Forest	8,066	319	732	399	**367**	3,414	13,297	13.2%
Natural Resources	690	79	29	23	**16**	688	1,525	1.5%
Conservation	732	133	109	7	**62**	732	1,775	1.8%
Water	0	1,382	741	244	**728**	10,960	14,055	14.0%
Lake	7,313	788	294	294	**178**	2,708	11,575	11.5%
River	5,033	625	370	131	**279**	n/a	6,438	6.4%
Stream	1,602	169	24	36	**67**	n/a	1,898	1.9%
Recreation	3,224	2,334	483	314	**211**	1,969	8,535	8.5%
Fish	4,708	5,028	131	248	**285**	2,646	13,046	13.0%
Native fish	98	2	15	15	**3**	135	268	0.3%
Sportfish	22	0	0	0	**2**	1	25	0.0%
Fishing	480	502	55	434	**147**	1,035	2,653	2.6%
Forest Fire	247	15	28	3	**16**	2,491	2,800	2.8%
Mining	165	282	25	9	**43**	1,504	2,028	2.0%
Endangered species	544	18	23	2	**14**	638	1,239	1.2%
Wildlife	2,747	167	185	135	**120**	2,824	6,178	6.1%
Native Wildlife	22	4	5	0	**0**	24	55	0.1%
Bird Watching	17	26	1	30	**1**	153	228	0.2%
Hunting	3,231	514	56	253	**63**	1,114	5,231	5.2%
Range	0	1,194	56	67	**146**	1,062	2,525	2.5%
Grazing	865	41	40	11	**19**	402	1,378	1.4%
The National Forests:								
Coconino National Forest	1,046	15	15	3	**0**	22	1,101	1.1%
Coronado National Forest	120	9	2	20	**0**	755	906	0.9%
Apache-Sitgreaves Nat. For.	109	12	2	87	**0**	68	278	0.3%
Kaibab National Forest	441	16	245	0	**0**	20	722	0.7%
Tonto National Forest	135	37	3	14	**7**	176	372	0.4%
Prescott National Forest	**141**	**11**	**7**	**73**	**78**	**27**	**337**	**0.3%**
Total articles found	41,798	13,722	3,676	2,852	**2,852**	35,568	100,468	100.0%

Past issues of The Prescott Valley Tribune were also examined to determine the types of natural resource topics that were of interest to the public in the region. Selected topics and their dates of publication in The Prescott Valley Tribune are provided in Table 37 below:

Table 11. Selected Key Public Issues for the Prescott National Forest

Topic	Date
1. Feds and states need to find new uses for harvested trees	March 2005
2. Experts foresee heavy wildfire season	March 2005
3. Peregrine nesting closes some climbing sites	February 2005
4. A managed forest means a logged forest	December 2004
5. Trout stocking on Lynx Lake	June 2004
6. PNF strip mine is back on the table	November 2004

Source: The Prescott Tribune

8.3 Communities of interest and forest partnerships

The Prescott National Forest has many communities of interest: that is, entities that share an interest along with the FS in the management of the forest. For the purpose of this assessment, a distinction should be made between communities of interest and forest partners. Communities of interest may include residents of physical communities or members of an interest group, agency, or private organization that are influenced by, and in turn, stand to influence forest planning and management. Consideration of their stake in forest management is important, but not specifically directed through formal partnership agreements. Following, in Table 38, is a listing of some of those communities of interest. 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 PNF. An especially noteworthy community of interest to the PNF is the Native American tribes. The tribal contact list for the PNF is found in Table 39. There are seven tribes for which the PNF has consultation responsibilities.

Table 12. Communities of Interest for the Prescott National Forest

Governmental	Special Advocacy Groups	Business
Yavapai County Board of Supervisors	Hyde Mountain Vista Group	Almida Land & Cattle Co
City of Prescott	Back Country Horsemen of Arizona	
Yavapai-Apache Nation Chairman	Prescott Open Trails Association	**Media**
Yavapai-Prescott Indian Tribe	Prescott Valley Economic Development Foundation	Prescott Courier
	Prescott National Forest Friends	
	Sharlot Hall Museum	**Educational**
	Highland Center for Natural History	Prescott College
	PAWUIC	
	Hyde Mountain Vista Group	

Source: M. Leonard, Staff Planning Officer, Prescott NF

Table 13. Tribal Consultation Responsibilities for the Prescott National Forest

Arizona Indian Tribe
Ft. McDowell Mohave-Apache Indian Comm.
Hopi Tribe
Hualapai Tribe
Navajo Nation
Tonto Apache Tribe
Yavapai-Apache Nation
Yavapai-Prescott Indian Tribe

Source: D. Firecloud, Regional Tribal Program Manager, Southwestern Region, USDA Forest Service

National Forest Partnerships

Although the USFS claims responsibility for approximately 193 million acres of forests and grasslands throughout the United States, it acknowledges that effective management and protection of the vast resources within forest boundaries would be virtually impossible without the effective involvement of individuals and organizations from neighboring communities. Given the agency's constraints on personnel, funding, and other resources, as well as the direct links between forest management and community well being, the FS places a high priority on the development of partnerships. In addition to the obvious financial benefits that accrue from partnerships, the agency views them as part of its continuing cultural shift from "lone rangers" and "rugged individualists" to facilitators and conveners. As such, partnerships have become a central strategy for strengthening relationships between the Forest Service and surrounding communities (USFS 2005c).

In an effort to promote partnerships and guide individual forest managers through the process of establishing and maintaining cooperative relationships with surrounding communities, the USFS has recently updated its Partnership Guide. Intended as a reference tool for employees and partners of the FS, the guide offers insight into the structure and management of non-profit organizations, issues surrounding forest cooperation with volunteers, and use of grants and other agreements as well as information on the common challenges and ethical issues involved in sustaining effective partnerships. The guide also includes an array of resources and tools based on previous partnership efforts of the Forest Service (NFF and USFS 2005).

Like other forests throughout the country and the region, the PNF is involved in multiple partnerships that contribute to forest health and fire management, the construction of community infrastructure, economic involvement with natural resources, and, most recently, issues surrounding the sustainability of regional water supplies. Previous planning processes such as the National Forest Management Act (NFMA) have attempted to implement policies aimed at enhancing participation of a growing number of interested stakeholders in forest planning and management.

Meanwhile, the Region 3 (Southwest) of the Forest Service has also outlined several priorities which directly affect the development of partnerships. They include the restoration of ecological functionality to forests and rangelands, the protection of communities adjacent to national forests, and the contribution to the economic vitality of communities. In addition to these priorities, the Southwestern Region of the Forest Service has established five objectives regarding the formation and maintenance of partnerships. They are to continue to increase the visibility and understanding of successful partnerships and collaboration, encourage and promote cultural change that supports and expands partnerships and collaboration, develop and maintain an accessible and user-friendly partnership process, identify the opportunities and needs for forest and regional coordination, and educate and train for a common understanding of partnerships.

Although the term "partnership" may be defined differently by individual stakeholders with distinct agendas, the FS has identified nine broad categories of forest partnerships. They are volunteers, cost-share contributions, donations and gifts, memoranda of understanding, cooperating associations, grants, "payments to states," stewardship contracting, and interagency collaboration.

Obviously, the number and quality of forest partnerships varies over time according to the level of interaction between individual forests and their communities. The Southwest Region, however, has established a list of partner organizations according to the nature of their involvement. This list, obtained from the regional partnership website, is included as Table 40 below. Additional information on partnerships in the Southwest Region is available at http://www.fs.fed.us/r3/partnerships/. Table 41 presents a list of the partnerships between the PNF and external groups.

Table 14. United States Forest Service, Southwest Region Partners

Conservation Organizations	
Ducks Unlimited	http://www.ducks.org/
Environmental Systems Research Institute (ESRI)	http://www.conservationgis.org/
Federation of Flyfishers	http://www.fedflyfishers.org/
Mule Deer Foundation	http://www.muledeer.org/
National Wild Turkey Federation (NWTF)	http://www.nwtf.org/
Quail Unlimited	http://www.qu.org/
Rocky Mountain Elk Foundation	http://www.rmef.org/
Trout Unlimited	http://www.tu.org
Wildlife Management Institute	http://www.wildlifemanagementinstitute.org/
Arizona Conservation Partners	
Arizona Department of Game and Fish	http://www.gf.state.az.us/
Arizona Wildlife Foundation	http://www.azwildlife.org/
Sonoran Institute	http://www.sonoran.org/
New Mexico Conservation Partners	
New Mexico Department of Game and Fish	Http://www.wildlife.state.nm.us/
New Mexico Wildlife Federation	Http://leopold.nmsu.edu/nmwf/
Audubon Society – New Mexico State Office	Http://www.audubon.org/chapter/nm/nm/rdac/index.html
New Mexico Museum of Natural History	Http://museums.state.nm.us/nmmnh/nmmnh.html
Youth Conservations Organizations	
AmeriCorps – New Mexico	http://www.nationalservice.gov/state_profiles/overview.asp?ID=38
National Association of Conservation and Service Corps	http://www.nascc.org/
Student Conservation Association	http://www.thesca.org/
Rocky Mountain Youth Corps	http://youthcorps.org/
National Ecosystem Health Organizations	
National Arbor Day Foundation	http://www.arborday.org/

Table 40 (cont). United States Forest Service, Southwest Region Partners

Arizona Ecosystem Health Organizations	
The Nature Conservancy – Arizona	http://www.nature.org/wherework/northamerica/states/arizona/
Sky Island Alliance	http://www.skyislandalliance.org/
Grand Canyon Trust	http://www.grandcanyontrust.org/
Greater Flagstaff Forest Partnership	http://www.gffp.org/
Northern Arizona University	http://www.for.nau.edu/cms/
New Mexico Ecosystem Health Organizations	
New Mexico Forestry Division	http://www.emnrd.state.nm.us/forestry/index.cfm
New Mexico Highlands University	http://www.nmhu.edu/forestry/
The Nature Conservancy – New Mexico	http://www.nature.org/wherework/northamerica/states/newmexico/
National Interpretive Recreation	
Public Lands Information Center	http://www.publiclands.org/home.php?SID=
Association of Partners for Public Lands	http://www.appl.org/
Tread Lightly	http://www.treadlightly.org/
National Outdoor Leadership School	http://www.nols.edu/
Leave No Trace	http://www.lnt.org/
Arizona Interpretive Recreation	
Arizona Trail Association	http://www.aztrail.org/
Arizona State Association of 4-Wheel Drive Clubs	http://asa4wdc.org/
New Mexico Interpretive Recreation	
New Mexico Environmental Education Association	http://www.eeanm.org/
Back Country Horsemen – New Mexico	http://www.bchnm.org/
New Mexico Council of Guides and Outfitters	http://nmoutfitters.org/
New Mexico Volunteers for the Outdoors	http://www.nmvfo.org/
Arizona Environmental Organizations	
Sierra Club – Arizona Chapter	http://www.sierraclub.org/az/
New Mexico Environmental Organizations	
New Mexico Wilderness Alliance	http://www.nmwild.org/
Sierra Club – New Mexico Chapter	http://www.sierraclub.org/nm/

