

Socio-Economic Assessment for the Coronado National Forest

Prepared for the Southwest Region
USDA Forest Service



The University of Arizona
School of Natural Resources

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Socioeconomic Assessment
of the
Coronado National Forest

Prepared for:

The Coronado National Forest
300 W. Congress St.
Tucson, AZ 85701

and

USDA Forest Service Region 3
(Southwestern Region)
333 Broadway SE
Albuquerque, NM 87102

Submitted by:

Arizona National Forests Socioeconomic Assessment Team
The University of Arizona
School of Natural Resources
312 BioSciences East
P.O. Box 210043
Tucson, AZ 85721-0043

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The cover photo, also featured in *Tapamveni: The Rock Galleries of Petrified Forest and Beyond*, by Pat McCreery and Ekkehart Malotki, represents prehistoric Native American rock art from an area north of Sitgreaves N.F. The exact location is not specified in order to protect the art. The photograph is courtesy of Professor Ekkehart Malotki of Flagstaff, AZ.

This report was developed through the combined efforts of the Socioeconomic Team.
Members include the following individuals:

J.E. "Ed" de Steiguer, Ph.D.	Principal Investigator
Tom Spangler	Project Manager
Sara Jensen	Research Specialist/Writer
Ian MacDonald	Writer / Editor
J.R. Owens	Data Analyst
Denise Fisher	Research Specialist
Cori Carveth	Research Specialist
Julie Michael	Research Specialist

Abstract

This report presents a socioeconomic assessment of the six-county area surrounding the Coronado National Forest. The assessment is based on analysis of secondary data 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 each county, it also discusses issues of natural and cultural resource protection common to the entire region.

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Acronyms

AACE	Arizona Association of County Engineers
AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway Transportation Officials
ADOC	Arizona Department of Commerce
ADOT	Arizona Department of Transportation
ADT	Average Daily Traffic Count
ADWR	Arizona Department of Water Resources
ALA	American Lands Alliance
AMA	Active Management Area
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
CLIMAS	Climate Assessment for the Southwest
CNF	Coronado National Forest
DN	Decision Notice
EA	Environmental Assessment
EIS	Economic Impact Study
EMA	Ecosystem Management Areas
FHWA	United States Department of Transportation Federal Highway Administration
FONSI	Finding of No Significant Impact
GIS	Geographic Information System
INA	Irrigation Non-expansion Area
INEGI	Instituto Nacional de Estadística, Geografía e Informática
IRA	Inventoried Roadless Areas
ITS	Intelligent Traffic Systems
KNF	Kaibab National Forest
LEIMARS	Law Enforcement and Investigations Management Attainment Reporting System
MCD	Minor Civil Division
MIG	Minnesota IMPLAN Group
MTP	Metropolitan Transportation Plan
MUCD	Mixed Use Compact Development
NAFTA	North American Free Trade Agreement
NAICS	North American Industry Classification System
NFMA	National Forest Management Act
NMDOT	New Mexico Department of Transportation
NRDC	National Resources Defense Counsel
NRIS	Natural Resource Information System
NSRE	National Survey on Recreation and the Environment
NVUM	National Visitor Use Monitoring
OHV	Off Highway Vehicle

Acronyms

PAD	Planned Area Development
PAG	Pima Association of Governments
PILT	Payments in Lieu of Taxes
PNF	Prescott National Forest
PPI	Per Capita Personal Income
PRIA	Public Rangelands Improvement Act
RAP	Roads Analysis Process
RARE	Roadless Area Review and Evaluation
ROS	Recreation Opportunity Spectrum
RTP	Regional Transportation Plan
SCCF	Sonoita Crossroads Community Forum
SDCP	Sonora Desert Conservation Plan
SEAGO	South Eastern Arizona Governments Organization
SEDOSOL	Secretaría de Desarrollo Social
SOPA	Schedule of Proposed Action
SVPP	Sonoita Valley Planning Partnership
SWCPP	Sitgreaves Communities' Wildfire Protection Plan
TEIM	Tourism Economic Impact Model
TEP	Tucson Electric Power Company
TIP	Transportation Improvement Program
TNC	The Nature Conservancy
USDHHS	United States Department of Health and Human Services
VMT	Vehicle Miles Traveled
VPD	Vehicles per Day
WMA	Waste Management of Arizona

Executive Summary

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

Multi-county areas of assessment provide a framework for the compiling of social and economic data for this report. The boundaries of the Coronado National Forest abut the state of Sonora, Mexico and extend into five Arizona counties and one in the state of New Mexico. 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. The following section 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 Pinal and Santa Cruz Counties over the twenty-year period. However, total population growth within the entire six-county area of assessment was less than that for the state of Arizona as a whole over the same period (61% versus 89% respectively). Population growth was considerably less in the more rural areas of Cochise, Graham, and Hidalgo Counties. Among individual cities, Oro Valley, Apache Junction, Nogales (Sonora), and Agua Prieta experienced the greatest increases in total population between 1980 and 2000.

Population age

Within the area of assessment, the population of individuals age 65 and over grew at a much greater rate between 1980 and 2000 than that of those under age 18. The greatest disparities between the growth of the 65-and-over and under-18 populations were seen in Pinal, Hidalgo, Cochise, and Santa Cruz Counties. The cities of Oro Valley, Catalina, and Apache Junction experienced increases in 65-and-over populations that were the largest among all of the selected cities within the area of assessment.

Racial / ethnic composition

The decade between 1990 and 2000 saw a significant increase of multiple-race individuals in five of the six counties within the area of assessment, mirroring statewide trends for Arizona and New Mexico. The lone exception to this trend was Santa Cruz County, which saw an increase in the multiple-race population that was much lower than overall population growth for the county within the same period. Despite substantial increases in individuals of multiple-race and Hispanic ethnicity, whites remain the predominant racial group in each county within the area of assessment.

Housing

Increases in total housing and housing density were greatest in Pinal and Santa Cruz Counties between 1990 and 2000, mirroring growth in the state population as a whole. A clear trend in each of the six counties was the significant increase in the number of houses for seasonal use. Seasonal housing increases exceeded state averages for five of the six counties, the lone exception being Graham County which saw only a 35% increase in seasonal housing.

Economic Characteristics and Vitality

Employment

Economic growth for the area of assessment was relatively limited between 1990 and 2000. Gains in total full- and part-time employment for each of the six counties in the area of assessment were below those for their corresponding states between 1990 and 2000. Although each of the counties in Arizona witnessed a substantial increase in construction jobs, none of them matched the rate of increase in construction employment for Arizona overall, which was nearly 84% between 1990 and 2000. Considerable job losses in the mining sector were reported for Cochise, Pinal, and Santa Cruz Counties, reflecting a similar trend for the state of Arizona as a whole. Within the area of assessment, significant gains were made between 1990 and 2000 in the finance, insurance, and real estate (F.I.R.E.) industries as well as the service and government sectors.

Occupational structure

Data show that five of the six counties within the area of assessment maintain occupational structures very similar to those of the states of Arizona and New Mexico as a whole. The management, professional, and related occupations grouping is the dominant occupational category for both states followed by sales and office occupations and, finally, by service occupations. The exception is Hidalgo County, where service was slightly more predominant than either sales and office occupations or management, professional, and related occupations as of 2004. For each of the counties within the area of assessment, construction, extraction, and maintenance, along with production, transportation, and material moving, was among the five most dominant occupational categories.

Income

As of 2000, each of the six counties within the area of assessment maintained levels of per capita and median family income that were lower than state averages. Pinal County saw the greatest increases in per capita and median family income between 1990 and 2000. Both Pinal and Graham Counties 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, each of the counties maintained rates of poverty greater than those for its respective state. Within the area of assessment, Hidalgo and Santa Cruz Counties reported the highest rates of individual and family poverty as of 2000.

Natural resource dependent economic activity

The area of assessment experienced a relatively strong increase in income from wood products and processing between 1990 and 2000, outstripping gains at the state level over the same period. Meanwhile, losses in income from special forest products and processing were also greater than those for the state of Arizona as a whole. Within the area of assessment, Cochise, Graham, and Pima Counties reported the greatest increases in tourism employment between 1990 and 2000.

Access and Travel Patterns

Existing federal and state road networks

County and state transportation plans reviewed for this assessment acknowledge that current circulation networks have been developed to fit arising needs but are 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 likely to continue given patterns of development in rural areas and the expense of developing infrastructure for alternative modes of transportation. Increase in vehicle miles traveled (VMT) was greatest in Pinal County between 1990 and 2000—an expected result of population increases over the same period. Peak traffic flow for most of the area of assessment occurs between the months of February and April, and traffic is lowest from July to September. The exception is the Interstate 10 corridor, which reaches a peak in December. 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 plans for a number of road improvements in proximity to the Coronado National Forest over the next five years, most of which entail road widening and resurfacing. Similarly, county governments throughout the area of assessment envision improvements to arterial road networks to accommodate expected population growth. There are currently no plans to expand the existing network of internal roads in the Coronado 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 Coronado National Forest is the passage of forest roads and trails through 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 differs from overall ownership patterns for the state of Arizona in that it involves relatively large amounts of private acreage and State Trust land, both of which are likely to have a considerable impact on future development patterns throughout the region. Hidalgo, Cochise, and Santa Cruz Counties reported the greatest amounts of private land as of 2005 while Pima and Graham Counties had the least. The percentage of State Trust land was greatest in Pinal and Cochise Counties. Santa Cruz County has far and away the greatest amount of national forest land, and Graham and Pima Counties reported the highest percentage of land owned by Native American entities.

Land coverage and land use

Shrub, brush, and mixed range constituted the predominant land cover in five of the six counties in the area of assessment. The lone exception was Santa Cruz County, which reported a considerable portion of evergreen forest land and a relatively high percentage of herbaceous land cover. Within the area of assessment, Pinal County reported the highest percentage of residential cover while Pima County reported the greatest amount of commercial, services, industrial, and urban 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 farming and 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 debate over preservation of open space has gained increased attention throughout the region as elements such as the *Sonoran Desert Conservation Plan* draw both support and opposition from diverse stakeholders. 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. These national trends are supported by information which suggests a similar decline in livestock grazing and mining on lands managed by the Coronado National Forest.

Non-extractive uses

Although recreational 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 Coronado National Forest received over 2 million visits during fiscal year 2001—the majority of which were male, white, and between the ages of 31 and 70. The Forest Service has identified the significant increase in off-highway vehicle activity as a major component of unmanaged recreational use.

Special uses

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

Illegal uses

In the Coronado National Forest, undocumented immigrants are the most common type of “illegal users.” The region has seen a gradual increase in the migration of undocumented immigrants since 1994 with particularly large numbers of crossings and apprehensions in the Nogales, Sierra Vista, and Douglas Ranger Districts.

Designated Areas and Special Places

Natural, recreational, and interpretive resources

The Coronado National Forest encompasses considerable natural, recreational, cultural, and interpretive resources including over 400 dispersed sites, campgrounds, picnic areas, and scenic areas. Although special places are inherently difficult to identify and categorize, the Coronado National Forest is home to a number of identifiable places considered special by various user groups. They include numerous mountain ranges, canyons, springs, caves, and cultural sites scattered throughout the Sky Islands of southeastern Arizona.

Issues surrounding identification of special places as 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, the 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 Coronado 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 continued local interest in the use and management of these resources and particularly intense concern surrounding fire control and prevention, illegal activity along the U.S.-Mexico border, and management of wildlife and regional water supplies.

Communities of interest and historically underserved communities

The management activities of the Coronado 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 Coronado 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 grows, 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 the future management activities of the Coronado 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 over border security will continue to be important issues for the Coronado National Forest.

Given rates of population growth and urban expansion in southern Arizona, the Coronado 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 Coronado 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 Coronado 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 off-highway vehicle travel promises to raise concerns from various user groups and affect natural resource management in the Coronado 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 Coronado National Forest (CNF) by showing the relationship and linkages between National Forest System land and local 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 assess the consequences of potential forest management options.

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

1.2 Assessment methodology and topics

This assessment of the social and economic environment surrounding the CNF is based entirely on the analysis of secondary research. Secondary research is commonly understood as data which have already been collected and published for different purposes but which may prove useful to any number of other inquiries or applications. Examples of secondary data include demographic and economic information obtained from the United States Census Bureau or through review of 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 USDA Forest Service (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 preferred 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 CNF, this includes Graham, Cochise, Pima, Pinal, and Santa Cruz Counties in Arizona as well as Hidalgo County in New Mexico. Where appropriate, social and economic trends for the area of assessment are compared to those for the states of Arizona and New Mexico. It should be noted, however, that statewide trends for Arizona are significantly influenced by Maricopa County, which was home to nearly sixty percent of the entire state population as of 2000.

In addition to analyzing information at the county and regional levels, this assessment includes data on individual communities of interest to Coronado NF. 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 area of assessment for the CNF also includes the state of Sonora, Mexico and the individual towns of Agua Prieta, Naco, and Nogales. Due to

limited access and comparability, information on areas within Sonora, Mexico is primarily limited to existing demographic and economic data and does not include details on road networks, land use, or community and cultural resources.

This 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 U.S. Forest Service Natural Resource Information System (NRIS), the Arizona Department of Transportation (ADOT), county comprehensive plans, 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 CNF and local communities in analyzing and monitoring 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 the 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 the 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 Coronado NF and discusses their importance to forest management. Chapter 8 assesses relationships between the CNF 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 separate, complete annotated bibliography will be presented to individual forests alongside the assessments.

2. Demographic Patterns and Trends

This section discusses both the historic and current conditions affecting local populations and illustrates demographic trends for each of the six counties within the area of assessment for Coronado National Forest (CNF). Data on selected cities within the area of assessment are provided in order to illustrate important factors contributing to demographic changes in specific populations. Demographic data for Arizona; New Mexico; and Sonora, Mexico are also included, forming a basis to compare trends among the border states. Indicators used to assess demographic patterns and trends include total population, racial/ethnic origin, urban versus rural populations, age structure, educational attainment, and housing density.

A review of secondary social data affirms that Tucson is by far the largest city within the area of assessment. However, the two most recent censuses report that population growth in both Pinal and Santa Cruz Counties exceeded that of Pima County over the twenty-year period between 1980 and 2000. Among selected cities within the area of assessment, Oro Valley, Apache Junction, and Catalina have all seen substantial increases in population as well as total and seasonal housing units since 1990. With the exception of Graham County, the region's population is predominantly urban despite considerable increases in the rural populations of Cochise and Pima Counties between 1990 and 2000. Five of the six counties in the area of assessment became more racially and ethnically diverse between 1990 and 2000 largely as the result of substantial increases in multiple race and Hispanic populations.

2.1. Historical context and social characteristics

Sheridan (1995) describes the time from the fifteenth to the nineteenth centuries in what is now Arizona as the convergence of the Athapaskan (Apache and Navajo), Hispanic, and Anglo American cultures on the Native American groups already living in that area, including the Hopi, River Yuman, Upland Pais, and Piman (O'odham and Sobaipuri) peoples. As the first Hispanic missionaries entered central and southern Arizona, those areas were populated by Piman-speaking groups that may have descended from the much older Hohokam civilization. These groups farmed corn, beans, and squash along the region's rivers, particularly the Santa Cruz (dominated by the Tohono O'odham or Papago), the San Pedro (dominated by the Sobaipuris), and their tributaries (Sheridan 1995, Hadley and Sheridan 1995).

In 1540, less than two decades after the Spanish entered the New World, Francisco Vasquez de Coronado entered what is now the modern southern boundary of the United States at a point on the San Pedro River in Cochise County. Coronado was in search of gold and precious minerals that legends claimed were to be found in the area, but of which the native tribes were unaware. At the time, of course, Coronado could not imagine the wealth in minerals under the surface that would later bring in a booming mining industry. Coronado and his troops continued into northern Arizona and New Mexico on an expedition in search of the mythical seven cities of Cibola. While the sought-after treasures were never found, Coronado's entrada laid the groundwork for the process of Spanish colonization over the following three hundred years. The route they followed later became Route 666, which originates in Cochise County. It is now the Coronado Trail Scenic Byway, which runs through the Apache National Forest. A museum has been established at the point where Coronado was said to have crossed and is part of the Coronado National Memorial (Houston Institute 2005, Sheridan 1995).

When the Jesuit missionary Padre Eusebio Kino entered modern southern Arizona in the late 17th century, Apaches and other raiding groups had banded together to attack these Piman-speaking groups and were in the process of either "displacing or assimilating" them (Hadley and Sheridan 1995). It is not clear when the Pimans or the Apaches first arrived in the area, but by the 18th century, the groups that later came to be known as Chiricahua Apaches had learned to tame wild Spanish horses and had spread throughout the Peloncillo, Dragoon, Dos Cabezas, Chiricahua, and probably Huachuca mountain ranges. They gathered

wild foods as well as engaging in some agriculture and generally preferred higher elevations than the Pimans and descended from the highlands to raid the more agricultural settlements (Sheridan 1995).

Many of the threats that faced Piman-speaking farmers also confronted subsequent waves Hispanic and Anglo settlers. Apache attacks, the marginal environment, disease, and other factors slowed Spanish missionaries, early Hispanic farmers and ranchers, Anglo trappers, Gold Rush migrants, and early U.S. settlements. The Treaty of Guadalupe-Hidalgo was signed in 1848, ending the U.S. war with Mexico and bringing California and New Mexico (including Arizona north of the Gila River) under U.S. control. The 1853 Gadsen Purchase added southern Arizona and the Mesilla Valley of New Mexico. The Southern Pacific Railroad followed soon after. For nearly forty years, continuing aggression between the Apaches and the westward-bound Americans kept the area sparsely populated. However, the U.S.'s military conquest of Native American groups opened the doors to large-scale Anglo settlement. A year after the surrender of Geronimo, the area became a major mining center with Tombstone at its heart (Houston Institute 2005). Arizona's extensive livestock industry was born, and a series of extractive booms and busts (most notably mining, cattle, and cotton) followed.

The current boundaries of the CNF are the result of an amalgamation of numerous forest reserves and national forests. In 1902, the Santa Rita, Santa Catalina, Mount Graham, and Chiricahua Forest Reserves were established, followed four years later by the Huachuca and the Tumacacori Forest Reserves. The following year, the Dragoon National Forest was established. In 1927, two natural areas were put aside for scientific research, including the Santa Catalina area. By 1930, land from the various forests and reserves had been combined to form the CNF, which at the time was one of fourteen such forests in the region. In 1938, land was transferred from the Coronado to the Chiricahua National Monument, which was established in 1924 on a site previously home to the Faraway Ranch guest house, owned by Swedish immigrants. By the late 1950s, the Crook National Forest had been dissolved and its lands split between the Coronado, Tonto, and Gila National Forests (Baker et al. 1988).

Today, the scattered holdings of the CNF cover over 2,600 square miles of land ranging in elevation from 3,000 to over 10,000 feet (on Mt. Graham) in southeastern Arizona and southwestern New Mexico. The area is rich in vegetation zones including desert grasslands, Douglas fir and Ponderosa pine forests, and saguaro-covered desert, all of which harbor a diversity of wildlife including numerous bird species, reptiles, mammals, and large predators such as bears and even jaguars. Its long stretches of grassland make it a historical grazing area, and its variety of elevations allows for year-round recreational use.

The recent demographic history of the area surrounding the Coronado NF, and the region as a whole, represents one of sustained and rapid growth. Since 1930, the Mountain West has doubled its share of the U.S. population, from 3% to 6.5%. Growth increased dramatically in the 1950s and then declined again in the 1960s. This pattern of growth was repeated for the next forty years, with alternating decades of intense growth followed by decades of slower growth (Otterstrom and Shumway 2003). Following a period of population loss in Cochise and Santa Cruz Counties between 1920-1950, the Arizona counties into which the forest boundaries extend have grown steadily from 240,000 residents to over 1.2 million (Forstall 1995, U.S. Census Bureau 2005). Washington and Arizona are the only two states to show such startling demographic expansion (U.S. Census Bureau 2005). The average age in the state has been steadily increasing: 31% of the state population was under 15 in 1950, but only 22.4% fall 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 in the state has increased from 20.4% to 25.2% of the population since 1940, the African American cohort, despite an especially rapid influx during the two decades following WWII and an average population growth rate of 49% per decade, has remained static, sitting 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 total population, 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.

The past fifty years of increased growth is considered to be a marked pattern for the region, and more of the same is likely in the near future. As local populations increase, additional pressure for space continually affects the borders, integrity, and biodiversity of the federal lands surrounding such growing communities as homes abut forested land and a higher concentration of visitors travel to favored forest destinations (USFS 1999a).

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.

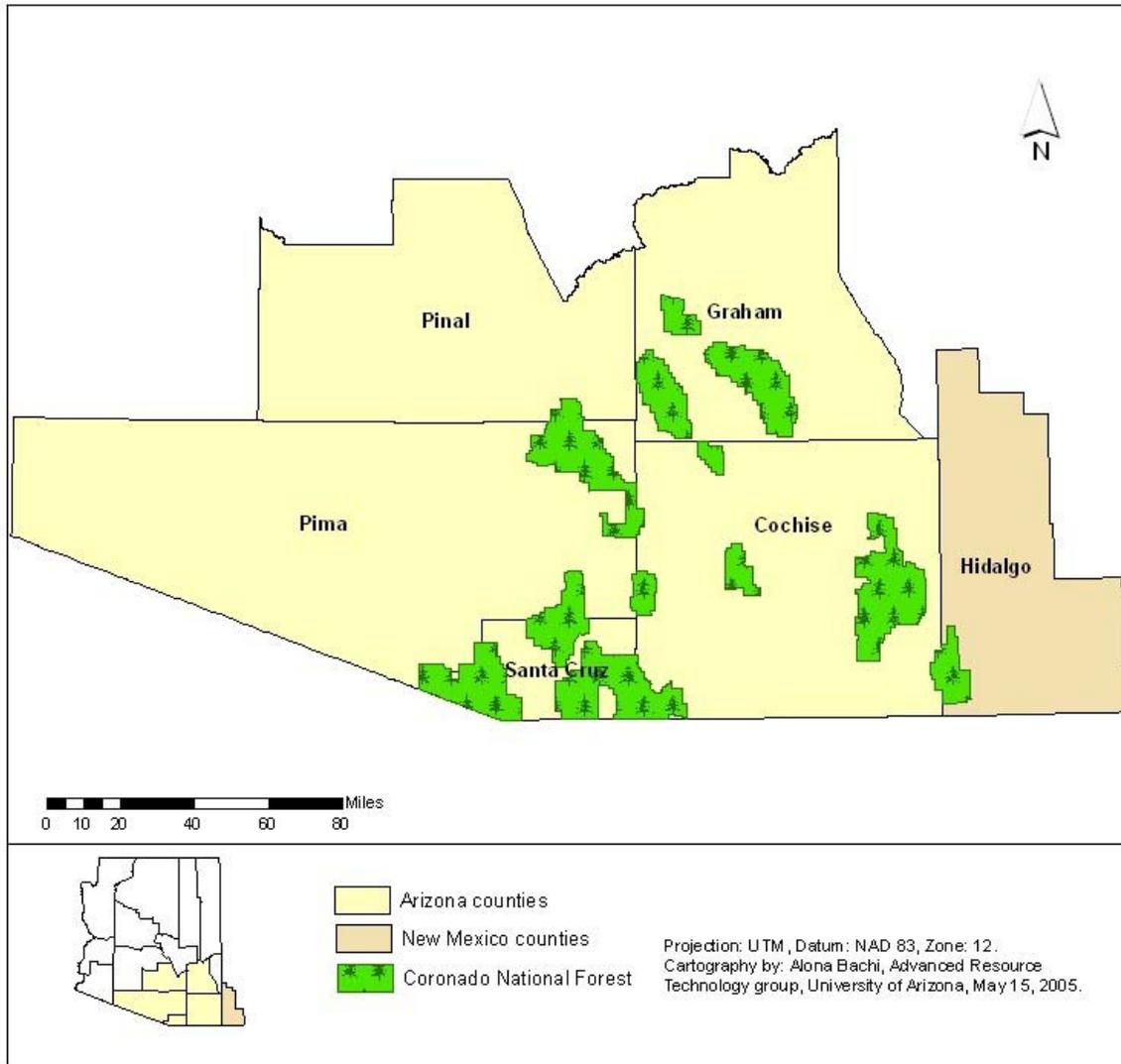


Figure 1. Map of Forest Boundaries and Counties in Area of Assessment

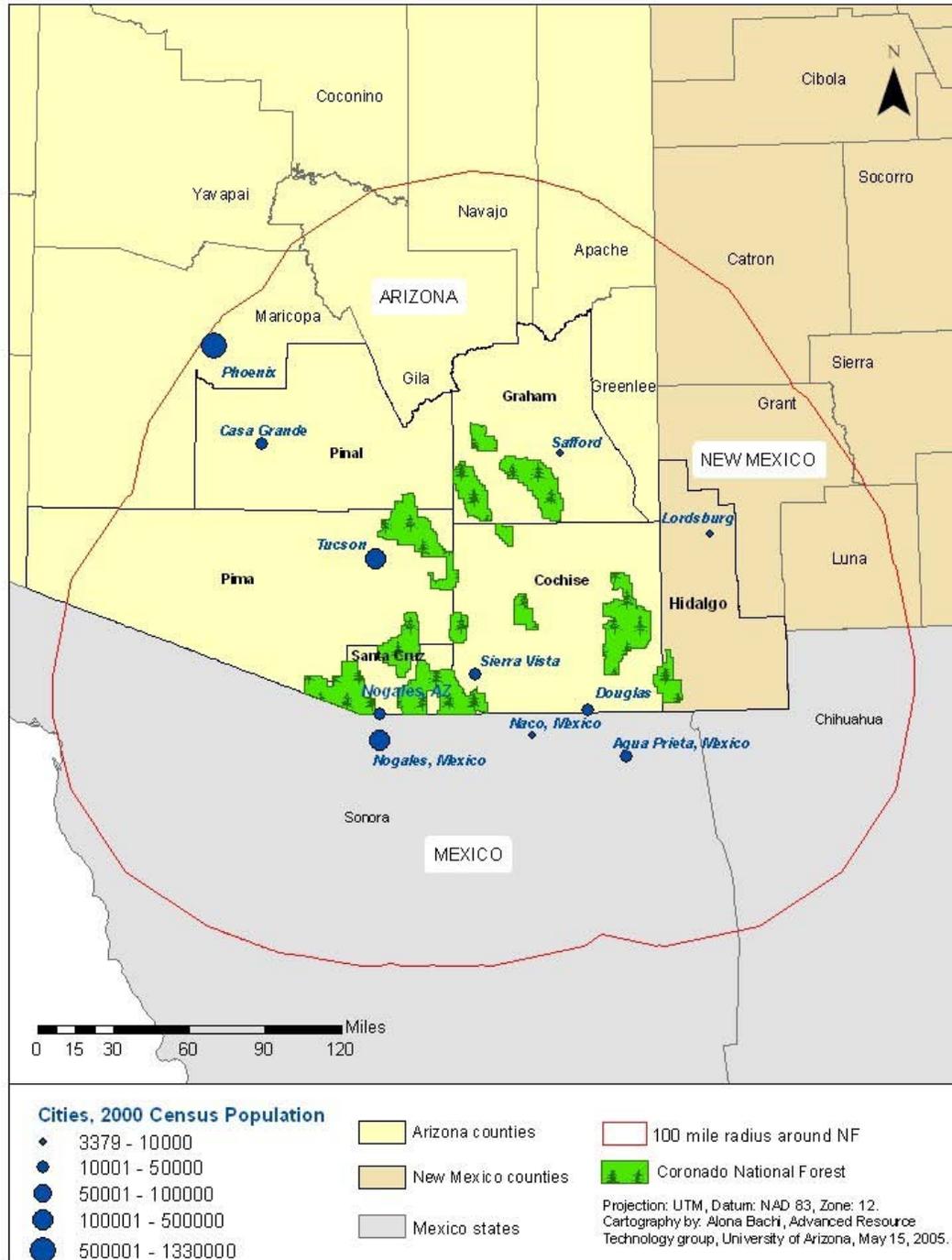


Figure 2. Proximity of Population – Municipalities within 100-mile Radius

2.2 Population, age structure, net migration, and tourism

Information concerning total land area, U.S. Forest Service (USFS) acreage, total population, and population density for each of the six counties and selected places is presented in Table 1. Data identify Pima County as both the largest and the most populous county in the region, but Cochise County holds the largest amount of Forest Service (FS) land with over 490,000 acres. Population density within the area of assessment ranges from 91.8 individuals per square mile in Pima County to 1.7 individuals per square mile in sparsely populated Hidalgo County, New Mexico. Tucson is the most populous of the selected cities within the area of assessment followed by Nogales and Agua Prieta, both located in Sonora, Mexico. Due to the unavailability of total land area statistics at the time of this assessment, it was not possible to calculate population density for the three cities in Sonora.

Data on population change for each of the six counties as well as the selected places are presented in Table 2. These data show that, in general, the population growth of counties in the region did not match the statewide growth rate in Arizona, which itself was roughly double the rate of population growth in New Mexico over the same period. The exceptions to this trend are Santa Cruz County, which experienced a population increase of 45.05% between 1980 and 1990, and Pinal County, which saw an increase of 54.43% from 1990 to 2000. Both of these counties significantly exceeded the statewide growth rate over the same period. Among the selected cities within the area of assessment, Oro Valley has grown most dramatically, sustaining a growth rate of over 345% between 1980 and 2000. Coolidge, Apache Junction, Marana, and Green Valley also experienced significant population growth, particularly between 1980 and 1990. Interestingly, the data show that Hidalgo County's population has continued to decline over the past two decades, further eroding a very limited population base. In Sonora, the cities of Nogales and Agua Prieta have also experienced dramatic growth at various stages over the last two decades. Although population growth statistics reported by the Instituto Nacional de Estadística Geografía e Informática (INEGI) report increases in residents of the state and municipalities, they do not account for the significant transient populations of cities along the U.S.-Mexico border. Various estimates suggest that during the peak season for labor migration, daily populations of Agua Prieta, Naco, and other border communities may be double that of the permanent, year-round population (Ibarra 1997, USDHHS 2002). Long-term population change for the six-county area of assessment is also displayed in Figure 3, demonstrating a relatively dramatic increase in the population of Pima County, particularly in the years following World War II.

Table 3 presents urban and rural population data from the three most recent censuses and the percent change by county. Data confirm an overall trend towards urbanization in Arizona over the last two decades with a few notable exceptions. Graham County alone maintained a predominantly rural population. Although Santa Cruz County experienced a significant increase in its rural population, particularly between 1980 and 1990, the majority of its population continues to reside in urban areas. The rural populations of Cochise County and Pima Counties also increased between 1990 and 2000 significantly (35.29% and 41.13% respectively).

Although Pinal County undoubtedly underwent a process of urbanization during this decade, the dramatic increase in urban population depicted in Table 3 (593%) is likely due to a change in reporting criteria adopted by the U.S. Census Bureau. In 1980, urban populations were defined strictly as those living in urban areas—areas determined according to minimum total population and population density criteria not met by the city of Casa Grande and expanding areas such as Apache Junction, Queen Creek, and others outside of the Phoenix and Tucson metropolitan areas. In 1990, however, reporting criteria for urban populations was changed to include those living *in* urban areas as well as those living in the suburbs *outside* urban areas. This shift likely accounts for much of the total population growth for Pinal County between 1980 and 1990, contributing to a somewhat skewed increase in urban versus rural populations. The aggregated change in rural and urban populations for the entire six-county assessment area over the same period is displayed in Figure 4.

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
Cochise County	6,169	117,755	19.1	490,182
Sierra Vista	153.5	37,775	246.09	n/a
Douglas	7.7	14,312	1,858.70	n/a
Bisbee	4.8	6,090	1,268.75	n/a
Benson	35.7	4,711	131.96	n/a
Willcox	6	3,733	622.17	n/a
Graham County	4,629	33,489	7.2	396,174
Safford	7.9	9,232	1,168.61	n/a
Thatcher	4.4	4,022	914.09	n/a
Hidalgo County, NM	3,446	5,932	1.7	76,589
Lordsburg	8.4	3,379	402.26	n/a
Pima County	9,186	843,746	91.8	389,871
Tucson	194.7	486,699	2,499.74	n/a
Oro Valley	31.8	29,700	933.96	n/a
Green Valley	26.2	17,283	659.66	n/a
Catalina	13.9	13,556	975.25	n/a
Marana	72.7	7,025	96.63	n/a
South Tucson	1.0	5,490	5,490.00	n/a
Pinal County	5,374	179,727	33.44	223,155
Apache Junction	34.2	31,814	930.23	n/a
Casa Grande	48.2	25,224	523.32	n/a
Florence	8.3	17,054	2,054.70	n/a
Eloy	71.7	10,375	144.70	n/a
Coolidge	5.0	7,786	1,557.20	n/a
Queen Creek	25.8	4,316	167.29	n/a
Santa Cruz County	1,238	38,381	31	418,302
Nogales	20.8	20,878	1,003.75	n/a
Patagonia	1.2	881	734.17	n/a
Sonora, Mexico	184,934	2,216,969	12	n/a
Nogales	-	159,787	-	n/a
Agua Prieta	-	61,944	-	n/a
Naco	-	5,370	-	n/a

Source: NRIS - Human Dimensions

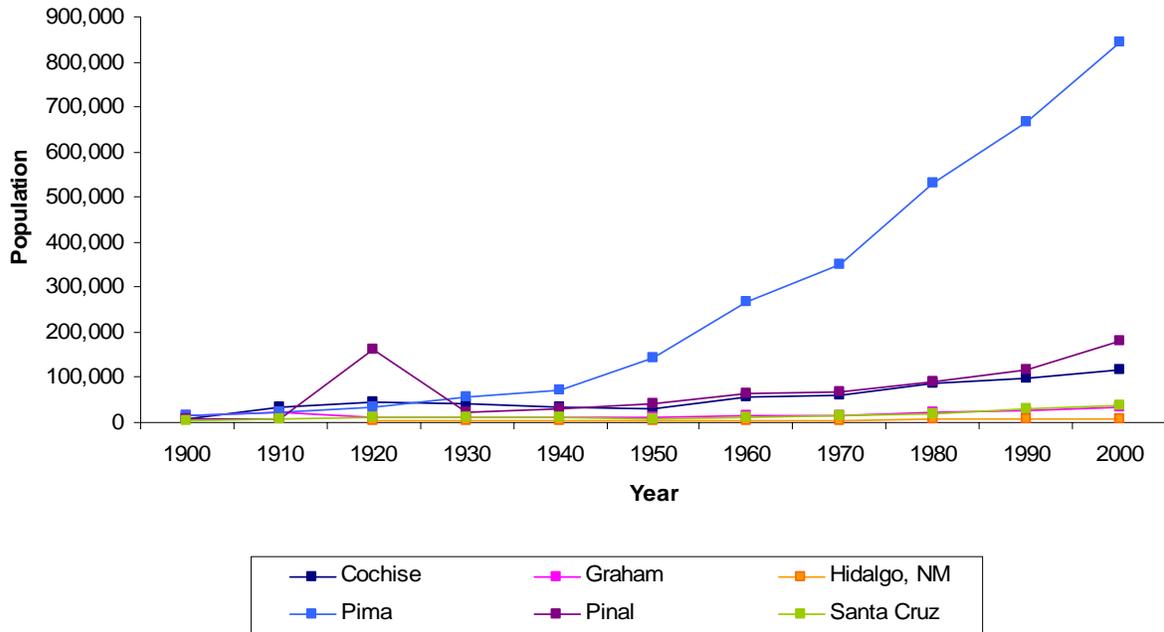
*Population density for areas in Mexico expressed in individuals per square kilometer

<http://www.inegi.gob.mx/est/contenidos/espanol/tematicos/mediano/mun.asp?t=mpob103&c=3850&e=26>
<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	1990-2000
	1980	1990	2000	% Change	% Change
Cochise County	85,686	97,624	117,755	13.93%	20.62%
Sierra Vista	24,937	32,983	37,775	32.27%	14.53%
Douglas	13,058	12,905	14,312	-1.17%	10.90%
Bisbee	7,154	6,288	6,090	-12.11%	-3.15%
Benson	4,190	3,824	4,711	-8.74%	23.20%
Willcox	3,243	3,122	3,733	-3.73%	19.57%
Graham County	22,862	26,554	33,489	16.15%	26.12%
Safford	7,010	7,359	9,232	4.98%	25.45%
Thatcher	3,374	3,763	4,022	11.53%	6.88%
Hidalgo County, NM	6,049	5,958	5,932	-1.50%	-0.44%
Lordsburg	3,195	2,922	3,379	-8.54%	15.64%
Pima County	531,443	666,880	843,746	25.48%	26.52%
Tucson	330,537	405,390	486,699	22.65%	20.06%
Oro Valley	1,489	6,670	29,700	347.95%	345.28%
Green Valley	7,999	13,231	17,283	65.41%	30.63%
Catalina	1,674	2,187	13,556	30.65%	519.84%
Marana	2,749	4,864	7,025	76.94%	44.43%
South Tucson	6,554	5,093	5,490	-22.29%	7.80%
Pinal County	90,918	116,379	179,727	28.00%	54.43%
Apache Junction	9,935	18,196	31,814	83.15%	74.84%
Casa Grande	14,971	19,082	25,224	27.46%	32.19%
Florence	6,851	7,510	17,054	9.62%	127.08%
Eloy	6,240	7,201	10,375	15.40%	44.08%
Coolidge	3,391	6,927	7,786	104.28%	12.40%
Queen Creek	n/a	2,478	4,316	n/a	74.17%
Santa Cruz County	20,459	29,676	38,381	45.05%	29.33%
Nogales	15,683	19,489	20,878	24.27%	7.13%
Patagonia	980	923	881	-5.82%	-4.55%
Arizona	2,718,215	3,665,228	5,130,632	34.84%	39.98%
New Mexico	1,302,894	1,515,096	1,819,046	16.29%	20.06%
Sonora, Mexico	1,513,731	1,823,606	2,216,969	20.47%	21.57%
Nogales	68,076	107,936	159,787	58.55%	48.04%
Agua Prieta	34,380	39,120	61,944	13.79%	58.34%
Naco	4,441	4,645	5,370	4.59%	15.61%

Source: NRIS - Human Dimensions
<http://www.sonora.gob.mx/portal/Runscript.asp?p=ASP/bg212.asp>



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

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

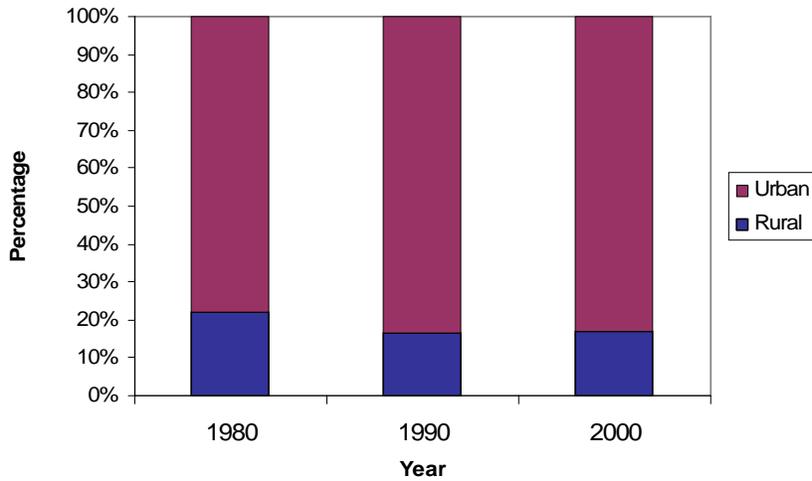
Table 3. Urban and Rural County Populations, 1980-2000 and % Change

County		1980*			1990			2000		
		Population	% of Total	% Change	Population	% of Total	% Change	Population	% of Total	% Change
Cochise	Urban	52,582	61.37%	n/a	68,359	70.02%	30.00%	78,163	66.38%	14.34%
	Rural	33,104	38.63%	n/a	29,265	29.98%	-11.60%	39,592	33.62%	35.29%
Graham	Urban	10,384	45.42%	n/a	11,122	41.88%	7.11%	14,829	44.28%	33.33%
	Rural	12,478	54.58%	n/a	15,432	58.12%	23.67%	18,660	55.72%	20.92%
Hidalgo (NM)	Urban	3,195	52.82%	n/a	2,922	49.04%	-8.54%	2,986	50.34%	2.19%
	Rural	2,854	47.18%	n/a	3,036	50.96%	6.38%	2,946	49.66%	-2.96%
Pima	Urban	450,059	84.69%	n/a	616,159	92.39%	36.91%	772,162	91.52%	25.32%
	Rural	62,633	11.79%	n/a	50,721	7.61%	-19.02%	71,584	8.48%	41.13%
Pinal	Urban	9,935	10.93%	n/a	68,908	59.21%	593.59%	116,082	64.59%	68.46%
	Rural	36,841	40.52%	n/a	47,471	40.79%	28.85%	63,645	35.41%	34.07%
Santa Cruz	Urban	15,683	76.66%	n/a	19,489	65.67%	24.27%	25,939	67.58%	33.10%
	Rural	4,776	23.34%	n/a	10,187	34.33%	113.30%	12,442	32.42%	22.14%

*Does not account for farming populations

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

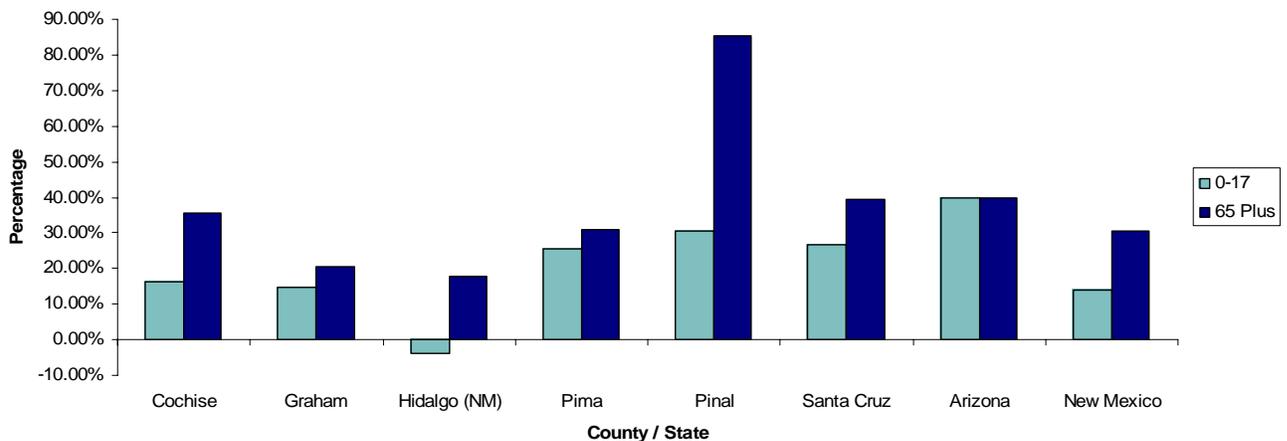
Source: NRIS - Human Dimensions



Source: NRIS - Human Dimensions

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

The age structure of populations for each of the six counties and their selected places is presented in Figure 5. The corresponding data in Table 4 show a clear difference in population trends for individuals under 18 and those 65 and over for each of the counties. Between 1990 and 2000, the county and state under-18 populations grew at a much slower rate than those populations 65 and over. The exceptions to this trend were the Sonoran cities of Nogales and Agua Prieta as well as the state of Arizona, all of which experienced considerable rates of growth in under-18 populations during the same period. The greatest disparities between the growth of the under-18 and 65-and-over populations were seen in Pinal, Cochise, Santa Cruz, and Hidalgo Counties, with Hidalgo actually losing a considerable portion of its already limited under-18 population. Among all counties, Pinal County demonstrated the most dramatic growth in the 65-and-over population with an increase of over 85%, well above the state average for the same group. The cities of Catalina and Oro Valley experienced increases in 65-and-over populations that were the largest among all of the selected cities within the area of assessment (519.14% and 437.48% respectively). Similarly, these two cities were the only two that had dramatic increases in their under-18 populations over the ten-year period. All other counties in the area of assessment realized a growth in the 65-and-over population that was below that of the state as a whole.