Source: USDA Forest Service, Southwest Region – Partnerships

http://www.fs.fed.us/r3/partnerships/

Table 15. Partnerships for the Prescott National Forest

Cooperator Name	Project Title
Central Yavapai Fire District	Co-Location Of Fire Resources
Prescott Fire Department	Co-Location Of Fire Resources
Yavapai County Sheriff's Office	Cooperative Lease Agreement
Yavapai County Sheriff's Office	FY2005 AOP Agreement
Arizona Public Service Corp	NEPA 69kv Transmission Line
USDI, BLM - Phoenix Dist.	BLM Dispatcher O/T Work
Arizona State University	Lower Lynx Creek Restoration Project
M3 Companies	NEPA And Trail Construction
Sharon Ann and Rodney Cole	Small Tracts Act Case No. 0066
Arizona Department Of Water Res.	Verde Wild And Scenic River Fence
U.S. Department Of The Treasury	Heavy Equipment Work
Coconino County Sheriff's Office	Search And Rescue Operations
Creative Networks	Fee Demo Day-Use Passes
Sterling Ranch	Fee Demo Day-Use Passes
U.S. Department of the Treasury	Maintenance Of Roads
U.S. Department of the Treasury	Road Maintenance And Surfacing
Federal Land Exchange, Inc.	Federal Land Exchange, Inc.
Arizona Natural History Assoc.	Arizona Natural History Association
BLM, Phoenix Field Office	Fire Management
Donald Manville	Donald And Wanda Manville
Drake Cement, LLC	Drake Cement, LLC
Arizona State University	Arizona Water Protection Fund
Arizona Water Protection Fund	Arizona Water Protection Fund
Arizona Game And Fish Department	Arizona Game And Fish Department
Aires	Aires - Fee Demo Day-Use Passes
Northern Arizona University	School Of Forestry
USGS	U. S. Geological Survey
USDI – National Park Service	Montezuma Castle National Mon.
Department Of Veterans Affairs	Flu Shots
Arizona State Parks	Arizona State Parks
USDI, Geological Survey	Paulden Gauge – NFWF10 Funding
Arizona Game And Fish Department	Page Flat Juniper Treatment
Highlands Center For Natural History	Highlands Center For Natural History
Yavapai County	Forest Road Agreement
Arizona Dept. Of Water Resources	Verde River Riparian
Arizona Game And Fish Depart.	Lynx Creek Restoration At Sediment Trap #2
Arizona Dept Of Water Resources	Lynx Creek Restoration At Sediment Trap #2
Arizona Dept Of Water Resources	Arizona Water Protection Fund
Yavapai County Sheriff's Office	Rappel Tower
Arizona State Land Department	Arizona State Land Department
City Of Prescott	Fire Center Well
Financial Management Service	Financial Management Services
Arizona Game And Fish Depart.	Bald Eagle Nestwatch Program
Department Of Veterans Affairs	Administrative Health Care Services

8.4 Historically underserved communities and environmental justice

This section deals with special communities located near the PNF that may have been historically underserved in terms of public services received and their participation in business. This information will be of particular interest to PNF managers as they consider ways to improve delivery of services to minority groups which may have been underserved in the past.

Arizona's rapid population growth has affected the availability of affordable housing and fundamental social services, segregated social groups, created urban sprawl, stressed the state's infrastructure, and caused financial burdens and conflicts for local and state governments (Arizona Town Hall 1999). These factors can have an especially negative influence on Arizona's ethnic and racial minorities and their employment opportunities.

Data on individual racial and ethnic groups as a percentage of total county population were presented in Chapter 2 of this report (Table 7). In 2000, Native Americans were the largest minority group in Coconino County (28.51%) while Hispanics represented the predominant minority group in Yavapai County (9.78%). Note that individuals claiming Hispanic heritage may also claim identification with other ethnic and racial groups and be counted in those categories as well. As of 2000, individuals of Hispanic origin accounted for 25.25% of the statewide population.

The Census Bureau has estimated that, by 2025, Whites will comprise 57.5% of Arizona's population. The number of people of Hispanic origin is expected to increase from its 1995 level of 20.6% of the population to 32.2% in 2025. The African American population is projected to grow by 65.7% and the Native American population by 34.9% (U.S. Census Bureau 2005, Partnership for Community Development 2000). Thus, in the future, the national forests must prepare to serve even larger minority populations than at present.

Possible assistance in the formation of minority- and woman-owned businesses is another issue for the PNF to consider. Table 42 presents data on minority- and woman-owned businesses for surrounding Arizona counties. As the data indicate, minorities currently own a smaller number of businesses than the size of their populations might suggest.

Table 16. Minority- and Women-owned Businesses by County, 2002

County	All Businesses	Total Minorities	African American	Native American	Asian or Pacific Islander	Hispanic	Women
Coconino	17,940	2,456	-	1,046	341	927	5,339
Yavapai	31,225	2,030	-	218	-	1,579	8,439

Sources: Arizona Dept. of Commerce, 2002
U.S. Census Bureau – 1997 Economic Census

Finally, the long term goals of the USFS have led to the development of specific outreach activities designed to enhance the participation of underserved populations in forest planning and management. They include the provision that each FS unit will perform the following tasks (USFS 2000b):

Ecosystem Health

- plan for underserved communities and develop an outreach analysis

- ensure the representation of underserved communities in team membership, participation, and implementation of decisions

- develop a nationally coordinated effort to establish dialogue with underserved communities about FS programs and land management

- expand financial and technical support for underserved communities' participation in land management activities

Multiple Benefits to People

- develop relationships by establishing a FS presence within networks of urban and rural community-based organizations that represent underserved people and conduct community assessments with underserved populations by working closely with existing leadership and resources

- partner with a broad range of non-governmental organizations to increase benefits and other FS resources to underserved communities to help them organize and develop national and localized programs of work which reflect their priorities

- collaborate with underserved populations to create customized delivery systems

Scientific and Technical Assistance

- conduct a research and development review with the direct involvement of underserved people to identify their concerns

- share and conduct collaborative social science research through a Federal Center of Excellence to share information across organizations, foster effective use of federal research resources, and include the needs of underserved communities in setting social science research priorities

- improve access to and distribution of information, including research findings and technical assistance, through partnerships with existing public and private networks involving cities and counties (such as the Joint Center for Sustainable Communities), federal agencies (such as the Sustainable Development Network), culturally sensitive employees (such as employee resource groups), and professional marketing specialists with expertise that benefits underserved communities

Effective Public Service

- develop training programs that strengthen the capabilities of employees and partners to engage underserved communities

- increase scholarship, education, and work experience opportunities to train employees and partners in how to engage underserved groups

- implement grants and training agreements for employees along with representatives of underserved communities

In addition to these general guidelines, the FS currently interacts with its neighboring communities in the following ways:

Rural Community Assistance

The FS implements the national initiative on rural development in coordination with the USDA Rural Business and Cooperative Development Service and State rural development councils. The goal is to strengthen rural communities by helping them diversify and expand their economies through the wise use of natural resources. Through economic action programs, the FS provides technical and financial assistance to more than 850 rural communities that are adversely affected by changes in availability of natural resources or in natural resource policy.

Urban and Community Forestry

The FS provides technical and financial assistance to more than 7,740 cities and communities in all States, the District of Columbia, and Puerto Rico for the purpose of building local capacity to manage their natural resources.

Human Resource Programs

Human Resource Programs provide job opportunities, training, and education for the unemployed, underemployed, elderly, young, and others with special needs, simultaneously benefiting high-priority conservation work. These programs are a major part of the FS work force.

Southwestern Strategy

In November of 1997, the Secretaries of Agriculture and the Interior issued a directive to their agency leaderships to develop a collaborative approach to resolving quality of life, natural resource, and cultural resource issues in Arizona and New Mexico. The result was the Southwest Strategy, which addresses community development and natural resources conservation and management within the jurisdictions of the involved federal agencies.

Environmental justice is the fair treatment and involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, or tribal programs and policies. Inequities can result from a number of factors, including distribution of wealth, housing and real estate practices, and land use planning that may place African Americans, Latinos, and Native Americans at greater health and environmental risk than the rest of society (Bullard 1993).

The White House, with Executive Order 12898, elevated environmental justice issues to the federal agency policy agenda. EO 12898 instructs each federal agency to identify and address “disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations” (Clinton 1994).

The USDA’s goals in implementing EO 12898 are as follows (from USDA 1997):

- To incorporate environmental justice considerations into the USDA's programs and activities and to address environmental justice across mission areas;

- To identify, prevent, and/or mitigate disproportionately high or adverse human health and environmental effects of USDA programs and activities on minority and low-income populations;

- To provide the opportunity for minority and low-income populations to participate in planning, analysis, and decision making that affect their health or environment, including the identification of program needs and designs;

- To review and revise programs in order to ensure incorporation and full consideration of the effects that agency decisions have on minority and low-income populations;

- To develop criteria consistent with the USDA's environmental justice implementation strategy which determine whether the agency's programs and activities have, or will have, a disproportionately adverse effect on the health or the environment of minority or low-income populations;

- To collect and analyze data to determine whether agency programs and activities have disproportionately adverse human health or environmental effects;

- To collect, maintain, and analyze information on the consumption patterns of populations that principally rely on fishing, hunting, or trapping for subsistence;

- To develop, as part of ensuring the integration of the USDA's environmental justice strategy, outreach activities that include underserved populations in rural and urban America, including women, minorities, persons with disabilities, and low-income people, as well as tribal governments, in natural resource management activities;

Native Americans pose a special environmental justice case since few reservations possess environmental regulations or waste management infrastructures equivalent to those of the state and federal governments. In the past, these areas have been targeted for landfills and incinerators. However, these ecological inequities have met with an increasingly resistant environmental justice movement.

8.5 Community-forest interaction

As the national forests and other federal agencies focus on stakeholder and community-based management, the social linkages, or social networks, formed by different groups and individuals are becoming increasingly important. Social networks provide a framework for balancing needs and priorities in the forest, and they often provide a cadre of willing and eager participants in the forest planning process. Nonetheless, they can also represent a significant challenge to managers trying to accommodate conflicting multiple uses.

The Forest Service has identified three processes resulting from greater agency attention to the social value of forests, the need for greater public involvement, and the ecosystem approach to management. Frentz and others (1999) describe them as follows:

- An increasing demand by the general public, interest groups, and local communities to become more involved in resource management planning and decision-making;
- An awareness that stewardship of natural resource systems by knowledgeable and committed community members is more effective than top down governmental mandates and regulatory procedures; and
- Growing support for an ecosystem management approach that is community based and incorporates both ecosystem and community sustainability into an overarching theory of holistic ecosystem health.