Source: NRIS - Human Dimensions

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

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

County/Place/State	Under 18			65 And Over		
	1990	2000	% Change	1990	2000	% Change
Cochise County	26,687	30,999	16.16%	12,815	17,365	35.51%
Sierra Vista	8,815	9,755	10.66%	2,393	4,574	91.14%
Douglas	4,409	4,798	8.82%	1,861	1,873	0.64%
Bisbee	1,495	1,318	-11.84%	1,315	1,193	-9.28%
Benson	948	921	-2.85%	964	1,381	43.26%
Willcox	963	1,097	13.91%	505	597	18.22%
Graham County	8,793	10,077	14.60%	3,309	3,985	20.43%
Safford	2,300	2,790	21.30%	1,345	1,546	14.94%
Thatcher	1,285	1,110	-13.62%	463	499	7.78%
Hidalgo County, NM	1,959	1,882	-3.93%	685	808	17.96%
Lordsburg	944	1,078	14.19%	441	508	15.19%
Pima County	165,740	207,896	25.44%	91,257	119,487	30.93%
Tucson	98,889	119,617	20.96%	51,190	57,828	12.97%
Oro Valley	1,292	6,392	394.74%	1,254	6,740	437.48%
Green Valley	311	270	-13.18%	9,517	12,662	33.05%
Catalina	686	3,626	428.57%	209	1,294	519.14%
Marana	1,500	1,931	28.73%	655	990	51.15%
South Tucson	1,641	1,730	5.42%	659	549	-16.69%
Pinal County	34,537	45,081	30.53%	15,731	29,171	85.44%
Apache Junction	4,051	6,515	60.82%	4,611	8,050	74.58%
Casa Grande	6,247	7,797	24.81%	1,994	3,469	73.97%
Florence	865	1,294	49.60%	760	1,626	113.95%
Eloy	2,872	3,501	21.90%	557	661	18.67%
Coolidge	2,431	2,558	5.22%	929	1,040	11.95%
Queen Creek	986	1,528	54.97%	155	209	34.84%
Santa Cruz County	10,204	12,913	26.55%	2,947	4,114	39.60%
Nogales	7,048	7,228	2.55%	1,859	2,260	21.57%
Patagonia	281	184	-34.52%	164	188	14.63%
Arizona	978,783	1,366,947	39.66%	477,200	667,839	39.95%
New Mexico	446,439	508,574	13.92%	162,518	212,225	30.59%
	Under 15			65 And Over		
Sonora	652,577	719,618	10.27%	73,057	105,330	44.18%
Nogales	36,896	53,441	44.84%	3,317	4,383	32.14%
Agua Prieta	14,248	21,986	54.31%	1,288	2,005	55.67%
Naco	1,739	1,999	14.95%	178	219	23.03%

Source: NRIS - Human Dimensions
 XI Censo General de Población y Vivienda, 1990
<http://www.inegi.gob.mx/est/contenidos/espanol/tematicos/mediano/mun.asp?t=mpob93&c=3839&e=26>

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 Pinal County has been especially strong, fueled by the inward migration of individuals previously living outside the county. Conversely, net migration to Hidalgo County was particularly low between 1990 and 2000. Pinal County reported relatively high numbers of immigrants from within the state of Arizona as well as individuals from other states. Although the majority of out-of-state immigrants came from the West, South, and Midwest, many counties reported the greatest increases in out-of-state immigrants as coming from the northwest region of the country. Finally, both Graham and Pinal Counties reported significant increases in the number of individuals migrating from “elsewhere” (different countries) over the period.

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 CNF is located primarily within the region referred to as the “Old West Territory.” The 2003 profile for the Old West Territory reported 4.77 million domestic overnight leisure visitors representing a 77.3% increase over the 2.69 million domestic overnight leisure visitors a decade earlier. This established the Old West Territory as the second most visited region in the state behind the Valley of the Sun in the number of domestic overnight visitors. Approximately 73% of Old West Territory visitors came to the area for leisure while the remaining 27% were visiting on business (AZOT 2004a).

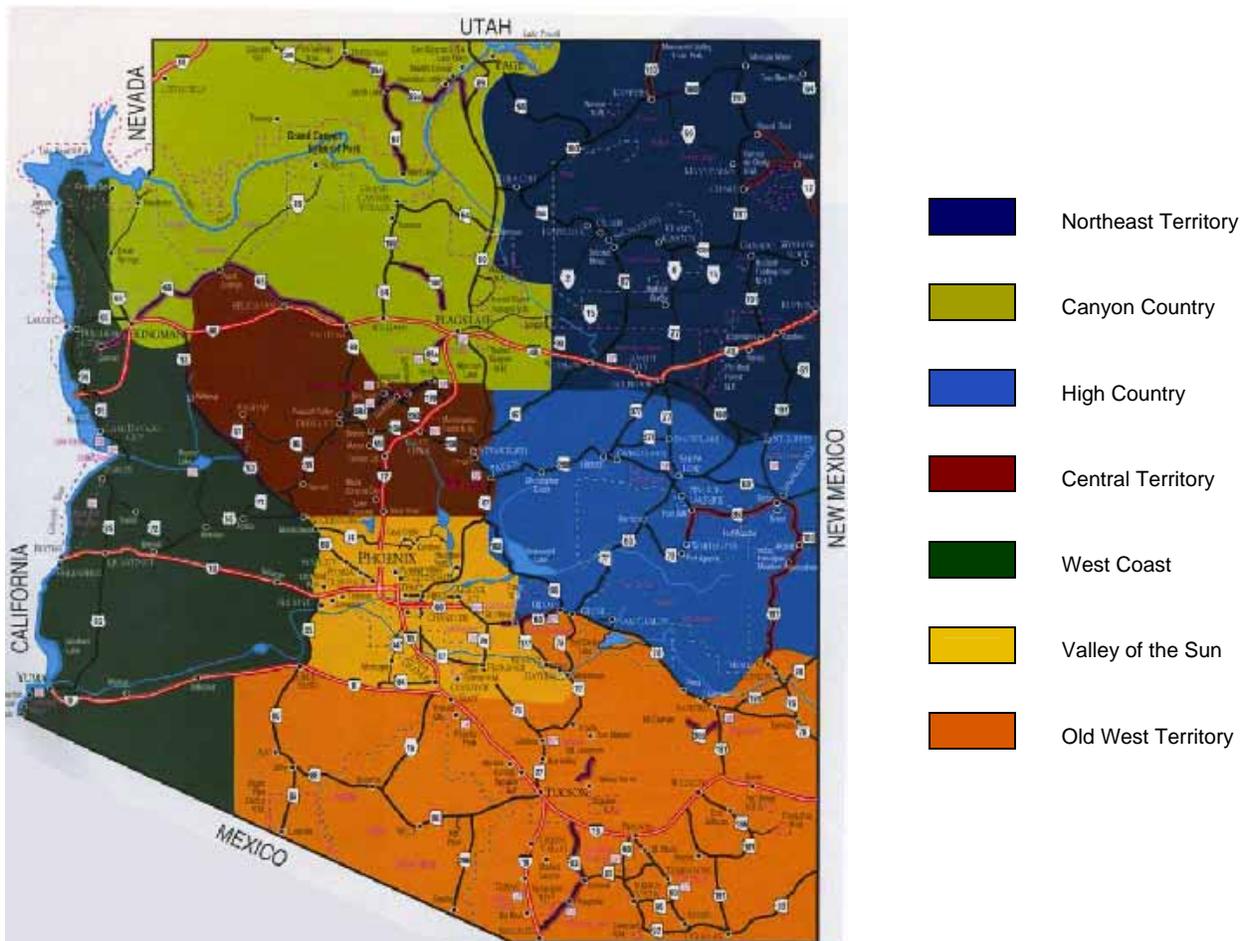
In 2002, 31.7% of domestic visitors to the Old West Territory came from within Arizona while 26.6% were visitors from California. In addition, Texas, New Mexico, Nevada, and Illinois contributed significant numbers of tourists. AZOT data suggest that general spending and sightseeing were both popular for visitors to the Old West Territory with 44% of respondents engaging in these activities. 33% of tourists reported visiting for nature activities, which include camping, visiting national and state parks, and “eco-travel.” Coronado NF and Sabino Canyon were the sixth most visited natural tourist attractions in the state with 1.5 million reported visitors in 2003 (AZOT 2004a). 2002 data confirm that the flow of visitors is greatest during winter with 43% of visits taking place between the months of December and March (AZOT 2004b).

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. 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).

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

	Cochise County			Graham County			Hidalgo County, NM		
	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
Total*	90,617	110,047	21.44%	24,364	30,909	26.86%	5,450	5,473	0.42%
Same House	38,243	51,018	33.40%	13,283	17,785	33.89%	2,863	3,526	23.16%
Different House	52,374	59,029	12.71%	11,081	13,124	18.44%	2,587	1,947	-24.74%
In United States	46,145	54,340	17.76%	10,951	12,375	13.00%	2,546	1,834	-27.97%
Same County	19,880	25,237	26.95%	4,670	5,824	24.71%	1,375	982	-28.58%
Different County	26,265	29,103	10.81%	6,281	6,551	4.30%	1,171	852	-27.24%
Same State	7,629	8,198	7.46%	3,931	4,199	6.82%	613	233	-61.99%
Different State	18,636	20,905	12.18%	2,350	2,352	0.09%	558	619	10.93%
Northwest	1,456	2,248	54.40%	61	67	9.84%	13	14	7.69%
Midwest	3,920	3,363	-14.21%	386	375	-2.85%	47	26	-44.68%
South	6,421	7,371	14.80%	455	586	28.79%	93	183	96.77%
West	6,839	7,923	15.85%	1,448	1,324	-8.56%	405	396	-2.22%
In Puerto Rico	18	120	566.67%	0	0	n/a	0	0	n/a
Elsewhere	6,086	4,569	-24.93%	130	749	476.15%	41	113	175.61%
	Pima County			Pinal County			Santa Cruz County		
	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
Total*	617,632	788,868	27.72%	106,788	167,639	56.98%	26,798	35,184	31.29%
Same House	268,012	364,326	35.94%	50,936	79,159	55.41%	14,819	19,430	31.12%
Different House	349,620	424,542	21.43%	55,852	88,480	58.42%	11,979	15,754	31.51%
In United States	331,150	399,916	20.77%	54,574	84,554	54.93%	9,981	14,143	41.70%
Same County	187,589	245,742	31.00%	26,325	32,275	22.60%	6,406	10,055	56.96%
Different County	143,561	154,174	7.39%	28,249	52,279	85.06%	3,575	4,088	14.35%
Same State	33,254	35,158	5.73%	12,632	26,642	110.91%	2,068	2,090	1.06%
Different State	110,307	119,016	7.90%	15,617	25,637	64.16%	1,507	1,998	32.58%
Northwest	13,228	15,408	16.48%	1,196	2,261	89.05%	198	59	-70.20%
Midwest	29,820	27,424	-8.03%	4,450	7,655	72.02%	261	224	-14.18%
South	21,984	25,372	15.41%	2,925	3,796	29.78%	213	468	119.72%
West	45,275	50,812	12.23%	7,046	11,925	69.24%	835	1,247	49.34%
In Puerto Rico	89	408	358.43%	0	50	n/a	0	0	n/a
Elsewhere	18,101	24,218	33.79%	1,278	3,876	203.29%	1,998	1,611	-19.37%
	Arizona			New Mexico					
	1990	2000	% Change	1990	2000	% Change			
Total*	3,374,806	4,752,724	40.83%	1,390,048	1,689,911	21.57%			
Same House	1,454,319	2,103,907	44.67%	719,628	919,717	27.80%			
Different House	1,920,487	2,648,817	37.92%	670,420	770,194	14.88%			
In United States	1,840,216	2,465,345	33.97%	645,519	731,488	13.32%			
Same County	1,026,332	1,456,345	41.90%	345,469	400,128	15.82%			
Different County	813,884	1,009,490	24.03%	300,050	331,360	10.43%			
Same State	164,063	213,070	29.87%	107,289	126,093	17.53%			
Different State	649,821	796,420	22.56%	192,761	205,267	6.49%			
Northwest	63,950	84,288	31.80%	14,311	15,329	7.11%			
Midwest	179,202	190,720	6.43%	28,270	29,457	4.20%			
South	118,041	140,608	19.12%	73,548	72,497	-1.43%			
West	288,628	380,804	31.94%	76,632	87,984	14.81%			
In Puerto Rico	665	1,745	162.41%	110	398	261.82%			
Elsewhere	78,618	181,237	130.53%	24,466	38,308	56.58%			

* 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>



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 six counties as well as the states of Arizona and New Mexico. Table 6 presents reported numbers and percentage change in individuals of specific racial and ethnic categories between 1990 and 2000. Table 7 provides these racial and ethnic categories according to their proportional representation in the overall county and state populations. As a point of clarification, race and ethnicity are defined as separate concepts by the federal government. People of a specific race may be of any ethnic origin, and people of a specific ethnic origin may be of any race. Race in this section covers the following five groups: White, Black or African American, American Indian and Alaska Native, Asian and Pacific Islander, and Multiple Races. The population of Hispanic origin is defined for federal statistical purposes as another group and may be of any race (Hobbs and Stoops 2002; Leefers, Potter-Witter, and McDonough 2004).

The reported census data may indicate an increase in individuals who identify themselves as being both of multiple racial backgrounds and of Hispanic origin. Notably, the decade between 1990 and 2000 saw significant increases in individuals of multiple races for five of the six counties, mirroring the overall trend for the states of Arizona and New Mexico (Table 6). The sole exception to this trend was Santa Cruz County, which saw an increase in the multiple-race population that was much lower than overall

population growth for the county within the same period. Similarly, the growth in Hispanic populations exceeded the overall population growth rates for each of the six counties. These particularly large increases solidified previous Hispanic majorities in both Hidalgo and Santa Cruz Counties and contributed to significant gains in Hispanic populations for both Arizona and New Mexico. The most dramatic increase in any one racial population was seen in Graham County where the multiple race population grew by 268% between 1990 and 2000. Although considerable increases were seen in the Native American populations of Hidalgo and Santa Cruz Counties, the racial group remains minimally represented in both counties (Table 7). The aggregated change in the racial and ethnic composition of the entire six-county assessment area over the same period is displayed in Figure 7.

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

Race/Ethnicity	Cochise County			Graham County			Hidalgo County (NM)		
	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
American Indian or Alaska Native	1,136	1,350	18.84%	3,908	5,005	28.07%	26	46	76.92%
Asian or Pacific Islander	2,139	2,243	4.86%	167	201	20.36%	36	19	-47.22%
African American or Black	5,074	5,321	4.87%	461	625	35.57%	40	24	-40.00%
Multiple Races	9,720	18,572	91.07%	1,408	5,185	268.25%	433	873	101.62%
White	79,555	90,269	13.47%	20,610	22,473	9.04%	5,423	4,970	-8.35%
Hispanic	27,766	36,134	30.14%	6,520	9,054	38.87%	2,995	3,324	10.98%
	Pima County			Pinal County			Santa Cruz County		
	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
American Indian or Alaska Native	20,034	27,178	35.66%	11,150	14,034	25.87%	70	251	258.57%
Asian or Pacific Islander	12,149	17,415	43.35%	677	1,121	65.58%	110	218	98.18%
African American or Black	20,856	25,594	22.72%	3,639	4,958	36.25%	66	145	119.70%
Multiple Races	87,437	139,286	59.30%	13,721	32,944	140.10%	7,212	8,583	19.01%
White	526,404	633,387	20.32%	87,192	126,559	45.15%	22,218	29,168	31.28%
Hispanic	161,053	247,578	53.72%	34,158	53,671	57.13%	22,894	31,005	35.43%
	Arizona			New Mexico					
	1990	2000	% Change	1990	2000	% Change			
American Indian or Alaska Native	204,589	255,879	25.07%	134,035	173,483	29.43%			
Asian or Pacific Islander	54,127	98,969	82.85%	14,372	20,758	44.43%			
African American or Black	110,062	158,873	44.35%	29,818	34,343	15.18%			
Multiple Races	328,768	743,300	126.09%	188,282	376,209	99.81%			
White	2,967,682	3,873,611	30.53%	1,148,562	1,214,253	5.72%			
Hispanic	680,628	1,295,617	90.36%	576,709	765,386	32.72%			

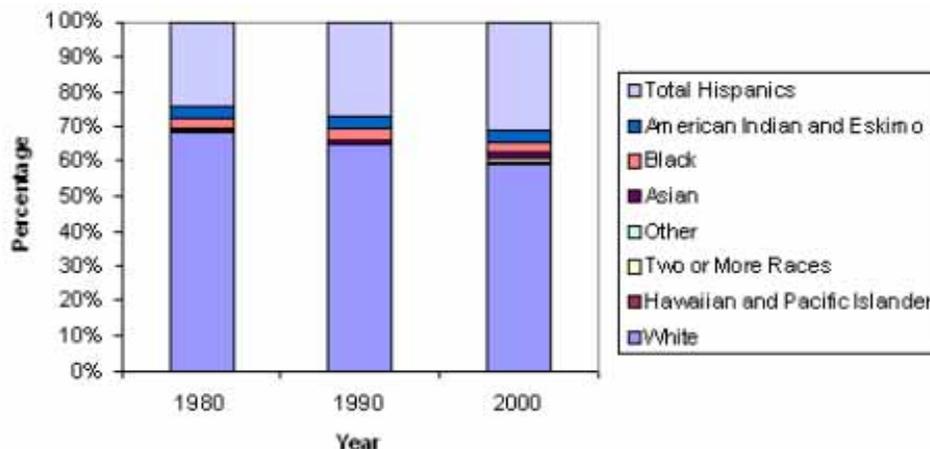
Source: NRIS - Human Dimensions

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

Race/Ethnicity	Cochise County			Graham County			Hidalgo County (NM)		
	1990	2000	Change	1990	2000	Change	1990	2000	Change
American Indian or Alaska Native	1.16%	1.15%	-0.02%	14.72%	14.95%	0.23%	0.44%	0.78%	0.34%
Asian or Pacific Islander	2.19%	1.90%	-0.29%	0.63%	0.60%	-0.03%	0.60%	0.32%	-0.28%
African American or Black	5.20%	4.52%	-0.68%	1.74%	1.87%	0.13%	0.67%	0.40%	-0.27%
Multiple Races	9.96%	15.77%	5.82%	5.30%	15.48%	10.18%	7.27%	14.72%	7.45%
White	81.49%	76.66%	-4.83%	77.62%	67.11%	-10.51%	91.02%	83.78%	-7.24%
Percent Non-white	18.51%	23.34%	4.83%	22.38%	32.89%	10.51%	8.98%	16.22%	7.24%
Hispanic	28.44%	30.69%	2.25%	24.55%	27.04%	2.49%	50.27%	56.04%	5.77%
Race/Ethnicity	Pima County			Pinal County			Santa Cruz County		
	1990	2000	Change	1990	2000	Change	1990	2000	Change
American Indian or Alaska Native	3.00%	3.22%	0.22%	9.58%	7.81%	-1.77%	0.24%	0.65%	0.42%
Asian or Pacific Islander	1.82%	2.06%	0.24%	0.58%	0.62%	0.04%	0.37%	0.57%	0.20%
African American or Black	3.13%	3.03%	-0.09%	3.13%	2.76%	-0.37%	0.22%	0.38%	0.16%
Multiple Races	13.11%	16.51%	3.40%	11.79%	18.33%	6.54%	24.30%	22.36%	-1.94%
White	78.94%	75.07%	-3.87%	74.92%	70.42%	-4.50%	74.87%	76.00%	1.13%
Percent Non-white	21.06%	24.93%	3.87%	25.08%	29.58%	4.50%	25.13%	24.00%	-1.13%
Hispanic	24.15%	29.34%	5.19%	29.35%	29.86%	0.51%	77.15%	80.78%	3.63%
Race/Ethnicity	Arizona			New Mexico					
	1990	2000	Change	1990	2000	Change			
American Indian or Alaska Native	5.58%	4.99%	-0.59%	8.85%	9.54%	0.69%			
Asian or Pacific Islander	1.48%	1.93%	0.45%	0.95%	1.14%	0.19%			
African American or Black	3.00%	3.10%	0.09%	1.97%	1.89%	-0.08%			
Multiple Races	8.97%	14.49%	5.52%	12.43%	20.68%	8.25%			
White	80.97%	75.50%	-5.47%	75.81%	66.75%	-9.06%			
Percent Non-white	19.03%	24.50%	5.47%	24.19%	33.25%	9.06%			
Hispanic	18.57%	25.25%	6.68%	38.06%	42.08%	4.02%			

Source: NRIS - Human Dimensions

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



Source: NRIS - Human Dimensions

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

Educational attainment for the population 25-years of age and older is shown for both the counties and states in Table 8. Data show that five of the six counties fall short of state averages in percentage of high school and college graduates. The exception is Pima County, which exceeded the average for the state of Arizona in both categories. Santa Cruz and Hidalgo Counties are clearly the most limited in terms of educational attainment of individuals 25 and over. In Santa Cruz County, a full twenty percent of individuals have less than a 9th-grade education and only sixty percent have graduated from high school. Similar statistics are found in Hidalgo County, where nearly eighteen percent of the 25-and-over population has less than a 9th-grade education and less than ten percent hold a college degree.

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

	Cochise County		Graham County		Hidalgo County (NM)		Pima County	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total Population Over 25	75,774	100%	19,302	100%	3,596	100%	546,200	100%
Less than 9th grade	7,112	9.4%	1,703	8.8%	642	17.9%	34,722	6.4%
9th to 12th grade, no diploma	8,451	11.2%	3,011	15.6%	480	13.3%	55,761	10.2%
High school graduate (includes equivalency)	18,670	24.6%	5,811	30.1%	1,328	36.9%	127,343	23.3%
Some college, no degree	20,742	27.4%	4,782	24.8%	696	19.4%	145,579	26.7%
Associate degree	6,552	8.6%	1,711	8.9%	94	2.6%	36,687	6.7%
Bachelor's degree	9,390	12.4%	1,234	6.4%	224	6.2%	86,752	15.9%
Graduate or professional degree	4,857	6.4%	1,050	5.4%	132	3.7%	59,356	10.9%
Percent high school graduate or higher	(x)	79.5%	(x)	75.6%	(x)	68.8%	(x)	83.4%
Percent bachelor's degree or higher	(x)	18.8%	(x)	11.8%	(x)	9.9%	(x)	26.7%
	Pinal County		Santa Cruz County		Arizona		New Mexico	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Population 25-years and over	119,102	100%	22,445	100%	3,256,184	100%	1,134,801	100%
Less than 9th grade	12,681	10.6%	4,588	20.4%	254,696	7.8%	104,985	9.3%
9th to 12th grade, no diploma	19,832	16.7%	4,242	18.9%	364,851	11.2%	134,996	11.9%
High school graduate (includes equivalency)	36,255	30.4%	5,124	22.8%	791,904	24.3%	301,746	26.6%
Some college, no degree	29,418	24.7%	4,191	18.7%	859,165	26.4%	259,924	22.9%
Associate degree	6,739	5.7%	898	4.0%	219,356	6.7%	67,001	5.9%
Bachelor's degree	8,964	7.5%	2,008	8.9%	493,419	15.2%	154,372	13.6%
Graduate or professional degree	5,213	4.4%	1,394	6.2%	272,793	8.4%	111,777	9.8%
Percent high school graduate or higher	(x)	72.7%	(x)	60.7%	(x)	81.0%	(x)	78.9%
Percent bachelor's degree or higher	(x)	11.9%	(x)	15.2%	(x)	23.5%	(x)	23.5%

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 are presented in Table 9. Total housing units in 2000 ranged from a high of 366,737 in Pima County to a low of 2,848 in Hidalgo County. Even with an 18% increase in total housing units between 1990 and 2000, Hidalgo County remains sparsely developed with less than one house per square mile. In contrast, Pima County reported forty houses per square mile in 2000. A clear trend in each of the six counties was the significant increase in the number of houses for seasonal use. Seasonal housing increases exceeded state averages for five of the six counties, the lone exception being Graham County, which saw only a 35% increase in seasonal housing. Of the selected cities within the area of assessment, Catalina, Benson, Wilcox, and Douglas all saw seasonal housing units increase by over 700% during the ten-year period between 1990 and 2000. Pinal and Santa Cruz

Counties experienced the greatest increases in both total housing units and seasonal housing units between 1990 and 2000. Total and seasonal housing growth was particularly strong in Pinal County at 53.90% and 92.22% respectively. Among selected cities, Catalina and Oro Valley experienced the greatest increases in total housing units over the ten-year period. The number of total housing units also grew significantly in Apache Junction, Queen Creek, and Benson between 1990 and 2000. Although the increase in seasonal housing for Hidalgo County was dramatic (672.73%), the total of eighty-five units in 2000 is unlikely to significantly alter the architectural landscape of the county. Between 1990 and 2000, Catalina and Queen Creek had the greatest increases in median home value. Census data from INEGI suggest that growth in total housing units was strong for the state of Sonora in general and for the cities of Agua Prieta and Nogales in particular. Between 1990 and 2000, these two cities experienced increases in total housing units of 77.44% and 67.94% respectively. Statistics on seasonal housing units, housing density, and medium home value were not available for municipalities in Sonora at the time of this assessment. Percentage increases in total and seasonal housing units between 1990 and 2000 are displayed for each of the six counties in Figure 8.

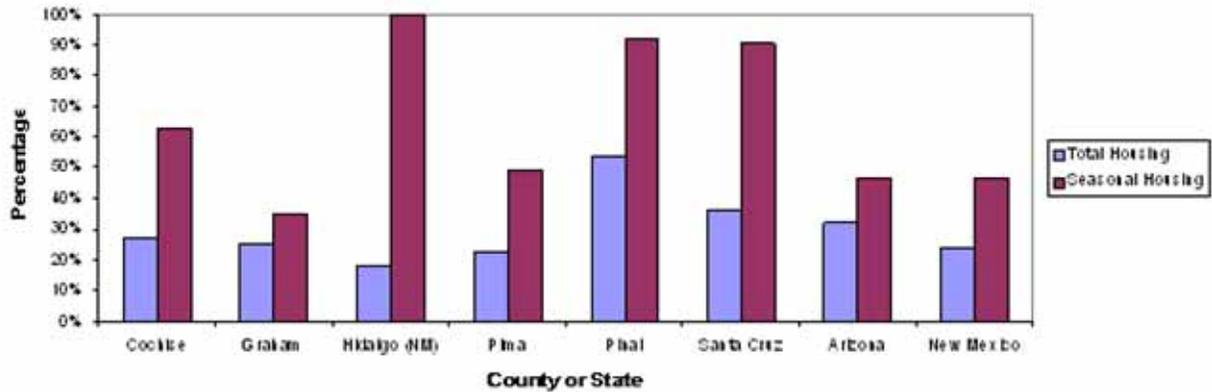
Table 10 suggests that population growth at the county and state level is expected to continue although at somewhat lower rates than were experienced over the last two decades (Table 2). The possible exception to this trend is Graham County, which is projected to grow at an accelerated rate until 2010 before slowing considerably. It is interesting to note that population growth within Pinal County is projected to slow dramatically to 11.12% between 2000 and 2010 after having experiencing a 54.43% increase in the previous decade. Finally, the decline of Hidalgo County's population is expected to continue at an increasing rate through 2030.

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
Cochise County	40,238	51,126	27.06%	1,185	1,932	63.04%	7.00	8.00	14.29%	\$59,700	\$88,200	47.74%
Sierra Vista	12,927	15,621	20.84%	119	170	42.86%	91.00	102.00	12.09%	\$77,400	\$105,300	36.05%
Douglas	4,327	5,156	19.16%	8	66	725.00%	915.00	668.00	-26.99%	\$45,200	\$62,700	38.72%
Bisbee	3,181	3,282	3.18%	58	134	131.03%	661.00	682.00	3.18%	\$39,700	\$67,600	70.28%
Benson	1,872	2,670	42.63%	45	433	862.22%	220.00	75.00	-65.91%	\$46,900	\$72,800	55.22%
Willcox	1,371	1,597	16.48%	12	111	825.00%	237.00	266.00	12.24%	\$44,400	\$65,100	46.62%
Graham County	9,112	11,430	25.44%	214	289	35.05%	1.97	2.47	25.38%	\$50,300	\$80,900	60.83%
Safford	2,857	3,691	29.19%	23	45	95.65%	405.00	466.00	15.06%	\$49,400	\$83,000	68.02%
Thatcher	1,263	1,441	14.09%	30	12	-60.00%	400.00	330.00	-17.50%	\$59,900	\$89,200	48.91%
Hidalgo County, NM	2,413	2,848	18.03%	11	85	672.73%	0.70	0.83	18.57%	\$38,400	\$53,900	40.36%
Lordsburg	1,204	1,424	18.27%	6	41	583.33%	144.00	170.00	18.06%	\$36,400	\$47,200	29.67%
Pima County	298,207	366,737	22.98%	7,113	10,622	49.33%	32.00	40.00	25.00%	\$76,500	\$114,600	49.80%
Tucson	183,338	209,792	14.43%	2,944	3,472	17.93%	1,173.00	1,078.00	-8.10%	\$66,700	\$96,300	44.38%
Oro Valley	3,576	14,004	291.61%	313	873	178.91%	151.00	440.00	191.39%	\$131,400	\$177,400	35.01%
Green Valley	10,047	13,241	31.79%	1,140	1,579	38.51%	453.00	505.00	11.48%	\$83,100	\$123,200	48.26%
Catalina	850	5,658	565.65%	12	224	1,766.67%	16.00	78.00	387.50%	\$53,600	\$134,500	150.93%
Marana	1,923	2,803	45.76%	10	38	280.00%	139.00	202.00	45.32%	\$76,000	\$121,700	60.13%
South Tucson	1,861	2,059	10.64%	0	9	n/a	1,826.00	2,039.00	11.66%	\$38,300	\$48,700	27.15%
Pinal County	52,732	81,154	53.90%	6,120	11,764	92.22%	9.82	15.11	53.91%	\$53,400	\$93,900	75.84%
Apache Junction	12,760	22,781	78.53%	3,393	6,797	100.32%	776.00	666.00	-14.18%	\$58,800	\$98,400	67.35%
Casa Grande	7,404	10,936	47.70%	163	861	428.22%	340.00	227.00	-33.24%	\$64,300	\$86,600	34.68%
Florence	2,143	3,255	51.89%	492	628	27.64%	370.00	393.00	6.22%	\$46,500	\$88,000	89.25%
Eloy	2,333	2,737	17.32%	10	22	120.00%	34.00	38.00	11.76%	\$36,400	\$51,500	41.48%
Coolidge	2,806	3,179	13.29%	119	370	210.92%	588.00	632.00	7.48%	\$40,500	\$59,800	47.65%
Queen Creek	769	1,306	69.83%	0	15	n/a	70.00	51.00	-27.14%	\$106,300	\$202,900	90.87%
Santa Cruz County	9,595	13,036	35.86%	173	330	90.75%	8.00	11.00	37.50%	\$71,500	\$94,700	32.45%
Nogales	5,537	6,487	17.16%	59	57	-3.39%	266.00	311.00	16.92%	\$68,300	\$88,800	30.01%
Patagonia	464	502	8.19%	24	34	41.67%	390.00	422.00	8.21%	\$59,700	\$108,900	82.41%
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%
New Mexico	632,058	780,579	23.50%	21,778	31,990	46.89%	5.00	6.00	20.00%	\$69,800	\$108,100	54.87%
Sonora, Mexico	380,407	535,743	40.83%									
Nogales	22,672	38,076	67.94%									
Agua Prieta	8,394	14,894	77.44%									
Naco	1,034	1,262	22.05%									

Sources: NRIS - Human Dimensions

XI Censo General de Población y Vivienda, 1990
http://www.inegi.gob.mx/est/librerias/tabulados.asp?tabulado=tab_ho01a&c=770&e=26



* For purposes of graphing, increase in seasonal housing for Hidalgo County is shown at 100.00% when in fact the increase was 672%. The actual increase was minimal from 11 to 85 seasonal units.

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.	Projected		Projected		Projected	
	2000	2010	% Change	2020	% Change	2030	% Change
Cochise	117,755	137,035	16.37%	149,990	9.45%	160,049	6.71%
Graham	33,489	43,499	29.89%	50,673	16.49%	57,355	13.19%
Hidalgo (NM)	5,932	5,799	-2.24%	5,624	-3.02%	5,378	-4.37%
Pima	843,746	1,031,623	22.27%	1,206,244	16.93%	1,372,319	13.77%
Pinal	179,727	199,715	11.12%	231,229	15.78%	255,695	10.58%
Santa Cruz	38,381	46,246	20.49%	55,111	19.17%	64,459	16.96%
Arizona	5,130,632	6,145,108	19.77%	7,363,604	19.83%	8,621,114	17.08%
New Mexico	1,819,046	2,112,986	16.16%	2,383,116	12.78%	2,626,553	10.22%

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

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

University of New Mexico – Bureau of Business and Economic Research

<http://www.unm.edu/~bber/demo/table1.htm>

2.5 Key issues for forest planning and management

Over the past two decades, continued population growth in previously 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.