As awareness and commitment to these processes grow, so does the need for forest managers and planners to understand the social linkages within and surrounding the national forests. The FS emphasizes these ideas in many of its policies and publications. For example, it lists among its guiding principles,

- Striving to meet the needs of our customers in fair, friendly, and open ways;
- Forming partnerships to achieve shared goals; and
- Promoting grassroots participation in our decisions and activities. (USFS 2005n)

Recent changes to the NFMA planning process similarly underscore the role of social linkages in forest management, stating, “Public participation and collaboration needs to be welcomed and encouraged as a part of planning. To the extent possible, Responsible Officials need to work collaboratively with the public to help balance conflicting needs, to evaluate management under the plans, and to consider the need to adjust plans” (USFS 2005o). A careful examination of existing and potential social networks can help guide these planning processes.

A social network analysis visualizes social relationships as a set of “nodes” (i.e., individual actors within the network) and “ties” (i.e., the relationships between the actors) (Hanneman 1999). Formal network analyses generally diagram social networks of interest and often attempt to quantify the personal relationships involved. Computer software is available to conduct formal network analyses by calculating aggregate measures of centrality, density, or inclusiveness and aiding in the visualization of social networks (Garson 2005). A variety of methods exist for graphically displaying these networks (Brandes et al. 1999).

In addition to displaying and/or quantifying the relationships among individuals, sociologists and other social scientists often use social network theory to study relationships among organizations (Stevenson and Greenberg 2000). The distinguishing feature of social network analysis is that it focuses on the relationships among individuals or organizations instead of analyzing individual behaviors, attitudes, or beliefs. The social interactions are seen as a structure that can be analyzed, and formal network analysis aims to describe social networks as compactly and systematically as possible (Galaskiewicz and Wasserman 1994, Hanneman 1999).

While social network analysis offers a significant alternative to analyzing individuals and organizations as if they were isolated from one another, it also contains some problematic simplifications. First, in viewing social networks as analyzable structures, this method inevitably treats networks as static and overlooks the dynamic nature of interpersonal and inter-organizational relationships (Sztompka 1993). It is assumed that the position of the actor in the network is static (Stevenson and Greenberg 2000); however, most managers that work with the public would agree that the relations among network members are not only changeable but are, in many cases, in almost constant flux.

In addition, the focus on quantitative features of social linkages overlooks a wide variety of important qualitative factors, including the kinds of ties involved and the power relationships among the actors (Bodemann 1988). For example, the ties in a social network can represent relationships as different as kinship, patronage, reciprocity, avoidance, or assistance (Breiger 1988). Managers attempting to explain community relationships through social network analysis would no doubt consider ties between network members involved in cooperative management and those between opponents in litigation to be very different; however, in the mere visual representation of a network it would be difficult, if not impossible, to represent this difference.

Finally, network analysis often assumes that social networks operate as constraints on action (or, at the very least, as constraints on peripheral actors) and fail to recognize the agency of individuals acting within the network (Stevenson and Greenberg 2000). This is not a necessary function of network analysis, but this common assumption can easily hamper attempts at cooperative management.

As such, a reliance on formal network analysis for understanding stakeholder linkages can be somewhat misleading. Unfortunately, the graphic representations and statistical conclusions of social networks offered by formal network analyses often convey an impression of objectivity and inclusiveness. It is important to note that research on networks has thus far generally failed to draw reliable conclusions on the actions of individuals based on the characteristics of their networks (Stevenson and Greenberg 2000). In line with many other social researchers, this assessment suggests that the qualities of relationships and strategies used by actors should be of more concern than a visual or mathematical representation of networks.

In place of a formal network analysis, which is both time consuming and based in an incomplete conception of social interactions a view of the PNF’s social linkages is offered that communicates the importance of relationships and the uncertain, active, and dynamic nature of the actors.

Provan and Milward (2001) outline three broad groups of “network constituents,” or stakeholders: principals, agents, and clients. Principals are individuals or groups that “monitor and fund the network and its activities” (3). Agents “work in the network both as administrators and service-level

professionals," and clients "actually receive the services provided by the network." However, as Provan and Milward also note, actors can and often do fulfill multiple roles, acting, for example, as a client at one geographical or political level and as an administrator at a different level. Figure 20 illustrates the interactions of these groups in the context of natural resource management. Different stakeholders interact with one another and with the resources being managed.

According to this view, a national forest is managed not simply by a USDA chain of command, but by a network that includes a wide variety of stakeholders. The resource itself forms the "center" of the network, and these stakeholders both affect the management of the resource and are in turn affected by its management direction. In a very real sense, non-USDA actors such as county officials, the U.S. Border Patrol, and even media and citizen groups participate in forest management. Figure 21 provides examples of principals, agents, and clients involved in the management of the PNF (see Table 38 for a more complete list).

While this network is by no means exhaustive, Figure 21 shows how different actors interact in the social network involved in managing the Prescott NF. However, this typology is neither unambiguous nor static. For example, forest-level administrators can function as principals, agents, or clients depending on the situation and geographic scale. They monitor and administrate the network, but they also receive services provided by other stakeholders, such as recreation users and those with special permits. Local residents are generally seen as clients of the forest, but some residents also actively participate in network monitoring to ensure that they receive the services they expect. Environmental groups, while perhaps most often seen as clients, can also play an important role in monitoring management and even directly helping to manage the forests. While none of these designations is set in stone, this framework provides a unique perspective on the linkages among and the roles of different stakeholders (or network members) in managing the forest.

The framework and diagrams presented here are intended to facilitate a discussion of social networks and the roles of stakeholders that effectively describes the actors and relationships in the Prescott NF social network. Future research might address the different needs, priorities, skills, and challenges of different kinds of stakeholders. For example, how does policy or practice differentiate among principles, agents, and clients? Does the Forest Service's vision of visitors and users (i.e., clients) as customers in any way influence the latter's ability to participate in forest planning processes? What management practices help Forest Service personnel treat different kinds of stakeholders in a fair and equitable manner? And, perhaps most importantly, how can managers and planners use existing networks to bring maximum benefit to the forest itself?

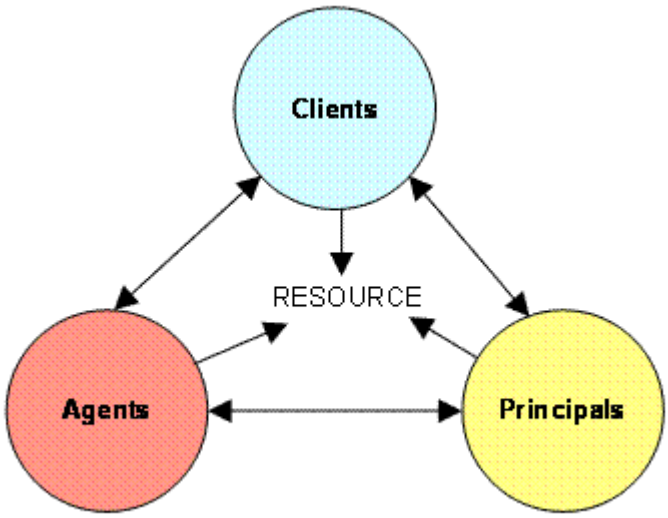

Figure 5. Social Networks in Natural Resource Management

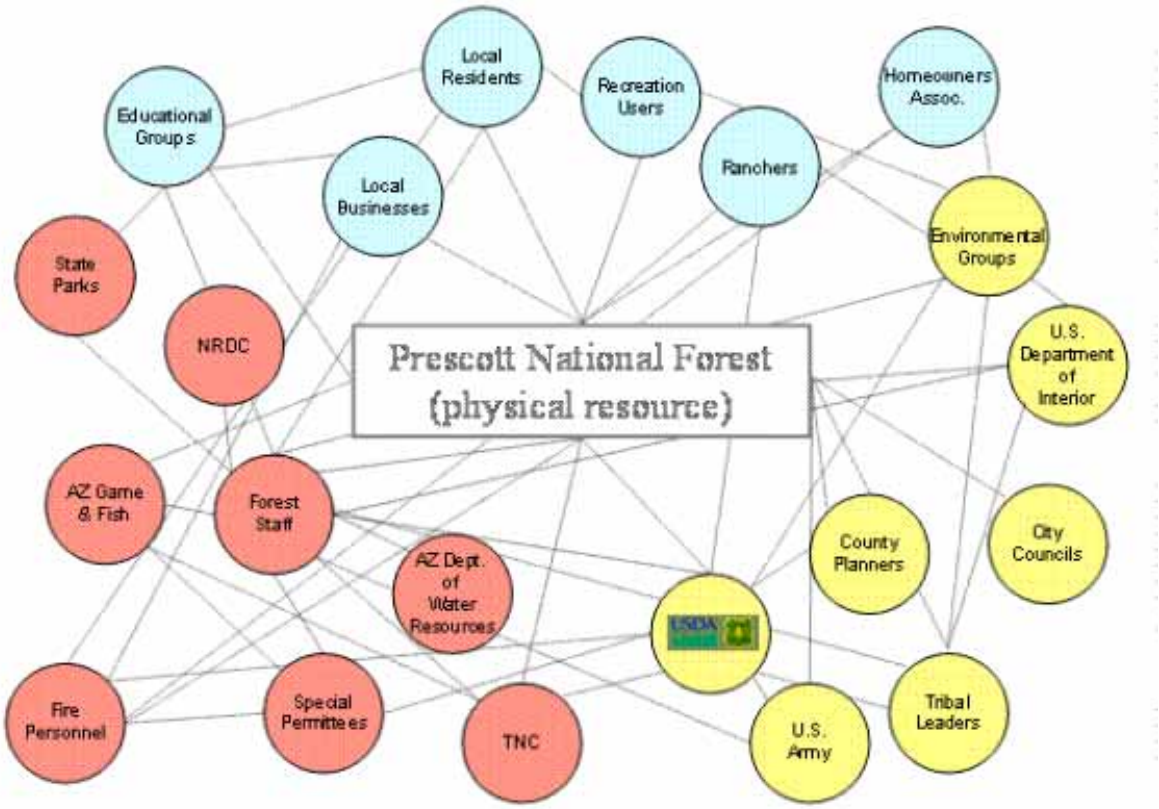

Figure 6. Partial Social Network for the Prescott National Forest

8.6 Key issues for forest planning and management

Arizona communities are experiencing rapid economic and demographic transformation, resulting in considerable changes in racial and economic diversity, multiculturalism, and social values. These trends have been well documented in other parts of this assessment through analysis of both quantitative and qualitative data which point to the challenges the national forests face as they try to accommodate diversity while delivering forest-based goods and services to the public.