Although population growth in the communities surrounding the Coronado NF has been somewhat slower than in other parts of the state, 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 to 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, access to

hiking and camping, presence of clean air and water) are increasingly attractive to retirement-age populations as well as others seeking to take advantage of the quality of life offered by small, rural communities. In particular, prospective residents 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 data on the area surrounding the CNF which show substantial increases in the retirement-age population and the number of seasonal housing units throughout the area of assessment.

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 from individuals who interact with natural resources in fundamentally different ways than have been the historic norm for the resident population (McCool and Kruger 2003).

Together, these shifts in the demographic makeup of communities surrounding the CNF 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 influence not only the management of natural resources, but also the social and political acceptability of processes used to develop management plans. Land management objectives of new property owners may lead to demands 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 six counties surrounding the Coronado National Forest (CNF) 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 CNF has experienced limited economic growth over the past two decades. In general, growth in total part- and full-time employment was particularly low when compared to the state averages over the same period. In terms of occupational structure, the region's closely resembled those for the states of Arizona and New Mexico overall with management, professional, and related occupations maintaining primary importance over sales and office as well as service occupations. Cochise, Pinal, and Pima Counties experienced significant gains in income from wood products and processing between 1990 and 2000 but reported either minimal gains or substantial losses in income from special forest products and processing over the same period. Cochise, Pima, and Graham Counties also reported increases in tourism employment that exceeded gains at the state level over the same period. Graham, Hidalgo, and Santa Cruz Counties reported relatively low per capita and family incomes as well as high rates of poverty, placing them among the most economically challenged counties in their respective states. In terms of federal-lands related revenue, Pima County has consistently been the largest recipient of Payment in Lieu of Taxes (PILT) benefits over the last several years whereas Cochise 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 has continued to the present day, 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 .45 on the Industrial Diversity Index² (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 CNF are collectively some of the most economically challenged compared to those surrounding the other forests in the state. The 2002 PPI of the six U.S. counties abutting CNF land is \$19,687³, representing a 26.2% differential from the state average at that time, a 2.6% drop from 1969. Compared to the national averages, the PPI of the counties containing the Coronado represents only 63.9% of the national total, down nearly 13% over the past 30 years (BEA 2002). The thirty-year average rate of income growth in this region is 8.4%, well below the 10.1% state average. These figures are likely influenced by, among other things, the aforementioned shift in economic industries within the state away from mining, which has historically been a popular industry in the area of assessment.

3.2 Income and employment within key industries

Table 11 presents employment data by industry at both the state and county levels for the years 1990 and 2000. Economic data confirm earlier findings of relatively limited growth in the region when compared to state averages for both Arizona and New Mexico. For instance, growth in total full- and part-time employment for each of the six counties in the area of assessment was below that for its corresponding states between 1990 and 2000. Job growth was particularly limited in Santa Cruz County (17.35%), and total employment declined by 15.86% in Hidalgo County over the ten-year period. Similarly, growth in wage, salary, and proprietor's employment was relatively low for each of the counties with the exception of Cochise County, which experienced a relatively strong increase in proprietor's employment when compared to the state of Arizona over the same period. Each of the six counties experienced growth in non-farm and private employment that was well below the average for its respective state. Graham and Santa Cruz Counties saw substantial job growth in agricultural services and forestry while Pinal County experienced a 20.81% decline in jobs for the same sector. Considerable job losses in the mining sector were reported for Cochise, Pinal, and Santa Cruz Counties, mirroring a similar trend for the state of Arizona as a whole. Although each of the counties in Arizona witnessed a substantial increase in construction jobs, none of them matched the rate of increase in construction employment for Arizona overall, which was nearly 84% between 1990 and 2000. Both Graham and Cochise Counties saw relatively strong gains in employment within the financial services, insurance, and real estate (F.I.R.E.) sector over the ten-year period. Employment in the service and government sectors also saw significant gains throughout the area of assessment over this period.

Table 12 displays the percentage of employment in each industry at the state and county levels as well as the percentage change between 1990 and 2000. Data show that, as of 2000, proprietor's employment was higher in each of the six counties than its respective state average. Similarly, the percentage of farm employment was higher than the state average for each of the counties with the exception of Pima County. Graham County maintained a relatively high percentage of jobs in the agricultural services and forestry sector, as did Cochise County in the sector of wholesale trade. Throughout the region, counties

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.

demonstrated a high percentage of government and government enterprise employment when compared to state averages. A graphic display of the percentage changes in individual industry sectors between 1990 and 2000 is shown at both the county and state level in Figure 9.

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

	Graham County			Cochise County			Hidalgo County (NM)			Pima County		
	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
Employment by place of work												
Total full-time and part-time employment	7,753	10,562	36.23%	40,595	50,792	25.12%	2,838	2,388	-15.86%	321,710	444,366	38.13%
By type												
Wage and salary employment	6,141	8,252	34.38%	33,814	40,031	18.39%	2,393	1,875	-21.65%	267,918	363,960	35.85%
Proprietors employment	1,612	2,310	43.30%	6,781	10,761	58.69%	445	513	15.28%	53,792	80,406	49.48%
Farm proprietors employment	383	356	-7.05%	943	986	4.56%	145	157	8.28%	495	486	-1.82%
Non-farm proprietors employment	1,229	1,954	58.99%	5,838	9,775	67.44%	300	356	18.67%	53,297	79,920	49.95%
By industry												
Farm employment	548	549	0.18%	1,278	1,677	31.22%	302	311	2.98%	1,044	992	-4.98%
Non-farm employment	7,205	10,013	38.97%	39,317	49,115	24.92%	2,536	2,077	-18.10%	320,666	443,374	38.27%
Private employment	4,638	6,987	50.65%	22,741	32,315	42.10%	2,099	1,524	-27.39%	261,214	363,244	39.06%
Ag. services, forestry, fishing and other	183	436	138.25%	(D)	809	n/a	88	(D)	n/a	3,334	4,944	48.29%
Mining	18	21	16.67%	133	75	-43.61%	(L)	(D)	n/a	2,741	2,476	-9.67%
Construction	314	406	29.30%	(D)	2,781	n/a	102	84	-17.65%	18,834	27,709	47.12%
Manufacturing	195	332	70.26%	1,614	1,356	-15.99%	629	(D)	n/a	28,255	34,934	23.64%
Transportation and public utilities	210	260	23.81%	1,815	1,673	-7.82%	102	75	-26.47%	10,115	14,578	44.12%
Wholesale trade	158	204	29.11%	686	806	17.49%	162	(D)	n/a	8,838	12,616	42.75%
Retail trade	1,583	2,211	39.67%	6,612	8,909	34.74%	502	521	3.78%	60,494	73,942	22.23%
Finance, insurance, and real estate	269	548	103.72%	1,558	2,801	79.78%	65	76	16.92%	24,779	36,216	46.16%
Services	1,708	2,569	50.41%	8,362	13,105	56.72%	442	454	2.71%	103,824	155,829	50.09%
Government and government enterprises	2,567	3,026	17.88%	16,576	16,800	1.35%	437	553	26.54%	59,452	80,130	34.78%
Federal, civilian	322	330	2.48%	5,210	4,133	-20.67%	38	71	86.84%	7,966	9,160	14.99%
Military	99	77	-22.22%	6,478	5,944	-8.24%	30	19	-36.67%	7,840	7,686	-1.96%
State and local	2,146	2,619	22.04%	4,888	6,723	37.54%	369	463	25.47%	43,646	63,284	44.99%
State government	981	1,064	8.46%	355	1,322	272.39%	51	78	52.94%	16,079	(D)	n/a
Local government	1,165	1,555	33.48%	4,533	5,401	19.15%	318	385	21.07%	27,567	(D)	n/a

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

	Pinal County			Santa Cruz County			Arizona			New Mexico		
	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
Employment by place of work												
Total full-time and part-time employment	41,577	50,262	20.89%	13,489	15,830	17.35%	1,909,879	2,819,302	47.62%	767,139	972,954	26.83%
By type												
Wage and salary employment	34,947	41,939	20.01%	11,328	12,816	13.14%	1,607,628	2,355,299	46.51%	635,725	789,690	24.22%
Proprietors employment	6,630	8,323	25.54%	2,161	3,014	39.47%	302,251	464,003	53.52%	131,414	183,264	39.46%
Farm proprietors employment	807	747	-7.43%	186	180	-3.23%	8,027	7,572	-5.67%	13,600	14,985	10.18%
Non-farm proprietors employment	5,823	7,576	30.10%	1,975	2,834	43.49%	294,224	456,431	55.13%	117,814	168,279	42.83%
By industry												
Farm employment	2,088	2,110	1.05%	227	206	-9.25%	19,297	19,842	2.82%	19,766	21,760	10.09%
Non-farm employment	39,489	48,152	21.94%	13,262	15,624	17.81%	1,890,582	2,799,460	48.07%	747,373	951,194	27.27%
Private employment	27,667	31,997	15.65%	11,333	12,359	9.05%	1,583,146	2,410,566	52.26%	568,085	748,804	31.81%
Ag. services, forestry, fishing and other	1,350	1,069	-20.81%	116	255	119.83%	27,817	46,873	68.50%	8,414	13,548	61.02%
Mining	4,111	1,411	-65.68%	34	19	-44.12%	15,475	12,607	-18.53%	20,489	19,323	-5.69%
Construction	1,370	2,049	49.56%	502	631	25.70%	108,918	200,373	83.97%	40,606	59,895	47.50%
Manufacturing	3,681	3,416	-7.20%	1,142	1,053	-7.79%	194,529	225,767	16.06%	47,732	48,788	2.21%
Transportation and public utilities	1,518	1,070	-29.51%	835	1,425	70.66%	84,360	124,954	48.12%	34,130	43,350	27.01%
Wholesale trade	848	1,347	58.84%	1,621	1,910	17.83%	82,812	122,582	48.02%	27,896	33,751	20.99%
Retail trade	6,095	7,915	29.86%	3,746	3,166	-15.48%	344,297	484,207	40.64%	134,482	172,516	28.28%
Finance, insurance, and real estate	1,904	2,479	30.20%	695	788	13.38%	170,005	281,675	65.69%	46,955	62,905	33.97%
Services	6,790	11,241	65.55%	2,642	3,112	17.79%	544,933	911,528	67.27%	207,381	294,728	42.12%
Government and government enterprises	11,822	16,155	36.65%	1,929	3,265	69.26%	307,436	388,894	26.50%	179,288	202,390	12.89%
Federal, civilian	727	901	23.93%	383	1,006	162.66%	45,843	48,135	5.00%	31,621	30,205	-4.48%
Military	437	415	-5.03%	111	88	-20.72%	38,197	33,258	-12.93%	22,552	17,167	-23.88%
State and local	10,658	14,839	39.23%	1,435	2,171	51.29%	223,396	307,501	37.65%	125,115	155,018	23.90%
State government	4,593	4,939	7.53%	131	332	153.44%	61,595	81,026	31.55%	55,722	64,654	16.03%
Local government	6,065	9,900	63.23%	1,304	1,839	41.03%	161,801	226,475	39.97%	69,393	90,364	30.22%

(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

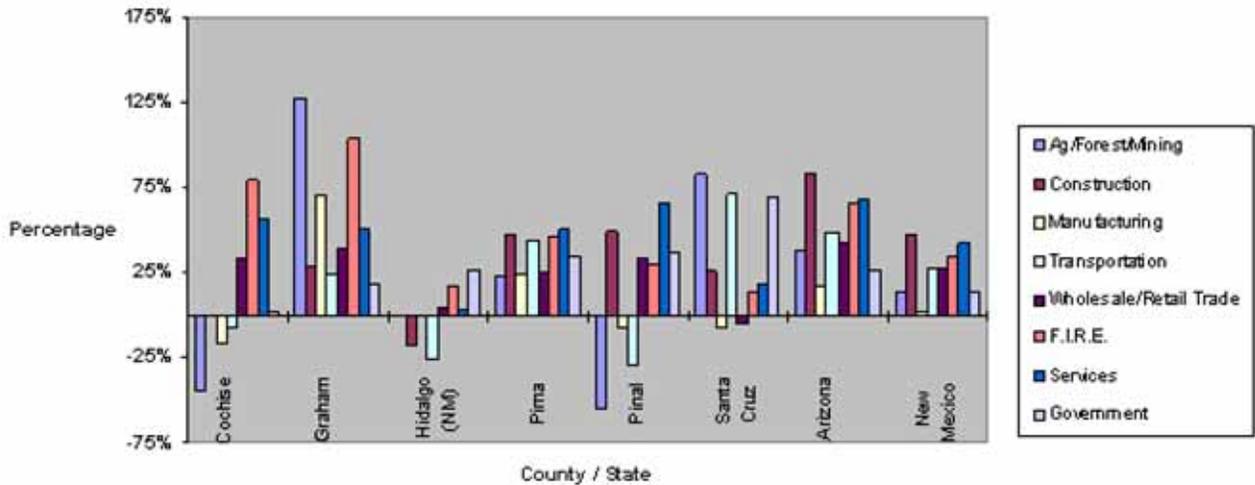
	Graham County			Cochise County			Hidalgo County (NM)			Pima County		
	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
Employment by place of work												
Total full-time and part-time employment	100.00%	100.00%	0.00%	100.00%	100.00%	0.00%	100.00%	100.00%	0.00%	100.00%	100.00%	0.00%
By type												
Wage and salary employment	79.21%	78.13%	-1.36%	83.30%	78.81%	-5.38%	84.32%	78.52%	-6.88%	83.28%	81.91%	-1.65%
Proprietors employment	20.79%	21.87%	5.19%	16.70%	21.19%	26.83%	15.68%	21.48%	37.00%	16.72%	18.09%	8.22%
Farm proprietors employment	4.94%	3.37%	-31.77%	2.32%	1.94%	-16.43%	5.11%	6.57%	28.68%	0.15%	0.11%	-28.92%
Non-farm proprietors employment	15.85%	18.50%	16.71%	14.38%	19.25%	33.82%	10.57%	14.91%	41.03%	16.57%	17.99%	8.56%
By industry												
Farm employment	7.07%	5.20%	-26.46%	3.15%	3.30%	4.88%	10.64%	13.02%	22.39%	0.32%	0.22%	-31.21%
Non-farm employment	92.93%	94.80%	2.01%	96.85%	96.70%	-0.16%	89.36%	86.98%	-2.67%	99.68%	99.78%	0.10%
Private employment	59.82%	66.15%	10.58%	56.02%	63.62%	13.57%	73.96%	63.82%	-13.71%	81.20%	81.74%	0.68%
Ag. services, forestry, fishing and other	2.36%	4.13%	74.89%	(D)	1.59%	n/a	3.10%	(D)	n/a	1.04%	1.11%	7.36%
Mining	0.23%	0.20%	-14.36%	0.33%	0.15%	-54.93%	(D)	(D)	n/a	0.85%	0.56%	-34.60%
Construction	4.05%	3.84%	-5.09%	(D)	5.48%	n/a	3.59%	3.52%	-2.13%	5.85%	6.24%	6.51%
Manufacturing	2.52%	3.14%	24.98%	3.98%	2.67%	-32.85%	22.16%	(D)	n/a	8.78%	7.86%	-10.49%
Transportation and public utilities	2.71%	2.46%	-9.12%	4.47%	3.29%	-26.33%	3.59%	3.14%	-12.61%	3.14%	3.28%	4.34%
Wholesale trade	2.04%	1.93%	-5.22%	1.69%	1.59%	-6.10%	5.71%	(D)	n/a	2.75%	2.84%	3.35%
Retail trade	20.42%	20.93%	2.53%	16.29%	17.54%	7.69%	17.69%	21.82%	23.34%	18.80%	16.64%	-11.51%
Finance, insurance, and real estate	3.47%	5.19%	49.54%	3.84%	5.51%	43.69%	2.29%	3.18%	38.96%	7.70%	8.15%	5.81%
Services	22.03%	24.32%	10.41%	20.60%	25.80%	25.26%	15.57%	19.01%	22.07%	32.27%	35.07%	8.66%
Government and government enterprises	33.11%	28.65%	-13.47%	40.83%	33.08%	-19.00%	15.40%	23.16%	50.39%	18.48%	18.03%	-2.42%
Federal, civilian	4.15%	3.12%	-24.77%	12.83%	8.14%	-36.60%	1.34%	2.97%	122.05%	2.48%	2.06%	-16.75%
Military	1.28%	0.73%	-42.91%	15.96%	11.70%	-26.66%	1.06%	0.80%	-24.73%	2.44%	1.73%	-29.02%
State and local	27.68%	24.80%	-10.42%	12.04%	13.24%	9.93%	13.00%	19.39%	49.12%	13.57%	14.24%	4.97%
State government	12.65%	10.07%	-20.38%	0.87%	2.60%	197.63%	1.80%	3.27%	81.76%	5.00%	(D)	n/a
Local government	15.03%	14.72%	-2.02%	11.17%	10.63%	-4.77%	11.21%	16.12%	43.88%	8.57%	(D)	n/a

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

	Pinal County			Santa Cruz County			Arizona			New Mexico		
	1990	2000	% Change	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%	100.00%	100.00%	0.00%
By type												
Wage and salary employment	84.05%	83.44%	-0.73%	83.98%	80.96%	-3.60%	84.17%	83.54%	-0.75%	82.87%	81.16%	-2.06%
Proprietors employment	15.95%	16.56%	3.84%	16.02%	19.04%	18.85%	15.83%	16.46%	4.00%	17.13%	18.84%	9.96%
Farm proprietors employment	1.94%	1.49%	-23.43%	1.38%	1.14%	-17.54%	0.42%	0.27%	-36.10%	1.77%	1.54%	-13.12%
Non-farm proprietors employment	14.01%	15.07%	7.62%	14.64%	17.90%	22.27%	15.41%	16.19%	5.09%	15.36%	17.30%	12.62%
By industry												
Farm employment	5.02%	4.20%	-16.41%	1.68%	1.30%	-22.67%	1.01%	0.70%	-30.34%	2.58%	2.24%	-13.20%
Non-farm employment	94.98%	95.80%	0.87%	98.32%	98.70%	0.39%	98.99%	99.30%	0.31%	97.42%	97.76%	0.35%
Private employment	66.54%	63.66%	-4.33%	84.02%	78.07%	-7.07%	82.89%	85.50%	3.15%	74.05%	76.96%	3.93%
Ag. services, forestry, fishing and other	3.25%	2.13%	-34.50%	0.86%	1.61%	87.32%	1.46%	1.66%	14.15%	1.10%	1.39%	26.96%
Mining	9.89%	2.81%	-71.61%	0.25%	0.12%	-52.38%	0.81%	0.45%	-44.81%	2.67%	1.99%	-25.64%
Construction	3.30%	4.08%	23.72%	3.72%	3.99%	7.11%	5.70%	7.11%	24.62%	5.29%	6.16%	16.30%
Manufacturing	8.85%	6.80%	-23.23%	8.47%	6.65%	-21.43%	10.19%	8.01%	-21.38%	6.22%	5.01%	-19.41%
Transportation and public utilities	3.65%	2.13%	-41.69%	6.19%	9.00%	45.42%	4.42%	4.43%	0.34%	4.45%	4.46%	0.15%
Wholesale trade	2.04%	2.68%	31.40%	12.02%	12.07%	0.40%	4.34%	4.35%	0.28%	3.64%	3.47%	-4.60%
Retail trade	14.66%	15.75%	7.42%	27.77%	20.00%	-27.98%	18.03%	17.17%	-4.73%	17.53%	17.73%	1.15%
Finance, insurance, and real estate	4.58%	4.93%	7.70%	5.15%	4.98%	-3.39%	8.90%	9.99%	12.24%	6.12%	6.47%	5.63%
Services	16.33%	22.36%	36.95%	19.59%	19.66%	0.37%	28.53%	32.33%	13.32%	27.03%	30.29%	12.06%
Government and government enterprises	28.43%	32.14%	13.04%	14.30%	20.63%	44.23%	16.10%	13.79%	-14.31%	23.37%	20.80%	-10.99%
Federal, civilian	1.75%	1.79%	2.52%	2.84%	6.36%	123.82%	2.40%	1.71%	-28.87%	4.12%	3.10%	-24.68%
Military	1.05%	0.83%	-21.44%	0.82%	0.56%	-32.44%	2.00%	1.18%	-41.02%	2.94%	1.76%	-39.98%
State and local	25.63%	29.52%	15.17%	10.64%	13.71%	28.92%	11.70%	10.91%	-6.75%	16.31%	15.93%	-2.31%
State government	11.05%	9.83%	-11.05%	0.97%	2.10%	115.96%	3.23%	2.87%	-10.89%	7.26%	6.65%	-8.51%
Local government	14.59%	19.70%	35.03%	9.67%	11.62%	20.17%	8.47%	8.03%	-5.18%	9.05%	9.29%	2.67%

(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>



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 adapted from the Arizona Department of Commerce 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 five of the six counties within the area of assessment maintain occupational structures very similar to that of the states of Arizona and New Mexico as a whole. Management, professional, and related occupations is the dominant occupational category for both states, followed by sales and office occupations and, finally, by service occupations. Management/professional and sales/office are the two most common categories of occupation in Cochise, Graham, Pima, Pinal, and Santa Cruz Counties. The exception is Hidalgo County, where, as of 2004, service was slightly more predominant than either sales and office occupations or management, professional and related occupations. For both the states of Arizona and New Mexico, as well as for each of the counties within the area of assessment, construction, extraction, and maintenance and production, transportation, and material moving were also among the five most dominant occupational categories.

Table 13. Major Employers by County, 2004

Cochise County	Graham County	Hidalgo County (NM)
U.S. Army, Fort Huachuca	Arizona State Prison Systems, Safford	Burgett Geothermal Greenhouses, Animas
Sierra Vista Unified School District	Bonita Nurseries, Bonita	Hidalgo Medical Services, Lordsburg
Cochise County, Bisbee	City of Safford, Safford	Kentucky Fired Chicken, Lordsburg
U.S. Border Patrol	Eastern Arizona College, Thatcher	Kranberry's Family Restaurant, Lordsburg
Cochise College, Douglas/Sierra Vista	Federal Prison Facility, Safford	McDonald's, Lordsburg
Aegis, Sierra Vista	Impressive Labels, Safford	Phelps Dodge Corp. - Copper Smelter, Playas
Sierra Vista Regional Health Center	Mt. Graham Hospital, Safford	Sunshine Haven Nursing Home, Lordsburg
Arizona State Prison, Douglas	Safford Unified School District, Safford	USA Petroleum Corp., Deming
Douglas Unified School District	Wal-Mart, Thatcher	Western Bank, Lordsburg
Wal-Mart, Douglas/Sierra Vista		Lordsburg Municipal Schools, Lordsburg
City of Sierra Vista		U.S. Border Patrol, Silver City
Safeway Stores, Inc.		Animas Public Schools, Animas
New Tech, Fort Huachuca		
Sierra Southwest, Benson		
Northrop Grumman, Sierra Vista		
City of Douglas		
Willcox Unified School District		
Palominas Public Schools		
ILEX, Sierra Vista		
Cochise Private Industrial Council, Sierra Vista		
Pima County	Pinal County	Santa Cruz County
Arizona Air National Guard, Tucson	Abbott Labs/Ross Prod. Div., Casa Grande	Canchola Foods Company, Nogales
Amphitheater Public Schools, Tucson	Albertson's	Carondelet Holy Cross Hospital, Nogales
Bashas' Inc., Tucson Metro	Apache Junction Health Center	Immigration and Naturalization Service, Nogales
Carondelet Health Network, Tucson	Apache Junction Schools	City of Nogales
Checkmate Professional Employer	Arizona State Prison, Florence	District 35 Public Schools, Tubac
City of Tucson	Asarco, Hayden	Nogales Unified School District, Nogales
Davis-Monthan AFB, Tucson	Bashas'	Santa Cruz County, Nogales
Fry's Food and Drug Stores, Tucson Metro	Casa Grande Regional Medical Center	Wal-Mart Discount Cities, Nogales
International Business Machines Corp., Tucson	Casa Grande Elementary School Dist.	United Musical Instruments, Nogales
Marana Unified School District	Casa Grande Union H.S. Dist.	U.S. Customs Service, Nogales
Northwest Medical Center, Tucson	Casa Grande Valley Newspapers	
Pascua Yaqui Tribe, Tucson	Central Arizona College, Coolidge	
Phelps Dodge Mining Company, Safford	City of Apache Junction	
Pima Community College, Tucson	City of Casa Grande	
Pima County, Tucson	City of Eloy	
Pinal County	Coolidge Unified School District	
Raytheon Missile Systems, Tucson	Corrections Corp. of America, Eloy/Florence	
Safeway Stores, Inc.	Eloy Schools	
Southern Arizona VA Health Care System	Evergreen Air Center, Marana	
State of Arizona, Tucson	Flying J Truckstop	
Sunnyside Unified School District	Frito-Lay, Casa Grande	
TMC HealthCare, Tucson	Fry's Food and Drug Stores	
	Gila River Indian Community,	
	Government Farms	
Tohono O'Odham Nation	Harrah's Ak-Chin Casino	
Tucson Unified School District	Hexcel Corp.	
Unisource Energy Corp., Tucson Electric Power	Holiday Inn	
University Medical Center Corp., Tucson	Hunter Douglas Wood Products	
University of Arizona, Tucson	K-Mart	
U.S. Army Intelligence Center & Fort Huachuca	Pinal County	
U.S. Border Patrol, Tucson	Tanger Outlet Center	
Wal-Mart, Tucson Metro	Westile Roofing Products	

Source: Arizona Department of Commerce - Community Profiles
http://www.azcommerce.com/Communities/community_profiles.asp
<http://www.dol.state.nm.us/pdf/LE-NM-2002.pdf>

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

County/State	Number	Percent
Cochise County		
Management, professional, and related occupations	12,876	30.2%
Sales and office occupations	11,543	27.1%
Construction, extraction, and maintenance occupations	4,559	10.7%
Service occupations	9,075	21.3%
Production, transportation, and material moving occupations	4,001	9.4%
Graham County		
Management, professional, and related occupations	2,769	25.9%
Sales and office occupations	2,516	23.5%
Service occupations	2,219	20.8%
Construction, extraction, and maintenance occupations	1,751	16.4%
Production, transportation, and material moving occupations	1,232	11.5%
Hidalgo County , NM		
Service occupations	477	22.5%
Sales and office occupations	441	20.8%
Management, professional, and related occupations	435	20.5%
Construction, extraction, and maintenance occupations	369	17.4%
Production, transportation, and material moving occupations	300	14.2%
Pima County		
Management, professional, and related occupations	129,709	35.0%
Sales and office occupations	100,527	27.1%
Service occupations	65,326	17.6%
Construction, extraction, and maintenance occupations	39,765	10.7%
Production, transportation, and material moving occupations	34,698	9.4%
Pinal County		
Sales and office occupations	14,937	24.4%
Management, professional, and related occupations	13,523	22.1%
Service occupations	13,432	21.9%
Production, transportation, and material moving occupations	8,998	14.7%
Construction, extraction, and maintenance occupations	8,727	14.2%
Santa Cruz County		
Sales and office occupations	4,202	32.6%
Management, professional, and related occupations	3,229	25.1%
Service occupations	2,109	16.4%
Production, transportation, and material moving occupations	1,900	14.8%
Construction, extraction, and maintenance occupations	1,264	9.8%
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%
New Mexico		
Management, professional, and related occupations	259,510	34.0%
Sales and office occupations	197,580	25.9%
Service occupations	129,349	17.0%
Construction, extraction, and maintenance occupations	87,172	11.4%
Production, transportation, and material moving occupations	81,911	10.7%

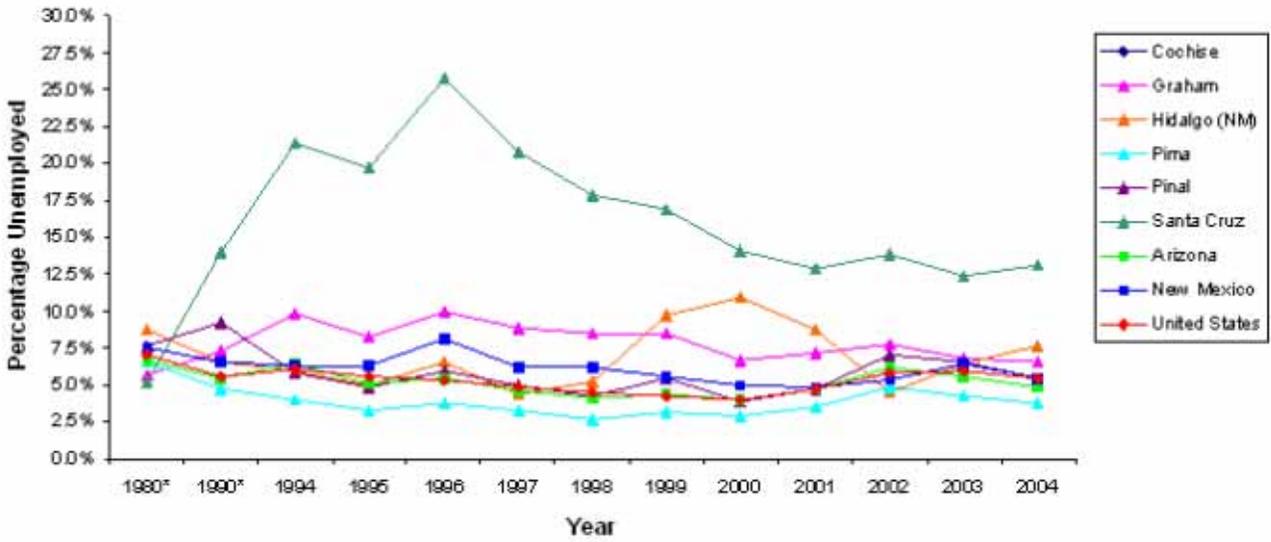
Source: U.S. Census Bureau, American Fact Finder
<http://factfinder.census.gov>

Table 15 presents annual unemployment rates for the counties in the area of assessment, the states of Arizona and New Mexico, the United States, and selected cities. Figure 10 graphically displays the unemployment rates at the county, state, and national levels over the same period. Data portray challenging economic circumstances throughout the region with five of the six counties in the area of assessment reporting average unemployment figures that were higher than average for their respective states. The lone exception to this trend was Pima County, which reported the lowest average unemployment at 3.9% over the period covered. In contrast, Santa Cruz County reported an average unemployment rate of 16.0% over the same period, due at least in part to the extremely high rate (20.3%) in the city of Nogales. The cities of Douglas, Lordsburg, and Eloy also reported double-digit rates of unemployment over the same period. Among the selected cities within the area of assessment, Oro Valley and Queen Creek reported the lowest average annual unemployment rate at 2.5%. Unemployment rates for selected border cities were unavailable at the time of this assessment. 2000 data for the state of Sonora, however, show that despite a relatively low rate of official unemployment—1.16% of individuals who were “economically active” were unemployed—45.8% of the population 12-years and older were “economically inactive” (INEGI 2005).

Per capita and median family incomes, as well as rates of individual and family poverty, are provided in Table 16. Data show that between 1990 and 2000, Pinal County saw the greatest increases in per capita and median family income at 31.76% and 25.06% respectively. However, Table 16 also shows that, as of 2000, each of the six counties within the area of assessment maintained lower levels of per capita and median family income than was average for its state. A similar trend is evident in individual and family poverty between 1990 and 2000. Both Pinal and Graham Counties witnessed substantial declines in individual and family poverty that were greater than reductions in poverty at the state level over the same period. Here again, Pinal County saw the greatest improvement with cuts in individual and family poverty of -29.17% and -36.84% respectively. Nonetheless, as of 2000, each of the counties maintained rates of poverty greater than those for their respective states. Within the area of assessment, Hidalgo and Santa Cruz Counties reported the highest rates of poverty in both categories. Among individual cities within the area of assessment, Green Valley, Oro Valley, and Queen Creek reported the highest levels of per capita and median family income as of 2000 while Lordsburg and South Tucson reported the lowest income. Between 1990 and 2000, the city of Marana experienced dramatic increases in both individual and median family income (90.17% and 71.82% respectively) and substantial cuts in both individual and family poverty. Florence, Oro Valley, Apache Junction and Benson also saw significant decreases in rates of poverty over the same period. As of 2000, South Tucson remained severely limited economically with 46.5% of individuals and families living in poverty. The percentage changes in per capita income for each county over the same period are graphically represented in Figure 11. Percent change in family poverty over the same period is displayed in Figure 12.

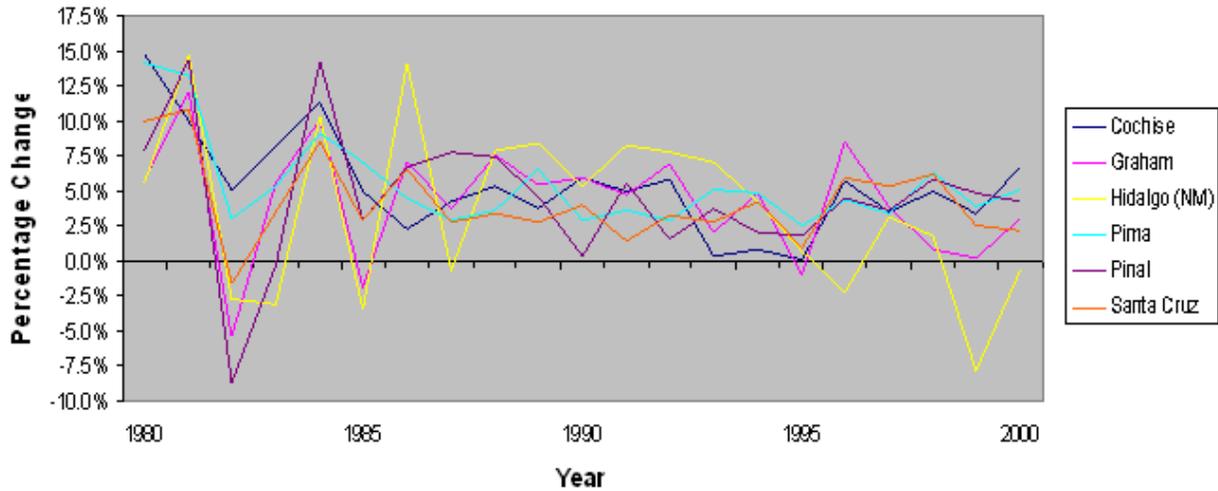
As expected, per capita and median family income figures for Sonora and selected border communities as of 2000 are much lower than areas within the United States. However, the cities of Agua Prieta and Nogales both reported individual and median family incomes which were higher than those for the state of Sonora as a whole. Still, rates of individual and family poverty, while high, were not the highest within the area of assessment as of 2000. For purposes of reporting, the Secretaría de Desarrollo Social (SEDOSOL) defines families and individuals in *pobreza de patrimonio* as those who cannot afford the basic demands of a nutritional diet, dress, footwear, dwelling, health, public transportation, and education (SEDOSOL 2002). Each of the selected border cities reported rates of individual and family poverty that were lower than the average for the state of Sonora.

Household income distribution for each county is presented in Table 17. Here again, the economic status of Hidalgo County is seen to be considerably limited with over 50% of households earning less than \$25,000 per year. Median household income ranged from a high of \$36,758 in Pima County to \$24,819 in Hidalgo County. Pima County was also the most affluent of the six counties with 9% of households earning \$100,000 or more as of 2000.