Such an identification and analysis of social and economic trends, however, does not provide sufficient information on community stability, satisfaction, or capacity needed to fully analyze interactions between individual communities and national forests. Therefore, increasing attention has been paid to assessing community interaction with natural resource managers. Methods such as social impact assessments and community surveys have gained prominence as communities evolve from rural to urban patterns of development while striving to incorporate more diverse interests in participatory decision making. An added benefit of these community-based approaches is that they can provide opportunities for community members to verify, comment on, and learn from collected secondary economic and social data. Perhaps most importantly, previous studies have shown that participants in these types of social assessments are better able to identify common concerns and links to structural conditions in a manner that contributes to resource and community development planning (Kruger 1996, USFS 2003f)

Although the size and organization of communities have traditionally been considered important influences in the fields of natural resource and forest management, there remains a lack of appreciation for the various roles and modes of interaction between communities and resource managers. The failure to recognize these different roles and purposes contributes to increasingly polarized debates over the appropriateness of forest management practices. A case in point is the common conflict between communities clinging to historic dependence on commodity use and those expanding communities seeking to capitalize on natural amenities to support retirement and recreation-based activity. Such disputes often make management objectives for stewardship and sustainability difficult, if not impossible, to achieve. Alternatively, a better understanding of the nature of relationships between forests and neighboring communities can provide important insight into divergent and sometimes competing interests and concerns. Ultimately, this process could provide for an enhanced analysis of forest management alternatives and their potential affect on communities (USFS 2003f).

The task of planning for multiple resource use is further complicated by the number and nature of interest groups and stakeholders that interact with the forest in a given community. In fact, as a Forest Service Technical Report asserts, “There are as many potential measures of organization and interaction in social communities as there are ecological interactions in biophysical systems” (USFS 2003f). Evidence of the dynamic nature of relationships between the PNF and various groups, individuals, and organizations is found in ongoing debates over the preservation of open space, the administration of recreation and grazing fees, the protection of water resources and wildlife, and the security of forest lands and communities along the international border.

Despite a growing consensus as to the importance of analyzing community relationships for forest planning and management, there remain relatively few applicable guidelines for developing an effective community-forest relations strategy. Whereas the Forest Service Manual and the Forest Service Handbook provide some guidance for the conduct of external relations, there is an opportunity for a more comprehensive plan to guide the management of local community relations. A good starting point for the development of such a plan is offered by research conducted by the Queensland Government in Australia on strengthening relationships between communities and government agencies (McMillan 1999).

The study focuses on five principal recommendations for enhancing the effectiveness and sustainability of community relations that may also prove useful to Arizona's national forests. They include 1) development of a concept and definition of community relations relevant to the national forest, 2) development of an understanding of the possible benefits of a positive community relations program, 3) development of a common agency image of what a positive community relations program might resemble, 4) development of some essential principles of an effective community relations program, and 5) development of a list of potential community relations questions and issues to be dealt with by the community relations plan (McMillan 1999).

Although identification of the essential principles in an effective community relations program will require community input and therefore vary in individual cases, the Queensland study offers the following examples:

- *Leadership*—improvements in community relations require leadership at the forest level.
- *Local Ownership*—community relations strategies work best when they are owned and designed by the local community, the groups in that community, and the institutions that serve that community.
- *Administrative Support*—community relations needs to be supported by appropriate forest administrators.
- *Planning*—in seeking to ensure positive conditions for community relations, planning is the key.
- *Positive Framework*—community relationships seek to provide a positive framework and infrastructure for dealing with community-related problems.
- *Integration*—community relationships work better when they are integrated into existing forest processes and procedures rather than regarded as add-ons that can be addressed outside the framework of those processes and procedures.
- *Holistic Approach*—effective community relations strategies frequently need to be multi-pronged and very frequently require the collaboration of a number of organizations, groups, and agencies in order to work effectively.
- *Informed Decision Making*—information from the community is vital in forming community relations, as is information from other sources (including research literature) from other organizations who have tried community relations projects, and from people with knowledge and expertise in the field.
- *Inclusion of Diversity*—community relations values and respects diversity and works to include all cultural and linguistic backgrounds into the social, cultural, and economic life of the community as well as into the decision-making mechanisms of the community.
- *Ongoing Effort*—recognize that improved community relations is an on-going effort and requires a long-term commitment by the agency. (McMillan 1999)

Finally, a list of issues and potential questions for inclusion in a comprehensive community-forest relationships plan should address the following:

- *Access to services*—how will the forest improve its delivery of goods and services and what will those goods and services be?
- *Employment opportunities*—does the forest have a role in providing improved employment opportunities for the community?
- *Information*—how might the forest improve its flow of information to the community?

- *Racial sensitivity*—how might the forest be more sensitive in accommodating the needs of different racial and ethic groups who use the forest?
- *Youth*—is there a special role for the forest in helping the community's youth?
- *Media*—how might the forest develop a positive working relationship with the community's media services?
- *Change*—finally, how will the forest cope with the future in terms of changes in the community and in the delivery of forest-based goods and services to that community? (McMillan 1999)

Although these lists represent a fraction of the elements that may be addressed in any single plan for community-forest relations, they reflect the diversity and urgency of the issues the Prescott National Forest faces as it takes positive steps to respond to a rapidly-changing demographic, political, and physical environment.

9. Key Resource Management Topics

The following section offers a brief overview of several topics that are highly relevant to current and future forest management. The issues addressed in this section have been discussed throughout the assessment; however, this section offers a more detailed analysis of their potential impact on the socioeconomic environment surrounding the Prescott National Forest (PNF). Forest planners from Arizona's six national forests identified these topics as being key to forest management. Although each topic can affect forests in distinct and varied ways and extents, it represents an issue of common concern to national forests and communities throughout the state.

9.1 Forest health

Maintaining and improving overall forest and ecosystem health is an important goal of the USDA Forest Service (USFS). Forest health, however, is a complex and wide-ranging concept, and its exact meaning can be difficult to define. At the national level, the FS has identified four key threats to the health of the nation's forests and grasslands:

- Fire and fuels;
- Invasive species;
- Loss of open space; and
- Unmanaged recreation. (USDA Forest Service 2005j)

Each of these threats, along with the trends associated with them and the implications for managing forest and grassland health, will be considered.

Fire and Fuels

In the Arizona national forests, wildland fire planning is of central importance to forest planning today. Federal and state fire-management agencies have reported fires on over more than 5 million acres in five of the last ten fire seasons. During the 2000 fire season, these agencies reported 8,422,237 acres of wildland fire, a record in the more than forty years for which the National Interagency Fire Season has compiled data (NIFC 2005). These numbers pale in comparison to the fires experienced in the western United States before modern fire suppression techniques. The Federal Wildland Fire Management Policy estimates that during the pre-industrial period (1500-1800), an average of 145 million acres burned annually in what is now the contiguous United States. Today, an average of about 14 million acres burn on both federal and non-federal lands. Nonetheless, wildland fire regimes and fire-management practices are a major concern for a wide variety of forest stakeholders, including Forest Service staff, recreational users, tribes, and neighboring communities.

Within the Prescott National Forest, the landscape consists primarily of three major vegetation types including chaparral, woodland, and grassland. Arizona chaparral is dominated by Quercus turbinella, an evergreen scrub oak, while the woodland forest type is dominated primarily by Juniperus osteosperma and J. monosperma (Lowe 1972). Ponderosa pine is the only commercial harvest species. In 1976, only 36% of the total national forest acreage was classified as forested and only 7% was classified as commercial forest (USFS 1976). Fire hazards within the forest are classified as high due to the dry climate, heavy fuel accumulation, steep topography and high number of forest visitors. Large fires have burned in the past including the Battle Fire in 1972, which burned a total of 28,000 acres; the Camp Verde fire in 2001, which burned 3,500 acres; and the Indian Fire of 2002, which destroyed more than

1,300 acres and came dangerously close to the city of Prescott. These in addition to frequent smaller fires such as the Granite fire, one north of Kirkland Junction in 2002, and a small fire near Walker in 2003. Recently, officials have expressed concern over possible wildfires along I-17 in the summer of 2005 (AP 2005). The roadside threat is a significant one. In the recent Prescott Forest-Level Roads Analysis, of 1,050 miles analyzed, almost 100% (1049 miles) of the roads represented a high risk for wildfire. 32% of these roads are under PNF jurisdiction (PNF 2003).

Across the nation, the last few fire seasons have provided more severe examples of the costs, financial and otherwise, that can be associated with large wildland fires. The Rodeo-Chediski fire of 2002 spread across 450,000 acres of land, including over 170,000 acres of the Tonto and Apache-Sitgreaves National Forests. The costs associated with that fire surpassed $40 million (USFS 2003d). It is important to note, however, that wildland fire has also proven to be a useful management tool in many areas. For example, the wilderness areas associated with the Gila National Forest in New Mexico now make extensive use of fire as a wilderness management tool, utilizing prescribed fire and naturally-ignited "wildland fire use" projects to help meet management objectives on more than 175,000 acres in 2003 (Madrid, pers. comm.).

Wildland fire behavior is determined by several factors, including climate and weather conditions and the type, distribution, and abundance of fuels. Because other elements are difficult or impossible for managers to control, management efforts generally focus on changing the likelihood of ignition and the behavior of fires by modifying fuels. For a fire to ignite and burn, fine fuels must be abundant, and fuel moisture must be low (Wright and Bailey 1982, Wink and Wright 1973). However, the chemical and structural properties of fuels also greatly influence a fire's behavior. Particularly abundant or combustible fuels result in fires that are more intense and are more likely to show extreme behaviors, such as spotting firewhirls; crowning; and long, fast runs (Pyne 1997). Intense fires can threaten species and landscapes that are better adapted to slow-burning, low-intensity fires, such as some ponderosa pine forests, and extreme fire behavior can make cultural resources and developed areas more difficult to protect. Heavy surface fuels, such as thick needle layers, can result in long-burning, low-intensity fires while dry grasses are consumed very quickly. Understory shrubs and small trees can act as ladders, carrying surface fires into the crowns of trees (Graham, McCaffrey, and Jain 2004). The most common strategies for managing wildland fire are mechanical treatments[1], controlled fire treatments (used here to include both prescribed and natural-ignition "wildland fire use" fires), and direct suppression of fires.

Locally, efforts to combat future wildfires in the PNF have taken any number of traditional and non-traditional forms. Prescribed fires remain a staple. The PNF identifies 5,000 acres as the maximum amount of live prescribed fire that can be managed at any one time. In addition, a number of thinning and timber salvage operations have been conceived of or begun in the PNF. By far the strangest stratagem was installed over the past few years and involves the use of goats to forage large tracts of PNF land in order to clear the underbrush. The extent of this program is limited, but recent reports claim surprising results from the hungry grazers, and the project allows the added benefit of partnerships with the local Native American tribes from whom the goats are borrowed (USFS 2004h, Thompson 2003).

The recent White House initiative describes 190 million acres of national forest land as dangerously susceptible to wildfires, and it states that ponderosa pine density is now fifteen times greater than it was 100 years ago. It also calls for aggressive thinning projects and places much of the blame for the recent Rodeo-Chediski fire and other fires in the region on the overly dense forests and "nuisance" litigation. Some researchers echo this claim, blaming no-cut environmentalists for creating a setting for apocalyptic wildfires, while others join environmentalists in arguing that thinning projects that remove larger trees may actually increase the frequency and/or intensity of fires (Segee and Taylor 2002, Omi and Martinson 2002). Other citizen groups argue against what they consider a preoccupation with fuel-reduction projects

[1] Although mechanical treatments and fire use projects generally have the common goal of altering fuels to reduce fire intensity, they are discussed separately here because risks and benefits of each are substantially different. Many policies implicitly or explicitly favor one method over the other.

at the expense of other protection efforts, such as the recent postponement of a project to protect Anderson Mesa (Eilperin 2004). Litigation has undeniably delayed, prevented, or changed some fuel-reduction projects. For example, the Grand Canyon Partnership Assessment Project, which was scuttled by litigation in 2001, was replaced by smaller projects. However, several studies have shown that the impact and scope of litigation on national forest logging plans has been substantially overstated (Cortner et al. 2003, Carter 2003).