Sources: Arizona Department of Commerce, Arizona Workforce Informer
 U.S. Bureau of Labor Statistics

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



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

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

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
Cochise County	10.1%	6.7%	10.7%	9.2%	9.7%	8.4%	6.8%	5.7%	4.6%	4.6%	5.5%	5.2%	4.3%	7.0%
Sierra Vista	11.3%	5.2%	8.3%	7.1%	7.5%	6.5%	5.2%	4.4%	3.5%	3.5%	4.2%	4.0%	3.3%	5.7%
Douglas	11.4%	13.5%	20.6%	18.0%	18.9%	16.5%	13.6%	11.6%	9.5%	9.5%	11.2%	10.7%	8.9%	13.4%
Bisbee	10.4%	6.6%	10.6%	9.1%	9.6%	8.3%	6.7%	5.6%	4.6%	4.5%	5.4%	5.2%	4.3%	7.0%
Benson	8.4%	7.8%	12.4%	10.7%	11.3%	9.7%	7.9%	6.6%	5.4%	5.4%	6.4%	6.1%	5.0%	7.9%
Willcox	7.2%	4.1%	6.7%	5.7%	6.0%	5.2%	4.1%	3.5%	2.8%	2.8%	3.4%	3.2%	2.6%	4.4%
Graham County	5.7%	7.3%	9.8%	8.2%	10.0%	8.9%	8.5%	8.5%	6.7%	7.2%	7.8%	6.8%	6.6%	7.8%
Safford	4.6%	6.1%	8.3%	6.9%	8.4%	7.5%	7.2%	7.1%	8.0%	6.0%	6.6%	5.7%	5.5%	6.8%
Thatcher	3.1%	4.8%	6.6%	5.5%	6.7%	5.9%	5.7%	5.6%	8.6%	4.7%	5.2%	4.5%	4.3%	5.5%
Hidalgo County	8.8%	6.6%	6.0%	5.0%	6.6%	4.4%	5.2%	9.7%	10.9%	8.7%	4.5%	6.4%	7.7%	7.0%
Lordsburg	13.2%	12.2%	n/a	n/a	n/a	N/a	n/a	n/a	11.6%	n/a	n/a	n/a	n/a	12.3%
Pima County	6.5%	4.7%	4.0%	3.3%	3.8%	3.3%	2.7%	3.1%	2.9%	3.5%	4.9%	4.3%	3.8%	3.9%
Tucson	6.5%	5.2%	4.4%	3.7%	4.2%	3.6%	3.0%	3.5%	3.2%	3.9%	5.4%	4.8%	4.2%	4.3%
Oro Valley	n/a	3.2%	2.7%	2.2%	2.5%	2.2%	1.8%	2.1%	1.9%	2.3%	3.3%	2.9%	2.5%	2.5%
Green Valley	13.3%	3.2%	2.7%	2.2%	2.6%	2.2%	1.9%	2.1%	2.0%	2.4%	3.3%	2.9%	2.6%	3.3%
Catalina	10.2%	5.2%	4.3%	3.6%	4.1%	3.6%	3.0%	3.4%	3.2%	3.9%	5.3%	4.7%	4.1%	4.5%
Marana	n/a	3.5%	2.9%	2.4%	2.8%	2.4%	2.0%	2.3%	2.1%	2.6%	3.6%	3.2%	2.8%	2.7%
South Tucson	n/a	11.9%	10.1%	8.5%	9.6%	8.5%	7.1%	8.1%	7.5%	9.0%	12.2%	10.9%	9.7%	9.4%
Pinal County	7.7%	9.2%	5.8%	4.8%	5.9%	5.0%	4.2%	5.5%	3.9%	4.7%	7.0%	6.5%	5.5%	5.8%
Apache Junction	11.2%	6.8%	4.2%	3.4%	4.3%	3.6%	3.0%	4.0%	2.8%	3.4%	5.1%	4.7%	4.0%	4.7%
Casa Grande	6.2%	7.9%	4.9%	4.1%	5.1%	4.3%	3.6%	4.7%	3.3%	4.0%	6.0%	5.6%	4.7%	5.0%
Florence	3.1%	4.7%	2.9%	2.4%	3.0%	2.5%	2.1%	2.8%	2.0%	2.4%	3.6%	3.3%	2.7%	2.9%
Eloy	12.6%	17.6%	11.5%	9.6%	11.7%	10.0%	8.4%	11.0%	7.9%	9.5%	13.8%	12.9%	10.9%	11.3%
Coolidge	13.4%	9.3%	5.8%	4.9%	6.0%	5.1%	4.2%	5.6%	3.9%	4.8%	7.1%	6.6%	5.6%	6.3%
Queen Creek	n/a	3.8%	2.9%	2.1%	2.3%	1.8%	1.7%	1.8%	1.6%	2.4%	3.5%	3.1%	2.5%	2.5%
Santa Cruz County	5.2%	14.0%	21.4%	19.7%	25.8%	20.8%	17.9%	16.9%	14.1%	12.9%	13.9%	12.4%	13.1%	16.0%
Nogales	5.2%	18.1%	27.0%	25.0%	32.1%	26.3%	22.9%	21.6%	18.3%	16.7%	17.9%	16.1%	17.0%	20.3%
Patagonia**	n/a	5.3%	n/a	n/a	n/a	n/a	5.3%							
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%
New Mexico	7.5%	6.5%	6.3%	6.3%	8.1%	6.2%	6.2%	5.6%	5.0%	4.8%	5.4%	6.4%	5.5%	6.1%
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 fewer than 2,500 individuals

**Bureau of Labor Statistics publishes annual unemployment figures only for cities with a population greater than 25,000 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>

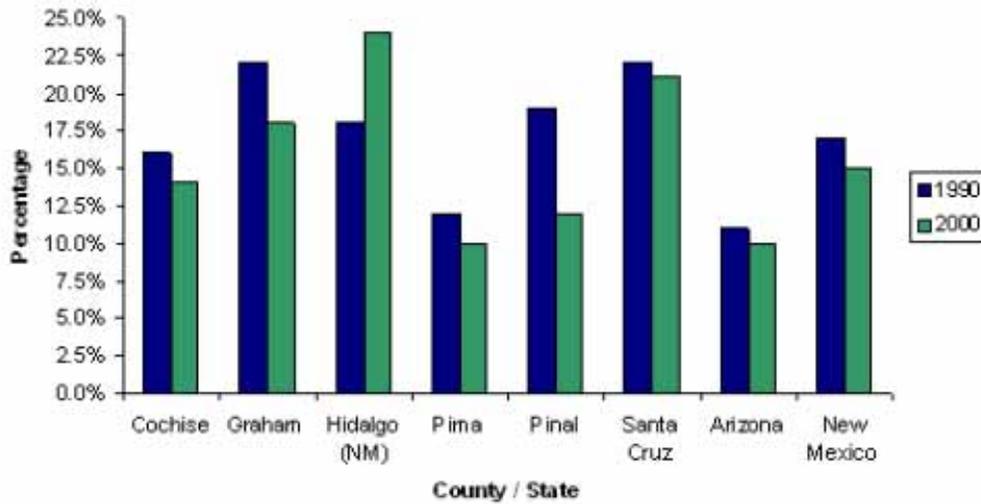
Table 16. Per Capita and Family Income by County and State, 1990-2000 and % Change

County/Place	Per Capita Income			Median Family Income			% Individuals in Poverty			% Families in Poverty		
	1990	2000*	% Change	1990	2000*	% Change	1990	2000	% Change	1990	2000	% Change
Cochise County	\$10,716	\$12,131	13.20%	\$26,152	\$28,835	10.26%	20.0%	18.0%	-10.00%	16.0%	14.0%	-12.50%
Sierra Vista	\$13,449	\$13,988	4.01%	\$32,764	\$33,442	2.07%	10.7%	10.5%	-1.87%	8.7%	8.0%	-8.05%
Douglas	\$6,619	\$10,232	54.59%	\$17,147	\$17,014	-0.77%	43.1%	36.6%	-15.08%	36.0%	32.1%	-10.83%
Bisbee	\$9,530	\$12,996	36.37%	\$22,276	\$27,834	24.95%	21.6%	17.5%	-18.98%	16.6%	12.9%	-22.29%
Benson	\$9,704	\$13,137	35.38%	\$21,357	\$27,590	29.19%	18.6%	13.7%	-26.34%	15.2%	6.2%	-59.21%
Willcox	\$8,428	\$8,964	6.36%	\$22,628	\$23,832	5.32%	23.1%	27.0%	16.88%	16.1%	21.6%	34.16%
Graham County	\$8,955	\$9,210	2.85%	\$21,754	\$26,113	20.04%	27.0%	23.0%	-14.81%	22.0%	18.0%	-18.18%
Safford	\$9,344	\$10,662	14.10%	\$24,206	\$27,842	15.02%	20.1%	17.3%	-13.93%	16.3%	13.9%	-14.72%
Thatcher	\$8,289	\$9,834	18.64%	\$24,611	\$30,646	24.52%	22.6%	20.2%	-10.62%	16.8%	12.8%	-23.81%
Hidalgo County	\$10,092	\$9,432	-6.54%	\$27,090	\$23,939	-11.63%	21.0%	27.0%	28.57%	18.0%	24.0%	33.33%
Lordsburg	\$7,077	\$8,253	16.61%	\$18,105	\$21,264	17.45%	35.8%	32.7%	-8.66%	32.1%	28.6%	-10.90%
Pima County	\$13,177	\$15,011	13.92%	\$30,985	\$33,722	8.83%	17.0%	15.0%	-11.76%	12.0%	10.0%	-16.67%
Tucson	\$11,184	\$12,384	10.73%	\$27,208	\$28,334	4.14%	20.2%	18.4%	-8.91%	14.4%	13.7%	-4.86%
Oro Valley	\$26,393	\$23,622	-10.50%	\$46,727	\$51,261	9.70%	5.3%	3.1%	-41.51%	4.1%	2.4%	-41.46%
Green Valley	\$21,531	\$23,625	9.73%	\$36,749	\$36,699	-0.14%	3.0%	3.0%	0.00%	2.0%	1.7%	-15.00%
Catalina	\$10,493	\$12,586	19.94%	\$27,372	\$31,194	13.96%	11.8%	9.7%	-17.80%	8.3%	7.9%	-4.82%
Marana	\$8,940	\$17,002	90.17%	\$25,045	\$43,033	71.82%	17.8%	6.2%	-65.17%	13.9%	5.5%	-60.43%
South Tucson	\$5,071	\$6,768	33.46%	\$12,931	\$13,364	3.35%	50.9%	46.5%	-8.64%	43.5%	46.5%	6.90%
Pinal County	\$9,228	\$12,159	31.76%	\$23,993	\$30,006	25.06%	24.0%	17.0%	-29.17%	19.0%	12.0%	-36.84%
Apache Junction	\$9,946	\$12,751	28.20%	\$23,151	\$28,624	23.64%	16.7%	11.6%	-30.54%	11.8%	7.3%	-38.14%
Casa Grande	\$11,388	\$12,077	6.05%	\$28,639	\$30,976	8.16%	17.4%	16.0%	-8.05%	16.1%	12.4%	-22.98%
Florence	\$10,101	\$8,557	-15.29%	\$24,397	\$31,835	30.49%	17.6%	7.0%	-60.23%	14.9%	6.1%	-59.06%
Eloy	\$5,836	\$6,976	19.53%	\$19,839	\$21,619	8.97%	36.7%	31.9%	-13.08%	31.2%	27.8%	-10.90%
Coolidge	\$7,634	\$10,366	35.79%	\$18,733	\$25,445	35.83%	36.2%	24.7%	-31.77%	29.5%	20.9%	-29.15%
Queen Creek	\$12,057	\$16,382	35.87%	\$37,083	\$49,832	34.38%	14.4%	9.2%	-36.11%	10.7%	6.0%	-43.93%
Santa Cruz County	\$9,007	\$10,074	11.85%	\$24,431	\$24,322	-0.45%	26.0%	24.0%	-7.69%	22.0%	21.0%	-4.55%
Nogales	\$7,795	\$7,722	-0.93%	\$20,386	\$18,693	-8.31%	31.2%	33.9%	8.65%	27.4%	30.8%	12.41%
Patagonia	\$8,436	\$11,627	37.83%	\$22,045	\$23,520	6.69%	30.9%	25.1%	-18.77%	26.1%	18.0%	-31.03%
Arizona	\$13,461	\$15,383	14.28%	\$32,178	\$35,450	10.17%	16.0%	14.0%	-12.50%	11.0%	10.0%	-9.09%
New Mexico	\$11,246	\$13,096	16.45%	\$27,623	\$29,913	8.29%	21.0%	18.0%	-16.67%	17.0%	15.0%	-11.76%
Sonora	n/a	\$1,954	n/a	n/a	\$7,969	n/a	n/a	34.1%	n/a	n/a	32.7%	n/a
Nogales	n/a	\$2,564	n/a	n/a	\$10,439	n/a	n/a	20.3%	n/a	n/a	19.7%	n/a
Agua Prieta	n/a	\$2,766	n/a	n/a	\$11,552	n/a	n/a	24.5%	n/a	n/a	22.3%	n/a
Naco	n/a	\$1,836	n/a	n/a	\$7,861	n/a	n/a	23.4%	n/a	n/a	21.7%	n/a

*2000 Income data for areas in the United States adjusted to reflect 1990 constant dollars by applying deflation factor calculated by Consumer Price Index
Income data for areas in Mexico calculated according to 2000 exchange rate of 9.4556 pesos to 1 U.S. dollar

Source: NRIS - Human Dimensions

Instituto Nacional de Estadística, Geografía e Informática (INEGI), Censo General de Población y Vivienda, 2000



Source: NRIS Human Dimensions

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

Table 17. Household Income Distribution by County, 2000

	Cochise County		Graham County		Hidalgo County (NM)		Pima County		Pinal County		Santa Cruz County	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than \$10,000	5,438	12.39%	1,509	14.91%	447	20.77%	34,224	10.29%	6,319	10.29%	1,579	13.36%
\$10,000 to \$14,999	3,772	8.59%	1,090	10.77%	252	11.71%	23,849	7.17%	4,604	7.50%	1,188	10.05%
\$15,000 to \$24,999	7,579	17.27%	1,776	17.55%	383	17.80%	51,181	15.39%	9,488	15.45%	2,164	18.31%
\$25,000 to \$34,999	6,701	15.27%	1,406	13.89%	298	13.85%	48,844	14.69%	9,380	15.27%	1,913	16.18%
\$35,000 to \$49,999	7,453	16.98%	1,747	17.26%	329	15.29%	57,733	17.36%	12,082	19.67%	1,647	13.93%
\$50,000 to \$74,999	7,439	16.95%	1,720	17.00%	268	12.45%	58,835	17.69%	11,221	18.27%	1,802	15.24%
\$75,000 to \$99,999	3,154	7.19%	537	5.31%	93	4.32%	27,889	8.39%	4,435	7.22%	692	5.85%
\$100,000 to \$149,999	1,631	3.72%	236	2.33%	56	2.60%	18,830	5.66%	2,683	4.37%	519	4.39%
\$150,000 to \$199,999	430	0.98%	71	0.70%	12	0.56%	5,359	1.61%	605	0.99%	177	1.50%
\$200,000 or more	299	0.68%	28	0.28%	14	0.65%	5,753	1.73%	596	0.97%	140	1.18%
Median household income (\$)	\$32,105	(x)	\$29,668	(x)	\$24,819	(x)	\$36,758	(x)	\$35,856	(x)	\$29,710	(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 income. Data show that Cochise, Pinal, and Pima Counties each reported especially strong gains in total labor income from wood processing and products between 1990 and 2000, contributing to an increase in this category for the area of assessment that was substantially greater than that for the state of Arizona over the same period. Particularly strong gains were reported in the individual sectors of special product sawmills, prefabricated wood buildings, reconstituted wood products, wood household furniture, structural wood members, and millwork. Interestingly, the counties that reported the largest increases in total labor income from wood products and processing reported either minimal gains or substantial losses in income from special forest products and processing over the same period. Graham and Hidalgo Counties reported the strongest increases in income from special forest products and processing between 1990 and 2000. Table 18 shows that the area of assessment, in comparison to statewide figures, realized a large increase in income from wood products and processing and an overall loss in income from special forest products and processing between 1990 and 2000.

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

County / State	Income from Wood Products and Processing			Income from Special Forest Products and Processing		
	1990	2000*	%Change	1990	2000*	%Change
Cochise County	\$930,836.12	\$2,316,042.25	148.81%	\$2,749,189.17	\$2,847,457.56	3.57%
Graham County	\$0.00	\$47,675.72	n/a	\$1,301,649.08	\$2,622,988.60	101.51%
Hidalgo County	\$0.00	\$0.00	0.00%	\$815,788.28	\$1,316,613.24	61.39%
Pinal County	\$1,857,088.91	\$3,403,789.99	83.29%	\$14,124,030.37	\$9,449,586.45	-33.10%
Pima County	\$12,710,945.28	\$23,744,236.92	86.80%	\$7,086,517.78	\$3,526,435.86	-50.24%
Santa Cruz County	\$302,875.49	\$280,303.11	-7.45%	\$962,175.81	\$929,841.86	-3.36%
Assessment Area Total	\$15,801,745.81	\$29,792,048.00	88.54%	\$27,039,350.49	\$20,692,923.57	-23.47%
Arizona	\$263,558,989.17	\$369,474,538.71	40.19%	\$175,994,086.50	\$137,825,248.28	-21.69%
New Mexico	\$74,750,035.16	\$71,318,854.00	-4.59%	\$32,359,688.72	\$39,734,899.98	22.79%

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

Information on tourism employment for each of the counties within the area of assessment, as well as the states of Arizona and New Mexico, 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, tourism employment has been assessed based on percentages derived from the Travel Industry Association of America 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 most substantial gains in tourism employment between 1990 and 2000 took place in Cochise, Graham, and Pima Counties, each of which exceeded the rate of increase for tourism employment at the state level. Although Hidalgo County reported the highest rate of increase in tourism employment over the period, the number of individuals employed as a result of tourism in 2000 remained relatively low. Meanwhile, Pinal and Santa Cruz Counties reported figures that suggest minimal increases in tourism employment over the same period.

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

Industry Sector	Cochise County			Graham County		
	1990	2000	%Change	1990	2000	%Change
Retail	406	550	35.44%	111	152	36.25%
Restaurant/Bar	471	744	58.01%	132	147	11.13%
Lodging	708	858	21.29%	98	195	98.93%
Amusement	12	18	46.95%	1	1	0.00%
Total	1,597	2,171	35.91%	342	494	44.38%
Industry Sector	Hidalgo County			Pima County		
	1990	2000	%Change	1990	2000	%Change
Retail	36	35	-2.65%	3,758	4,269	13.62%
Restaurant/Bar	55	49	-11.33%	4,764	6,633	39.23%
Lodging	11	148	1,196.65%	7,547	10,846	43.71%
Amusement	0	2	2,779.99%	353	427	21.21%
Total	102	233	128.10%	16,421	22,176	35.04%
Industry Sector	Pinal County			Santa Cruz County		
	1990	2000	%Change	1990	2000	%Change
Retail	456	535	17.39%	329	252	-23.16%
Restaurant/Bar	375	574	53.12%	113	166	47.14%
Lodging	665	510	-23.29%	446	589	32.15%
Amusement	34	80	134.27%	13	11	-13.30%
Total	1,530	1,700	11.09%	901	1,019	13.18%
Industry Sector	Arizona			New Mexico		
	1990	2000	%Change	1990	2000	%Change
Retail	21,655	30,376	40.28%	8,217	10,748	30.81%
Restaurant/Bar	26,393	38,395	45.47%	10,734	14,290	33.13%
Lodging	47,848	56,848	18.81%	14,056	17,021	21.09%
Amusement	1,442	3,462	140.05%	490	1,421	189.73%
Total	97,338	129,081	32.61%	33,497	43,480	29.80%

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).

In Table 20, PILT entitlement acreage is presented for each county by agency as of 2004. Pima County holds the greatest entitlement acreage with nearly 1.6 million acres, 389,871 of which are Forest Service (FS) lands. Cochise County holds the largest amount of FS lands entitled to PILT with 489,542 acres. Actual PILT payments for each county are presented in Table 21. Consistent with its abundance of entitlement acreage, Pima County has been the largest recipient of PILT payments over the last four years. Graham County had the second highest PILT payments over the last four years with an annual average of over \$1.2 million. Hidalgo County reported the lowest average annual PILT payment at \$397,318 between 2000 and 2004. Annual forest receipts for the period spanning 1986-1999 are presented for each county in Table 22. Here again, Hidalgo County reported the least amount in average annual forest receipts with \$8,900. By comparison, Cochise County had the greatest amount of annual average forest receipts over the same period with \$58,500.

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
Cochise County	391,051	489,542	1,989	17,592	0	0	0	0	900,174
Graham County	733,167	396,174	0	0	0	0	0	0	1,129,341
Hidalgo County (NM)	747,150	76,589	0	0	0	0	0	0	823,739
Pima County	376,616	389,871	5,898	410,822	0	0	416,210	0	1,599,417
Pinal County	382,231	222,889	21,312	473	0	0	0	0	626,905
Santa Cruz County	13,574	418,298	0	45	0	0	0	0	431,917
TOTAL	2,643,789	1,993,363	29,199	428,932	0	0	416,210	0	5,511,493

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
Cochise County	\$653,544	\$936,958	\$976,944	\$1,089,494	\$1,225,198	\$976,428
Graham County	\$817,889	\$1,187,783	\$1,248,837	\$1,421,185	\$1,461,333	\$1,227,405
Hidalgo County (NM)	\$282,260	\$405,862	\$425,861	\$430,317	\$442,290	\$397,318
Pima County	\$1,061,362	\$1,529,516	\$1,618,859	\$1,841,427	\$1,901,776	\$1,590,588
Pinal County	\$396,290	\$568,264	\$599,120	\$673,798	\$842,978	\$616,090
Santa Cruz County	\$331,976	\$475,255	\$498,484	\$569,132	\$597,577	\$494,485
TOTAL	\$3,543,321	\$5,103,638	\$5,368,105	\$6,025,353	\$6,471,152	\$5,302,314

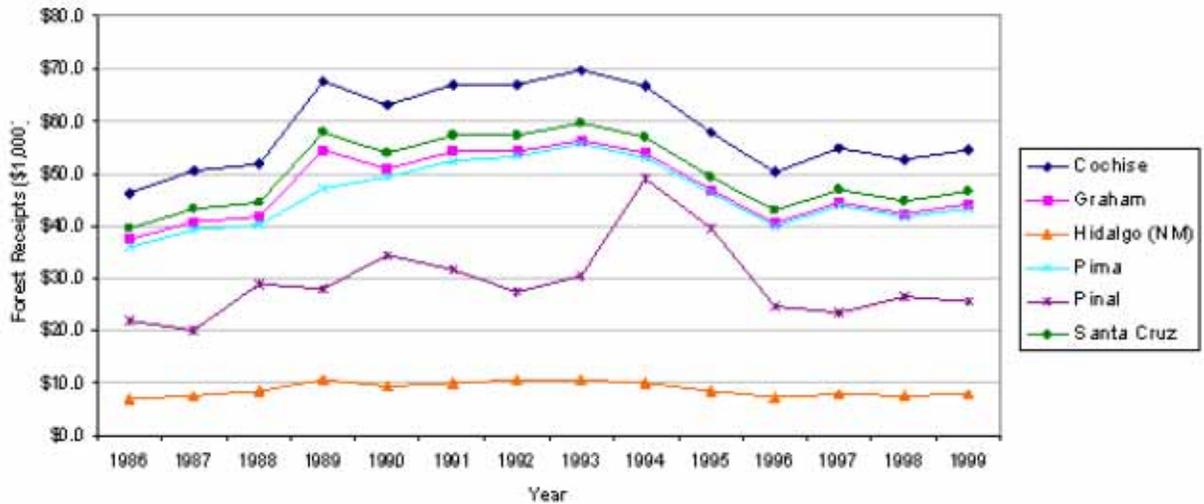
Source: U.S. Department of the Interior, Bureau of Land Management
<http://www.blm.gov/pilt/search.html>

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

County	1986	1987	1988	1989	1990	1991	1992	1993
Cochise County	\$46.1	\$50.4	\$51.7	\$67.4	\$62.9	\$66.9	\$66.8	\$69.7
Graham County	\$37.3	\$40.8	\$41.8	\$54.5	\$50.9	\$54.1	\$54.1	\$56.4
Hidalgo County (NM)	\$7.0	\$7.7	\$8.5	\$10.7	\$9.5	\$10.0	\$10.6	\$10.6
Pima County	\$36.0	\$39.3	\$40.3	\$47.0	\$49.2	\$52.4	\$53.3	\$55.6
Pinal County	\$21.8	\$20.1	\$29.0	\$28.1	\$34.4	\$31.5	\$27.5	\$30.3
Santa Cruz County	\$39.5	\$43.2	\$44.3	\$57.7	\$53.9	\$57.3	\$57.2	\$59.7

	1994	1995	1996	1997	1998	1999	Average
Cochise County	\$66.5	\$57.9	\$50.3	\$54.8	\$52.5	\$54.5	\$58.5
Graham County	\$53.8	\$46.7	\$40.6	\$44.3	\$42.4	\$44.0	\$47.3
Hidalgo County (NM)	\$10.0	\$8.6	\$7.4	\$8.0	\$7.7	\$7.9	\$8.9
Pima County	\$53.0	\$46.1	\$40.0	\$43.7	\$41.7	\$43.3	\$45.8
Pinal County	\$48.9	\$39.6	\$24.5	\$23.5	\$26.6	\$25.7	\$29.4
Santa Cruz County	\$56.8	\$49.4	\$42.9	\$46.8	\$44.8	\$46.5	\$50.0

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 negative impacts 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 CNF illustrate this trend, evincing substantial growth in the F.I.R.E. (finance, insurance and real estate), services, and construction industries. 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. Despite relatively slow economic growth for the area surrounding CNF, data show expansion of certain populations and industries that are increasingly important to the local economy. In particular, the increase in retirement-aged population and seasonal housing units, when combined with increases in the service/professional, retail trade, and construction industries, mirrors a common trend in rural western economies.

These trends support the notion that growth in many western communities is increasingly supported by individuals and households with the wherewithal to advocate non-extractive economies. Data show that per capita and median household incomes in the region grew less than the state average between 1990 and 2000, with overall income levels remaining well below the state average for each of the counties in the area of assessment. This trend takes on increasing relevance when combined with observed demographic trends showing an 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, and retirement) and dividend income. In other words, the growth of many western 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 CNF demonstrate the reciprocal cause-and-effect relationships between economic and demographic trends. Although economic growth of rural communities may be fueled by households with relatively "footloose" sources of income, potentially negative consequences include an increased demand for construction, schools, health care and other services as well as undesirable side effects such as pollution, urban sprawl, and congestion (Rasker 2000, Case and Alward 1997).

4. Access and Travel Patterns

This section examines historic and current factors affecting access patterns and transportation infrastructure within the six counties surrounding the Coronado National Forest (CNF). The information gathered is intended to help outline current and future trends in forest access as well as identify 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 (ADOT), the Arizona Department of Commerce (ADOC), 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 Coronado NF cite the difficulty of transportation planning in the region given its vast geographic scale, population growth and pace of development, as well as 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 suggest that the area surrounding CNF has a relatively large network of state highways compared to Arizona's other national forests. Overall increases in VMT were greatest in Pinal County between 1990 and 2000, mirroring the region's strong population growth. Research shows that there are relatively few major improvements currently scheduled for the region's transportation network and that seasonal traffic flows coincide with weather conditions which influence patterns of visitors from outside the region.

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 extractive economy. Transportation plans reviewed for this assessment specifically mention economic influences such as farming, ranching, and mining as having played a role in developing the region's circulation system (Graham County 1996, Santa Cruz County 2004, ADOT 2004a).

Today, many regions of the state, including the area surrounding the CNF, 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 particularly challenging given recent rates of population growth and expansion of urban areas. The comprehensive plans further admit that current transportation networks have been developed as needs have arisen and are therefore inadequate for handling projected long-term growth (Cochise County 2002, PAG 2003a, Santa Cruz County 2004).

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 (PAG 2001, Pinal County 2001, Santa Cruz County 2004). 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. They are as follows: 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 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, growing 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 prepare adequately for future transportation needs, ADOT calls for greater coordination between state, regional, and local agencies on 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 plans on playing 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. Figure 14 shows particularly dense road networks surrounding the urban population centers and a considerable network of interstates, state highways, and Indian routes. Additionally, the majority of major roads follow a north-south orientation with the exception of Interstate 10 and State Route 86, which are primarily situated east to west through the area of assessment.

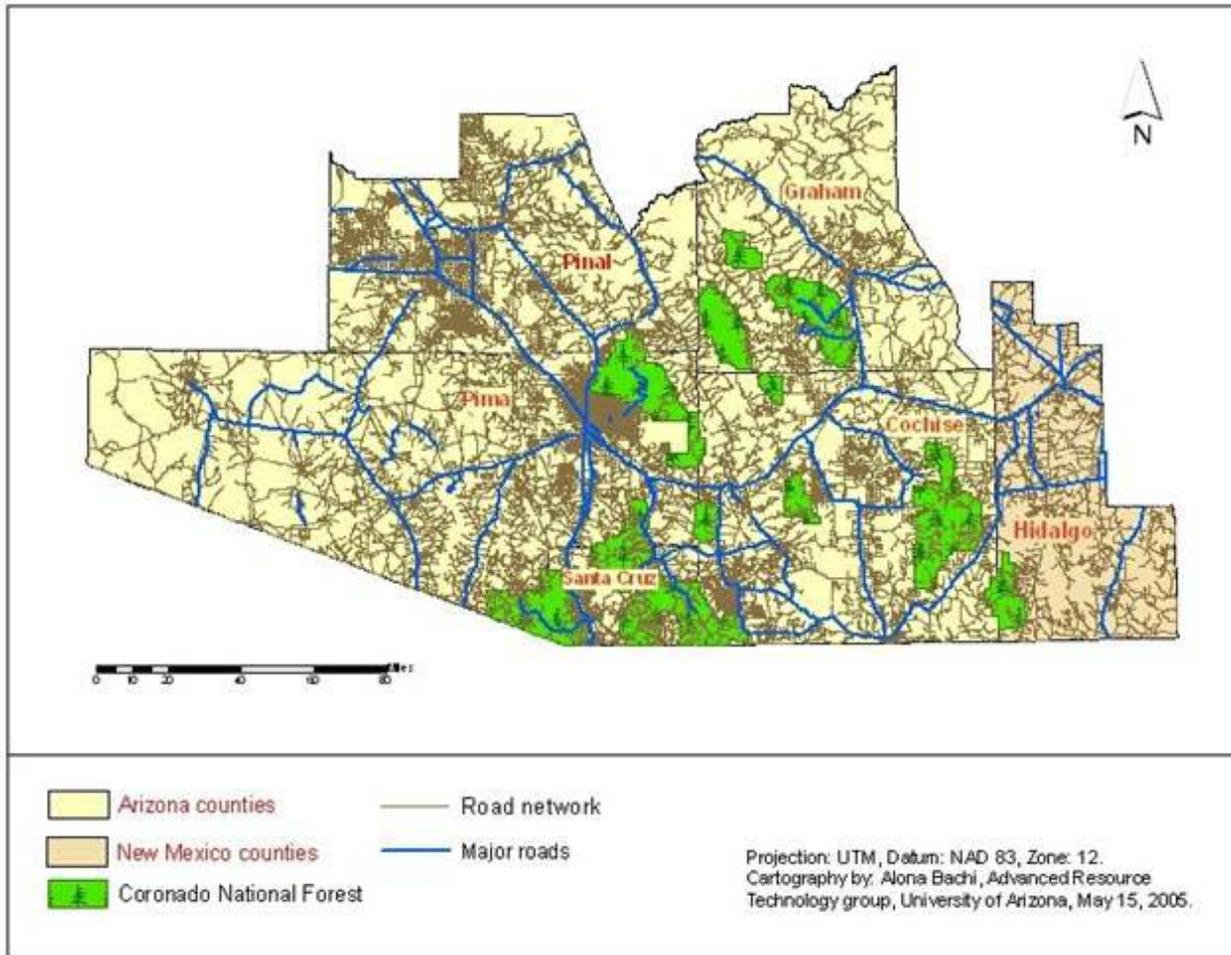


Figure 1. Road Network within Area of Assessment

Table 1. U.S., State, and Indian Routes by County

	Interstates / U.S. Highways	State Highways	Indian Routes
Cochise County	Interstate 10 US 191	State Highway 80 State Highway 82 State Highway 90 State Highway 92 State Highway 181 State Highway 186	
Graham County	US 70 US 191	State Highway 170 State Highway 266 State Highway 366	
Hidalgo County	Interstate 10 US 70	State Highway 9 State Highway 80 State Highway 81 State Highway 90 State Highway 92 State Highway 113 State Highway 145 State Highway 338 State Highway 464	
Pima County	Interstate 10 Interstate 19	State Highway 79 State Highway 83 State Highway 85 State Highway 86 State Highway 286 State Highway 366	Indian Route 15 Indian Route 19 Indian Route 21 Indian Route 34
Pinal County	Interstate 8 Interstate 10 US 60	State Highway 77 State Highway 78 State Highway 84 State Highway 87 State Highway 88 State Highway 187 State Highway 237 State Highway 287 State Highway 347 State Highway 387 State Highway 177	Indian Route 15

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

	Interstates / U.S. Highways	State Highways	Indian Routes
Santa Cruz County	Interstate 19	State Highway 82 State Highway 83 State Highway 289	
Sonora, Mexico	Mexico Highway 2 Mexico Highway 4 Mexico Highway 15 Mexico Highway 49 Mexico Highway 99 Mexico Highway 108 Mexico Highway 120 Interstate 5	State Highway 59	

Source: Arizona Department of Commerce, County Profiles

The vast majority of circulation corridors throughout the area of assessment provide infrastructure for a single transportation mode—travel by motorized vehicle. Given the expense of developing infrastructure for alternative modes of transportation, and the patterns of development throughout rural areas of the state, the predominance of motorized vehicles is likely to continue for the foreseeable future. Nonetheless, planning agencies throughout the region express a desire to reduce dependency on automobiles by supporting alternative modes—transit, walking, bicycling—thereby reducing the demand for expanded roadways (PAG 2001, Pinal County 2001, Santa Cruz County 2004).

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 12% of the total highway network are state facilities, over 57% of the daily VMT occurs on these roads. The interstate system carries 28% 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 70% of the land in Arizona. Federal lands agencies, including the U.S. Forest Service (USFS), the Bureau of Land Management (BLM), and others, own 42% 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 28% of Arizona land. An additional 1,200 miles of state highway passes 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 Pinal County over the ten-year period. A similar, though relatively modest, increase in traffic for all roads was also reported within the county over the same time period. These increases are obviously due in part to substantial increases in population and housing units in Pinal County as discussed in Chapter 2. The extraordinary increase in travel on non-state roads is likely attributable to significant increases in VMT on county roads and roads serving private residential and commercial developments. Table 24 also shows that half of the counties within the area of assessment reported decreases in travel on non-state roads between 1990 and 2000. Directly comparable data for Hidalgo County and the state of New Mexico were unavailable due to the fact that the New Mexico Department of Transportation (NMDOT) monitors traffic by *functional* classification rather than *administrative* classification. Available data however suggest that Hidalgo County experienced a significant increase in travel on rural interstates between 1990 and 2000 (35.93%) and a slight increase in VMT on rural arterial routes (8.33%). Increase in travel on interstates and rural arterial routes for the State of New Mexico were nearly identical to increases in statewide travel for Arizona (NMDOT 2005).

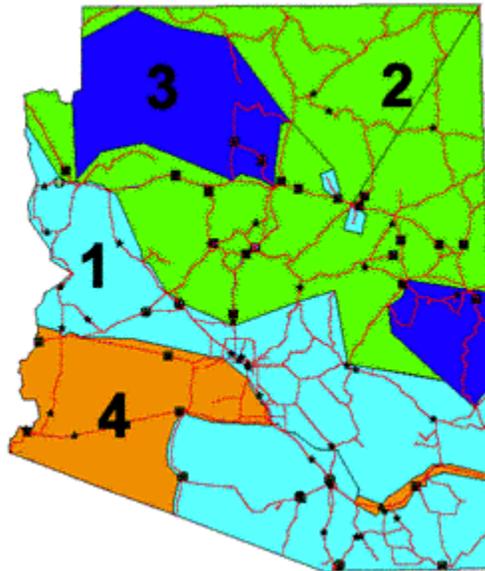
Table 2. Daily Vehicle-Miles of Travel (VMT) by County, 1990-2000 and % Change

Area	Total VMT all roads (000s)			Total VMT state system (000s)			Total VMT non state (000s)		
	1990	2000	% Change	1990	2000	% Change	1990	2000	% Change
Cochise County	3,395	4,233	24.68%	2,216	3,108	40.25%	1,179	1,125	-4.58%
Graham County	731	814	11.35%	374	460	22.99%	357	354	-0.84%
Pima County	16,065	18,928	17.82%	4,097	6,450	57.43%	11,968	12,478	4.26%
Pinal County	3,446	6,917	100.73%	3,361	4,805	42.96%	85	2,112	2,384.71%
Santa Cruz County	933	1,017	9.00%	544	726	33.46%	449	291	-35.19%
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 2. 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 CNF extend into the portions of the state designated as Area One and Area Four by ADOT's Transportation Planning Department. Data in Table 25 show that peak traffic flow for Area One occurs between the months of February and April and is lowest from July to September. 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. On the other hand, traffic flow for Area Four fluctuates much more with the highest traffic flows reported in December and the lowest in October. For the portion of Area Four nearest the Coronado, this pattern is likely due to seasonal fluctuation of through traffic on Interstate 10.

Table 3. 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 Annual Average Daily Traffic (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 in addition to 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 CNF.

Planned improvements to the state highway system surrounding the CNF 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 4. ADOT Current 5-Year Transportation Facilities Construction Program, Coronado National Forest

Year	Route	County	Milepost	Funding Source	Location	Length (miles)	Type Of Work	Cost (\$1,000s)
2008	77	Pima	82	Surface Transportation Program	Tangerine Rd. – Pinal County line, Phase 1	5.82	Construct roadway widening to 6 lanes	\$1,327
2008	77	Pima	82	PAG 2.6%	Tangerine Rd. – Pinal County line, Phase 1	5.82	Construct roadway widening to 6 lanes	\$3,235
2006	77	Pima	82	State	Tangerine Rd. – Pinal County line, Phase 1	5.82	Design (roadway widening to 6 lanes)	\$507
2005	82	Santa Cruz	3.1	Surface Transportation Program	Nogales city limits – Patagonia Lake Rd.	9.2	Resurface	\$2,666
2005	83	Santa Cruz	0	Transportation Enhancements	Sonoita – Patagonia	2	Scenic easement acquisition.	\$550
2007	92	Cochise	328.3	Surface Transportation Program	Carr Canyon Rd. – Hunter Canyon	3	Widen to four lanes with protected left turn opportunities	\$7,542
2005	289	Santa Cruz	0	State	JCT I-19 to Peña Blanca Lake	10	Seal	\$344
2006	366	Graham	118.7	State	Mt. Graham Rd.	0	District Force Account.	\$75
2005	366	Graham	118.7	State	Mt. Graham Rd	0	District Force Account.	\$75
2005	366	Graham	118.7	State	Mt. Graham Rd	0	District Force Account.	\$100

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

In an effort to facilitate coordination among the various planning authorities throughout the state, ADOT has charged 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 Coronado NF, the Central Arizona Association of Governments (CAAG), the Pima Association of Governments (PAG), and the South Eastern Arizona Governments Organization (SEAGO) 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 (Graham County 1996, PAG 2001, Pinal County 2001). A brief description of access issues and planned improvements, as discussed in regional and county transportation

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.

Cochise County

A recent report on roadway needs explains that Cochise County maintains 1,442 miles of roads, of which 579 miles are paved and 863 miles are dirt. In describing the primary function of the county road network, the report cites recently published guidelines developed by the American Association of State Highway Transportation Officials (AASHTO). The guidelines define a “low volume” road as having an Average Daily Traffic count (ADT) of less than 400 vehicles per day (vpd). Of the 1,442 miles of county-maintained roads, approximately 1,191 miles, or 83%, carry an ADT of less than 400 vpd (Cochise County 2002). County resources for road construction and maintenance are very limited and constraining.

In response, the county has established improvements in roadway safety, preservation of public investment in existing structures and pavements, and improvements in road surface as the three main governing principles for prioritizing department resources. Roadway maintenance expenses constitute a major percentage of Cochise County’s highway budget. The Arizona Association of County Engineers (AACE) recently contracted for a report of roadway needs for all Arizona counties. The AACE report indicates that Cochise County should be spending about \$8,389,000 annually to maintain the roadways, bridges, and appurtenant facilities. The county presently spends about \$4,800,000, or 57%, of what is needed (Cochise County 2002). While growth for most of the county is moderate, development of the area south of Sierra Vista is robust, and the need for expanded roadways in the area is apparent. The Roadway Needs Report calls for an additional study to identify traffic patterns, the need for new routes, and the possible location of new routes. Potential improvements include an east-west road between Moson Road and State Route 92 to supplement Ramsey Road and a north-south road between Hereford and State Route 90 to supplement Moson Road (Cochise County 2002).