Managers often also attempt to control human-caused ignitions. As of September 2004, more than 3,260 large, non-prescribed fires had been reported in Arizona and New Mexico. Humans caused 1,308 of these, affecting more than 62,000 acres (CLIMAS 2004, Sept.). Increases in human-ignited fires are likely due at least in part to the increased population of the counties surrounding the national forests (discussed further in the "Unmanaged Recreation" section below). With increased population comes an increase in visitors and in potential ignition sources, including campfires, debris burning, and faulty vehicle exhaust (USFS 1999a).

Increased population density also puts added pressure on forest staff to prevent or immediately contain wildland fires. Data for Arizona show that almost 130,000 homes (housing more than 300,000 residents) are currently at risk from fires (Morehouse 2001). In the wildland-urban interface, where human development meets often highly flammable wildlands, fire on public lands can be a major concern for neighbors on private lands.

Nationally, the focus of fire policy is now shifting from fire suppression to fire management (CNF 2003b). The protection of life and property is always the first priority; however, forests also aim to protect and improve overall ecosystem health through fire-management practices. The 2001 Federal Wildland Fire Management Policy states that "the role of wildland fire as an essential ecological process and natural change agent" should be incorporated into the planning process (NIFC 2003). In addition, the more recent Healthy Forests Initiative has also emphasized that the "real solution to catastrophic wildfires is to address their causes by reducing fuel hazards and returning our forests and rangelands to healthy conditions" (Office of the President 2002).

One of the more controversial topics to come out of fire management in recent years is the use of post-fire "salvage" logging to extract some economic gain from burnt areas. Although salvage logging is generally considered to "rescue" any remaining economic value from the affected trees, recent reports have questioned the efficacy and benefits to the national forests of such enterprises. Forest Service documents suggest, for example, that such logging further disrupts the landscape, causes soil erosion, disturbs wildlife, and can actually increase the likelihood of another fire (USFS 2003d, USFS 1999a).

Invasive species

The widely acknowledged concept that ecosystem health has declined since the arrival of Europeans on the North American continent is linked in large part with a reduction in the biodiversity and population numbers of native species and a concomitant explosion in non-native, invasive species (Ecological Restoration Institute 2005). Native species populations have fallen drastically under pressure from changing land uses and habitat fragmentation, but invasions of non-native species have been identified as the second greatest cause of species extinction (Vitousek et al. 1997). Pimentel, Zuniga, and Morrison (2005) estimate that approximately 50,000 alien-invasive species have been introduced into the United States, costing an estimated $120 billion per year (including both damages and control efforts). Furthermore, nearly half of the species federally listed as threatened or endangered are in jeopardy primarily because of competition with or predation by non-native species.

Nationwide, invasive species seriously affect forest ecosystems to the detriment of biological diversity, forest health, forest productivity, soil and water quality, and socioeconomic values (Chornesky et al. 2005). Researchers estimate that the roughly 360 non-native insect species that have invaded U.S. forests

cost about $2.1 billion per year in the loss of forest products alone. A similar value is also lost to non-native plant pathogens (Pimentel, Zuniga, and Morrison 2005). The invasions of several species of bark beetles currently pose a serious threat to Arizona's forest resources. A 2002 bark beetle infestation affecting many Arizona and New Mexico forests was likely the result of a combination of factors, including drought and high tree density. This outbreak killed millions of ponderosa pine and piñon trees, and mortality, which reached up to 90% at a few localized sites, was highly visible in some areas. 2003 brought an increase in juniper and Arizona cypress mortality, which was also partially attributed to bark beetle infestations (USFS 2004o).

Within the Southwest, 2002 bark beetle infestations have caused significant damage. On the Prescott National Forest, beetles affected over 93,000 acres of ponderosa pine and over 30,000 acres of piñon (USFS 2004d). Non-endemic weed infestations have also become an increasing concern in the area containing Prescott, Kaibab, and Coconino National Forests. According to the USFS (2005d), 187,500 acres across the three forests suffer from invasive weeds, such as dalmation toadflax (Linaria genistifolia), which pose a substantial threat to native plant and animal populations. Recent decisions include projects intended to reduce the infestation of various species of invasive weeds through 14,000 acres of manual removal, 18,000 acres of mechanical removal, 14,000 acres of cultural removal and revegetation, 16,000 acres of biological removal, and 57,000 acres of herbicidal treatments with limited spray zones established within a mile of communities, recreation and scenic sights, and trailheads (USFS 2005d).

Invasive grass species have also impacted both desert and grassland ecosystems in Arizona. In western deserts, annual grasses from Europe were unintentionally introduced through grazing and have changed fire regimes, increasing fire frequency, intensity, and extent (D'Antonio and Vitousek 1992). Likewise, invasions of cheatgrass (Bromus tectorum) and Lehman lovegrass (Eragrostis lehmanniana) in grassland ecosystems increase fire frequency and intensity. This can be particularly problematic when these invasions occur adjacent to dense forests that are susceptible to wildfire (Chornesky et al. 2005). In the spring and early summer of 2005, above-average winter rains led to significant accumulations of grass and weeds in desert environments, which then carried several large human-ignited fires through desert ecosystems (Johnson 2005, Meahl 2005, Becerra and Pierson 2005). These ecosystems are normally characterized by high concentrations of succulents, which evolved with little or no fire and are poorly adapted to withstand it (D'Antonio and Vitousek 1992). Many non-native plant species also reduce forage quality. Forage losses due to invasive weed species have been estimated at nearly $1 billion per year (Pimentel, Zuniga, and Morrison 2005).

Invasive species threaten a wide variety of forest resources and uses, including both recreation and extractive uses. Chornesky and others (2005) suggest three complementary strategies for controlling non-native species invasions on forested lands:

- Prevention of harmful new introductions by identifying and impeding pathways for invasive species introduction and spread,
- Detection and eradication of invaders that elude prevention, and
- Long-term management of well-established invasive species.

The U.S. Bureau of Entomology and Plant Quarantine, Forest Health Protection, part of the U.S. Department of Agriculture, provides technical assistance on forest health issues and focuses much of its attention on non-native insects, pathogens, and plants (USFS 2005q). Forest Health Protection provides a variety of services aimed at lessening the impacts of these invasive species, including management, monitoring, technology development, pesticide use guidance, and technical assistance programs. A joint project of the University of Georgia and the USDA, available at http://www.invasives.org, provides detailed information on a wide variety of invasive weeds, diseases, insects, and other species. The Forest Service has also developed the National Strategy and Implementation Plan for Invasive Species

Management, which aims to "reduce, minimize, or eliminate the potential for introduction, establishment, spread, and impact of invasive species across all landscapes and ownerships" (USFS 2004o).

Loss of Open Space

Changing patterns in demography and land use (discussed in more detail in the following section) are leading to a loss of open spaces in U.S. landscapes. In the western United States, "exurbanization," the shift of populations to semi-rural areas outside suburban areas, is a major contributor to this phenomenon. Much of the rapid growth currently sweeping the Rocky Mountain States is occurring outside of metropolitan areas on land that was previously used for grazing, agriculture, private forestry, and/or recreation (Esparza and Carruthers 2000). The USFS has identified this fragmentation of forests and grasslands as a major threat to ecosystem health (USFS 2004n). Vitousek and others (1997) describe land transformation (including transformation of natural ecosystems to row-crop agriculture, urban and industrial areas, and pastureland) as, "the primary driving force in the loss of biological diversity worldwide."

The negative effects of these changes are wide ranging and also include local and global climate changes, air pollution, sediment and nutrient runoff, the destruction of aquatic ecosystems, and a reduction in opportunities for outdoor recreation (Vitousek et al. 1997). The FS notes that, although the loss of open space through residential and commercial development generally increases land values and taxes, it also increases the cost of providing social services to local communities and undermines traditional and rural land uses (USFS 2004n).

A study of exurbanization in southern Arizona described how city- and county-level planning can inadvertently encourage exurban development by increasing the cost and complexity of residential development within the city limits and by promoting low-density development through zoning designations (Esparza and Carruthers 2000).

Unmanaged Recreation

In its Agricultural Fact Book, the USDA identifies the Forest Service as supplying more recreational activities than any other federal agency. Given a rising involvement in wilderness recreation, the continuing availability of such opportunities is increasingly important (Cordell et al. 1999). Sixty years ago, public use of the national forests was limited, with only 600,000 visitor days in the state of Arizona. Twenty years ago, however, visitor days had increased to nearly 15 million, making the national forests the main recreational resource in the Southwest (Baker et al. 1988). Today, the National Forest System is an impressive source of outdoor recreation, education, and involvement. Nationwide, more than 200 million recreational visits are logged annually, and the national forests provide 50% of the nation's forested trail area and 60% of the skiing opportunities (USDA 2002). In Prescott alone, there are between 600,000-900,000 visitors each year and between 12,600-20,800 wilderness visits to the national forest itself (Kocis et al. 2003a), making tourism one of the single most vital economic factors to the communities surrounding the forest.

In Arizona, access to recreational activities on federal- and state-protected land is important and valuable. Over the past half-century, the demand for such outdoor experiences has grown tremendously nationwide. This change can be attributed to several trends, including an increase in leisure time and discretionary income and a greater appreciation for nature in response to growing urbanization (Clawson 1985). About 45% of registered Arizona voters frequently or occasionally go hiking while 40% go picnicking or animal watching. Whether fishing, off-roading, boating, hunting, visiting archeological sites, mountain biking, or horse riding, it is clear that a substantial portion of Arizona residents make use of the National Forest System at one point or another (Merrill 1998). For example, 93% of respondents in a Forest Service

report on the Heber-Overgaard area of the Apache-Sitgreaves National Forests agreed that the availability of public lands for recreational activity was at least somewhat important, and nearly all of the respondents felt hiking should be allowed within reasonable parameters. 87% of the respondents even felt that off-road vehicles should have access to forests with only limited restrictions (USFS 1999a). In 1996, almost half of all hunters used public lands, and one-third of their hunting days occurred entirely or in part on public lands (Flather, Brady, and Knowles 1999). In addition, activities such as rock climbing have greatly increased in popularity although the inherent risks have caused officials to consider special use fees to cover added ranger responsibilities surrounding climbing-related injuries (Cordell et al. 1999).

Locally, tourism plays an especially important economic role in Coconino County, with Grand Canyon National Park, Oak Creek Canyon, Lake Powell, Sunset Crater, Walnut Canyon, and Wupatki drawing large numbers of tourists (Coconino 2003). Recreational opportunities within the Prescott National Forest are available year round due to the mild climate within the forest. Summer temperatures peak around 80°F and average winter temperatures remain above zero. A wide variety of recreational opportunities are available including mountain biking, camping, hiking, hunting, and off-road vehicle use. Fishing opportunities within the forest are limited. Wilderness areas, including Pine Mountain and Sycamore Canyon, are in part located on the PNF. These areas provide opportunities for wilderness experiences. Over 196,367 acres of the Sycamore Canyon wilderness in located on Prescott NF land. Elevations within the canyon vary from 3,600 feet at Sycamore creek to 7,000 feet on the rim. Vegetation within the canyon is comprised of chaparral and semi-desert types. Over 9,000 acres of the total 20,062 acres of the Pine Mountain Wilderness fall on Prescott Forest land. High summer temperatures and the lack of water limit the number of people that visit this rugged area. Elevation within the area ranges from 4,600 feet to 6,800 feet, with numerous peaks, ridges and canyons. Vegetation varies from semi-desert shrub to ponderosa pine (USFS 2005l).

In many national forests, the explosive growth of recreational use presents challenges to managers even as the public receives increasing benefits from its forests and grasslands. The FS has acknowledged the increasing pressure on forest resources, particularly in the Rocky Mountain and Southwest regions. Similarly, it is currently emphasizing the need to effectively manage recreation, especially the use of off-highway vehicles (OHVs) (see Section 9.3, Forest Access and Travel). With the growing trend toward exurbanization, changing land patterns may threaten easy access to those environmental recourses of escaping urban stress and enjoying the serenity of a natural environment, which are some of the foremost reasons for forest usage (Peart 1995, Knopf 1987).

Given the rapid growth of Arizona's population, overcrowding may eventually be an increasing challenge for the PNF, but it does not seem to be a major issue at present. Nearly 80% of visitors interviewed, according to NVUM data, suggested that there appeared to be hardly anyone else present during wilderness visits, and in the response regarding overnight developed sites, only 29% of visitors thought overcrowding was more of a problem than not (Kocis, et. al. 2003a). According to the 2004 Prescott forest plan, the average annual recreation visitor days (RVDs) are projected to be in excess of 1,800,000, which is a substantial increase over the 450,000 RVDs logged in 1986. The 2004 plan suggests that visitor contacts and litter control activities should be intensified in order to increase visitor satisfaction. The PNF, however, remains committed to excluding recreation use in areas where wilderness resources or values are present (USFS 2004h).

A related issue that has drawn national attention recently is the use of recreation fees for public lands. Some users feel that such fees amount to double taxation, adding costs on top of the money donated in taxes, and that these fees discourage lower-income individuals from accessing the park. These arguments echo the ideas of Frederick Law Olmstead, the designer of New York's Central Park and an instrumental voice in the formation of America's national parks. For Olmstead, public open spaces oiled the gears of democracy by bringing disparate classes together. Nevertheless, fees remain relatively low, and studies have shown that the primary cost-incurring activities involved with visits to public lands are those related to travel and lodging (Grewell 2004). However, given that in 2001 nearly 97% of the wilderness visitors

to the PNF were Caucasian (in a state with a 25% non-white population), the question of how fees might affect diversity on the public lands system merits some discussion (Kocis et al. 2003a).

9.2 Land and water resources

Previous sections have provided substantial information on recent demographic changes within the area surrounding Prescott NF. Here, the focus is not on the quantitative nature of demographic change but on the qualitative characteristics of change likely to affect forest management.

Arizona is among the fastest growing states. The United States' aging population—one in eight people in the U.S. is now over 65 as opposed to one in twenty-five 100 years ago—is leading to more and more people escaping to the warmer climates of the South and West (Alig et. al. 2003). The population in Arizona increased by more than a factor of four over the 1950-1995 period, and the demographic data within this report show that this trend exhibits no immediate signs of slowing. Some researchers predict another doubling in population between now and 2040 (Peart 1995). As noted throughout this report, Arizona is also becoming increasingly "exurban" (that is, residences are spreading further from metropolitan areas and becoming more widely spaced), and the popularity of many outdoor recreation activities continues to rise. Previous descriptions in this assessment have shown how, as a result of these developments, many forests are seeing a growing trend toward recreational use and "ecosystem services" (i.e., the management of public lands to provide services such as improved water quality, wildlife habitat, and clean air to surrounding communities) and away from extractive uses such as mining, logging, and grazing. Availability of land and water is a growing concern for Arizona's rapidly expanding urban areas. Although national forests in the state are affected by urban growth to different extents, each will need to consider its role as a provider of open space and healthy watersheds. Forest planners identified livestock grazing, changes involving state trust lands, the increased utilization of forests' water resources, and roadless area rules as points of particular interest.

Grazing

Livestock grazing has a long history in Arizona. The prominence of grazing in this area dates back to the middle of the 18th century, when Spanish explorers transported livestock into the region by way of Mexico (Allen 1989). Formal ranching began in the late 1800s following the Civil War and the widespread suppression of the local indigenous populations (Sheridan 1995). The U.S. government's primary interest was in land acquisition until the 1850s. The distribution of lands to Anglo settlers began in earnest with the Homestead Act of 1862. Over the century following the Civil War (1865-1965), there was a 600% increase in the number of cattle in the western states. However, this transition was by no means linear. For example, the 1880s saw an immense boom in livestock numbers. Nearly a million head of cattle were reported in Arizona by the end of that decade, up from about 38,000 in 1870. However, a combination of environmental and economic pressures soon decimated the herds (and the range, which was devastatingly overgrazed by the mid-1890s), and by the end of that century, an estimated 50-75% of southern Arizona's cattle had perished (Sheridan 1995).

In 1906, the Forest Service implemented the practice of collecting fees for grazing private livestock on all public lands. The amount of FS land devoted to livestock grazing has been stable over the past three decades, as has been the amount of BLM land (USFS 2000a). However, some studies have suggested that changes in land use will result in a decrease of grazing land in the Pacific and Rocky Mountain Assessment Regions (Mitchell 2000). At present, nearly 167 million acres of BLM land and 95 million acres of Forest Service land are allotted to fee-based grazing rights, the latter accounting for 65% of the entire National Forest System. Livestock graze over 90% of federal lands in the eleven western states (Carter 2003). The forage grazed on this land accounts for about 2% of the beef-cattle feed in the continental U.S. and financially supports one-tenth of western livestock producers, whose grazing fees

continue to be charged based on the formula initiated by the Public Rangelands Improvement Act of 1978 (PRIA) (Cody 2001). The grazing leases provided by the Forest Service account for nearly one-quarter of the grazing land utilized by Arizona ranchers, and most Arizona ranching operations rely on one or more federal or state grazing permits (Ruyle et al. 2000).

The PRIA began the fee formula for the FS and the BLM on an experimental basis, but following continuing presidential and congressional support, it has remained the standard. Grazing fees have become controversial in part because the fee has increased only marginally from its inception and has not kept pace with the market rates. In 2002, for example, the grazing fee remained $1.35 per AUM[2] on federal land while the USDA estimated the average rate for grazing leases on non-irrigated private land among sixteen western states at $13.50 per AUM (NASS 2003). Some citizen groups assert that this leads to disproportionate financial output by the Forest Service in the interests of grazing (Coalition 2001). In Arizona, for example, conservation groups note that the Forest Service recently spent nearly $250,000 to establish and maintain cattle fences and borders for land that generates only $7,000 per year in grazing revenue as part of an attempt to protect Apache Trout and other threatened fish in livestock-impacted watersheds (Wolff 1999). Many groups also argue that livestock ranching interferes with other uses of the national forests.

The National Forest System contains much of the summer range and a portion of the year-round grazing in the area, and as such, regional administrators help determine the success of southwestern livestock industries. However, ecological impacts of ranching, including the persecution of "problem animals," the alteration of fire regimes, impacts to water supplies and riparian areas, introduction of exotic weeds, and the construction of fences and roads, can bring it into conflict with other uses (Freilich et al. 2003). Drains on budget and oversight are issues likely worth attention since the environmental impact of unrestrained grazing can be intense. Livestock grazing represents the primary cause of species endangerment in the Southwest and the second cause of plant species becoming listed as endangered (Flather, Joyce, and Bloomgarden 1994; Flather, Knowles, and Kendall 1998). In addition, soil compaction from grazing herds can affect the water table and rainfall infiltration as well as erode streambanks. Those watersheds which suffer from extended overgrazing have an increasing susceptibility to floods which in turn leads to accelerated channel lowering (Belsky, Matzke, and Uselman 1999; Dreeson, et. al. 2002; USFS 2002a). Some of this damage in the Prescott is due to a sustained overuse of at least twenty-nine of its sixty-two grazing allotments (USFS 2004h). In the region surrounding Coconino County in particular, excessive grazing has been identified as a major cause of increased fire frequency (Huggard 2001, Carter 2003).

Many proponents of ranching point to the social and economic benefits of rural lifestyles, arguing, for example, that "the best way to preserve the open spaces, arid ecosystems, and diverse biota of the Southwest is to keep rural people on the land" (Brown and McDonald 1995). Thus, ranching on public and private lands may also be seen as a viable method of limiting urban sprawl and promoting the economic independence and cultural uniqueness of rural communities.

State Trust land reform

In Arizona, the practice of allocating public lands for various beneficiaries dates back to the founding of the territory in 1863. The current system of managing these lands, referred to as State Trust lands, was established with the Arizona State Land Department (AZSLD) in 1915. Since that time, the department has worked actively to manage these lands to help fund schools and other public institutions. In addition to original allotments granted by the federal government through Territorial and State Enabling Acts, the State Selection Board was allowed to select various lands throughout Arizona sufficient to ensure future financial support for selected beneficiaries. The selection of lands for state acquisition was completed in 1982 although most land selections were made between 1915 and 1960. Federal laws prohibited acquiring

[2] An AUM, or Animal Unit Month, is equal to one cow with calf or five sheep feeding for one month.

mineral lands or agricultural areas previously claimed by homesteaders, so the Selection Board chose lands with the greatest grazing potential. As a result, the majority of land selected between 1915 and 1960 was in central and southeastern Arizona with some additional "checkerboard" parcels near railroads in the north central portion of the state. Since that time, land exchanges have led to relocation of limited trust lands in western desert areas toward the region surrounding Phoenix and Tucson as well as western Yavapai County (AZSLD 2005).

Since its inception, the State Land Department has been granted authority over all trust lands as well as the natural products they provide. This authority over trust land is central to the AZSLD's primary mission of maximizing revenues for its beneficiaries, a role that distinguishes it from other agencies charged with management of public lands (national parks, national forests, state parks, and the like). As of 2005, the AZSLD manages land holdings for fourteen beneficiaries, the most prominent of which is the K-12 public school system. The public schools currently hold 87.4% of State Trust lands. The vast majority of Arizona trust lands currently are intended solely for livestock grazing. However, the Urban Lands Act, passed by the state legislature in 1981, has allowed the State Land Department to capitalize on the increased value of trust lands surrounding the state's rapidly growing municipalities. As a result, the Land Department's urban lands lease and sale program has become the largest revenue producer for the trust (AZSLD 2005).