Pima County

PAG has developed a long-term transportation plan for the unincorporated areas in eastern Pima County. The PAG 2025 Regional Transportation Plan (RTP) replaced the previous Metropolitan Transportation Plan for 1998-2020 (MTP) and was adopted by the PAG Regional Council on January 24, 2001. Immediately following the 2025 RTP update, a major long-range transportation plan revision was initiated to cover the years 2005 to 2030. This major plan revision will include Census 2000 data, new forecasts from that data, and completed 2000 Household Travel Demand Survey data as well as an extensive public participation outreach program (PAG 2001).

The 2025 RTP addresses transportation facilities and services in eastern Pima County, which includes unincorporated Pima County, the City of Tucson, the City of South Tucson, the Town of Marana, the Town of Oro Valley, the Town of Sahuarita, the San Xavier District of the Tohono O’odham Nation, and the Pascua Yaqui Tribe of Arizona. The regional roadway system under PAG’s jurisdiction consists of approximately 4,000 lane-miles of freeways, parkways, and major and minor arterials. There are also more than 5,000 lane-miles of local streets within the region. Most of these roadways are maintained and operated by state and/or local jurisdictions. PAG estimates that this roadway system provides for over eighty percent of the total VMT in the metropolitan area (PAG 2001).

Planned improvements submitted to PAG by area jurisdictions are funded by local, state, and federal transportation resources. Planned improvements under PAG jurisdiction are discussed in both the Five-year Transportation Improvement Program (TIP) as well as the 2025 RTP. The TIP is typically updated annually with the most recent report covering the period from 2005-2009. The TIP provides an extensive list of projects, several of which may influence access and travel patterns to and from the CNF. They include the purchase of the scenic easement adjacent to I-10 and the Davidson Canyon Preserve, the widening to six lanes of I-10 from Tangerine Rd. to Pinal Air Park Rd., the widening to six lanes of State Route 77 from Tangerine Rd. to the Pinal County line, and ongoing improvements to the Mt. Lemmon

Highway (PAG 2004). A complete list of projects approved by the 2005-2009 PAG Transportation Improvement Program can be found on-line at http://www.pagnet.org/TIP/tip2005-2009/FY05_Final_TIP_approvedweb.pdf.

In addition to projects identified by the TIP, the PAG 2025 Regional Transportation Plan identifies several projects that will be given long-term priority. They include the widening to eight lanes of I-10 from the Pinal County Line to I-19, the widening to six lanes of I-19 from Ajo Way to Valencia Rd., and the reconstruction of numerous interstate traffic interchanges along I-10 and I-19 at various points within the Tucson metropolitan area (PAG 2001).

Pinal County

The Pinal County roadway network consists of two interstates, one U.S. route, twelve state routes, Bureau of Indian Affairs routes, BLM and USFS roads, county roads, and municipal streets. Many of these roads, especially the main thoroughfares, are north-south aligned. East-west aligned roads connect the larger communities such as Casa Grande, Apache Junction, Coolidge, and Florence (Pinal County 2001).

The *Pinal County Comprehensive Plan* points to the rapid population growth in northern areas of Pinal County and southern portions of Maricopa County as the single most pressing issue affecting transportation planning in the region. Current travel patterns in Pinal County are not focused on a central area where services and employment are concentrated. Rather, residents in different parts of the county flow toward the closest area for services or employment. For example, residents of Apache Junction are closely tied to the Phoenix area, people in the Superior region may travel to Globe, and those in Oracle visit Tucson for basic services. Travel patterns in the center of the county—the region that includes Casa Grande, Eloy, Arizona City, Coolidge, and Florence—are also affected by significant travel to and from the metropolitan area due to the proximity of Phoenix and Tucson, the strong employment base that Casa Grande and Florence provide, and the varied and specialized services that can be found in the metropolitan areas. In an effort to respond to projected growth, Pinal County has emphasized the need for an efficient multimodal transportation system with special priority given to expanded public transit capacity (Pinal County 2001).

The *Pinal County Comprehensive Plan* does not provide details on planned improvements to the county roadway network; instead, it refers to two previous documents which further describe existing conditions, levels of service, and identified transportation improvement projects. In April 2000, the Central Arizona Association of Governments (CAAG) adopted a *Regional Transportation Plan* that identified deficiencies along the regionally significant roadways and recommended necessary improvements for CAAG's short-term, mid-term, and long-term transportation improvement plans. The *2000 Pinal County Transportation Plan* discusses expected land use and transportation impacts of Comprehensive Plan implementation as well as the role of planning partnerships between human service providers, major employers, and municipalities throughout the county (Pinal County 2001). Both of these documents were produced by a private transportation-planning contractor and were unavailable for review at the time of this assessment.

Santa Cruz County

Interstate 19 runs generally north-south through the county and connects Nogales with Tucson at Interstate 10. It is the only principal arterial roadway in Santa Cruz County and is under ADOT jurisdiction. State Routes 82 and 83 are considered by ADOT to be major collectors. SR 82 runs generally southwest-northeast from Nogales to Sonoita and into Cochise County. SR 83 traverses the northeast corner of the County from the Parker Canyon area through Sonoita and into Pima County (Santa Cruz County 2004).

Transportation planning within Santa Cruz County has been, and will continue to be, influenced by the area's proximity to the international border with Mexico. Interstate 19 and State Routes 82 and 83 have been affected by increases in the volume of international truck and tourist traffic that have occurred with

the passage of the North American Free Trade Agreement (NAFTA). These increases are projected to continue. In addition, the increases in border crossings have created a bottleneck situation at the Mariposa Port of Entry. Portions of SR 82 and SR 83 are designated as scenic roads, passing through beautiful natural areas and rural residential communities, and play an important role in the county's tourist economy. Increasing use by NAFTA-related truck traffic creates unique impacts. Designation of I-19 as the main hazardous materials route through the county could reduce some of the truck traffic on this route and contribute to sustaining SR 82 and SR 83 as rural collectors (Santa Cruz County 2004).

The I-19 corridor from Nogales to Rio Rico is the highest traffic-growth area in the county. This traffic increase is due to residential, industrial, and commercial development. In an effort to prepare for continued growth, the county is pursuing the development of design standards as well as the planning and construction of major and minor collector roads to ensure the circulation system can adequately maintain a high level of service. To reduce the impact from the developing areas, I-19 traffic flow should continue to be regulated. This can be facilitated with improvement to, and increased use of, the frontage roads and ensuring connectivity to established interchanges (Santa Cruz County 2004).

Other Regional Transportation Planning Authorities

Despite considerable effort, the assessment team was unable to access certain transportation planning data that may prove useful for determining access and travel patterns in areas surrounding the Coronado. The usefulness of the circulation element of the *Graham County Comprehensive Plan* is limited given that it discusses only four overall transportation-planning objectives. It alludes to the *Graham County Transportation Plan* developed in 1992 (later amended in 1998); however, this plan was developed by a private transportation-planning contractor and was unavailable for review at the time of this assessment.

4.4 Internal modes, barriers, and access issues

With respect to internal access issues, a common concern regarding barriers to access for the CNF is the development of private land adjacent to forest boundaries. In particular, FS personnel and members of the general public share a growing concern regarding the use and/or misuse of public lands by abutting private landowners. Currently, nearly all access points to the forest are through private lands. Other forests in the state experiencing similar access issues have noted that, at times, developers and individual private property owners have responded to perceived congestion by seeking to control access to established forest trails and roads. Another source of potential conflict regarding access to the CNF through private lands concerns the impact of undocumented migrants in areas near the U.S.-Mexico border. Private owners cite security concerns and environmental damage caused by migrants as primary reasons for closing gates and otherwise restricting access through private property (Emmett, pers. comm.; Farr, pers. comm.).

These observations from forests in Arizona are supported by similar findings issued in a report to the House Subcommittee on National Parks and Public Lands in 1992. The report claimed that access to fourteen percent (50.4 million acres) of FS and BLM lands was inadequate. Inadequate access for the purpose of the report was defined as a lack of "permanent, legal right for the public to enter federal land at the point(s) needed to use the federal land as intended by the managing agency." According to study respondents, the primary cause of inadequate access to public lands was an increase in private landowners' unwillingness to grant public access across their land. This trend coincided with an increase in recreational uses on federal land and reflected private landowners' concerns regarding vandalism, potential legal liability, and desire for private and/or exclusive use. Reduced access to public lands resulting from private landholders not only affects recreational opportunities, it also interferes with agency management activities such as construction and maintenance of trails and roads, law enforcement, fire protection, and habitat monitoring (Duffus 1992).

Another concern common among various user groups is that of OHV access to both FS and user-created roads. While virtually all user groups claim to support the limitation of damage to FS lands as a result of OHV use, opinions differ on how to do so. Organized OHV-user groups have voiced general support for limiting cross-country travel between FS and user-created roads but would like to see both remain open in the future. Various environmental groups, on the other hand, believe that access to user-created roads should be curtailed until the completion of a forest-wide Roads Analysis Process (RAP). Finally, a third perspective is offered from individuals typically unaffiliated with organized user groups. Many of these individuals are retired, physically limited, and/or long-time users of backcountry areas. They rely on OHV access to remote areas and do not believe that their intermittent use causes damage to non-roaded areas. They are therefore opposed to limitations on cross-country travel (Emmett, pers. comm.; Farr, pers. comm.). Trends in OHV use are discussed in more detail later in this assessment.

In 2003, the CNF conducted a roads analysis for maintenance-level 3, 4, and 5 roads (passenger car roads). The analysis reviewed road density, use, and maintenance. Additionally, individual roads were assessed for their effect on human-caused wildfires, wildlife, cultural resources, air quality, and watershed conditions. The analysis determined that 96.5% of the 797.75 miles of roads within the CNF should be classified as high-value roads for passenger car access. The analysis also includes recommendations for changes in the level of maintenance for certain forest roads and accurate determinations of management responsibilities and jurisdiction based on the collection of site-specific road data (CNF 2003a). Earlier this year (2005), the Engineering Staff began conducting a roads analysis for Ecosystem Management Areas (EMA's) on the CNF.

Currently, there are no explicit differences in the general access afforded to various user groups on the Coronado NF. Businesses, individuals, or groups intending to use CNF lands for a variety of special purposes ranging from commercial recreation to infrastructure must apply for a Special Use Authorization.

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 CNF 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.

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 CNF 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. Within the area of assessment, increases in VMT were greatest in Pinal and Cochise Counties (100% and 24% respectively). 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 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 and the likely increase in truck traffic as a result of the CANAMEX corridor, the Coronado is bound to be affected by increased traffic flow, congestion, and longer commute times.

Finally, current and projected trends in vehicular traffic are particularly relevant in that they are instrumental in determining local and regional land use patterns. Each of the county comprehensive plans reviewed for this assessment makes specific mention of the link between transportation networks and land use. Some acknowledge that regional approaches to transportation development and financing likely offer the best chances of accommodating expected growth without compromising residents’ quality of life. Indeed, research has shown that adequate highway systems and access to regional urban centers have a direct impact on population density, reflecting the importance of transportation on the location decisions of 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

This section examines land ownership and use within the six counties surrounding the Coronado National Forest (CNF). Land ownership and use are both variables which can significantly influence interaction between forests and surrounding communities. Regional development patterns and major land use vary from county to county, reflecting differences in climate, topography, ownership, and other cultural, social, and economic trends. Individual counties must attend to 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 CNF contains a relatively high percentage of private and State Trust land, both of which stand to have a considerable impact on future forest planning. Santa Cruz County is also notable for the amount of land managed by the USDA Forest Service (52.7%). Each of these factors contributes to a land use policy environment that is increasingly focused on the sustainability of urban development in the face of increasing calls for the preservation of open space. The proximity of private parcels and forest lands has also contributed to a number of significant land exchanges involving the CNF within the last twenty 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 extracted (Baker et al. 1988). 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. While the Coronado has 30,000 roadless acres, 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.

The majority of land in the National Forest System is grassland, while about 20% of the Rocky Mountain Region (including Arizona and New Mexico) is forested (Alig et al. 2003)¹. 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 30% or more, 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). Although there are no active timber interests in the CNF, projects on a local scale such as road construction, mining, and the harvesting of firewood for fuel and kindling may affect protected sites for owls and other wildlife (USFWS 1999). Mining remains an active industry both in Arizona and in the Coronado. The production value of Arizona's minerals five years ago

¹ In this particular report, Alig and the others have defined the Rocky Mountains Regions as consisting of "the Intermountain and Great Plains subregions," including the following states: Kansas, Nebraska, North Dakota, South Dakota, Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming.

was in the vicinity of \$3 billion and accounted for over 65% of U.S. copper production. Arizona's copper industry makes use of over 180,000 acres of the state's land. Hundreds of mines, active and inactive, are spread through Cochise County and beyond, many on USFS land (U.S. Customs 2003). In 2003, the Department of Agriculture announced a proposed mine expansion into a roadless area near the Dragoon Mountain range for Alpha Calcit Arizona, Ltd. (USFS 2003b).

Also in the planning stages is an extended power line set for installation by the Tucson Electric Power Company (TEP). The corridor plans include a fifteen-mile segment which would pass through the CNF and which would require regular maintenance involving increased vehicular traffic to that area. In addition, there are suggestions that such a corridor might increase residential development in the project vicinity along with increased border patrol presence and security concerns involving illegal immigrants. While comprehensive studies were incomplete at the time of this report, the possibility of adverse affects on biological, visual, and cultural resources, as well as to land use and soil, were considered foreseeable and were balanced against improved electricity reliability in the region surrounding Nogales which some expect would contribute to long-term benefits in business development and regional growth.

As noted, although the total amount of land covered has remained consistent, the specific lands contained within the national forests have occasionally transferred ownership. The forests have added or released land regularly in an attempt to consolidate land within the outer boundaries of the national forests (Baker, et al. 1988). In the Coronado, land swaps like the Cote and the Camp Tatiyee land exchanges are still pending. Naturally, the private citizens who live on the outskirts of the forest represent a formidable influence on the forests themselves. Originally, grazers and lumbermen expanded their own privately held lands into those earmarked for the national forests although this was eventually suppressed. Nonetheless, the communities that build and grow on the edges of these public lands frequently apply for trades involving these lands to allow towns to grow—applications which may either be accepted or rejected by the USFS depending upon how such trades threaten to impact specific forests.

5.2 Land ownership and land use

There are over 19 million acres of land in the six-county area of assessment for CNF. 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 relatively large amount of State Trust land in close proximity to private land as well as considerable Native American holdings within the area of assessment. Data in Figure 17 suggest that, as a whole, the area of assessment for the CNF differs from overall ownership patterns for the State of Arizona. For example, the area contains a relatively large amount of private acreage compared to the state (25% versus 18% respectively) as well as a considerable amount of State Trust land (23% versus 13% respectively). 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 among the six individual counties within the area of assessment. Here again, Cochise, Pinal, and Hidalgo Counties are notable for their relatively substantial amounts of private and State Trust land. Graham and Pima Counties show the highest percentage of land owned by Native American entities (36.33% and 42.11% respectively) while Santa Cruz County reports the greatest amount of land held by the FS (52.72%). Meanwhile Santa Cruz County also reports a considerable amount of private land (37.68%) and limited State Trust land (7.78%) when compared to neighboring counties and the state as a whole.

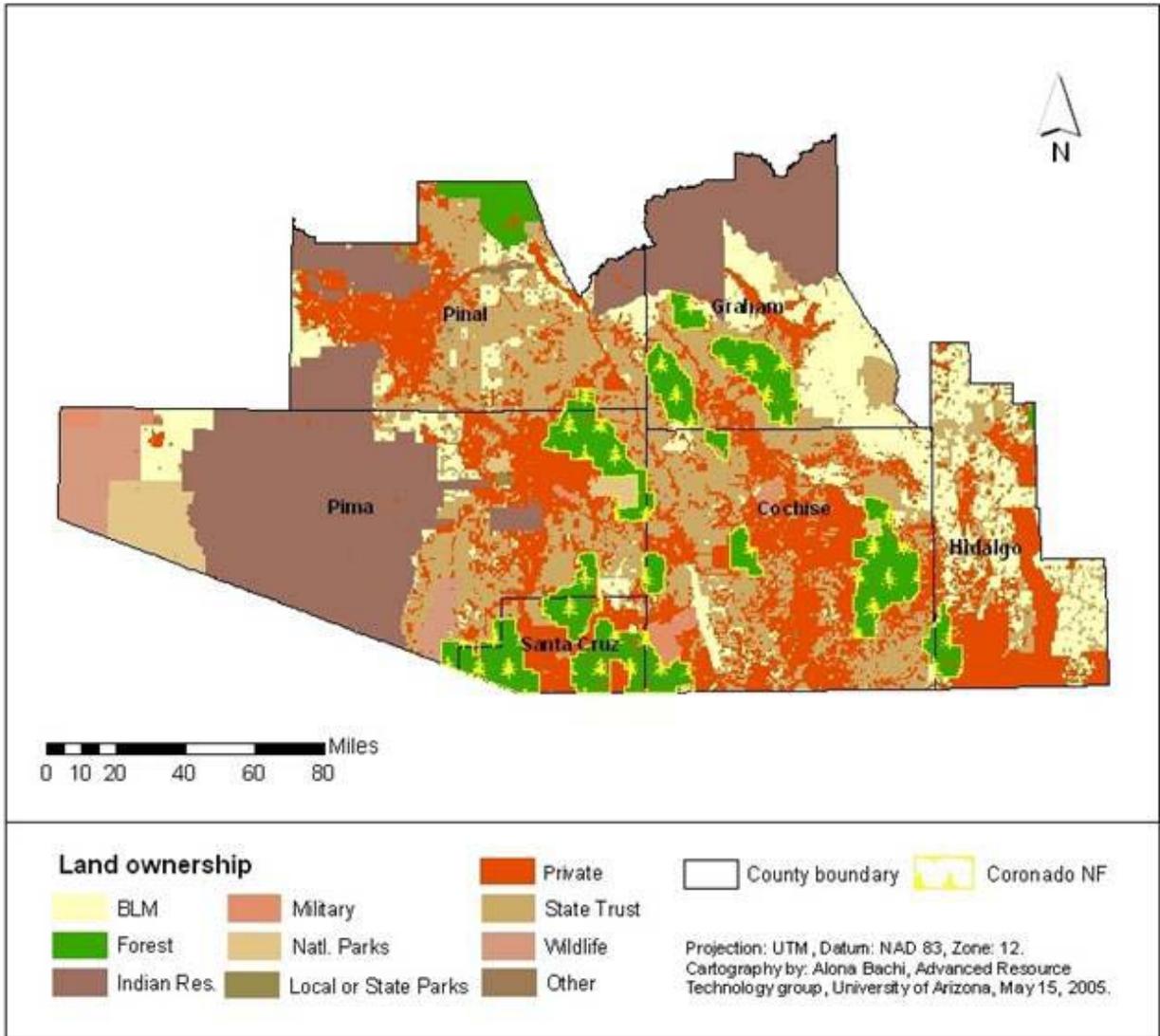
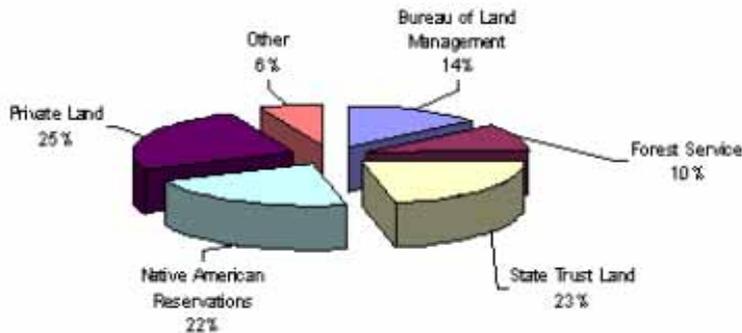


Figure 3. Land Ownership within Area of Assessment



Sources: Arizona State Land Department
 Hidalgo County Tax Assessors Office

Figure 4. Percent Ownership by Major Land Owners in Six-County Area of Assessment

Table 5. Land Ownership by County, 2005

Land Ownership	Acres	Percent	Land Ownership	Acres	Percent
Cochise County			Pinal County		
BLM	390,906.48	9.83%	Ak-Chin Indian Res.	21,449.98	0.62%
Chiricahua N.M.	12,162.87	0.31%	BLM	374,035.32	10.88%
Coronado NF	490,740.92	12.34%	Bureau of Reclamation	40,204.42	1.17%
Coronado N.M.	4,172.49	0.10%	Casa Grande N.M.	469.42	0.01%
Fort-Bowie N.H.S	1,561.09	0.04%	Coronado NF	23,281.87	0.68%
Fort-Huachuca	79,364.16	2.00%	County Land	3,676.12	0.11%
Game and Fish	3,092.63	0.08%	Game and Fish	52.93	0.00%
Military Res.	664.33	0.02%	Gila River Indian Res.	276,028.20	8.03%
Other	61.77	0.00%	Hohokam Pima N.M.	1,574.81	0.05%
Private Land	1,590,299.94	39.99%	Indian Allotments	1,090.45	0.03%
San Bernardino N.W.R.	2,368.49	0.06%	Military Res.	7,300.52	0.21%
State Trust Land	1,374,463.33	34.56%	Parks and Recreation	10,527.79	0.31%
Willcox Range	27,825.94	0.70%	Private Land	877,267.20	25.52%
TOTAL	3,977,184.44	100.00%	San Carlos Indian Res.	133,544.31	3.88%
Graham County			State Trust Land	1,204,920.53	35.05%
BLM	733,117.44	24.64%	Tohono O' odham Indian Res.	266,350.41	7.75%
Coronado NF	380,693.78	12.80%	Tonto NF	195,735.84	5.69%
Fort Grant	40.04	0.00%	TOTAL	3,437,510.12	100.00%
Game and Fish	1,036.87	0.03%	Santa Cruz County		
Military Res.	399.69	0.01%	BLM	13,518.30	1.71%
Private Land	282,943.80	9.51%	Coronado NF	417,233.87	52.72%
San Carlos Indian Res.	1,080,785.68	36.33%	Other	277.10	0.04%
State Trust Land	496,181.38	16.68%	Parks and Recreation	599.87	0.08%
TOTAL	2,975,198.68	100.00%	Private Land	298,252.35	37.68%
Pima County			State Trust Land	61,597.17	7.78%
Barry Goldwater Air	57,433.49	0.98%	Tumacacori N.M.	9.94	0.00%
Buenos Aires N.W.R.	113,641.28	1.93%	TOTAL	791,488.60	100.00%
BLM	373,786.22	6.36%	Hidalgo County, NM		
Cabeza Prieta N.W.R.	400,681.23	6.82%	BLM	805,454	36.51%
Coronado NF	336,888.98	5.73%	Coronado NF	77,220	3.50%
County Land	2,573.35	0.04%	State Trust Land	354,431	16.07%
Davis-Mothan AFB	10,728.30	0.18%	Indian Allotments	11,000	0.50%
Game and Fish	1,560.84	0.03%	Private Land	957,970	43.42%
Military Res.	39.94	0.00%	TOTAL	2,206,080	100.00%
Organ Pipe N.M.	328,944.09	5.60%			
Other	440.40	0.01%			
Parks and Recreation	11,191.64	0.19%			
Pascua Yaqui Res.	556.86	0.01%			
Private Land	816,920.51	13.90%			
Saguaro NP	82,246.08	1.40%			
San Xavier Indian Res.	71,226.43	1.21%			
State Trust Land	862,221.37	14.67%			
Tohono O' odham Indian Res.	2,403,533.14	40.89%			
TOTAL	5,877,607.42	100.00%			

Sources: Arizona State Land Department
Hidalgo County Tax Assessors Office

Figure 18 depicts land cover within the entire area of assessment while Table 28 provides detailed data on land cover within each of the six 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 constituted less than one-tenth of one percent of the county's total land area. Pinal County reported the greatest amount of residential cover at 3.38% compared to 1.11% for the assessment area as a whole. Meanwhile, Pima County reported the highest amount of commercial, services, industrial, and urban land cover of all counties in the area. Shrub, brush, and mixed range constituted the predominant land cover in five of the six counties in the area of assessment. The lone exception was Santa Cruz County, which reported a considerable portion of evergreen forest land (38.05%) and a relatively high percentage of herbaceous land cover (14.28%). Graham County also reported significant evergreen forest land (13.23%) while Pinal County held the greatest amount of cropland and pasture (13.98%).

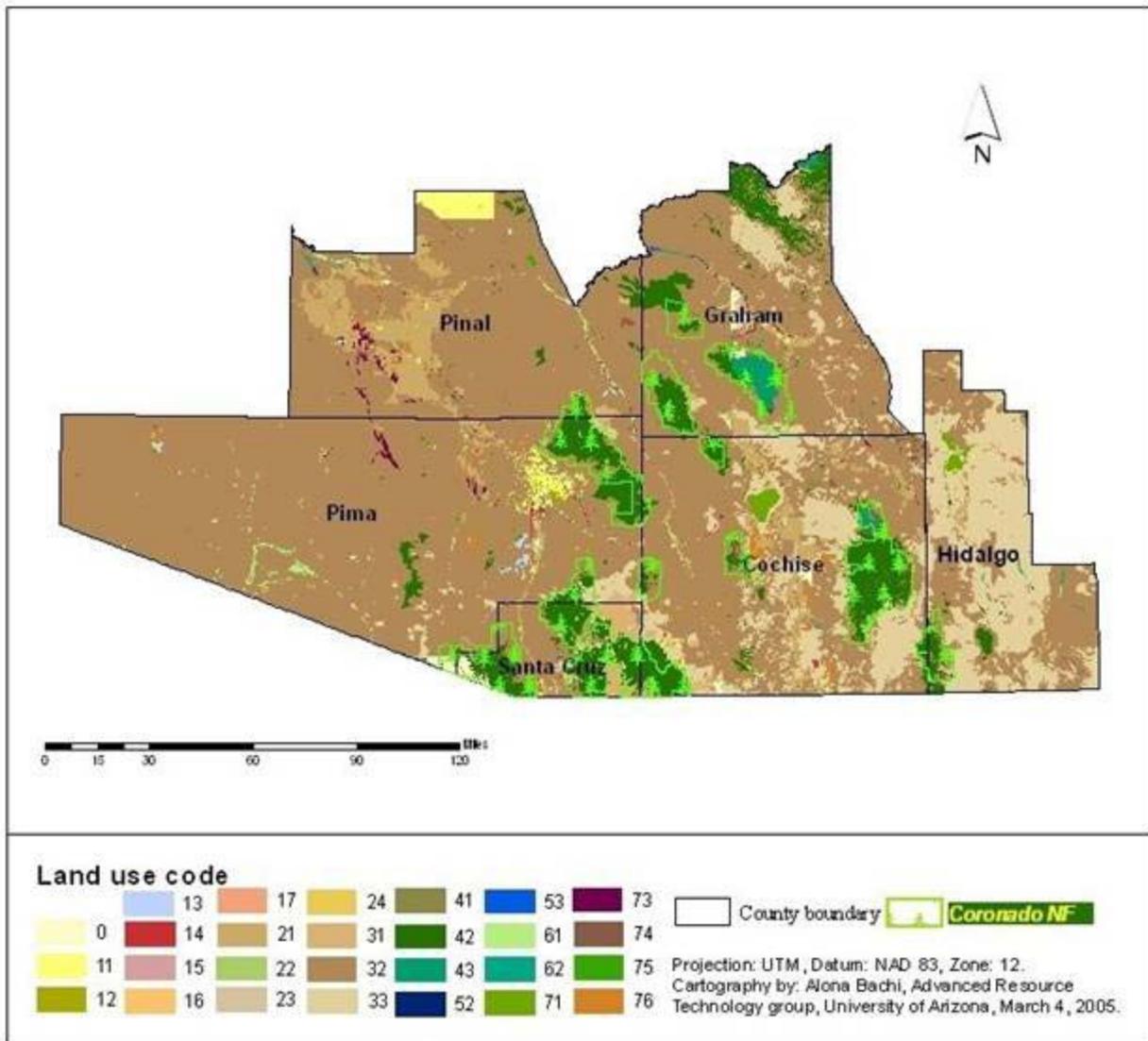


Figure 5. Land Cover within Area of Assessment

Table 6. Land Cover by County and Assessment Area, 1990

Land Use Code	Coverage Type	Cochise County		Graham County		Hidalgo County		Pima County	
		Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
0	Unknown / Background	6,696	0.17%	12,739	0.43%	1,141	0.05%	28,511	0.49%
11	Residential	13,848	0.35%	3,140	0.11%	1,078	0.05%	77,339	1.32%
12	Commercial and services	5,548	0.14%	710	0.02%	375	0.02%	18,090	0.31%
13	Industrial	2,858	0.07%	230	0.01%	412	0.02%	21,246	0.36%
14	Transportation, communication, utilities	10,885	0.27%	297	0.01%	2,288	0.10%	7,992	0.14%
15	Industrial and commercial complexes	854	0.02%	16	0.00%	-	-	-	-
16	Mixed urban or built-up land	405	0.01%	297	0.01%	-	-	3,562	0.06%
17	Other urban or built-up land	2,030	0.05%	781	0.03%	-	-	8,507	0.14%
21	Cropland and pasture	237,619	5.97%	71,032	2.39%	50,498	2.29%	79,589	1.35%
22	Orchards, groves, vineyards, nurseries and ornamental horticultural areas	2,089	0.05%	318	0.01%	-	-	8,888	0.15%
23	Confined feeding operations	167	0.00%	10	0.00%	111	0.01%	499	0.01%
24	Other agricultural land	4,207	0.11%	470	0.02%	546	0.02%	1,942	0.03%
31	Herbaceous rangeland	39,986	1.01%	13,888	0.47%	401	0.02%	22,376	0.38%
32	Shrub and brush rangeland	2,150,826	54.08%	2,023,904	68.03%	831,369	37.69%	5,091,944	86.63%
33	Mixed rangeland	900,597	22.64%	301,633	10.14%	1,201,490	54.46%	121,407	2.07%
41	Deciduous forest land	5,955	0.15%	3,086	0.10%	-	-	223	0.00%
42	Evergreen forest land	434,737	10.93%	393,686	13.23%	70,940	3.22%	279,935	4.76%
43	Mixed forest land	19,595	0.49%	102,460	3.44%	173	0.01%	275	0.00%
52	Lakes	-	-	51	0.00%	110	0.01%	15	0.00%
53	Reservoirs	272	0.01%	4,693	0.16%	-	-	434	0.01%
61	Forested wetland	6,461	0.16%	15,969	0.54%	4,274	0.19%	34,890	0.59%
62	Nonforested wetland	1,702	0.04%	4,558	0.15%	5,705	0.26%	1,068	0.02%
71	Dry salt flats	34,891	0.88%	0		27,065	1.23%	8	0.00%
73	Sandy areas not beaches	2,475	0.06%	5,640	0.19%	886	0.04%	21,497	0.37%
74	Bare exposed rock	29,571	0.74%	14,240	0.48%	6,049	0.27%	1,838	0.03%
75	Strip mines, quarries, gravel pits	2,329	0.06%	486	0.02%	530	0.02%	9,213	0.16%
76	Transitional areas	60,581	1.52%	864	0.03%	637	0.03%	36,322	0.62%
	Total	3,977,184	100.00%	2,975,199	100.00%	2,206,080	100.00%	5,877,607	100.00%

Table 28 (cont.). Land Cover by County and Assessment Area, 1990

Land Use Code	Coverage Type	Pinal County		Santa Cruz County		Total Assessment Area	
		Acres	Percent	Acres	Percent	Acres	Percent
0	Unknown / Background	1,467	0.04%	20,727	2.62%	71,280	0.37%
11	Residential	116,038	3.38%	3,339	0.42%	214,783	1.11%
12	Commercial and services	3,511	0.10%	1,063	0.13%	29,297	0.15%
13	Industrial	5,510	0.16%	94	0.01%	30,350	0.16%
14	Transportation, communication, utilities	9,302	0.27%	1,847	0.23%	32,611	0.17%
15	Industrial and commercial complexes	-	-	-	-	870	0.00%
16	Mixed urban or built-up land	138	0.00%	480	0.06%	4,881	0.03%
17	Other urban or built-up land	2,399	0.07%	1,326	0.17%	15,043	0.08%
21	Cropland and pasture	480,601	13.98%	12,401	1.57%	931,741	4.84%
22	Orchards, groves, vineyards, nurseries and ornamental horticultural areas	4,837	0.14%	-	-	16,133	0.08%
23	Confined feeding operations	1,751	0.05%	-	-	2,537	0.01%
24	Other agricultural land	374	0.01%	1,050	0.13%	8,588	0.04%
31	Herbaceous rangeland	13,962	0.41%	113,038	14.28%	203,651	1.06%
32	Shrub and brush rangeland	2,649,065	77.06%	293,052	37.03%	13,040,161	67.69%
33	Mixed rangeland	-	-	39,332	4.97%	2,564,459	13.31%
41	Deciduous forest land	-	-	280	0.04%	9,545	0.05%
42	Evergreen forest land	50,467	1.47%	301,173	38.05%	1,530,937	7.95%
43	Mixed forest land	279	0.01%	169	0.02%	122,951	0.64%
52	Lakes	-	-	-	-	176	0.00%
53	Reservoirs	1,847	0.05%	316	0.04%	7,562	0.04%
61	Forested wetland	23,472	0.68%	-	-	85,066	0.44%
62	Nonforested wetland	6,347	0.18%	-	-	19,379	0.10%
71	Dry salt flats	-	-	-	-	61,964	0.32%
73	Sandy areas not beaches	32,406	0.94%	-	-	62,904	0.33%
74	Bare exposed rock	9,807	0.29%	53	0.01%	61,558	0.32%
75	Strip mines, quarries, gravel pits	5,577	0.16%	253	0.03%	18,388	0.10%
76	Transitional areas	18,354	0.53%	1,496	0.19%	118,254	0.61%
	Total	3,437,510	100.00%	791,489	100.00%	19,265,069	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.txt>

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 the region, the patterns of development, desired conditions, and current county land use policies. It should 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 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. Comprehensive land use plans for Hidalgo County, NM and the state of Sonora, Mexico were not available at the time of this assessment.

Graham County Comprehensive Plan

Like many areas throughout the Mountain West, patterns of existing land use in Graham County are rooted in the history of settlement by miners, ranchers, and farmers. The *Graham County Comprehensive Plan* marks 1872 as a milestone in the development of the county after the establishment that year of a copper mine in the town of Clifton (then in Graham County). At about the same time, farming communities were being established along the Gila River, which traverses the county from east to west (Graham County 1996).

Today, Graham County remains an area of rich natural resources with a rural culture and an economy supported by continued copper mining, cotton farming, and cattle ranching. The Gila River is a vital source of water for approximately 52,000 acres of cultivable land in the county, much of which is dedicated to the production of cotton, a primary component of the county's agricultural economy. Mining has also continued to play a major role the development of Graham County. In addition to a number of small mines operating throughout the county, the Phelps-Dodge Corporation manages a large open pit mine north of Safford. Graham County is also home to the Large Binocular Telescope, the world's most powerful optical telescope, which was completed in 2004. For these reasons, the *Graham County Comprehensive Plan* emphasizes the importance of protecting both the natural resources and scenic beauty that are "essential to the economic stability and unique character and lifestyles" of the area (Graham County 1996).

Graham County covers 4,650 square miles, making it the twelfth largest of Arizona's fifteen counties. In addition to twenty-two square miles of water, the *Comprehensive Plan* identifies three basic geologic areas within Graham County: 1) The Gila River basin; 2) the mountain areas comprised by the Gila, Pinaleño, Santa Teresa, and Galiuro ranges; and 3) the high desert plains north of the Gila and Pinaleño Mountains. Graham County is also the home of Aravaipa Canyon and the Gila Box, the only two federally designated riparian areas in the United States as of 1996 (Graham County 1996).

The *Graham County Comprehensive Plan* identifies fifteen land use zones in the county permitting uses from dense residential developments such as mobile home and travel trailer parks to manufacturing and industrial uses. The plan further classifies these zones into five broad land use categories: 1) urban residential, 2) rural residential, 3) agricultural and ranching, 4) commercial, and 5) manufacturing.

- Residential land use

The urban residential classification includes single-family residential, manufactured and mobile homes, and multiple-family residential uses. Minimum lot sizes range from 5,000 square feet for manufactured and mobile homes to 10,000 square feet for multi-family residential parcels. Each parcel must be served

by an approved domestic water supply system, and parcels less than 10,000 square feet must also be served by an approved sewage collection and treatment system.

The rural residential classification applies to agricultural-residential, single-family residential, residential recreation, and special development zones. Minimum lot sizes range from 20,000 square feet for single-family residential uses to three acres for special development zones. Both light farming and home occupations are permitted in the zones, and approved domestic water supply systems are required for parcels less than one acre. Parcels in special development zones may serve mixed-use purposes, including residential, commercial, and manufacturing where a minimum of three acres are part of singular or joint-planned developments (Graham County 1996).

- Commercial and industrial land use

Commercial land uses in Graham County are classified as either commercial recreation, neighborhood commercial, or general commercial uses. Minimum lot sizes range from 10,000 square feet for neighborhood and general commercial uses to one acre for commercial recreation uses. Rather than industrial land use, the *Graham County Comprehensive Plan* designates its fifth and final category as manufacturing land use. This category accounts for commercial manufacturing, general manufacturing, and unlimited manufacturing land use zones. Minimum parcel sizes range from one acre for commercial manufacturing to five acres for general and unlimited manufacturing zones. The plan stipulates that fencing or screening may be required for lots adjacent to non-industrial uses and that one dwelling unit is allowed per parcel (Graham County 1996).

Cochise County Comprehensive Plan

The *Cochise County Comprehensive Plan* was last amended in September 2002, and, like other comprehensive plans throughout the state, alludes to a rural culture and a lifestyle largely influenced by traditional land uses such as livestock production, farming, and mining. Like other plans in this region, it also states the purpose of assisting residents and planners in achieving a balance between urban, rural, and public land uses which supports the protection of both the local economy and the county's natural resource base. The plan makes specific mention of Fort Huachuca as a key player in the county's history as well as a primary contributor to its current economic stability. Rather than a detailed guide to residential, commercial, and industrial zoning, the *Cochise County Comprehensive Plan* offers a description of various growth categories and plan designations as well as overall policies designed to support desired land use patterns in the county (Cochise County 2002).