Pressure for reform of the State Trust land system has been fed in recent decades by a relative scarcity of private developable land in areas that are continuing to experience massive population growth. Although various kinds of reforms have been proposed, the variety of stakeholders involved makes resolution a challenge. The competing interests involved include city and town governments and political lobbies representing educators, environmentalists, grazing interests, and homebuilders. Several cities throughout the state are striving to work with builders in order to ensure a sufficient supply of land for future housing. At the same time, educators would like to collect as much money as possible from the sale of trust lands in order to supplement limited financial support from the state legislature. Finally, environmentalists and ranchers have an interest in preserving lands for their conservation value and existing grazing rights. Despite continued efforts to reach a compromise among these interests, a number of proposed reform plans have thus far failed to pass from committee in the Arizona State Legislature (Nintzel 2005, Davis 2004).

At issue is the process by which the State Land Department takes advantage of increased land values for educational funding while still preserving sensitive areas for conservation in the face of increasing urbanization. Policy makers suggest that the impasse over proposed reforms for the State Trust Land System can be broken down into the following key issues, all of which have been viewed as "deal breakers" by one or more of the interested parties: 1) the amount of land available to be set aside for conservation; 2) open, competitive auctioning for grazing leases; 3) federal and state land exchanges; and 4) the composition of the State Trust Land Board (Sherwood and McKinnon 2005, Nintzel 2005, Riske 2005).

State legislators have balked at proposals favored by organizations such as the Sonoran Institute and Grand Canyon Trust that call for protection of nearly 700,000 of the state's 9.3 million acres of Trust Land. Meanwhile, the Arizona Preserve Initiative, a measure that would allow the state to match payments from local jurisdictions to buy state land that qualified for open-space preservation, has been delayed by legal challenges to its constitutionality. Similarly, legal court challenges to State Trust Land reform have been posed by groups seeking to overturn the Arizona Supreme Court's decision in 2001 that allows non-ranchers to bid on state grazing leases as well as a 1990 Supreme Court ruling which prohibits the state from swapping parcels with federal agencies and/or private speculators. Finally, comprehensive reform of Arizona's State Trust Land system has also been held up by the education lobby's insistence that any reforms should be approved by a newly composed Board of Trustees charged with overseeing the management and disposal of trust lands (Sherwood 2005, Nintzel 2004).

These and other challenges have been addressed by various proposals for reform submitted by state lawmakers. As recently as October 2004, a coalition seeking the overhaul of state land management was "pronounced dead" after the facilitator resigned in the wake of failed attempts to pass a measure through the legislature. Still, Governor Napolitano, along with a number of state senators and representatives, remains committed to Trust land reform and aims to present voters with a reform package by the 2006 general election. Whatever the outcome, it should be noted that the ultimate resolution of these issues will likely have a significant impact on national forests in Arizona given the extent and value of State Trust lands in close proximity to forest boundaries (Davis 2004, Riske 2005). More information on the management of State Trust Lands by the Arizona State Land Department is available online at http://www.land.state.az.us/.

Water

The U.S. uses a lot of water, and the primary uses are not always obvious to the general public. Even though per capita public consumption of water resources has increased by 400% over the past century, less than one-tenth of total freshwater removal is utilized in the areas most often considered under "primary water use": domestic and private use. The judicious use of water resources is particularly important in the West, and water is an immediate and everyday concern to Arizona residents. The National Forest System in the state is central to the question of water resources. Although USFS lands account for only 14% of the total land area, those lands contain 40% of the region's water resources (Baker et al. 1988). In fact, national forests and grasslands function as the largest provider of water in the continental U.S., containing nearly 10 million acres of wetland and riparian areas and the headwaters of 15% of the nation's supply of water. These resources, valued at billions of dollars, supply water to more than 60 million people and provide opportunities for recreation, preservation, and employment (Schuster and Krebs 2003).

Major aquatic systems within Prescott National Forest include the Verde, Agua Fria, Hassayampa, and Bill Williams Rivers. The majority of streams on the forestland are intermittent, flowing only during spring runoff or after heavy rains. Several lakes, including Lynx Lake, Horsethief Lake, Granite Basin Lake, and Goldwater Reservoir, are located within the ponderosa pine forests. Water quality within the forest's major water sources is good. Increased turbidity is often noted during summer runoff, and concerns have been expressed about water pollution created by mining wastes, road construction, and human uses. Water uses within the forest's boundaries include municipal use, industrial uses, irrigation, recreation, livestock, and wildlife (USFS 1976).

Lynx Lake Dam is on Lynx Creek in Yavapai County, near Prescott, Arizona. The dam is owned and operated by the Arizona Game and Fish Department for wildlife and recreational purposes. The dam and lake are contained within the Prescott National Forest and therefore within the resource management of the USFS. As part of the National Dam Safety Inspection Program, the dam was determined to be inadequate to safely pass the spillway inflow design flood without overtopping the earthen and rock embankment. Yet floods have, up until recently, been the least of the state's water problems. Below-average precipitation over the past several years has once again brought water to the forefront of natural resource management concerns. According to the U.S. Geological Survey, the period following 1999 is the driest in the hundred years that the Colorado River has been monitored. That river supplies 25 million people in seven states with water (USGS 2004, CRWUA 2005, Pontius 1997). Recently, the Secretary of the Interior noted that, barring changes, action would be necessary at the federal level within two or three years. Low rainfall has led to periodic drops in water levels in nearly all the primary reservoirs in Arizona. Statewide, although Lake Mohave and Lake Havasu raised their levels by 1% and 3% respectively over the second half of 2004, other reservoirs dropped precipitously. The Salt River system dropped 8% against the maximum storage level, and Lyman Reservoir dropped 16%. By early 2005, both Mohave and Havasu had already returned to the previous, lower levels. Above average rains last winter,

however, have had a profound effect upon Arizona's primary reservoirs with four at over 90% capacity and nearly all at higher levels than the year before. One of the watersheds closest to the PNF, the Verde River System, was up to 99% of capacity by May of 2005. The capricious nature of Southwest precipitation is one of the aspects that make management of water resources particularly difficult in this region (CLIMAS, September 2004; CLIMAS, February 2005; CLIMAS, May 2005).

Much of the previous years' water worries can be attributed to below-average precipitation starting in October 2003. Below-average snow-pack in Payson, Arizona, has caused that community, and many others like it, to implement programs aimed at conserving water. The Salt River Project Board of Directors, which instituted cutbacks in residential, agricultural, and municipal use for 2005, has taken similar precautions. That was the third straight year such methods were implemented (CLIMAS, September 2004; CLIMAS, February 2005).

Similarly, water providers in the Pinetop-Lakeside region of Navajo County are engaged in aggressive planning on how to meet demand through 2020 and beyond. Meanwhile, at the state level, the creation of groundwater Active Management Areas (AMAs) requires proof of 100-year water viability before any new development can begin (Pinetop-Lakeside 2004). These requirements have led some communities with adequate water supplies to predict increased growth as developers search for areas with enough water to meet AMA requirements. Statewide, other longstanding water protection initiatives are suffering setbacks. The Colorado River Compact of 1922, for example, was meant to limit withdrawals from the Upper Colorado Basin to the lower basin states, including Arizona, to 8.23 million acre-feet (maf); however, recent deliveries have been about 10 maf, well above the requirements of the compact (Brown 1999).

While the government has contracted research organizations to investigate the possibilities of developing a water pipe across the Coconino Plateau which would transport water from Lake Powell and the Grand Canyon Dam as far south as Phoenix, these plans have not translated into any large-scale action to date (Heffernon and Muro 2001).

Watershed pollution also remains a concern in the region. In 1993, Pinto Creek suffered environmental damage from a breach in containment at a tailing waste levee. Acid drainage and other chemical byproducts of the mining industry also pose dangers to recreational and fishing activities on public lands (Peart 1995).

Active management of the water resources on public and private lands is a complex and multifaceted endeavor. Considering the value of water though, continuing such management activities while working in partnership with tribal and other nongovernmental agencies is, in the words of Schuster and Krebs (2003), "simply good business."

9.3 Forest access and travel

Earlier chapters discussed forest access and travel, focusing on the transportation characteristics of communities surrounding the Prescott National Forest. This section provides a detailed assessment of recent interpretations of the Roadless Rule and current trends in OHV use—two internal access issues that are of particular concern to many forest planners and that are likely to have a significant impact on future forest planning.

Roadless areas in the National Forests

Nationally, the larger roadless areas in national forests have long received different treatment from more developed areas. Through Roadless Area Review and Evaluation (RARE) studies, these areas have been inventoried and their wilderness characteristics considered for potential designation as wilderness under the Wilderness Act of 1964 (Baldwin 2004). The National Wilderness Preservation System is comprised

of federal lands "where the earth and its community of life are untrammeled by man, where man himself is a visitor and does not remain" (16 USC 1131 et seq.). Wilderness areas are designated only by Congress and are generally protected from commercial enterprises, road construction, mechanical vehicles, and structural development.

Roadless areas provide a variety of social and ecological benefits, and these unfragmented lands have become even more important as unprotected areas are increasingly developed and converted to urban uses. Among other benefits, they provide clean sources of drinking water and help prevent downstream flooding, protect threatened and endangered species, provide a wide variety of recreation opportunities, and serve as barriers against invasions of non-native species. The PNF includes approximately 140,000 acres of inventoried roadless areas (IRAs) (USFS 2001c).

In 2001, the FS published a final rule that prohibited several activities in IRAs. These activities were prohibited because they threatened to diminish the areas' suitability as designated wilderness (USFS 2001b). With significant exceptions, road construction and reconstruction and timber cutting were prohibited in IRAs. Implementation of this rule was administratively delayed, then enjoined, by two separate Federal District Courts and remains enjoined under appeal (Baldwin 2004). Subsequently, a new rule was adopted by the USDA on May 5th, 2005 that provides individual states with significant flexibility in managing IRAs by allowing governors to petition the Secretary of Agriculture to create special, state-specific rules (USFS 2004g). According to a report from the nonpartisan Congressional Research Service, the new rule suggests that IRAs "would be presumed available for a variety of uses, including timber harvests, subject to unit-by-unit planning processes" (Baldwin 2004).

Off Highway Vehicle (OHV) access

Historically, recreational use of the forests was non-motorized except on major forest roads. Beginning in the 1980s, however, the use of motorized recreational vehicles significantly increased (USFS 1999a). Currently, 1.1 million Arizonans, slightly more than 20% of the state's residents, identify themselves as motorized trail users (USFS 2003a, Arizona State Parks 2004). The popularity of OHVs creates yet another challenge to the FS's commitment towards balancing recreational use and forest health. OHV use can provide substantial economic advantages to the surrounding communities. According to Silberman (2003), OHV users spent a combined $398.3 million in 2002 in Coconino and Yavapai Counties, representing $19.7 million in state tax revenue. However, a number of studies have shown that OHV use also poses a threat to resources through trail deterioration, vegetation damage, reduced air and water quality, noise pollution, wildlife disruption, and social conflicts arising between different groups of recreational users such as hikers or bikers.