The plan divides the entire area of Cochise County, with the exception of incorporated cities, into four growth-area categories based on the area's expected capacity for change. Intensive growth areas (Category A) are those that are experiencing an unusually high rate of growth and have the infrastructure and service capacity to support it. The urban growth category (Category B) is applied to areas demonstrating community sentiment in support of growth that maintains land use intensity at more moderate levels than that of Category A. Rural growth areas (Category C) are smaller rural community areas which demonstrate a slow rate of change and community attitudes that favor preservation of a rural, small-town atmosphere. Finally, rural areas (Category D) include sparsely populated rural lands in the county which serve primarily as rural/residential and agricultural areas rather than identifiable communities (Cochise County 2002).

Within each of the aforementioned growth categories, the *Cochise County Comprehensive Plan* establishes five distinct land use designations. The designations are intended to identify the existing character of smaller areas within specific growth categories. The "neighborhood conservation" designation identifies established areas that are primarily residential and will be afforded zoning

protection to maintain the desired character and intensity of land use. An “enterprise” designation identifies areas with an established pattern of commercial and/or industrial land use. A “developing” designation indicates an area experiencing “non-rural” growth which is expected to continue. It allows for flexibility in determining both the character and intensity of future development. The “neighborhood rehabilitation” designation is applied to residential neighborhoods experiencing deterioration but which show potential for revitalization. Finally, the “enterprise redevelopment” designation is assigned to existing developed areas undergoing change which may make them amenable to commercial and/or industrial land uses (Cochise County 2002).

Pima County Comprehensive Plan Update

The *Pima County Comprehensive Plan Update* was specifically intended to reflect the land use policies, principles, and concepts identified in the *Sonoran Desert Conservation Plan*. Adopted in September 2001, the plan’s purpose is to contribute to the quality of the built environment as well as the effectiveness of the conserved environment and improve the status of the region’s fiscal, natural, and cultural resources (Pima County 2001).

Over the last hundred years, Tucson’s urban area has expanded dramatically: from two square miles in 1900, to ten square miles in 1950, to 100 square miles in 1980, to nearly 200 square miles as of 2001. Although population levels have experienced a similar increase, population density has not. In fact, the *Pima County Comprehensive Plan* suggests that population density has actually *declined* from approximately 5,200 individuals per square mile in 1953 to only 2,400 per square mile today. The combined effect of population growth at low densities equates to a land consumption rate of nearly seven square miles a year, meaning that given current rates of population growth, the land base of Tucson will nearly double over the next twenty years. Acknowledging that the conservation objectives of the *Sonoran Desert Conservation Plan* are not likely to be achieved within metropolitan areas, the plan focuses its policies on over a million acres of land in unincorporated Pima County. Specifically, the comprehensive plan is aimed at responding to a current land market that encourages unregulated, leap frog development, a leading cause of natural resource depletion and urban sprawl (Pima County 2001).

The vast majority of the population of Pima County resides in the eastern portion of the county, where residential units are the primary use within the built environment. Since the adoption of the *Pima County Comprehensive Plan* in 1992, residential development has proceeded at lower densities than intended, fueled by large-lot development and lot splitting, both of which contribute to continued urban sprawl. The comprehensive plan update states that between 1993 and 2000, the county received 496 requests for rezoning, 380 of which were approved. Of the 10,988 acres entailed in the rezoning requests, 6,480 acres (59%) were for residential uses while only 356 acres (3.2%) were for commercial uses (Pima County 2001).

- Residential land use

Regarding residential land use in Pima County, the comprehensive plan focuses on dynamic changes in the residential housing market over the last decade. It claims that between 1991 and 2000, the number of housing units sold in the county nearly doubled while the average sale price, expressed in actual dollars, rose from \$97,352 to \$155,907. Meanwhile, the average square footage of single-family residences has more than doubled since 1950. The plan goes on to explain that the local real estate market has benefited higher-income residents of Pima County but left an affordability gap for many low-income residents. According to the Tucson Association of Realtor’s Residential Sales Statistics, less than four percent of all residential units sold in Pima County in 2000 were affordable for the lowest earning twenty percent of county residents. Meanwhile, the American Community Survey of 2000 found that forty-seven percent of renters in Pima County were spending one-third or more of their household income on housing. This lack

of affordable housing has contributed to detrimental land uses and unregulated development. The comprehensive plan also cites studies which show that despite growing more rapidly than many similar counties throughout the country, Pima County spent less on a per capita basis, collected less in growth-related fees, and provided less in the way of affordable housing programs than similarly situated county governments. In response to these issues, the *Pima County Comprehensive Plan Update* establishes regional policies which create a Mixed Use Compact Development (MUCD) land use designation and promote the creation of strategies to provide affordable housing to median, low, and very low income level households (Pima County 2001).

Sonoran Desert Conservation Plan

Beginning in 1998, the Pima County Board of Supervisors initiated a review of previous county planning efforts with an eye toward integrating effective natural resource management with sustainable urban development. Although not a “comprehensive plan” in the traditional sense, the *Sonoran Desert Conservation Plan* (SDCP) addresses many of the critical land use planning issues currently faced by Pima County. Mindful of the distinct correlation between urban growth and consumption of natural resources, the SDCP serves three primary purposes: it creates a science-based conservation plan, it supports the update to the *Pima County Comprehensive Plan*, and it ensures compliance with federal regulations requiring protection of endangered species to be addressed through a multiple species conservation plan. A primary goal of SDCP is to direct future urban growth in Pima County toward areas with the fewest natural, historic, and cultural resource values. In addition to guiding future land use decisions in the county, the plan is also intended to serve as a reference for allocation of public resources for acquisition of open space and protection of cultural resources. Given the plan’s emphasis on a comprehensive analysis of available science and the use of available geographic information system (GIS) data, an extensive list of stakeholders is credited with contributing to its development (Pima County 2004).

- Critical habitat and biological corridors

The SDCP states that when the process of developing the plan began in 1998, basic information on the area’s most vulnerable species, biological standards, and distribution of vegetation were not compiled in a format that could serve as a starting point for conservation planning. Since that time, an intensive research effort involving members of the local, regional, and national science community has resulted in a list of species and maps of corridors for nine mammals, eight birds, seven reptiles, seven plants, six fish, two amphibians, and numerous invertebrates in need of habitat protection. Selected priority habitats and corridors identified by the SDCP Science Technical Advisory Team include the Altar Valley, Baboquivari Mountains, Cienega Creek, Eastern Tucson Riparian Complex, Organ Pipe/Goldwater Complex, Sabino Canyon, San Pedro River, Santa Rita Mountains, Silverbell Mountains, Tortolita Mountains, and the Tucson Mountains (Pima County 2004).

- Riparian protection

The SDCP claims that sixty to seventy-five percent of all species in Arizona rely on a riparian environment at some point during their life cycle. This assertion adds urgency to the need for riparian protection given that several perennial water courses in Pima County have ceased flowing or have been significantly impacted by lower water tables. In addition to the obvious impact from development activities, the SDCP warns of the negative effects of ground water pumping and the introduction of invasive, non-native species into the county’s riparian areas. The plan cites previous riparian restoration and protection efforts in Cienega Creek, Tanque Verde Wash, the San Pedro River, and Sabino-Bear

Canyon as positive examples of conservation strategies that have not only protected wildlife and plants but also provided recreational opportunities, promoted groundwater recharge, protected water quality, and mitigated flooding. Selected priority riparian resources identified by the SDCP Science Technical Advisory Team include Rincon Creek, Cienega Creek, Arivaca Creek, Brown Canyon, Wakefield, Sutherland, Happy Valley, portions of the San Pedro River, Davidson Canyon, Gardner Canyon, Madera Canyon, Agua Verde Wash, and Sopori/Papalote Wash (Pima County 2004).

- Mountain parks

The preservation of Pima County's mountain areas began in 1929 with the establishment of Tucson Mountain Park. Since then, similar protection efforts have led to the creation of Tortolita Mountain Park, Ironwood Forest National Monument, Colossal Cave Mountain Park, Cienega Creek Natural Preserve, and Buehman-Bingham Natural Preserve. Nonetheless, the SDCP states that a continuing decline in the county's natural resource base shows that this incremental approach to conservation over the last seventy years has not adequately protected vulnerable habitats and species. Priority mountain parks and natural preserves identified by the SDCP Science Technical Advisory Team include Buehman-Bingham Natural Preserve, Cienega Creek Natural Preserve, Santa Rita Mountain Park, Colossal Cave Mountain Park, Davidson Canyon Natural Preserve, Tucson Mountain Park, Catalina State Park, Tortolita Mountain Park, and Ironwood Forest National Monument (Pima County 2004).

- Cultural resources

The SDCP notes that Pima County has had a continuous human presence for approximately 12,000 years. In an effort to protect the county's historical and cultural resources, the plan identifies numerous archaeological sites, historic buildings, national registers, historic communities, ghost towns, and historic trails as worthy of protection. An important task in delineating areas and sites for protection involved the development of digital data layers that compare core biological, habitat, and riparian areas with specific historic locations to determine where they overlap and where they are distributed separately. Priority cultural resources identified by the SDCP include ancient Native American villages, the Mission San Xavier del Bac, Mexican- and U.S. Territorial-era ranches, Fort Lowell, historic mines, existing examples of traditional Sonoran and Victorian architecture as well as several churches, schools, bridges, and parks, many of which lie at the core of the Tucson metropolitan area (Pima County 2004).

- Ranch conservation

The SDCP credits ranching with having been "the single greatest determinant of a definable urban boundary in eastern Pima County," explaining that over half of the county's 2.4 million acres of open land has been in continual use for the purpose of ranching enterprises. Expected benefits of ranch conservation identified by the plan include preservation of open space and mitigation of urban sprawl as well as maintenance of habitat continuity and the rural heritage and culture of the Southwest. The primary threat facing rangelands is urban encroachment and land fragmentation as a result of conversion to real estate development. Ongoing drought, legal challenges to grazing leases, and lucrative land prices also contribute to the trend of ranch conversion. The SDCP states that, currently, ranch conversion and fragmentation is greatest within a twenty-five-mile radius of the Tucson urban core. The SDCP identifies a number of "subareas" where ranching comprises a significant proportion of land use and is supported by sufficient grazing capacity and stability to support future sustainable ranch use. These subareas include Altar Valley, Empire-Cienega Valley, Upper Santa Cruz Valley, San Pedro Valley, and the Ironwood Forest National Monument area of Avra Valley. Meanwhile, the SDCP identifies the central Santa Cruz

Valley and portions of the Tortolita Fan as areas “least likely to retain ranch uses in the future” (Pima County 2004).

Detailed maps of each of the protection areas under the SDCP are available for viewing at <http://www.co.pima.az.us/cmo/sdcp/maps.html>.

Pinal County Comprehensive Plan

The *Pinal County Comprehensive Plan* stresses the cultural and economic importance of managing land use in such a way as to protect the county’s natural resource base. Although traditional land uses such as ranching, farming, and mining have experienced a gradual decline throughout the county, an increase in urban, commercial, and industrial developments has placed increasing pressure on the area’s natural resources. Protection of desert open space, wildlife corridors, and undeveloped mountain areas is seen as a critical step towards sustaining a rural lifestyle as well as the economically vital components of retirement housing and tourism (Pinal County 2001).

Currently, Pinal County covers 3,441,920 acres, portions of which lie within the Gila River, Ak-Chin, Tohono O’odham, and San Carlos Native American communities. In addition to several rapidly growing incorporated cities and towns, the county is home to the unincorporated communities of Arizona City, Dudleyville, Gold Canyon, Maricopa, Oracle, Picacho, Queen Valley, Red Rock, San Manuel, and Stanfield. The comprehensive plan specifically mentions maintenance of mountain views as vital to the long-term economic and environmental interests of the county. These mountains include the San Tans, Superstitions, Sierra Estrella, Santa Catalina, Table Top, Palo Verde, Casa Grande, Sacaton, Picacho Peak, Sawtooth, Tortolita, Black, and Samaniego Hills (Pinal County 2001).

Adopted in December 2001 and amended in December 2004, the *Pinal County Comprehensive Plan* is seen as an important tool for managing land use during a period of dramatic growth and transition. In it, planners call for a reexamination of planning methods in order to ensure the sustainability of both the regional economy and standard of living in light of a projected sixty-percent increase in county population over the next decade. Stated objectives in the land use element of the comprehensive plan include the following: 1) more efficient land use enabled by clustered development, architectural controls, and development standards; 2) an improved county roadway network that effectively links residential and employment centers while retaining panoramic views, natural washes, and wildlife habitat; and 3) a diverse mix of employment and housing opportunities that balances resource conservation and development needs. The comprehensive plan divides land use into several designations. The intent of the land use categories is to determine development patterns that will be both economically and environmentally sustainable during a period of rapid urban growth (Pinal County 2001).

“Rural Areas” are areas suitable for lower-density development and uses such as agriculture, grazing, mining, sand and gravel operations, large acreage home sites, and small farms. Multi-family development is discouraged in rural areas and single-family residency should not exceed one dwelling unit per acre. The “Transitional Area” designation is used for areas that are predominantly rural but are expected to serve as future centers of growth. A primary purpose of this designation is to retain existing large tracts for potential development. Here again, maximum residential density is one single-family unit per acre. A “Foothill Area” designation is intended to preserve sensitive areas by limiting foothill development to low densities that are in harmony with the natural landscape. Maximum density is one dwelling unit per acre. The “Rural Community Area” designation signifies a rural area with the capacity to provide goods, services, and increased residential uses. Growth is typically slower in these areas and is dependent on the level of public services, facilities, and infrastructure. Future rural community areas should be designed to allow for commercial uses, governmental activity, health and educational facilities, industrial uses, and parks and open space. For Planned Area Developments (PADs), under this designation, the maximum density is three-and-a-half single-family dwelling units per acre. This designation also allows for five

attached homes (town houses, patio homes) per acre or twelve multiple-family units (apartments) per acre (Pinal County 2001).

The “Urban Area” designation is applied to areas with higher density residential development and the existing infrastructure to support larger populations. Urban areas primarily include towns and cities and are likely to account for the majority of future growth in Pinal County. The purpose of the Urban Area designation is to encourage the provision of high quality, efficient public services as well as diverse housing and employment opportunities. Maximum density guidelines are three-and-a-half dwelling units per acre (du/ac) for PAD, five du/ac for attached homes, and twelve du/ac for multiple family units. A “Commercial Activity Center” designation allows intense concentrations of commercial and high density residential development. Land uses include retail stores and services, office development, business parks, and high-density multi-family development. An expected benefit of this designation is the proximate location of housing and employment centers. Multiple-family housing density ranges from twelve to twenty du/ac with an ideal density of sixteen du/ac. An “Interchange Mix Area” designation caters to the needs of travelers and businesses along the county’s highways. Land uses include, but are not restricted to, hotels and motels, vacation resorts, restaurants, RV parks, service stations, and other small-scale commercial uses. “Corridor Mix Areas” are similar in that they provide for a variety of land uses and intensities oriented toward and compatible with interstate highways. In addition to the land uses prescribed for Interchange Mix Areas, Corridor Mix Areas may include industrial parks, research and development facilities, light industry, warehousing, and recreation facilities. Open space, landscaping, and noise buffering are encouraged to ensure compatibility with adjacent land uses and traffic (Pinal County 2001).

An “Industrial Area” designation applies specifically to areas suitable for industrial and other intense land uses. The plan specifies that these areas will be concentrated and separated from residential and commercial uses in order to manage the impact of heavy truck traffic, noise, vibration, light, dust, and odors. A “Mining Area” designation applies only to those areas where mineral resources have been identified or are likely to be identified in the future. The designation recognizes the rights applied to exploration, mining, and mineral resource processing. All mining operations within the county are required to comply with federal, state, and local laws providing environmental protection. “Development Sensitive Areas” are intended to preserve natural resources and open space in areas that are particularly sensitive. Potential land uses include parks, ranching, livestock grazing, conservation leases, guest ranches, and single-family uses. Density is not to exceed three-tenths (.3) du/ac. The “Natural Resource Area” designation is applied to private and public lands which may be enhanced by the maintenance of large, undivided parcels. Land uses may include river corridors, natural areas, livestock grazing, conservation leases, national forests, wilderness areas, and State Trust lands (Pinal County 2001). A detailed map of land use within Pinal County is available at <http://www.co.pinal.az.us/PlanDev/PDCP/files/CompPlanFinal2004.pdf>.

Santa Cruz County Comprehensive Plan

Land use patterns in Santa Cruz County have long been shaped by the traditional activities of farming, ranching, and mining. Increasingly, however, development in the area is influenced by its proximity to the major international border crossing in the city of Nogales and by a burgeoning community of retirees. Adopted in June 2004, the *Santa Cruz County Comprehensive Plan* seeks to protect both natural resources and a rich cultural heritage by concentrating and regulating future land development (Santa Cruz County 2004).

Historically, development in Santa Cruz County has been concentrated along the Santa Cruz River, a pattern sustained since the construction of Interstate 19, which follows the same north-south orientation. The comprehensive plan claims that, between 1990 and 2000, the unincorporated areas of Santa Cruz County grew by 79% while the cities of Nogales and Patagonia experienced relatively minimal growth

(7% and -4% respectively). Of all the growth in unincorporated areas, 93% occurred on the western side of the county along the I-19 corridor in the communities of Amado, Tubac, Rio Rico, and south to the Nogales city limits. It is expected that development over the next decade will continue to be concentrated along this corridor. The *Santa Cruz County Comprehensive Plan* projects a high rate of population growth (6.5% per annum through 2010) resulting from natural increase as well as substantial immigration from other areas (Santa Cruz County 2004). In anticipation of this growth trend, the comprehensive plan includes a specific element devoted to county growth areas. Identified are seven growth areas, each of which is located west of the Santa Rita Mountains. They include the following: the airport, Amado, the I-19 Corridor (Rio Rico to Nogales), the Kino Springs Village Center, Rio Rico Drive East, Ruby Road, and Tubac.

Given the likelihood for continued population growth and the resulting need for residential and commercial development, Santa Cruz County intends to concentrate future land use in a way that maintains a rural character, protects natural resources, and makes efficient use of existing and future infrastructure. While the comprehensive plan claims that the county has a substantial amount of private, undeveloped land which is easily accessible from primary roadways, future growth is likely to have a pronounced impact on the county's natural resources and existing development patterns. For instance, new development within the county has begun to shift from individual homes constructed on private lots to production housing. In the past five years, approximately thirty percent of requests for residential rezoning were for parcels larger than 100 acres. Of these, over forty percent are at densities exceeding four dwelling units per acre. In response, the plan encourages maintaining existing land use intensities and densities in the Sonoita-Elgin area while allowing for urban-style development in the Rio Rico area and, to some extent, around Tubac and Kino Springs. According to the plan, future employment centers will be focused south of Rio Rico along the I-19 corridor, and commercial uses specific to the county's tourism industry will be encouraged at the Sonoita crossroads of SR 82 and SR 83 (Santa Cruz County 2004).

Based on the clear demarcation of land uses along the I-19 corridor and those in other locations throughout the county, the land use element of the comprehensive plan refers to two general types of land use intensities and densities: urban and rural. The land use categories described under each of these two classifications are described below.

- Rural land use

The "Ranch 40" category signifies very low-density residential, ranching, agricultural, viticultural, low-impact tourism, or resource conservation uses. Maximum residential density in this category is 1/40 dwelling unit per acre (or 1 unit per 40 acres). A "Ranch" designation allows for the same land uses as Ranch 40; however, in this category, maximum residential density is, at one-quarter dwelling unit per acre (1 unit per 4 acres), much greater. The "Public Lands" category includes all federal public land managed by the Department of Agriculture and the Department of the Interior as well as state lands managed by the State Parks Department. Land use in the "State Trust" category includes grazing and conservation as well as other uses in accordance with regulations of the State Land Department. Principle land uses in the "Preservation" category include historic sites, museums, research study areas, and permanent open space. Residential and light commercial uses related to the principle preservation function are also permitted. The "Local Services" designation is applied to areas whose primary land use includes retail, restaurants, tourism services, and low impact neighborhood services (Santa Cruz County 2004).

- Urban land use

Principle land uses in the “Low Density Residential” category include residential use as well as low-intensity tourism services, restaurants, and neighborhood services. Maximum residential density in these areas is one du/ac. “The Medium Density Residential” category allows for residential, office, and commercial services with a maximum density of three du/ac. The principle land uses in the “High Density Residential” areas include residential, retail, office, and commercial services. Maximum density for single- and multi-family residences in this category is ten du/ac. In the “Mixed Use” category, high-density residential uses are integrated with retail, services, and employment uses in areas accessible to infrastructure and public services. Maximum residential density in the Mixed Use category is ten du/ac. The “Regional Services” designation is applied to areas where the primary uses are high-intensity commercial, employment, and retail uses which are regionally significant and are easily accessible from major transportation corridors and population centers. The primary land uses in the “Enterprise” category are heavy commercial and industrial enterprises with major employment potential. This category is situated to take advantage of facilities and major transportation corridors.

A detailed map of land use within Santa Cruz County is available at <http://scc-mail.co.santa-cruz.az.us/commdev/commdev1/Santa%20Cruz%20County%202004%20Comprehensive%20Plan.pdf>

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 from urban and economic development. While residents and planners prefer to maintain a rural character throughout unincorporated county lands, rapidly increasing populations and expanding city boundaries present challenges for doing so. Despite many similarities, the policies of the county comprehensive plans reviewed for this assessment also offer an array of differing perspectives on how best to deal with these issues.

Preservation of open space is a particularly important land use issue among planners and property owners within the area of assessment. While the counties generally share a common interest in preserving open space, comprehensive plans suggest different motivations for doing so. For more rural areas such as Cochise and Graham Counties, a high priority is placed on the preservation of open space for the purpose of protecting and sustaining traditional farming and ranching land uses. Specific policies support the removal of critical habitat and wilderness designations and warn of the negative impact on development resulting from measures such as the *Sonoran Desert Conservation Plan* (Cochise County 2002, Graham County 1996, Santa Cruz County 2004). Meanwhile, areas with rapidly growing urban populations—such as Pima and Pinal Counties—emphasize the cultural and environmental value of protected watersheds, mountain areas, wildlife habitat, native vegetation, riparian areas, and archeological sites. Several policies aimed at preserving open space are mentioned in each of the county comprehensive plans. These methods include the encouragement of “clustered development,” purchase of development rights, and dedication of land such as conservation and agricultural easements. Area comprehensive plans also note the increasing role of organizations such as the Audubon Society of Arizona, the Nature Conservancy, the Sky Islands Alliance, the Wildlands Project, and the Sonoran Institute in the ongoing debate over open space (Pima County 2001, 2004; Santa Cruz County 2004; Pinal County 2001).

Related 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 but also preserves open space and high natural resource value areas. Perhaps most importantly, infill maximizes the efficiency of infrastructure and minimizes traffic congestion, thereby lowering the overall cost of development. Policies aimed at encouraging infill include the provision of

density bonuses and density transfers as well as zoning changes allowing for mixed uses in low-density areas (Pinal County 2001; Santa Cruz County 2004; Pima County 2001, 2004; Cochise County 2002).

Another factor certain to influence the pattern of future development is the conversion of private land within the area surrounding CNF. Combined with the proximity of many rural communities to large parcels of public land, transition of private parcels has led to calls for greater collaboration on land use planning between county and municipal governments and their federal and state counterparts. County residents are particularly interested in coordinating efforts on land acquisition and exchange in order to address a variety of long-term land use concerns.

Proponents of development advocate consolidation and conversion of the current patchwork of State Trust lands in order to guide growth of expanding municipalities. They argue that the exchange and/or sale of these trust lands will alleviate land scarcity and provide much-needed funds for the state educational system. Others promote conversion and/or consolidation of public lands as a means of protecting environmentally and biologically sensitive lands while granting communities greater authority on local land use decisions such as fire prevention and forest restoration (Cochise County 2002; Graham County 1996; Pima County 2001, 2004; Pinal County 2001; Santa Cruz County 2004). A more detailed discussion of current policy regarding state trust land is presented later in this assessment.

The scarcity of private land has also fueled efforts to capitalize on the current land market and accommodate the need for residential and commercial development resulting from population growth. In response, each of the comprehensive plans reviewed for this assessment includes policies aimed at addressing the detrimental effects 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 the cost 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 in order to ensure county infrastructure that meets state standards (Cochise County 2002, Graham County 1996, Pima County 2001, Santa Cruz County 2004, Pinal County 2001).

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 Active Management Areas (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. ADWR has designated five AMAs in the state, three of which extend into the area of assessment for the Coronado NF. They are the Pinal AMA (4,000 sq. miles), the Tucson AMA (3,800 sq. miles), and the Santa Cruz AMA (750 sq. miles). In a related measure, ADWR has also established an Irrigation Non-expansion Area (INA) surrounding the city of Douglas, restricting increases in the number of irrigated acres in the area. Additionally, the 1998 *Growing Smarter* legislation passed by the State Congress requires the inclusion of a Water Resource element in the comprehensive plans of all counties with a 2000 population of 125,000 or greater. Currently four of the five comprehensive plans reviewed for this assessment contain Water Resources elements that support making water availability a key consideration for all major developments and subdivision applications. Policies for effectively managing future growth with respect to projected water supplies include the development design requirements for low-water plumbing devices, drought-tolerant landscaping, and enhanced recharge of treated effluent for water table and riparian area restoration (ADWR 2005, Cochise County 2002, Graham County 1996, Pima County 2001, Santa Cruz County 2004, Pinal County 2001).

5.4 Changes in land ownership affecting Coronado National Forest

A number of land acquisitions and exchanges proposed in recent years have either directly or indirectly involved lands managed by the CNF. A brief description of information available on these land transactions follows:

- Rosemont Ranch Land Exchange (2005)

On June 2nd 2005, Augusta Resource Corporation announced it had agreed to purchase 2,760 acres known as Rosemont Ranch from Triangle Ventures LLC. The majority of the property is located within the boundaries of the Coronado National Forest approximately twenty-five miles south of Tucson. Triangle Ventures previously purchased the property from ASARCO Inc., a Tucson-based mining company. Although the parcel had originally been slated for preservation by Pima County, the citizens advisory committee reviewing the acquisition decided that the purchase price of \$11.5 million was too high. The property has long been considered for its potential as a copper mine, but previous owners such as ASARCO and Anaconda have met with significant opposition to mining operations in the area. The CNF and the Sky Islands Alliance have joined others in voicing concerns about the long-term environmental impacts of proposed copper mining operations while property owners and citizens' groups have claimed opposition due to inadequate oversight of the disposal of federal lands (Nijhuis 1998, Mitchell 1997).

- Gray Wolf Land Exchange (2005)

The current Statement of Proposed Action (SOPA) (April 1 – June 30, 2005) for the Coronado at the time of this assessment 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 CNF would receive title to seven parcels of private land, totaling approximately 872 acres. The Coronado is minimally involved, acquiring only thirty acres. This parcel is currently held by the Ash and Cedar Mining Claims, located approximately nine miles southeast of Patagonia in the Sierra Vista Ranger District. A final decision on the Gray Wolf land exchange is expected in May 2005 with implementation taking place in August 2005 (CNF 2005b, PNF 2004).

- Camp Tatiyee Land Exchange (2005)

The current SOPA for the ASNF at the time of this assessment (April 1 – June 30, 2005) describes this land exchange as an opportunity to provide land for children's camps currently operating under a special use permit while consolidating isolated parcels within forest boundaries. The proposed action involves the exchange of private parcels in the ASNF, CNF, PNF, and TNF for federal lands currently held within the Pinetop-Lakeside town limits. A final decision on the Camp Tatiyee land exchange is expected in October 2005 with implementation taking place in January 2006 (ASNF 2005).

- Cote Land Exchange (2005)

According to the Coronado NF SOPA, this land exchange involves parcels in all districts of CNF and portions of the ASNF. The SOPA explains that the land acquisition involves parcels in Cochise, Graham, Pima, and Santa Cruz Counties. As of May 15, 2004, the Sonoita Valley Planning Partnership raised concerns that the exchange would sever the last remaining corridor between FS lands and the Las Cienegas National Conservation Area. The current SOPA for the CNF at the time of this assessment (April 1 – June 30, 2005) describes the Cote Land Exchange as being "on hold" (CNF 2005b, SVPP 2004).

- Lone Mountain Land Exchange (2004)

As proposed in its Environmental Assessment (EA), this action involved the exchange of 1,603 acres of CNF land for 1,407 acres of private land held by Lone Mountain Ranch, Inc. in an area approximately twenty miles southwest of Sierra Vista in both Cochise and Santa Cruz Counties (CNF 2004).

- Santa Rita Experimental Range (2001)

Established in 1903, the Santa Rita Experimental Range is located approximately thirty miles southeast of Tucson and is the oldest such range in the FS. The 53,000 acres of the range were originally categorized as “Other Federal Lands” under the jurisdiction of the BLM while surface activities were managed by the Rocky Mountain Research Station of the FS. In 1990, the range was relinquished to the State of Arizona through an exchange that involved lands from several agencies including the FS, the BLM, and the U.S. Fish and Wildlife Service. The headquarters site, which is on FS lands, was turned over to the Coronado NF except that the station has the responsibility to remove soil contaminated by leaking gas tanks. A contract was awarded and cleanup operations were due to start in September 1992. As of 2001, the AZSLD intended to transfer lands from the range to the University of Arizona via an “institutional takeover.” The Coronado NF grants the university access to the headquarters site via a special use permit (USFS 2001b).

- Sierra Grand Land Exchange (1999)

On May 21, 1999, CNF Supervisor John McGee signed a Decision Notice (DN) and Finding of No Significant Impact (FONSI) on the proposed Sierra Grande Ranch, Inc. Land Exchange. The exchange was to transfer approximately 500 acres of national forest land on the southeastern slope of the Santa Rita Mountains into private ownership in exchange for approximately 429 acres of non-federal holdings in Big Casa Blanca Canyon and Mansfield Canyon. The Sonoita Crossroads Community Forum (SCCF) appealed the supervisor's decision for several reasons, including failure to properly analyze the impacts of the proposed exchange and connected actions and an accusation that the supervisor's decision was based on factual error. The primary concern of the SCCF was that the land exchange would increase the potential for unregulated subdivision in the area (Dierking 1999).

- Lewis Land Exchange (1997)

This exchange involved the trade of approximately 9.83 acres of CNF land for 61.98 acres of private land held by Venice, Lelia, and Gordon Lewis. The DN of the Southwestern Regional Director of Lands and Minerals was unsuccessfully appealed by Susan McDonald and Bob McClain. The appellant's objections to the land exchange included compromised access to forest lands, deterioration of adjacent property values, and a petition opposing the exchange signed by 170 individuals. In the judgment of the presiding Appeal Reviewing Officer in the Washington D.C. Office of the Director of Minerals and Geology Management, the response to the appeal by the Coronado was sufficient to uphold the decision (USFS 1997).

- Kentucky Camp (1989)

The buildings and land of this former mining camp on the eastern side of the Santa Rita Mountains were sold to the ANAMAX Mining Company in the 1960s. The CNF acquired the site through a 1989 land exchange. The FS has worked with volunteers and other partners to restore and interpret Kentucky Camp as an important relic of the region's mining history (CNF 2005a).

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 the transition of public and private lands in Arizona is rooted in an 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 were located have typically enjoyed a certain amount of control over activities on surrounding dry areas. Likewise, large private land owners, 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 CNF exemplifies many of the trends and controversial issues involving economic stability and effective management of public lands. Within the area of assessment, Santa Cruz County serves as a particularly poignant example of an area engaged in vigorous debate over land management practices. Collected data show that over 52% of land within the county is owned and managed by the FS and another 37% is currently held in private ownership. Meanwhile, Santa Cruz 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 to best manage the competing priorities of resource conservation and economic development. As seen in the county comprehensive plans reviewed for this assessment, planners are struggling to cope with growing demands for housing and recreation while ensuring preservation of a shrinking natural resource base that contributes to Arizona’s highly valued “rural character.”

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 home builders over the immediate and long-term value of open space. Taking an example from within the area of assessment, Pinal County has undergone a dramatic shift from a predominantly rural area to one in which farm and rangeland are being converted to support a booming urban population. 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 CNF given the relatively high percentage of such lands within the area of assessment.

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 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 and New Mexico originates on lands administered by the FS (USFS 1983). The role of the Coronado NF in protecting the integrity of area watersheds is likely to become increasingly important given rates of projected growth in Pima, Pinal, and Santa Cruz Counties.

In order to facilitate resolution of current and future land use issues, the Coronado 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 to institute 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 Coronado National Forest (CNF) 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 Coronado NF is consistent with larger surveys of trends at the regional and national levels. These trends show a marked decline in the 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 CNF.

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 CNF 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 generally defined as being either extractive or non-extractive. Extractive uses include livestock grazing, 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 recreational 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).² As Davis (2001) notes, the number of permits issued for livestock grazing on public lands has decreased slightly over recent years. In 2004, the CNF issued 147 grazing permits totaling 185,154 authorized animal unit months (AUMs). The number of permits has decreased since the mid-1990s with permitted AUMs reduced from over 300,000 at that time (Ruyle, pers. comm.). Over 35,000 animals currently graze on nearly twenty Coronado allotments (USFS 2005p). One AUM is defined as the amount of forage required by an animal unit (the equivalent of one 1,000 pound cow and her suckling calf) for a one-month period. Thus, the total number of AUMs is equal to the number of animal units multiplied by the number of months they are on the range.

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 FY 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 Forest Service timber sales program reported a loss of \$88.6 million (GAO 2001a). Data on timber permits were not available for the CNF.

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 FY 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.).

Compared to other Arizona national forests, the Coronado's mineral program is all but non-existent. In 2002, the forest reported a mere \$225 in sale permits for sixteen tons of sand and gravel and landscape rock (Ruyle, pers. comm.). The forest is currently proposing the withdrawal of several areas from mineral entry in order to, "protect and preserve their natural resource values and integrity" (USFS 2001p). Included in this withdrawal are forty-three caves, three historic sites, six research areas, and two historic and/or recreation sites at various locations within the CNF.

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

² Data given are the most recent available.

6.3 Non-extractive uses and users

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, visual, and natural resource values” through a variety of management tasks and activities (FSH 2302). However, unmanaged recreation has also been identified by the Forest Service 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 Rocky Mountain regions will be heavy. Much of this pressure can be traced back to population trends throughout the West. The use of off-highway vehicles (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; for example, 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 11th. Nationally, there were 209 million national forest visits in 2001. The forests of the Southwest (Region 3) received 19.5 million visits³ (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 Arizonans living in urban areas has increased dramatically, so that more than 88% of Arizona residents 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 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 1,780,000 acres of Coronado National Forest received over 2 million visits during FY 2001. A majority of visitors to the CNF are male (65.1%). Visitors are predominately white (89.6%); Spanish, Hispanic, or Latino visitors make up approximately 7.9% of total visits while American Indian/Alaska Native and Asian users comprise only about 0.1% and 1.3% of visitors respectively. About 10% of users are under the age of 16 while relatively few visitors are between 16 and 30 or over 70-years old. An estimated 71.6% of visitors are between the ages of 31 and 70. Nearly 3% of visitors were from a foreign country. The most frequently reported zip codes suggest that the vast majority of CNF visitors come from the Tucson metro area, including nearby communities such as Green Valley and Oro Valley (Kocis et al. 2002b).

³ However, for the latter figure, there is a 41.2% margin of error at the 80% confidence level.

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 needs and wishes (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 (Table 29).

Table 7. 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).

Nationally, 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 and lists the ten most popular recreation activities, is summarized in Table 30 below for 2000-2001:

Table 8. 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

At the national level, walking is currently the most popular outdoor activity (Table 30). 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 below:

Table 9. Participation in General Outdoor Activities, NSRE 2000-2001

Activity	Percent of Population Participating
Viewing/learning/gathering activities ⁴	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 nonmotorized activities	22.8%

Source: Cordell et al. 2004

⁴ 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).

Locally, the CNF includes facilities for a variety of recreational activities, including camping and hiking, hunting and fishing, wildlife viewing, boating, skiing, rock climbing, and caving. The forest contains several lakes that are stocked by the Arizona Game and Fish Department, designated mountain bike trails, and a privately operated ski valley (USFS 2005p). One popular site for users from the Tucson area is the Sabino Canyon Recreation Area. Located adjacent to Tucson, this area is relatively developed, includes paved roads, a shuttle service, picnic areas, and interpretive activities and currently receives more than one million visitors annually. In 2001, the area was added to the Catalina Mountains Fee Demonstration Program.

The five most popular activities for visitors to Coronado were viewing natural features (63.2% participation), hiking or walking (50.9%), general relaxing (36.8%), viewing wildlife (36.4%), and driving for pleasure (24.3%). Visiting nature centers, nature trails, and other visitor information services, as well as camping and picnicking at developed sites, were also very popular (Kocis et al. 2002b).

6.4 Special users and uses

A number of special user groups merit attention from 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 one (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, and the Archeological Resources Protection Act as well as several presidential executive orders.

Tribes' use of FS land includes free, non-permitted activities such as gathering boughs and basket materials as well as the use of products such as sawtimber, for which fees are charged (Jevons, 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 include traditional cultural places, whose locations are known only to the tribes. Because the tribes cannot divulge the locations, they cannot apply for permits (Jevons, pers. comm.).

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, off-road vehicle users increased by more than 109% nationally (Cordell et al. 2004). In 1995, a GAO study found OHV use on federal lands to be generally undermanaged. The study suggested that the FS devoted limited funding and staffing to managing OHV use and that forests relied heavily on state funding (GAO 1995). According to surveys conducted by the Arizona State Parks, most Arizonans consider the provision of OHV recreation opportunities to be a lower priority than other services, such as the preservation of cultural resources and

natural areas; however, more Arizonans 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 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). The Coronado currently works with the Arizona State Parks to educate the public on OHV issues (USFS 2005p). The 1986 forest plan emphasized the need on the part of the FS to continue providing opportunities for OHV recreation while regulating use to protect other forest resources and uses (USFS 1986).

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 aged 16 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 the same period. 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 CNF, wildlife viewing is a more common activity than either fishing or hunting. National Visitor Use Monitoring (NVUM) data from 2002 show that an estimated 36.4% of the visitors interviewed participated in some sort of wildlife-viewing activity; however, only about 3.7% described it as their primary activity.⁵ Approximately 4.3% of interviewed visitors hunted and approximately 0.8% fished (opportunities for water-based recreation are extremely limited in the Coronado and throughout southern Arizona) (Kocis et al. 2002b).

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), making the decision to designate a roadless area as wilderness a

⁵ The NVUM definition of wildlife viewing appears to be somewhat broader than that used by the national survey discussed above.

potentially controversial one. 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).

The Coronado NF includes eight designated wilderness areas and 423,000 acres of inventoried roadless areas (USFS 2001b). Users of designated wilderness areas fit a profile similar to other forest users: the majority are male (61.4%), predominantly white (94.9%) or Hispanic/Latino (3.6%), and generally live in the Tucson area. NVUM data suggest that nearly 437,000 wilderness visits were made during fiscal year 2001 although the error rate on these data is high (+/- 35.6%) because of the relatively low number of visitors interviewed (Kocis et al. 2002b).

Illegal Users

The FS uses a computerized database, LEIMARS (the Law Enforcement and Investigations Management Attainment Reporting System), to collect information on crimes and rule violations that occur on lands in the national forest system (USDA and OIG 2004). In the CNF, undocumented immigrants have become very common illegal “users.” Starting in 1994, when enforcement was stepped up and a wall constructed along the border between San Diego and the San Ysidro Mountains (then the most popular crossing place), attempts to control illegal immigration have increasingly motivated undocumented immigrants to attempt crossings through remote desert and mountain areas. In FY 2003, 40% of the 900,000 arrests of illegal border crossers were made in the Tucson sector of Arizona (Marek 2004). About sixty miles of this 260-mile stretch of border are part of the Nogales and Sierra Vista ranger districts of the Coronado. Further east, the Douglas ranger district, though slightly removed from the border, also experiences heavy immigrant traffic. The social, economic, and ecological impacts of illegal immigration through federal lands are poorly documented, but coping with these users is, and will likely remain, a high priority for CNF personnel.

6.5 Key issues for forest planning and management

Extractive uses and non-extractive uses of national forests are often seen as competing with one another, and balancing the uses of these different groups can be challenging. Livestock grazing is no exception. Overgrazing, especially on arid lands, can seriously damage ecosystems. Soil erosion, watershed destruction, and the loss of native plants are commonly cited as potential impacts. In the late 1980s, reports issued by the USDA and the 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 were 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 (Vincent 2004).

Nationally, 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 their 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 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 USFS to the General Accounting Office, clearly illustrates these changes (GAO 1999a).



Source: General Accounting Office (GAO) 1999a

Figure 6. 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, resulting in the need for distinct management priorities which may lead to conflict. NSRE 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 formal 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 Forest Service's recreational sites and areas which 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 cited 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 recreational 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 increased 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 9.2.

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 Coronado National Forest (CNF) 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 has been made in this section to identify all designated areas and special places on the CNF. 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 CNF contains considerable recreational, interpretive, and cultural resources. Forest GIS Staff provided specific names and locations of 466 designated areas within the CNF, including dispersed sites, campgrounds, picnic areas, and scenic areas. Additionally, the mountain ranges, canyons, and caves that characterize the Sky Islands in the Coronado are home to numerous special places for Native Americans, descendents of settlers, recreational users, and wildlife enthusiasts in southern 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. 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 clear that special places are complex, subjective, and often exceedingly difficult to define in a concise manner.

The methods used to identify these special places were as follows. For the first category (i.e., designated areas) the Forest GIS Coordinator was asked to query the GIS data bases in order to identify the designated areas. Furthermore, many of these areas are also identified on the Coronado National Forest website found at <http://www.fs.fed.us/r3/coronado/index.shtml>.

Maps, geographic coordinates, and brochures for these designated places can be found at <http://www.fs.fed.us/r3/coronado/forest/maps/maps.shtml>.

The method used to identify the more elusive second category (i.e., undesignated special places) was to contact the forest archeologist, landscape architect, and recreation officer. These individuals were given

the opportunity to name and describe, to the best of their ability, the key special places in the forest. Also, they were 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 CNF is discussed in greater detail in the following section, Community Relationships.

7.2 Designated areas

Table 32 provides information on each of the designated areas within the Coronado National Forest.

Table 10. Designated Areas on the Coronado National Forest

Designated Area Type	Name	District	Mountain Range
Boating	Parker Canyon Lake	Sierra Vista	Huachuca
Boating	Riggs Flat	Safford	Pinaleño
Botanical Area	Wild Chili Botanical Area	Nogales	Tumacacori
Cave	Cave of the Bells	Nogales	Santa Rita
Cave	Crystal	Douglas	Chiricahua
Cave	Happy Jack	Sierra Vista	Huachuca
Cave	Onyx	Nogales	Santa Rita
Cave	Peppersauce	Sierra Vista	Huachuca
Dispersed Site	Arcadia Overflow	Safford	Pinaleño
Dispersed Site	Bigelow/Bear Wallow	Santa Catalina	Santa Catalina
Dispersed Site	Blue-Alamo Canyon	Nogales	Tumacacori
Dispersed Site	Bull Spring	Santa Catalina	Santa Catalina
Dispersed Site	Bullock Corral	Santa Catalina	Santa Catalina
Dispersed Site	Camp Bonita	Santa Catalina	Santa Catalina
Dispersed Site	Cargodera Road	Santa Catalina	Santa Catalina
Dispersed Site	Charouleau Gap	Santa Catalina	Santa Catalina
Dispersed Site	Chesley Flat	Safford	Pinaleño
Dispersed Site	Chimney Rock	Santa Catalina	Santa Catalina
Dispersed Site	Chiva Falls	Santa Catalina	Santa Catalina
Dispersed Site	Cinninham	Safford	Pinaleño
Dispersed Site	Cluff Dairy	Safford	Pinaleño
Dispersed Site	Control Road (Lower)	Santa Catalina	Santa Catalina
Dispersed Site	Control Road (Upper)	Santa Catalina	Santa Catalina
Dispersed Site	Cottonwood	Santa Catalina	Santa Catalina
Dispersed Site	CP Flat	Safford	Pinaleño
Dispersed Site	Cruz Canyon	Nogales	Tumacacori
Dispersed Site	Gardner Canyon	Nogales	Santa Rita
Dispersed Site	Grand View Peak	Safford	Pinaleño
Dispersed Site	Grant Creek	Safford	Pinaleño
Dispersed Site	Happy Valley	Santa Catalina	Santa Catalina
Dispersed Site	Hell's Hole	Safford	Pinaleño
Dispersed Site	Incinerator Ridge	Santa Catalina	Santa Catalina
Dispersed Site	Kentucky Camp	Nogales	Santa Rita
Dispersed Site	Large Rock	Safford	Pinaleño
Dispersed Site	Lizard Rock	Santa Catalina	Santa Catalina
Dispersed Site	Loop	Safford	Pinaleño

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

Designated Area Type	Name	District	Mountain Range
Dispersed Site	Lower Walker Canyon	Nogales	Tumacacori
Dispersed Site	Moonshine	Safford	Pinaleño
Dispersed Site	Nugget Canyon	Santa Catalina	Santa Catalina
Dispersed Site	Observatory	Santa Catalina	Santa Catalina
Dispersed Site	Old Prison Camo	Safford	Pinaleño
Dispersed Site	Peppersauce West	Santa Catalina	Santa Catalina
Dispersed Site	Peter's Flat	Safford	Pinaleño
Dispersed Site	Powers Cabin	Safford	Galiuro
Dispersed Site	Race Track	Santa Catalina	Santa Catalina
Dispersed Site	Rice Peak	Santa Catalina	Santa Catalina
Dispersed Site	Riffs Flat	Safford	Pinaleño
Dispersed Site	Soldier Camo	Safford	Pinaleño
Dispersed Site	Sykes Knob	Santa Catalina	Santa Catalina
Dispersed Site	Tanque Verde Falls	Santa Catalina	Santa Catalina
Dispersed Site	The Lake	Santa Catalina	Santa Catalina
Dispersed Site	Upper Hospital Flat	Safford	Pinaleño
Dispersed Site	Upper Walker Canyon	Nogales	Tumacacori
Dispersed Site	Wildcat Shooting Sight	Santa Catalina	Santa Catalina
Dispersed Site	Fish Canyon	Nogales	Santa Rita
Dispersed Site	Nogales Sycamore Canyon	Nogales	Tumacacori
Dispersed Site	Nuttall Ridge	Safford	Pinaleño
Dispersed Site	Pena Blanco Canyon	Nogales	Tumacacori
Dispersed Site	Snow Flat	Safford	Pinaleño
Dispersed Site	Sycamore Backcountry Area	Sierra Vista	Huachuca
Dispersed Site	Twilight	Safford	Pinaleño
Family Campground	Arcadia	Safford	Pinaleño
Family Campground	Bathtub	Douglas	Chiricahua
Family Campground	Bog Springs	Nogales	Santa Rita
Family Campground	Catalina State Park	Santa Catalina	Santa Catalina
Family Campground	Cochise Stronghold	Douglas	Dragoon
Family Campground	Cunningham	Safford	Pinaleño
Family Campground	Cypress Park	Douglas	Chiricahua
Family Campground	General Hitchcock	Santa Catalina	Santa Catalina
Family Campground	Geronimo	Douglas	Peloncillo
Family Campground	Gordon Hirabayashi	Santa Catalina	Santa Catalina
Family Campground	Herb Martyr	Douglas	Chiricahua
Family Campground	Hospital Flat	Safford	Pinaleño
Family Campground	Idlewilde	Douglas	Chiricahua
Family Campground	John Hands	Douglas	Chiricahua
Family Campground	Lakeview	Sierra Vista	Huachuca
Family Campground	Noon Creek	Safford	Pinaleño
Family Campground	Peppersauce	Santa Catalina	Santa Catalina
Family Campground	Pinery Canyon	Douglas	Chiricahua
Family Campground	Ramsey Vista	Sierra Vista	Huachuca
Family Campground	Reef Townsite Campground	Sierra Vista	Huachuca
Family Campground	Riggs Flat	Safford	Pinaleño
Family Campground	Rucker Lake	Douglas	Chiricahua

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

Designated Area Type	Name	District	Mountain Range
Family Campground	Rucker Forest Camp	Douglas	Chiricahua
Family Campground	Rustler Park	Douglas	Chiricahua
Family Campground	Shannon	Safford	Pinaleño
Family Campground	Snow Flat	Safford	Pinaleño
Family Campground	Soldier Creek	Safford	Pinaleño
Family Campground	Stewart	Douglas	Chiricahua
Family Campground	Stockton Pass	Safford	Pinaleño
Family Campground	Sunny Flat	Douglas	Chiricahua
Family Campground	Sycamore	Douglas	Chiricahua
Family Campground	Treasure Park	Safford	Pinaleño
Family Campground	West Turkey Creek	Douglas	Chiricahua
Family Campground	White Rock	Nogales	Tumacacori
Family Campground	General Hitchcock	Santa Catalina	Santa Catalina
Family Campground	Molino Basin	Santa Catalina	Santa Catalina
Family Campground	Rose Canyon	Santa Catalina	Santa Catalina
Family Campground	Spencer Campground	Santa Catalina	Santa Catalina
Family Picnic	Alder	Santa Catalina	Santa Catalina
Family Picnic	Bear Canyon Overlook	Santa Catalina	Santa Catalina
Family Picnic	Box Elder	Santa Catalina	Santa Catalina
Family Picnic	Cactus	Santa Catalina	Santa Catalina
Family Picnic	Catalina State Park	Santa Catalina	Santa Catalina
Family Picnic	Chihuahua Pine	Santa Catalina	Santa Catalina
Family Picnic	Cypress	Santa Catalina	Santa Catalina
Family Picnic	Inspiration Rock	Santa Catalina	Santa Catalina
Family Picnic	Loma Linda	Santa Catalina	Santa Catalina
Family Picnic	Lower Sabino	Santa Catalina	Santa Catalina
Family Picnic	Lower Sabino East Dam	Santa Catalina	Santa Catalina
Family Picnic	Lower Sabino West Dam	Santa Catalina	Santa Catalina
Family Picnic	Lower Thumb Rock	Nogales	Tumacacori
Family Picnic	Madera Canyon	Nogales	Santa Rita
Family Picnic	Madera Trailhead	Nogales	Santa Rita
Family Picnic	Marshall Gulch	Santa Catalina	Santa Catalina
Family Picnic	Middle Bear Canyon	Santa Catalina	Santa Catalina
Family Picnic	Mt. Wrightson (Roundup)	Nogales	Santa Rita
Family Picnic	Noon Creek	Safford	Pinaleño
Family Picnic	Old Noon Creek	Safford	Pinaleño
Family Picnic	Red Rock	Nogales	Tumacacori
Family Picnic	Sabino Canyon Group	Santa Catalina	Santa Catalina
Family Picnic	Sabino Dam Overlook	Santa Catalina	Santa Catalina
Family Picnic	South Fork	Douglas	Chiricahua
Family Picnic	Sykes Knob	Santa Catalina	Santa Catalina
Family Picnic	Upper Sabino Canyon	Santa Catalina	Santa Catalina
Family Picnic	Upper Thumb Rock	Nogales	Tumacacori
Family Picnic	Wet Canyon	Safford	Pinaleño
Family Picnic	Whipple	Nogales	Santa Rita
Family Picnic	White House	Nogales	Santa Rita
Fire Lookouts Cabins Overnight	Kentucky Camp Rental Cabin	Nogales	Santa Rita
Fishing Site	Pena Blanca Lake	Nogales	Tumacacori

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

Designated Area Type	Name	District	Mountain Range
Fishing Site	Riggs Flat	Safford	Pinaleño
Fishing Site	Rose Canyon Lake	Santa Catalina	Santa Catalina
Forest Service	Sollers Point Resident Housing	Santa Catalina	Santa Catalina
Forest Service	Palisades Visitor Center	Santa Catalina	Santa Catalina
Group Campground	Calabasas	Nogales	Tumacacori
Group Campground	Camp Rucker	Douglas	Chiricahua
Group Campground	Catalina State Park	Santa Catalina	Santa Catalina
Group Campground	Molino Basin	Santa Catalina	Santa Catalina
Group Campground	Peppersauce	Santa Catalina	Santa Catalina
Group Campground	Rock Bluff	Sierra Vista	Huachuca
Group Campground	Showers Point	Santa Catalina	Santa Catalina
Group Campground	Snow Flat	Safford	Pinaleño
Group Campground	Stockton Pass	Safford	Pinaleño
Group Campground	Treasure Park	Safford	Pinaleño
Group Campground	Twilight	Safford	Pinaleño
Group Campground	Upper Arcadia	Safford	Pinaleño
Group Campground	Upper Hospital Flat	Safford	Pinaleño
Group Campground	Whitetail Future	Santa Catalina	Santa Catalina
Group Picnic	Cactus	Santa Catalina	Santa Catalina
Group Picnic	Rose Canyon Group Site #1	Santa Catalina	Santa Catalina
Group Picnic	Rose Canyon Group Site #2	Santa Catalina	Santa Catalina
Horse Camp	Catalina State Park	Santa Catalina	Santa Catalina
Horse Camp	Clark Peak Corrals	Safford	Pinaleño
Horse Camp	Columbine Corrals	Safford	Pinaleño
Horse Camp	Deer Creek	Safford	Galiuro
Horse Camp	Gordon Hirabayashi	Santa Catalina	Santa Catalina
Horse Camp	Round the Mountain	Safford	Pinaleño
Hotel/Lodge/Resort Private Owner	Bellota Ranch	Santa Catalina	Santa Catalina
Hotel/Lodge/Resort Private Owner	Santa Rita Lodge	Nogales	Santa Rita
Information Site	Catalina State Park Entry Station	Santa Catalina	Santa Catalina
Information Site	Douglas District Office	Douglas	N/A
Information Site	Molino Fee Station	Santa Catalina	Santa Catalina
Information Site	Nogales District Office	Nogales	N/A
Information Site	Sabino Canyon Fee Station	Santa Catalina	Santa Catalina
Information Site	Safford District Office	Safford	N/A
Information Site	Sierra Vista District Office	Sierra Vista	N/A
Information Site	Supervisor's Office	Tucson	N/A
International Observatory	Mt. Graham International Observatory	Safford	Pinaleño
Interpretive Site	Sabino Canyon Nature Trail	Santa Catalina	Santa Catalina
Interpretive Site Major	Cave Creek Visitor Center	Douglas	Chiricahua
Interpretive Site Major	Columbine Visitor Center	Safford	Pinaleño
Interpretive Site Major	Palisades Visitor Center	Santa Catalina	Santa Catalina
Interpretive Site Major	Sabino Canyon Visitor Center	Santa Catalina	Santa Catalina
Interpretive Site Major	Smithsonian Visitor Center	Nogales	Santa Rita
Interpretive Site Minor	Camp Ruck Interpretive Trail	Douglas	Chiricahua
Interpretive Site Minor	Camp Rucker Historic Site	Douglas	Chiricahua
Interpretive Site Minor	Cave Creek Nature Trail	Douglas	Chiricahua
Interpretive Site Minor	Chesley Flat	Safford	Pinaleño

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

Designated Area Type	Name	District	Mountain Range
Interpretive Site Minor	Cochise Stronghold Historical Marker	Douglas	Dragoon
Interpretive Site Minor	Cochise Stronghold Interp. Trail	Douglas	Dragoon
Interpretive Site Minor	Cochise Stronghold Nature Trail	Douglas	Santa Rita
Interpretive Site Minor	Columbine VIC Nature Trail	Safford	Pinaleño
Interpretive Site Minor	Council Rock Interpretive Trail	Douglas	Dragoon
Interpretive Site Minor	Dragoon Springs Stage Stop	Douglas	Dragoon
Interpretive Site Minor	Geronimo Pass Interpretive Site	Douglas	Peloncillo
Interpretive Site Minor	Gordon Hirabayashi	Santa Catalina	Santa Catalina
Interpretive Site Minor	Hospital Flat Trail	Safford	Pinaleño
Interpretive Site Minor	Kentucky Camp	Nogales	Santa Rita
Interpretive Site Minor	Lowell House	Santa Catalina	Santa Catalina
Interpretive Site Minor	Peter's Flat	Safford	Pinaleño
Interpretive Site Minor	Pinery Canyon Mill Site Cabin	Douglas	Chiricahua
Interpretive Site Minor	Proctor Parking	Nogales	Santa Rita
Interpretive Site Minor	Reef Townsite	Sierra Vista	Huachuca
Interpretive Site Minor	Reef Townsite Mining	Sierra Vista	Huachuca
Interpretive Site Minor	Romero Ruin Trail	Santa Catalina	Santa Catalina
Interpretive Site Minor	Rucker Baber Shop	Douglas	Chiricahua
Interpretive Site Minor	Rucker Information Site	Douglas	Chiricahua
Interpretive Site Minor	Sabino Canyon Bajada Nature Trail	Santa Catalina	Santa Catalina
Interpretive Site Minor	Santa Rita Water & Mining Co.	Nogales	Santa Rita
Interpretive Site Minor	Shannon	Safford	Pinaleño
Interpretive Site Minor	Slavin Interpretive Site	Douglas	Dragoon
Interpretive Site Minor	Treasure Park	Safford	Pinaleño
Interpretive Site Minor	Upper Hospital Flat	Safford	Pinaleño
Interpretive Site Minor	Upper Hospital Flat 1	Safford	Pinaleño
Interpretive Site Minor	Upper Hospital Flat 2	Safford	Pinaleño
Interpretive Site Minor	Whipple Nature Trail	Nogales	Santa Rita
Interpretive Site Minor	White House Ruins	Nogales	Santa Rita
Interpretive Site Minor	Sabino Canyon Interpretive Area	Santa Catalina	Santa Catalina
Mountain Bike Route	Elephant Head	Nogales	Santa Rita
Municipal	Summerhaven Town	Santa Catalina	Santa Catalina
Observation Site	Aspen Vista	Santa Catalina	Santa Catalina
Observation Site	Babad Do'ag	Santa Catalina	Santa Catalina
Observation Site	Cathedral Vista Point	Douglas	Chiricahua
Observation Site	Geology Vista	Santa Catalina	Santa Catalina
Observation Site	Hageas Point	Safford	Pinaleño
Observation Site	Molino Canyon Vista	Santa Catalina	Santa Catalina
Observation Site	San Pedro Vista	Santa Catalina	Santa Catalina
Observation Site	Seven Cataracts Vista	Santa Catalina	Santa Catalina
Observation Site	Thimble Peak Vista	Santa Catalina	Santa Catalina
Observation Site	Windy Point Vista	Santa Catalina	Santa Catalina
Organization Site-F.S. Owned	Girl Scout Camp	Santa Catalina	Santa Catalina
Organization Site-F.S. Owned	Kent Springs Center	Nogales	Santa Rita
Organization Site-Privately Owned	Amphi Camp	Santa Catalina	Santa Catalina
Organization Site-Privately Owned	Arizona Boys Ranch	Santa Catalina	Santa Catalina
Organization Site-Privately Owned	Baptist Camp	Santa Catalina	Santa Catalina
Organization Site-Privately Owned	Boy Scout Camp	Santa Catalina	Santa Catalina

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

Designated Area Type	Name	District	Mountain Range
Organization Site-Privately Owned	LDS Camp	Santa Catalina	Santa Catalina
Organization Site-Privately Owned	Organization Camp	Safford	Pinaleño
Organization Site-Privately Owned	Pine Canyon United Methodist Camp	Douglas	Chiricahua
Organization Site-Privately Owned	Presbyterian Camp	Santa Catalina	Santa Catalina
Playground or Special Sport Site	Reddington Pass Backcountry Tour. Area	Santa Catalina	Santa Catalina
Playground or Special Sport Site	Rosemont Backcountry Touring Area	Nogales	Santa Rita
Playground Park Special Sport Site	Alambre Staging OHV	Santa Catalina	Santa Catalina
Playground Park Special Sport Site	Amphitheater	Nogales	Santa Rita
Playground Park Special Sport Site	Grant Hill Mountain Bike Loop	Safford	Pinaleño
Playground Park Special Sport Site	Pusch Ridge Archery Range	Santa Catalina	Santa Catalina
Playground Park Special Sport Site	Three Feathers	Santa Catalina	Santa Catalina
Possible Wild & Scenic River	Ash Creek	Safford	Pinaleño
Possible Wild & Scenic River	Canada Del Oro	Santa Catalina	Santa Catalina
Possible Wild & Scenic River	Grant Creek	Safford	Pinaleño
Possible Wild & Scenic River	Lower Cima Creek	Douglas	Chiricahua
Possible Wild & Scenic River	Post Creek	Safford	Pinaleño
Possible Wild & Scenic River	Redfield Canyon	Safford	Galiuro
Possible Wild & Scenic River	Romero Canyon	Santa Catalina	Santa Catalina
Possible Wild & Scenic River	Rucker Canyon	Douglas	Chiricahua
Possible Wild & Scenic River	Sabino Canyon	Santa Catalina	Santa Catalina
Possible Wild & Scenic River	South Fork Cave Creek	Douglas	Chiricahua
Recreation Concession Site	Parker Canyon Marina & Store	Sierra Vista	Huachuca
Recreation Residence	Bear Wallow Summerhomes	Santa Catalina	Santa Catalina
Recreation Residence	Carter Canyon Summerhomes	Santa Catalina	Santa Catalina
Recreation Residence	Cave Creek Summerhomes	Douglas	Chiricahua
Recreation Residence	Columbine Summerhomes	Safford	Pinaleño
Recreation Residence	Rustler Park Summerhomes	Douglas	Chiricahua
Recreation Residence	Soldier Camp Summerhomes	Santa Catalina	Santa Catalina
Recreation Residence	South Fork Summerhomes	Douglas	Chiricahua
Recreation Residence	Turkey Creek Summerhomes	Douglas	Chiricahua
Recreation Residence	Turkey Flat Summerhomes	Safford	Pinaleño
Recreation Residence	Loma Linda Summerhomes	Santa Catalina	Santa Catalina
Recreation Residence	Upper Sabino Summerhomes	Santa Catalina	Santa Catalina
Recreation Residence	Willow Canyon Summerhomes	Santa Catalina	Santa Catalina
Research Natural Area	Butterfly	Santa Catalina	Santa Catalina
Research Natural Area	Canelo	Sierra Vista	Huachuca
Research Natural Area	Elgin	Sierra Vista	Huachuca
Research Natural Area	Gooding	Nogales	Tumacacori
Research Natural Area	Goody	Safford	Pinaleño
Research Natural Area	Pole Bridge	Douglas	Chiricahua
Research Natural Area	Pole Bridge RNA Extension	Douglas	Chiricahua
Research Natural Area	Santa Catalina	Santa Catalina	Santa Catalina
Research Ranch	Elgin Research Ranch	Sierra Vista	Huachuca
Scenic/Sightseeing Route	Arizona Highway 83	Sierra Vista	Huachuca
Scenic/Sightseeing Route	Box Canyon Road (Forest Road 62)	Nogales	Santa Rita
Scenic/Sightseeing Route	Canelo Hills Loop	Sierra Vista	Huachuca
Scenic/Sightseeing Route	Carr Canyon (Forest Road 38)	Sierra Vista	Huachuca
Scenic/Sightseeing Route	Cave Creek/Portal/Paradise/Forest Road 42/4	Santa Catalina	Santa Catalina

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

Designated Area Type	Name	District	Mountain Range
Scenic/Sightseeing Route	Charouleau Gap Road	Santa Catalina	Santa Catalina
Scenic/Sightseeing Route	Control Road	Santa Catalina	Santa Catalina
Scenic/Sightseeing Route	Happy Valley	Santa Catalina	Santa Catalina
Scenic/Sightseeing Route	Harshaw (Forest Road 49)	Sierra Vista	Huachuca
Scenic/Sightseeing Route	Madera Canyon	Nogales	Santa Rita
Scenic/Sightseeing Route	Middlemarch (Forest Road 345)	Douglas	Dragoon
Scenic/Sightseeing Route	Mt. Hopkins Road	Nogales	Santa Rita
Scenic/Sightseeing Route	Pinery Canyon (Forest Road 42)	Douglas	Chiricahua
Scenic/Sightseeing Route	Proctor Interpretive Trail	Nogales	Santa Rita
Scenic/Sightseeing Route	Redington Pass Road	Santa Catalina	Santa Catalina
Scenic/Sightseeing Route	Ruby Road (AZ 289, Forest Road 39)	Nogales	Tumacacori
Scenic/Sightseeing Route	Rucker/Texas Canyon (Forest Road 74)	Douglas	Chiricahua
Scenic/Sightseeing Route	Sabino Canyon Road	Santa Catalina	Santa Catalina
Scenic/Sightseeing Route	Sky Island Scenic Byway	Santa Catalina	Santa Catalina
Scenic/Sightseeing Route	State Highway 83	Nogales	Santa Rita
Scenic/Sightseeing Route	Stockton Pass	Safford	Pinaleño
Scenic/Sightseeing Route	Swift Trail	Safford	Pinaleño
Scenic/Sightseeing Route	Turkey Creek (Forest Road 41)	Douglas	Chiricahua
Ski Area	Mt. Lemmon Ski Valley	Santa Catalina	Santa Catalina
Trailhead	Agua Caliente Hill	Santa Catalina	Santa Catalina
Trailhead	Amphitheater	Nogales	Santa Rita
Trailhead	Aqua Caliente	Nogales	Santa Rita
Trailhead	Arizona Trail at Parker Lake	Sierra Vista	Huachuca
Trailhead	Atascosa	Nogales	Tumacacori
Trailhead	Babad Do'ag	Santa Catalina	Santa Catalina
Trailhead	Bear Canyon	Safford	Pinaleño
Trailhead	Bear Canyon-east end of VC Parking	Santa Catalina	Santa Catalina
Trailhead	Bellota/Italian Spring	Santa Catalina	Santa Catalina
Trailhead	Bigelow (Butterfly)	Santa Catalina	Santa Catalina
Trailhead	Bigelow (Palisades)	Santa Catalina	Santa Catalina
Trailhead	Blue Jay Ridge	Safford	Pinaleño
Trailhead	Bog Springs	Nogales	Santa Rita
Trailhead	Box Camp	Santa Catalina	Santa Catalina
Trailhead	Box Canyon OHV	Nogales	Santa Rita
Trailhead	Brown	Sierra Vista	Huachuca
Trailhead	Brush Corral	Santa Catalina	Santa Catalina
Trailhead	Bug Spring	Santa Catalina	Santa Catalina
Trailhead	Butterfly	Santa Catalina	Santa Catalina
Trailhead	Canada del Oro	Santa Catalina	Santa Catalina
Trailhead	Canada del Oro/Sanmaniego	Santa Catalina	Santa Catalina
Trailhead	Canelo	Sierra Vista	Huachuca
Trailhead	Carr Canyon Perimeter	Sierra Vista	Huachuca
Trailhead	Catalina State Park End of Road	Santa Catalina	Santa Catalina
Trailhead	Cave	Nogales	Santa Rita
Trailhead	Clark Peak	Safford	Pinaleño
Trailhead	Cochise Equestrian	Douglas	Dragoon
Trailhead	Cochise Stronghold	Douglas	Dragoon
Trailhead	Cody	Santa Catalina	Santa Catalina

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

Designated Area Type	Name	District	Mountain Range
Trailhead	Columbine	Safford	Pinaleño
Trailhead	Cottonwood	Douglas	Chiricahua
Trailhead	Crystal Spring	Santa Catalina	Santa Catalina
Trailhead	Cunningham Loop	Safford	Pinaleño
Trailhead	Davis Spring	Santa Catalina	Santa Catalina
Trailhead	Deadman Trail	Safford	Pinaleño
Trailhead	Deer Creek	Safford	Galiuro
Trailhead	Dutch Henry Canyon	Safford	Pinaleño
Trailhead	Dutch Henry Lower	Safford	Pinaleño
Trailhead	East Divide	Safford	Galiuro
Trailhead	Elephant Head	Nogales	Santa Rita
Trailhead	Emigrant Canyon	Douglas	Chiricahua
Trailhead	Fife	Douglas	Chiricahua
Trailhead	Finger Rock/Pontatoc	Santa Catalina	Santa Catalina
Trailhead	Florida	Nogales	Santa Rita
Trailhead	Four Springs	Nogales	Santa Rita
Trailhead	Frye Canyon	Safford	Pinaleño
Trailhead	Gardner	Nogales	Santa Rita
Trailhead	Gardner & Cave Canyon OHV	Nogales	Santa Rita
Trailhead	Grant Creek	Safford	Pinaleño
Trailhead	Grant Creek Lower	Safford	Pinaleño
Trailhead	Grant Hill Loop	Safford	Pinaleño
Trailhead	Green	Douglas	Chiricahua
Trailhead	Green Mountain (Hitchcock)	Santa Catalina	Santa Catalina
Trailhead	Green Mountain (Near San Pedro Vista)	Santa Catalina	Santa Catalina
Trailhead	Greenhouse	Douglas	Chiricahua
Trailhead	Guindani Loop	Sierra Vista	Huachuca
Trailhead	Harshaw	Sierra Vista	Huachuca
Trailhead	Heliograph	Safford	Pinaleño
Trailhead	Herb Martyr	Douglas	Chiricahua
Trailhead	Hidden Spring	Santa Catalina	Santa Catalina
Trailhead	High Creek	Safford	Galiuro
Trailhead	Hoovey	Douglas	Chiricahua
Trailhead	Ida Canyon	Sierra Vista	Huachuca
Trailhead	Incinerator Ridge	Santa Catalina	Santa Catalina
Trailhead	Jesus Babcock	Safford	Pinaleño
Trailhead	Jesus Goudy Ridge	Safford	Pinaleño
Trailhead	Kentucky Camp	Nogales	Santa Rita
Trailhead	Ladybug	Safford	Pinaleño
Trailhead	Ladybug Saddle	Safford	Pinaleño
Trailhead	Last Chance	Santa Catalina	Santa Catalina
Trailhead	Linda Vista	Santa Catalina	Santa Catalina
Trailhead	Lower Tanque Verde	Santa Catalina	Santa Catalina
Trailhead	Lutz	Sierra Vista	Huachuca
Trailhead	Marshall Gulch	Santa Catalina	Santa Catalina
Trailhead	Middle March	Douglas	Dragoon
Trailhead	Miller	Sierra Vista	Huachuca
Trailhead	Miller Canyon Perimeter	Sierra Vista	Huachuca

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

Designated Area Type	Name	District	Mountain Range
Trailhead	Miller Creek	Santa Catalina	Santa Catalina
Trailhead	Mint Spring	Santa Catalina	Santa Catalina
Trailhead	Molino Basin	Santa Catalina	Santa Catalina
Trailhead	Molino Basin End of Road	Santa Catalina	Santa Catalina
Trailhead	Molino Basin Group Site	Santa Catalina	Santa Catalina
Trailhead	Molino Basin/Prison Camp	Santa Catalina	Santa Catalina
Trailhead	Monte Vista	Douglas	Chiricahua
Trailhead	Montezuma Pass	Sierra Vista	Huachuca
Trailhead	Morse Canyon	Douglas	Chiricahua
Trailhead	Mt. Lemmon/Aspen	Santa Catalina	Santa Catalina
Trailhead	Noon Creek Ridge	Safford	Pinaleño
Trailhead	Old Baldy	Nogales	Santa Rita
Trailhead	Onion Saddle	Douglas	Chiricahua
Trailhead	Oracle Ridge (Lower)	Santa Catalina	Santa Catalina
Trailhead	Oracle Ridge	Santa Catalina	Santa Catalina
Trailhead	Oversite Canyon	Sierra Vista	Huachuca
Trailhead	Palisades	Santa Catalina	Santa Catalina
Trailhead	Papago Well	Santa Catalina	Santa Catalina
Trailhead	Parker Canyon Lakeshore Trail	Sierra Vista	Huachuca
Trailhead	Pima Canyon	Santa Catalina	Santa Catalina
Trailhead	Pine Gulch	Douglas	Chiricahua
Trailhead	Pinery-Horsefall	Douglas	Chiricahua
Trailhead	Price	Douglas	Chiricahua
Trailhead	Proctor	Nogales	Santa Rita
Trailhead	Ramsey Vista	Sierra Vista	Huachuca
Trailhead	Rattlesnake	Douglas	Chiricahua
Trailhead	Rattlesnake Canyon	Safford	Galiuro
Trailhead	Red Ridge	Santa Catalina	Santa Catalina
Trailhead	Rose Canyon Lake	Santa Catalina	Santa Catalina
Trailhead	Rosemont OHV	Nogales	Santa Rita
Trailhead	Round the Mountain	Safford	Pinaleño
Trailhead	Rucker	Douglas	Chiricahua
Trailhead	Rustler Park	Douglas	Chiricahua
Trailhead	Sanmaniego	Santa Catalina	Santa Catalina
Trailhead	Sanmaniego/Canado del Oro	Santa Catalina	Santa Catalina
Trailhead	Saulsberry	Douglas	Chiricahua
Trailhead	Sawmill/Carr Peak	Sierra Vista	Huachuca
Trailhead	Shake	Safford	Pinaleño
Trailhead	Shake-State Route 366	Safford	Pinaleño
Trailhead	Shannon	Safford	Pinaleño
Trailhead	Shaw Peak	Douglas	Chiricahua
Trailhead	Shuttle Stop 9	Santa Catalina	Santa Catalina
Trailhead	Silver Peak	Douglas	Chiricahua
Trailhead	Skeleton Canyon	Douglas	Peloncillo
Trailhead	Slavin Gulch	Douglas	Dragoon
Trailhead	Snowshed	Douglas	Chiricahua
Trailhead	Soldier	Santa Catalina	Santa Catalina
Trailhead	Soldier Creek	Safford	Pinaleño

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

Designated Area Type	Name	District	Mountain Range
Trailhead	South Fork	Douglas	Chiricahua
Trailhead	South Skeleton	Douglas	Peloncillo
Trailhead	Sunnyside Canyon	Sierra Vista	Huachuca
Trailhead	Sunset	Santa Catalina	Santa Catalina
Trailhead	Super	Nogales	Santa Rita
Trailhead	Sutherland	Santa Catalina	Santa Catalina
Trailhead	Sycamore Canyon	Nogales	Tumacacori
Trailhead	Sycamore Reservoir	Santa Catalina	Santa Catalina
Trailhead	Taylor Canyon	Safford	Pinaleño
Trailhead	Temporal	Nogales	Santa Rita
Trailhead	Tripp Canyon	Safford	Pinaleño
Trailhead	Turkey Creek	Santa Catalina	Santa Catalina
Trailhead	Turkey Flat	Safford	Pinaleño
Trailhead	Turkey Pen	Douglas	Chiricahua
Trailhead	Turtle Mountain	Douglas	Chiricahua
Trailhead	Upper Arcadia	Safford	Pinaleño
Trailhead	Upper Tanque Verde	Santa Catalina	Santa Catalina
Trailhead	Ventana Canyon	Santa Catalina	Santa Catalina
Trailhead	Vista (Geology Vista)	Santa Catalina	Santa Catalina
Trailhead	Vista (Windy Point Vista)	Santa Catalina	Santa Catalina
Trailhead	Walker	Nogales	Santa Rita
Trailhead	Webb Peak	Safford	Pinaleño
Trailhead	West Divide	Safford	Galiuro
Trailhead	West Stronghold	Douglas	Dragoon
Trailhead	Witch	Douglas	Chiricahua
Trailhead	Wood Canyon	Douglas	Chiricahua
Wilderness	Chiricahua Wilderness	Douglas	Chiricahua
Wilderness	Galiuro Wilderness Area	Safford	Galiuro
Wilderness	Miller Peak Wilderness	Sierra Vista	Huachuca
Wilderness	Mt. Wrightson Wilderness	Nogales	Santa Rita
Wilderness	Pajarita Wilderness	Nogales	Tumacacori
Wilderness	Pusch Ridge Wilderness	Santa Catalina	Santa Catalina
Wilderness	Rincon Wilderness	Santa Catalina	Santa Catalina
Wilderness	Santa Teresa Wilderness Area	Safford	Santa Teresa
Wilderness Study Area	Mt. Graham Wilderness Study Area	Safford	Pinaleño
Zoological Botanical Area	Guadalupe Canyon	Douglas	Peloncillo
Zoological Botanical Area	South Fork Cave Creek	Douglas	Chiricahua

Source: Coronado National Forest, GIS Data Base, T. Austin

7.3 Special places

The following information on undesignated special places within the CNF was provided by the forest archaeologist, William Gillespie.