This, combined with the increased problems caused by illegal use, makes managing OHVs a topic of importance to the forests (Stokowski and LaPointe 2000, Bluewater Network 1999). In response, the PNF and four other Arizona national forests initiated a five-forest amendment for OHV travel. Still in the early stages at the time of this assessment, the Apache-Sitgreaves, Coconino, Kaibab, Prescott, and Tonto National Forests adopted a Draft Environmental Impact Statement (DEIS) that proposes limitations and/or restrictions on cross-country travel by OHV users on lands managed by the five forests. Several issues need to be resolved before these amendments can be adopted into existing forest plans, among them the feasibility of enforcing new OHV restrictions and the right of entry for individuals into certain areas for the purposes of cultural practices, fuelwood gathering, or retrieval of big game (USFS 2003a, USFS 2003c, Arizona State Parks 2004). Only the Coronado NF is not a party to the proposed amendment, having previously established forest rules regarding cross-country travel. Contrary to existing regulations in the PNF and other forests in Arizona, areas within the Coronado are considered closed unless otherwise posted. This has effectively prohibited the cross-country travel by OHVs that the five-forest amendment currently seeks to address.

A review of the FS-wide policy regarding OHV travel is also taking place at the national level. The draft national OHV policy, published in July 2004, would require forests to designate a system of roads and trails for OHV use. This process will likely require a considerable amount of time, personnel, and financial resources to complete (Roth, pers. comm.).

10. Summary of Key Findings and Recommendations

The communities surrounding the Prescott National Forest (PNF) have undergone substantial social and economic changes over the last twenty years. The purpose of this assessment has been to illustrate some of the more dramatic trends in key indicators and discuss their likely implications for future forest planning and management.

Among the most noteworthy trends in the area of assessment is a significant increase in population over the past two decades. Data show that overall population within the two counties surrounding the PNF increased by over ninety-eight percent between 1980 and 2000 with the strongest growth occurring in Yavapai County. Within this overall increase, growth in the retirement-age population and an upsurge in individuals of multiple race and Hispanic origin were particularly strong. Along with increases in population, the area witnessed a substantial growth in housing, including homes intended for seasonal use. Medium home values in the area surrounding the PNF also accelerated much more quickly than was average for the state of Arizona over the same period. Together, these trends warrant careful consideration by forest planners. Ultimately, a larger and more diverse population suggests not only an increased number of potential forest users but also a change in the level and nature of interaction between the PNF and surrounding communities.

The economy of northern Arizona is also likely to have a substantial impact on future planning and management of the PNF. Data suggest that economic growth in the region has been relatively strong, supported in part by strong gains in total part- and full-time employment in Yavapai County. The most significant economic gains between 1990 and 2000 were reported for the construction, wholesale trade, as well as finance and real estate sectors. Despite significant increases in per capita and family income and decreasing rates of poverty, data show that Coconino County remained economically limited when compared to statewide figures over the same period. Meanwhile, recent indicators of dependence on natural resources have shown mixed results. As a whole, the area of assessment experienced a substantial decline in income from wood products and processing and a slight increase in income from special forest products and processing. Both counties saw an increase in tourism employment with the gains in Yavapai County outpacing the statewide increase in tourism employment by over seventy percent. Although activities such as ranching and timber harvesting continue to play an important role in rural areas, recent years have seen a continued shift away from extractive industries and toward a regional economy that is increasingly dependent on the construction, real estate, and service sectors supporting growing urban populations. When combined with ongoing demographic changes, such factors are likely to have a direct impact on the PNF's role within the local and state economy.

A review of county comprehensive plans and long-range policies has demonstrated the importance of both travel patterns and land use characteristics surrounding the PNF. Though road conditions have generally improved over the last several decades, research shows that expansion of regional road networks has not kept pace with travel demands arising as a result of population and industry growth. Furthermore, previous transportation planning has not always been implemented in a way that supports long-range land use plans. Such plans reveal that the preservation of open space, the sustainable use of natural resources, and the use of public lands are of growing importance to regional planning authorities, government agencies, environmental advocates, and community residents. Increasing land values, the cost of infrastructure development, and limited water supplies are among the numerous factors that have made policy formation increasingly contentious in recent decades. The PNF has an opportunity to play an important role in the resolution of current and future transportation and land use issues by promoting sustainable regional planning policies, informing local stakeholders of the environmental and economic impacts of transportation and land use alternatives, and effectively involving surrounding communities in forest planning and management.

Concurrent with trends in the regional economy, there has been a measurable shift away from extractive uses of national forests. This trend is supported by national surveys showing continued declines in timber

harvesting, grazing and mining on forest lands. These same reports point toward a substantial increase in recreational uses of national forests in general and the PNF in particular. Data suggest that a significant increase in the use of OHVs is a primary reason for the Forest Service's growing concern over unmanaged recreation. These trends are consistent with the recent expansion of communities with high levels of natural resource amenities and signal a shift in the perceived role of forest lands. The PNF has the opportunity to incorporate these data on changing forest users and uses into future forest plan revisions and management priorities.

Although the incorporation of "special places" into forest management plans is a relatively new phenomenon, the PNF has designated over a hundred natural, cultural, and recreation sites within forest boundaries. Forest archeologists and recreation staff have also made considerable progress in identifying a number of areas throughout northern Arizona that are considered special by Native American tribes, descendents of early settlers, and wilderness enthusiasts. In the future, the PNF should continue to seek public input in identifying special places and planning for their protection.

Regional trends and Forest Service planning regulations have influenced the relationships between the PNF and surrounding communities. In particular, the protection of wildlife, the prevention of forest fire, the sustainable management of area watersheds, and the provision of land use policy have involved a diverse array of stakeholders. In recent years, growing attention has been paid to these issues given the general public's expectation for adequate participation in decisions affecting public land management. Although such relationships are inherently unique and dynamic, specific frameworks for monitoring and improving community-forest interaction may aid future PNF management objectives.

Finally, data suggest that a number of natural resource issues will continue to influence future management alternatives of the Prescott National Forest. The control of invasive species, management of fire and fuels, preservation of open space, and protection of regional biodiversity each carries important implications for future forest plans. Although an exhaustive analysis of these issues is beyond the scope of this assessment, research shows that each will be significantly impacted by ongoing socioeconomic trends.

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Appendix A. Industry Sectors for IMPLAN Data Analysis

Income from wood products and processing	
NAICS Sector	
133	Logging camps and logging contractors
134	Sawmills and planing mills
135	Hardwood dimension and flooring mills
136	Special product sawmills
137	Millwork
138	Wood kitchen cabinets
139	Veneer and plywood
140	Structural wood members
141	Wood containers
142	Wood pallets and skids
144	Prefabricated wood buildings
145	Wood preserving
146	Reconstituted wood products
147	Wood products, N.E.C.
148	Wood household furniture
152	Wood T.V. and radio cabinets
154	Wood office furniture
157	Wood partitions and fixtures
161	Pulp mills
162	Paper Mills-Except Building Paper
163	Paperboard Mills
164	Paperboard containers and boxes
165	Paper Coated & Laminated Packaging
166	Paper Coated & Laminated N.E.C.
168	Bags-Paper
169	Die-Cut paper and Board
170	Sanitary Paper Products
171	Envelopes
172	Stationary Products
173	Converted Paper Products N.E.C.

Income from special forest products and processing	
NAICS Sector	
22	Forest products
24	Forestry products
26	Agricultural-Forestry-Fishery Services

Tourism employment*	
NAICS Sector	
Retail	
449	General Merchandise Stores
450	Food Stores
451	Automotive Dealers and Service Stations
452	Apparel & Accessory Stores
455	Miscellaneous Retail
Restaurant / Bar	
454	Eating and drinking
Lodging	
463	Hotels and lodging places
477	Automobile Rental and Leasing
Amusements	
486	Commercial Sports Except Racing
487	Racing and Track Operations
488	Amusement and Recreation Services
489	Membership Sports and Recreation Clubs

* Discounted according to the Travel Industry Association of America Tourism Economic Impact Model (TEIM). TEIM attributes the following percentages of gross sales to tourism: lodging (95%), restaurant/bar (23.62%), retail (10.91%), and amusements (6.43%).

Source: Arizona Tourism Statistical Report 2003, Arizona Office of Tourism (AZOT)

Appendix B. Indirect Economic Effects of Forest-Related Products in the Prescott National Forest

Output, Value Added and Employment

July 26, 2005

Base Year: 2002

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	Industry	Industry Output*	Employment	Employee Compensation*	Proprietor Income*	Other Property Income*	Indirect Business Tax*	Total Value Added*
1	11 Ag, Forestry, Fish & Hunting	140.229	1,164.991	10.099	1.952	7.358	3.891	23.301
19	21 Mining	140.256	1,087.005	43.767	-9.040	32.496	6.150	73.374
30	22 Utilities	69.428	306.700	15.242	0.773	17.495	5.473	38.982
33	23 Construction	1,215.233	11,368.966	311.666	100.688	47.608	5.470	465.431
46	31-33 Manufacturing	1,120.358	5,832.594	231.468	32.746	139.039	8.583	411.837
390	42 Wholesale Trade	315.765	2,896.593	119.510	6.830	49.654	52.619	228.613
391	48-49 Transportation & Warehousing	382.966	3,677.737	140.883	17.479	31.294	11.123	200.779
401	44-45 Retail trade	875.233	16,156.737	349.204	51.763	130.192	128.291	659.449
413	51 Information	196.653	1,217.859	40.743	5.650	32.513	6.358	85.264
425	52 Finance & insurance	295.488	2,290.876	73.296	7.708	75.122	5.845	161.971
431	53 Real estate & rental	396.845	5,085.630	46.521	24.221	148.250	36.456	255.448
437	54 Professional- scientific & tech svcs	291.442	3,970.866	99.473	77.428	29.685	3.789	210.375
451	55 Management of companies	13.784	138.117	5.848	0.285	2.744	0.145	9.022
452	56 Administrative & waste services	209.362	4,802.757	78.063	11.559	16.224	3.726	109.572
461	61 Educational svcs	88.664	2,222.493	48.033	-0.082	1.133	0.502	49.586
464	62 Health & social services	958.049	13,539.026	439.659	54.883	52.986	7.190	554.718
475	71 Arts- entertainment & recreation	147.411	2,764.303	45.807	6.078	15.002	8.617	75.504
479	72 Accomodation & food services	667.057	16,641.823	227.191	13.318	67.267	40.736	348.512
482	81 Other services	374.562	7,459.057	131.332	31.514	9.195	4.874	176.914
495	92 Government & non NAICs	1,970.930	22,030.856	991.247	0.000	672.410	78.143	1,741.799
	Totals	9,869.715	124,654.985	3,449.051	435.753	1,577.666	417.981	5,880.451

*Millions of dollars