Native American Special Places and Traditional Cultural Properties

To date, one area, Mt. Graham (or *Dzil nchaa si'an*), has been formally recognized as an eligible Traditional Cultural Property important to the Western Apache groups (White Mountain, San Carlos, and Yavapai Apache). Mt. Graham has been recognized as a place of outstanding significance in Western Apache religion, culture, and history: that is, a sacred site. A summary statement of the significance is given in the National Register of Historic Places Determination of Eligibility prepared by Dr. Patricia Spoerl of the CNF:

Mount Graham is significant in Western Apache spiritual beliefs and practices. The mountain is associated with their oral history and plays a role in stories, songs and myths that reflect ties to it, both in historic and contemporary traditional cultural activities. Sources that document its significance include ethnographic reconstructions of pre-preservation lifeways and spiritual practices that involve visitation to Mount Graham, myths and songs about the mountain, and contemporary tribal interviews that describe its use and importance today. The mountain is associated with a pattern of events both spiritual and historical as evidenced by information provided during the 1930s and 1990s. Four closely related themes have been identified to describe Mount Graham in terms of the values Western Apaches ascribe to it and the themes that could then be used to evaluate its significance in determining eligibility for the National Register of Historic Places. These themes are: 1) home of the Mountain Spirits (*gaan*); 2) source of natural resources and traditional medicine for ceremonial uses; 3) place of prayer; and, 4) source of supernatural power.

Other mountain ranges or smaller areas could also be recognized as traditional cultural properties but have not yet been evaluated in this context. In particular, the Dragoon Mountains, and specifically Cochise Stronghold (both East and West Stronghold Canyons), have long been recognized as special places for the descendants of the Chiricahua Apaches (including Mescalero and Chiricahua-Warm Springs-Fort Sill Apache Tribes). The O'odham people traditionally hold mountaintops, springs, caves, and rock art sites to be special places though no such specific locations have been formally identified on the Coronado.

In discussing Native American special places, it is important to bear in mind that native peoples in the Southwest often conceive of places differently than either researchers or FS planners. Many tribal people view all southern Arizona mountains as "special places" with importance rooted not only in history but in a more general spirituality, philosophy, and worldview. Tribal members have traditionally been reluctant to identify specific special places in part because of confidentiality and religious reasons but also because the notion of isolating and recognizing specific locations is considered an inappropriate Euro-American analytical procedure that is contrary to their worldview and way of thinking.

A location that has taken on "special place" attributes in recent years is Montosa Canyon in the Santa Rita Mountains, the site of the "To All Our Relations" sweat lodge. This site, operated under a special use permit, is used for spiritual cleansing and purification. Though not long in existence, numerous people, including both tribal and non-tribal members, have come to attach considerable emotional importance to the area.

In addition to Traditional Cultural Properties places, some areas traditionally used for collecting foods, basketry materials, and medicinal or ceremonial items could fit the definition of special places. Examples include acorn-collecting areas in the Huachuca and Pinaleño Mountains, and yucca- and beargrass-collecting areas around the Santa Catalina and Santa Rita Mountains.

Local Community Gathering Places

A number of local Euro-American communities have developed long-lasting traditions in particular areas in the Coronado NF—traditions which suggest that the areas fit the Special Places category. Some of these are traditional gathering places for extended families and communities on Easter or other events. Mexican-American families in the Santa Cruz Valley, between Tucson and Nogales, have developed a tradition of Easter celebrations in Madera Canyon and at Peña Blanca Lake. The Mexican-American community of Douglas has a comparable connection with Rucker Canyon in the Chiricahua Mountains. Descendants of the old community of Harshaw in the Patagonia Mountains frequently visit ancestral graves in the area and hold family picnics. In all of these cases, community members have developed emotional connections with specific places.

Another long-standing (over 100 years) tradition of using summer retreats to cooler mountains for relief from summer heat has developed for residents of Tucson with Mount Lemmon and the Gila Valley (Safford, Thatcher, and other communities) with Mount Graham. Both of these mountains have long-standing summer home communities. For summer home occupants and other community members, these mountain highlands rank as special places.

General Public “Scenic Special Areas”

There are a number of places that are considered special to the general public, particularly those people with a stronger general environmental awareness and an appreciation of outdoor places. These are places that seem to be a bit ambiguous in terms of the proposed distinction between “special areas” and “special places” noted above. Although these are areas that have notable intrinsic scenic values, they have inspired emotional responses in many people, and many people have formed emotional attachments to them and consider them special. These attachments are not unlike the attachment many people feel for the Grand Canyon—it is clearly a special area but also a special place.

On the Coronado, widely recognized scenic special places include Cave Creek (Douglas RD), Cochise Stronghold (Douglas RD), Sabino Canyon (Santa Catalina RD), Ramsey Canyon (Sierra Vista RD), and Madera Canyon (Nogales RD). All of these receive considerable eco-tourism visitation and have been identified as special. Perhaps less widely acclaimed candidates suggested by Coronado NF personnel are the Tumacacori Highlands and Sycamore Canyon (Nogales RD), Turkey Creek and Rucker Canyons (Douglas RD), Rattlesnake Canyon and Galiuro Mountains (Safford RD), and the Catalina State Park vicinity (Romero Canyon, Sutherland Wash, Pusch Ridge) (Santa Catalina RD).

Cultural Heritage Special Areas

Several places are considered special in large part for their historical or archaeological qualities. Examples include Kentucky Camp (Nogales RD), Camp Rucker (Douglas RD), Sutherland Wash (Santa Catalina RD), Marijilda Canyon (Safford RD), Carr Reef (Sierra Vista RD), American Flag Ranch (Santa Catalina RD), and historic lookouts in all districts.

“Special Interest” Special 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. They include:

- Birders
Ramsey Canyon and Carr Canyon (Sierra Vista RD), Cave Creek and Rucker Canyon (Douglas RD), Madera Canyon and California Gulch (Nogales RD);
- Rock climbers
Cochise Stronghold (Douglas RD), Santa Catalina Mountains (Santa Catalina RD);

- Spelunkers
Cave of the Bells and Onyx Cave (Nogales RD), Crystal Cave (Douglas RD); SP Cave, Happy Jack, Van Horn (Sierra Vista RD), Peppersauce Cave (Santa Catalina RD);
- Prospectors and Treasure-Hunters
Tumacacori Mountains and Greaterville area (Nogales RD) and Cañada del Oro (Santa Catalina RD);
- All-Terrain Vehicle users
Redington Pass area (Santa Catalina RD), eastern Santa Rita Mountains (Nogales RD);

In addition to the aforementioned user groups, others such as horseback riders, mountain bikers, hunters, and fishers undoubtedly would identify particular sites as special places. These special places on the CNF have also been organized according to their particular geographic location within the forest.

Table 11. Special Places by Geographic Area

Ranger District	Special Place
Douglas Ranger District	Cave Creek, Rucker Canyon, Turkey Creek, Cochise Stronghold, Dragoon Mountains.
Nogales Ranger District	Madera Canyon, Montosa Canyon, Kentucky Camp and the Greaterville area, Peña Blanca Lake, Sycamore Canyon, California Gulch, Tumacacori Highlands, Cave of the Bells, Onyx Cave
Sierra Vista Ranger District	Ramsey Canyon, Carr Reef, Happy Jack, Van Horn, and SP Caves.
Safford Ranger District	Mount Graham, Galiuro Mountains, Rattlesnake Canyon
Santa Catalina Ranger District	Sabino Canyon, Mount Lemmon, Cañada del Oro, Catalina State Park vicinity (Romero Canyon, Sutherland Wash, Pusch Ridge), American Flag Ranch, Redington Pass, Peppersauce Cave

Source: William Gillespie
Archaeologist, Coronado 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 the 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.”

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 these experiences and feelings, but often, this is an unconscious process. The ability and opportunity to form these connections fulfills people’s needs 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 the traditional extractive resources and 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 FS 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. Another growing concern for the state's forests, particularly in the southernmost districts of the Coronado, comes from the growing wave of unauthorized border crossers from Mexico and the associated problems of traffic, garbage, and other adverse environmental effects. The safety issues generated by smuggling activities are particularly problematic for land managers who may not have been trained to handle these risks.

8. Community Relationships

The purpose of this chapter is to describe the relationship between the Coronado National Forest (CNF) and its neighboring communities. Knowledge of local communities is of interest to the Coronado 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 CNF 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 CNF 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 their 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 CNF. 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 which are found in the counties surrounding the Coronado. 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 than those listed in Table 34. Table 35 categorizes national forest service acreage in Arizona according to current congressional districts.

Table 1. Weblinks to Community Profiles for Counties and Municipalities in the Area of Assessment

Cochise County	Http://www.azcommerce.com/doclib/COMMUNE/Cochise%20County.pdf
Sierra Vista	Http://www.azcommerce.com/doclib/COMMUNE/sierra%20vista.pdf
Douglas	Http://www.azcommerce.com/doclib/commune/douglas.pdf
Bisbee	Http://www.azcommerce.com/doclib/commune/bisbee.pdf
Benson	Http://www.azcommerce.com/doclib/commune/benson.pdf
Willcox	Http://www.azcommerce.com/doclib/commune/willcox.pdf
Graham County	Http://www.azcommerce.com/doclib/COMMUNE/Graham%20County.pdf
Safford	Http://www.azcommerce.com/doclib/commune/safford.pdf
Thatcher	Http://www.azcommerce.com/doclib/commune/thatcher.pdf
Hidalgo County	Http://www.hidalgocounty.org/
Lordsburg	Http://www.hidalgocounty.org/lrdsbrg.html
Pima County	Http://www.azcommerce.com/doclib/COMMUNE/Pima%20County.pdf
Tucson	Http://www.azcommerce.com/doclib/commune/tucson.pdf
Oro Valley	Http://www.azcommerce.com/doclib/COMMUNE/oro%20valley.pdf
Green Valley	Http://www.azcommerce.com/doclib/COMMUNE/green%20valley.pdf
Catalina	Http://www.azcommerce.com/doclib/commune/catalina.pdf
Marana	Http://www.azcommerce.com/doclib/commune/marana.pdf
South Tucson	Http://www.azcommerce.com/doclib/COMMUNE/south%20tucson.pdf
Pinal County	Http://www.azcommerce.com/doclib/COMMUNE/Pinal%20County.pdf
Apache Junction	Http://www.azcommerce.com/doclib/COMMUNE/apache%20junction.pdf
Casa Grande	Http://www.azcommerce.com/doclib/COMMUNE/casa%20grande.pdf
Florence	Http://www.azcommerce.com/doclib/commune/florence.pdf
Eloy	Http://www.azcommerce.com/doclib/commune/eloy.pdf
Coolidge	Http://www.azcommerce.com/doclib/COMMUNE/coolidge.pdf
Queen Creek	Http://www.azcommerce.com/doclib/COMMUNE/queen%20creek.pdf
Santa Cruz County	Http://www.azcommerce.com/doclib/COMMUNE/Santa%20Cruz%20County.pdf
Nogales	Http://www.azcommerce.com/doclib/commune/nogales.pdf
Patagonia	Http://www.azcommerce.com/doclib/commune/patagonia.pdf
Sonora, Mexico	Http://www.sonora.gob.mx/
Nogales	Http://www.sonora.gob.mx/portal/Runscript.asp?p=ASP\pg212.asp
Agua Prieta	Http://www.sonora.gob.mx/portal/Runscript.asp?p=ASP\pg171.asp
Naco	Http://www.sonora.gob.mx/portal/Runscript.asp?p=ASP\pg208.asp

Source: Arizona Department of Commerce
 Sonora, Mexico: <http://www.sonora.gob.mx/>

Table 2. 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 Coronado NF have a history of involvement with the national forests and with natural resource issues in general. Southern 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 CNF 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 Arizona Daily Star* (Tucson) is the newspaper most proximate to the CNF 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 which might reveal stories related to the Coronado in many of the state’s newspapers.

The keyword search 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 CNF’s nearest paper, *The Arizona Daily Star*, is one of Arizona’s most important in terms of natural resource news coverage. Furthermore, the search indicated that the CNF itself was the subject of 906 news articles during the period examined (approximately 1999-2005 although the exact period varied by newspaper).

Table 3. 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	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 Arizona Daily Star* were also examined to determine the types of natural resource topics that were of interest to the public in the region surrounding the CNF. Among the many natural resource issues of concern to the public were the wildfires that occurred during the 2004 fire season, incidents related to wildlife encroachment on recreation areas, drug smuggling, lost hikers, and the location of utility rights-of-way. Selected topics and their dates of publication in the *Arizona Daily Star* are provided in Table 37 below:

Table 4. Selected Key Public Issues for the Coronado National Forest

Topic	Date
1. Wildfires (including the Aspen fire)	Spring – Summer, 2004
2. Mountain lion encroachment on Sabino Canyon Recreation Area	May 2004
3. Border Patrol finds 1,500 lbs. of marijuana on the CNF	December 2004
4. Utility companies seek power line right-of-way through CNF.	July 2004, January 2005
5. Two hikers lost on CNF walk-out at Pima Canyon	June 2004
6. Black bear slain at Madera Canyon after it rips tent	June 2004

Source: Arizona Daily Star.

8.3 Communities of interest and forest partnerships

The Coronado National Forest has many communities of interest: that is, entities that share an interest along with the Forest Service 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, educational, business, and media organizations. Specific contact information and the names of principal individuals are available from the CNF. An especially noteworthy community of interest to the CNF is the Native American tribes. The tribal contact list for the CNF is found in Table 39. There are fourteen tribes for which the CNF has consultation responsibilities.

Table 5. Communities of Interest for the Coronado National Forest

Governmental	Special Advocacy Groups	Educational
Arizona Land Department	A.A. Jernigan Testamentary	American Museum of National History
AZ Game & Fish Dept.	Animas Foundation	Arizona Sonora Desert Museum
AZ State Legislature, Dist. 8	AZ Wildlife Federation	Desert Botanical Garden
Bureau of Land Management	Center for Biological Diversity	Laboratory of Tree Ring Research
Catalina State Park	Cochise County Cavers	University of Arizona
Chiricahua National Monument	Columbine Cabin Owners Assoc.	University of Arizona South
Chiricahua Regional Council	Coronado Rangeland User Committee	Water Resources Research Center
City of Sierra Vista	Douglas Rifle and Pistol Club	
City of Thatcher	Economic Development Foundation	Businesses
Cochise County Board of Supervisors	Forest Guardians	Canyon Ranch
Cochise County Planning Commission	Friends of Kentucky Camp	E Lazy H Ranch Partnership
Douglas Chamber of Commerce	Friends of Sabino Canyon	Lone Mountain Ranch, Inc.
Graham County	Green Valley Hiking Club	Sabino Canyon Tours, Inc.
Graham County Board of Supervisors	Malapai Borderlands Group	Santa Rita Lodge
Graham County Chamber of Commerce	People for the West, SE AZ Chapter	Summerset Homeowners Assoc.
Hereford Natural Resource Conservation Dist.	Quail Unlimited	Tanque Verde Guest Ranch
Mt. Lemmon Fire Department	Sabino Canyon Volunteer Naturalists	Walter Dawgie Ski Corp.
NM Dept. of Game & Fish	San Pedro 100	
Pima Town Manager	Sierra Club	Media
Pinal County Board of Supervisors	Singing Valley Ranch	Arizona Daily Star
Ramsey Canyon Preserve	Sky Island Alliance	Green Valley News & Sun
Safford City Manager	Society of American Foresters	Nogales International Newspaper
Saguaro National Park	Sonoran Bioregional Diversity	
Santa Cruz County Board of Supervisors	Sonoran Institute	
Santa Cruz County Emergency Management	Southern Arizona Hiking Club	
Santa Cruz County Planning	The Nature Conservancy - AZ Office	
Santa Cruz County Sheriff's Dept.	Wild Turkey Sportsmen Association	
Tumacacori National Historical Park		
U.S. Border Patrol, Nogales Station		
U.S. Fish and Wildlife		
Willcox Chamber of Commerce & Agriculture		

Source: J. Ruyle, Forest Planner, Coronado National Forest

Table 6. Tribal Consultation Responsibilities for the Coronado National Forest

Arizona Indian Tribe

Ak-Chin Indian Community
Ft. McDowell Mohave-Apache Indian Community
Ft. Sill Chiricahua-Warm Springs Apache Tribe
Gila River Indian Community
Havasupai Tribe
Hopi Tribe
Mescalero Apache Tribe
Pascua Yaqui Indian Tribe
Salt River Pima-Maricopa Indian Community
San Carlos Apache Tribe
Tohono O'odham Nation
White Mountain Apache Tribe
Yavapai-Apache Nation
Pueblo of Zuni

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 CNF 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 U.S.-Mexico border region. 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 Southwest Region (Region 3) of the FS 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 FS 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 CNF and external groups.

Table 7. 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/

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

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/
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/

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

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 8. Partnerships for the Coronado National Forest

New Mexico Department of Game and Fish	US Army - Ft. Huachuca
Pima Natural Resource Conservation District	AZ Game & Fish Department
Winkelman Natural Resource Conservation Dist.	University Of Arizona, Sponsored Projects
Santa Cruz Natural Resource Conservation Dist.	Cochise County, Juvenile Court Services
Redington Natural Resource Conservation Dist.	Pima County Dept. of Transportation
Arizona State Land Department	El Conquistador Stables
USDI NPS Saguaro National Park	Friends of Madera Canyon
USDI, National Park Service	US Dept. of Treasury - ATF
USDA Natural Resources Conservation Service	Pima County Dept of Transportation
US Border Patrol, Customs & Border Protection	Youth Corps of Southern Arizona (YCOSA)
USDI, BLM, Safford Field Office	Univ. of Arizona, School of Nat. Resources
USDI, BLM, Tucson Field Office	Pima County Sheriff's Department
Federal Highway Admin., Central Fed.	Santa Cruz County Sheriff's Department
USDI, Fish and Wildlife Service	Graham County Sheriff's Department
Tucson Electric Power	Friends of Sabino Canyon
Mt. Lemmon Fire District	Arizona State Parks Board
Malpai Borderlands Group	Cochise County Sheriff's Department
NPS, Chiricahua National Monument	Don Ricketts
Upper San Pedro Partnership	Friends of the Huachucas

Source: Coronado National Forest, Grants and Agreements

8.4 Historically underserved communities and environmental justice

This section deals with special communities located near the CNF which may have been historically underserved in terms of public services received and their participation in business. This information will be of particular interest to CNF 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). Those individuals of Hispanic/Latino origin represent the largest minority group, ranging from 27% in Graham County to 80% in Santa Cruz County. Note that individuals claiming Hispanic heritage may also claim identification with other ethnic and racial groups and be counted in those categories as well. The percentage of Native Americans is particularly noteworthy in Graham and Pinal counties. African Americans represent 4.5% of Cochise County.

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 CNF 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 9. Minority- and Women-owned Business by County, 2002

County	All Businesses	Total Minorities	African American	Native American	Asian or Pacific Islander	Hispanic or Latino Origin	Women
Graham	2,933	301	-	-	-	-	943
Cochise	12,625	2,696	341	321	252	1,781	4,005
Hidalgo (NM)*	298	n/a	n/a	n/a	n/a	n/a	n/a
Pima	112,293	18,847	1,117	1,860	2,868	14,033	31,485
Pinal	12,625	2,094	-	337	-	1,553	3,562
Santa Cruz	6,343	3,342	-	-	-	3,148	1,634

* 2002 Survey of Business Owners (including minority- and women-owned business) U.S., states, counties, places and metro areas projected early 2006

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 the 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 affects 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. Frenzt 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” (individual actors within the network) and “ties” (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 CNF’s social linkages has been 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 which “monitor and fund the network and its activities.” 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 resource 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 CNF (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 Coronado. 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 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 Coronado 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?

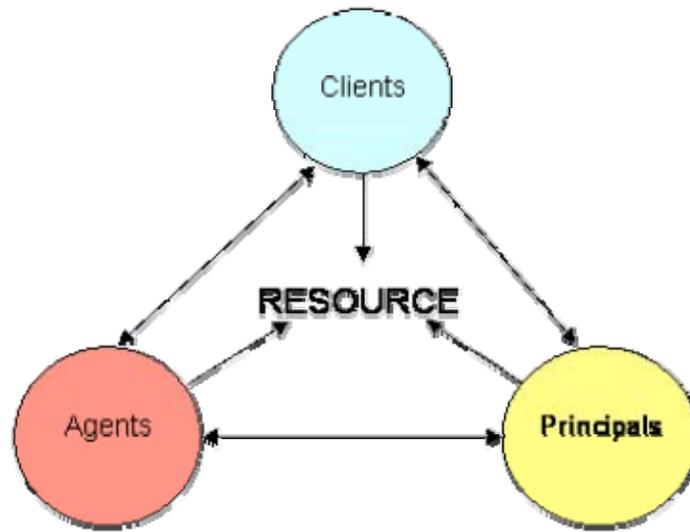


Figure 1. Social Networks in Natural Resource Management

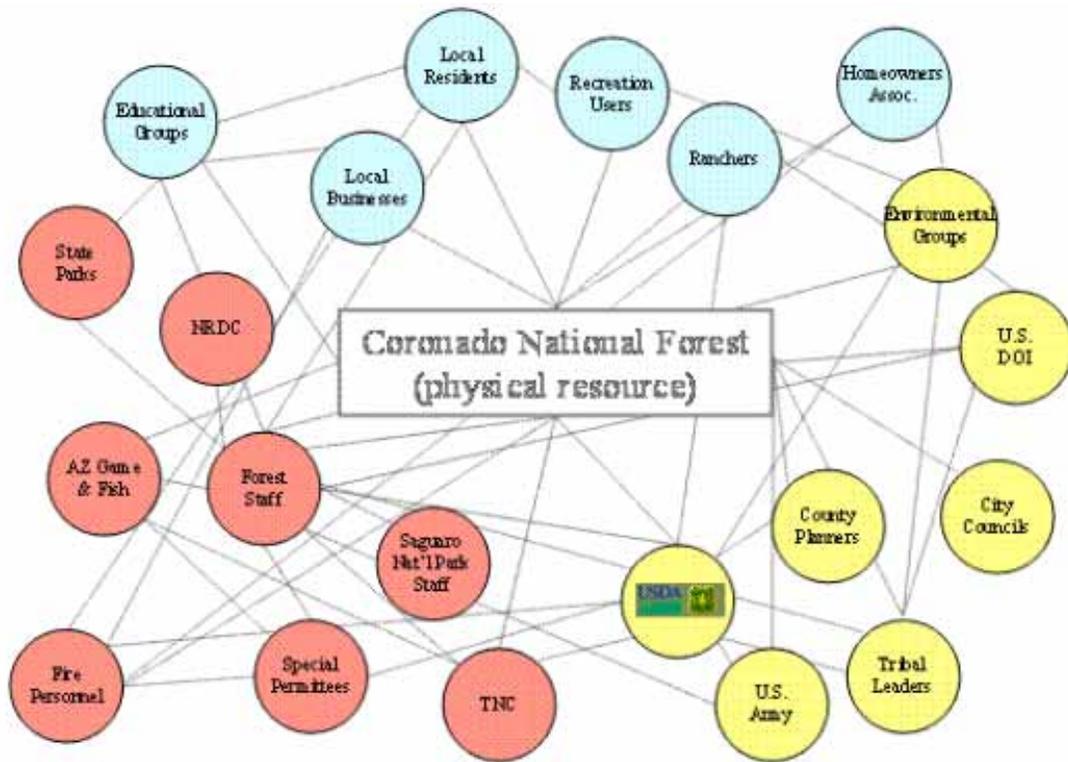


Figure 2. Partial Social Network for the Coronado National Forest

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 effects 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 CNF 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 relationships need 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 informing 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*—Managers must 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 ethnic 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 Coronado 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 an overview of several topics that are relevant to current and future forest management. The issues addressed in this section have been discussed throughout this assessment; however, this section offers a more detailed analysis of their potential impact on the socioeconomic environment surrounding the Coronado National Forest (CNF). Forest planners from Arizona's six national forests, at a meeting held in September 2004 in Tucson, identified these as key topics for national forest management. Although each topic affects specific forests in distinct and varied ways and to different extents, each represents an issue of common concern to all national forests and communities throughout the state. Where relevant, issues have been separated to identify their impact on the local, state, and national level.

9.1 Forest health

Maintaining and improving overall forest and ecosystem health is an important goal of the USDA Forest Service (USFS). At the national level, the Forest Service (FS) has identified four key threats to the health of the nation's forests and grasslands as follows (USFS 2005j):

- Fire and fuels;
- Invasive species;
- Loss of open space; and
- Unmanaged recreation.

Below, the trends associated with these threats are discussed along with the implications for forest management and grassland health.

Fire and Fuels

Nationally, fire on FS lands has been a subject of considerable attention. 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, including both federal and non-federal lands. Nevertheless, wildland fire regimes and fire management practices are a major concern for a wide variety of forest stakeholders, including FS staff, recreational users, tribes, and neighboring communities. Federal and state fire management agencies have witnessed over 5 million acres of fire 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).

The last few fire seasons provide several examples that illustrate the costs, financial and otherwise, associated with large wildland fires in the state of Arizona. The Rodeo-Chediski Fire of 2002 spread across over 450,000 acres of land, including over 170,000 acres of the Tonto and Apache-Sitgreaves National Forests. The costs associated with the fire surpassed \$40 million (USFS 2003e). Numerous fires have also affected the CNF. In 2004, late and relatively light summer rains led to the closure of many forested areas in Arizona, and the 30,000-acre Nuttall Complex Fire threatened summer homes and the Mount Graham International Observatory in the Pinaleno Mountains (SAIWFO 2004, Forsgren 2004).

Another example of fires in the CNF region is the Aspen fire, started on Tuesday, June 17, 2003. The Aspen wildfire began on Mt. Lemmon, just north of Tucson Arizona, at approximately 3:30 PM near Marshall Peak, about two miles from Summerhaven, Arizona. The fire grew rapidly on Thursday, June 19th in part

because of high winds, gusting at forty to sixty miles per hour. These winds accounted for the fire growing from about 450 acres by early morning on June 19, to about 4,000 acres by nightfall. The Aspen Fire burned 85,000 acres.

It is important to note, however, that wildland fire has also proven to be a useful management tool in many areas. For example, the Gila National Forest in New Mexico now makes extensive use of fire as a wilderness management tool in associated wilderness areas, using 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 to control, management efforts generally focus on changing the likelihood of ignition and the behavior of fires through fuel modification. 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 more likely to show extreme behavior, such as spotting; firewhirls; crowning; and long, fast runs (Pyne 1997). Intense fires threaten species and landscapes that are better adapted to slow-burning, low-intensity fires such as some ponderosa pine forests. In addition, 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 may act as ladders, carrying surface fires into the crowns of trees (Graham et al. 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.

Managers 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, Sep. 2004). 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 come increases in visitors and in potential ignition sources like campfires, debris burning, and faulty vehicle exhaust (USFS 1999a).

Increased population density also heightens pressure 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 often meets highly flammable wildlands, fire on public lands can be a major concern.

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 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 be “rescuing” the remaining economic value from the affected trees, recent reports have questioned the efficacy and benefits to the national forests of such enterprises. FS documents suggest, for example, that

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 the risks and benefits of each are substantially different. Many policies implicitly or explicitly favor one method over the other.

such logging may disrupt the landscape, increase soil erosion, disturb wildlife, and actually increase the likelihood of another fire (USFS 2003b, USFS 1999a).

Invasive species

The view held by some that ecosystem health has declined since the arrival of Europeans on the North American continent is linked in large part to a reduction in biodiversity; the falling population numbers of native species; and a concomitant explosion in non-native, invasive species (Ecological Restoration Institute 2005). Native species populations have fallen under pressure from changing land uses and habitat fragmentation. Invasions of non-native species have been identified as the second greatest cause of species extinction (Vitousek et al. 1997). Pimental, 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.

Invasive species 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 have cost about \$2.1 billion per year in loss of forest products alone. A similar amount is lost to non-native plant pathogens (Pimentel, Zuniga, and Morrison 2005). Invasion by several species of bark beetles currently poses a serious threat to Arizona's forest resources.

In the Southwest regional scale, the 2002 bark beetle infestation in Arizona and New Mexico forests caused significant damage. The infestation 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). The round-headed pine beetle actually decreased its impact area from 11,120 acres in 2002 to 4,530 acres in 2003. The CNF was particularly susceptible to the aforementioned infestation. All of the 2003 round-headed pine beetle damage occurred within the Coronado National Forest, which suggests that this beetle infestation may continue to be a cause for concern (USFS 2004d).

Invasive grass species have also affected both desert and grassland ecosystems in Arizona. In western deserts, annual grasses from Europe were unintentionally introduced through grazing and have changed fire regimes by 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 of summer of 2005, above-average winter rains led to a significant accumulation of grass and weeds in desert environments, which helped sustain several large, human-ignited fires through desert ecosystems (Johnson 2005, Meahl 2005, Becerra and Pierson 2005). Coronado-area 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). The presence of too many non-native plant species also reduces 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 recreational 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, 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). Its Forest Health Protection division provides a variety of services aimed at lessening the impact of these invasive species by focusing on management, monitoring, technology development, pesticide-use guidance, and technical assistance programs. A joint project of the University of Georgia and the USDA provides detailed information on a wide variety of invasive weeds, diseases, insects, and other species (ISSG 2005). The FS 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 involve 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 Cochise County, Arizona, describes how city- and county-level planning can inadvertently encourage exurban development by increasing the cost and complexity of residential development within the city limits by promoting low-density development through zoning designations (Esparza and Carruthers 2000).

Increased Recreation at National Forests

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 the CNF alone, there are nearly two million visits to the national

forest and more than 280,000 visits to designated wilderness areas² (Kocis et al. 2002b). As a result, tourism has become one of the single most vital economic factors to the communities surrounding the forest. In 1996, almost half of all hunters nationwide 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 their inherent risk has caused officials to consider special use fees to cover added ranger responsibilities surrounding climbing-related injuries (Cordell et al. 1999).

Regarding public access issues, access to recreational activities on federal- and state-protected land in Arizona 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 OHVs should have access to forests with only limited restrictions (USFS 1999a).

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 9.4, 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 the foremost reasons for forest usage (Peart 1995, Knopf 1987).

Given the rapid growth of Arizona's population, overcrowding may be an increasing challenge for the CNF. According to NVUM data, only 27.5% of those Coronado NF visitors interviewed stated that there appeared to be hardly anyone else present during wilderness visits. This proportion is lower than most of Arizona's national forests. However, effective recreation management and the dispersion of recreation opportunities throughout the Sky Islands have helped the Coronado avoid many of the overcrowding problems that plague other national forests. The same survey shows that only 16% of those interviewed considered overcrowding on developed overnight sites to be a problem in the Coronado (Kocis et al. 2002b).

A related issue that has drawn some 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, one of the designers of New York's Central Park and an instrumental voice in the formation of the National Park system. For Olmstead, public open spaces oiled the gears of democracy by bringing disparate classes together. Nevertheless, fees do 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 2002, nearly 95% of the wilderness visitors to the Coronado 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. 2002b).

² This figure represents the minimum number inclusive of the 35.6% margin of error as listed in NVUM data.

9.2 Changing demographics and forest uses

Previous sections have provided substantial information on recent demographic changes within the area surrounding Coronado 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 in the country. 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 a doubling in population between 1995 and 2040 (Peart 1995). Also, older Americans, an increasing part of the population (one in eight people in the U.S. is now over 65 as opposed to one in twenty-five 100 years ago), are moving to the warmer climates of the south and west (Alig et al. 2003). As noted throughout this report, Arizona is also becoming increasingly “exurban.” Residences are spreading from metropolitan areas and becoming more dispersed, and the popularity of outdoor recreation activities continues to rise. Many forests are experiencing 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. Changes in extractive uses are described in some detail elsewhere in this document. This section will focus on two uses that were identified as key management issues by forest planners for the Coronado: livestock grazing and forest use by undocumented migrants.

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 oppression of the local indigenous populations (Sheridan 1995). The U.S. government’s primary interest was in land acquisition until the 1850s, and 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 not without interruption. 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. By the end of that century, an estimated 50-75% of southern Arizona’s cattle had perished (Sheridan 1995).

In 1906, the FS implemented the practice of collecting fees for grazing private livestock on public land. The amount of national forest and BLM land devoted to livestock grazing has been stable over the past three decades (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 FS land are allotted to fee-based grazing rights, the latter accounting for 65% of the entire National Forest System. Livestock graze more than 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 national forests and the BLM on an experimental basis. Following continuing presidential and congressional support, it remained the standard. However, grazing fees have

become controversial, in part because fees have not kept pace with comparable private market rates. In 2002, for example, the grazing fee remained \$1.35 per AUM³ on federal lands while the USDA estimated the average rate for grazing leases on non-irrigated private land at \$13.50 per AUM among the 16 western states (NASS 2003). Some citizen groups assert that this constitutes implicit support of grazing interests by the Forest Service (Coalition 2001). In Arizona, for example, conservation groups note allegations that the Forest Service once 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, the ecological impact of ranching, including the persecution of “problem animals,” the alteration of fire regimes, damage to water supplies and riparian areas, introduction of exotic weeds and the construction of fences and roads, can bring grazing into conflict with other uses (Freilich et al. 2003). Some argue that a balanced relationship between livestock grazers, environmentalists, and the FS is important, even critical, given the continuing decline of grassland ecosystems (Baker et al. 1988).

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.

Illegal uses and Homeland Security

The United States shares nearly 2,000 miles of common border with Mexico. The federal government controls nearly 25% of this border. The CNF’s proximity to the U.S.-Mexico border creates challenges and responsibilities for land management and law enforcement not shared by other Arizona forests. The impact of illegal immigration and drug smuggling across those areas of the border covered by the National Forest System has recently led to important developments in interagency cooperation between the USFS and other government bodies. Since sixty miles of international border (12% of the federally managed border territory) lie within the Coronado National Forest, the resulting influence on biodiversity, ranger safety, and wildland fire make border crossings a particularly relevant issue (GAO 2004a). Yet, as of 2003, the Forest Service Law Enforcement and Investigations organization had not yet considered border security an enforcement issue of primary significance and had not assigned, in general, its officers to activities involving border security (USDA and OIG 2003).

The Border Patrol’s Tucson sector, which includes 281 miles of the international border, is responsible for 37% of all illegal immigrant apprehensions nationwide, a total of over 600,000 persons in FY 2000. In addition, the Tucson sector of the border region represented 18% of all marijuana seizures in 2000 and 37% of vehicle seizures. Between 2000 and 2003, 400,000 pounds of marijuana were seized just on the national forests along the southwestern border, primarily in Arizona (GAO 2004a, BLM 2001). Given the prevalence of recreational uses of the Coronado NF, as well as the proximity of working farms and ranches, the consequences for the safety of the public and of the migrants themselves is substantial. Recent increases in the number of undocumented immigrants in areas near the U.S.-Mexico border have also adversely affected access to the CNF as landowners cite security concerns and the environmental damage caused by migrants as reasons for restricting forest access through private property (Emmett, pers. comm.).

³ An AUM, or Animal Unit Month, is equal to one cow with calf or five sheep feeding for one month.

Environmental damage and contamination are key factors surrounding illegal border crossings. Trash and high concentrations of human waste pollute the landscape and affect wildlife, vegetation, and, in higher altitudes, water quality, all of which can detract from scenic quality and affect human and animal health through bacteria and disease. Migrants and traffickers abandon automobiles and create thousands of new trails throughout the border region. These and other actions increase erosion, destroy plant populations, and require substantial cleanup and restoration to keep forest land suitable for legal uses. Also, campfires created by these illegal users can spread into larger wildfires. Between 1994 and 1999, undocumented immigrants set at least twenty wildfires which cost more than \$34,000 to suppress. By 2000, the amount of money needed to combat these fires reached \$500,000. In addition to the obvious effects on recreation users, ranchers must cope with a number of the repercussions of illegal crossings, including damage to equipment, disruption of grazing and irrigation schedules, and cut fences (BLM 2001).

The controversy regarding illegal border crossings on public lands gained national attention in 2002 when Kristopher Eggle, a 28-year old National Park Service officer, was shot and killed by drug traffickers in the Organ Pipe Cactus National Monument (Hoekstra 2003). This, in addition to the heightened security interests by the Department of Homeland Security following the attacks of 2001, has forced the FS to become more actively aware of border security despite having no formal legislative responsibility in this area. Law enforcement officers on public lands can find themselves outnumbered and outgunned in the line of duty. Many land management agencies now require the use of bulletproof vests and assault weapons while on duty (BLM 2001, GAO 2004a). But the dangers may extend beyond the federal workers who attempt to stem the tide of illegal smuggling and immigration. The migrants themselves are often in extreme danger as they cross the rugged expanses of the Sonoran and Chihuahuan deserts. In many cases, “coyotes”—individuals who ferry migrants across the border—take the money from their clients then leave them in remote desert regions (BLM 2001, GAO 2004a). The realities of public danger led the Forest Service, in 1999, to designate over 400,000 acres as a “constrained area,” meaning closed to public access, due to the department’s inability to oversee and stem the high levels of illegal activity there (BLM 2001).

The five public-land management agencies have expressed concerns that current federal funding is insufficient to deal with border security issues. In 2002, the FS estimated that it would require almost \$15 million to address just one year of environmental damage, maintenance, and resource management surrounding the border. This money does not appear in the 2005 budget for the Department of Agriculture (GAO 2004a). In 1998, the United States and Mexico signed the Border Safety Initiative, meant to make the border safer for migrants, agents, and border residents (BLM 2001). In 2001, the Border Patrol, the BLM, the National Park Service, the US Fish & Wildlife Service, the USDA Forest Service, and the Natural Resources Conservation Service signed a Memorandum of Understanding to develop a general procedure for the Border Patrol’s use of federal land to apprehend undocumented migrants and conduct search and rescue and training as well as implement plans to mitigate environmental damage caused by illegal immigration. Although FS agents cannot arrest illegal border crossers, they can detain suspicious individuals until the arrival of a Border Official agent (USDA and OIG 2003).

In response to these trends, there has been an increasing law enforcement presence on CNF lands near the U.S.-Mexico border. The U.S. Border Patrol currently conducts activities on forest land. A number of jurisdictional issues have arisen between the agencies, including Border Patrol access to roads, trails, and natural areas within the forest. Discussions between the agencies are ongoing, but in the meantime, Coronado’s restrictions on off-trail OHV use are not applicable to Border Patrol personnel (Roth, pers. comm.).

9.3 Land and water resources

The 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.

State Trust land reform

The practice of allocating public lands for various beneficiaries in Arizona 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 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 to provide 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 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 AZSLD 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 department's primary mission of maximizing revenues for its beneficiaries, a role that distinguishes it from other agencies charged with management of public lands (e.g., national parks, national forests, state parks, and the like). As of 2005, the AZSLD managed land holdings for fourteen beneficiaries, the most prominent of which being the K-12 public school system. The public schools currently hold 87.4% of State Trust lands. The vast majority of Arizona trust lands are currently intended solely for livestock grazing. However, the Urban Lands Act, passed by the state legislature in 1981, has allowed the AZSLD 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 out of committee in the Arizona State Legislature (Nintzel 2005, Davis 2004).

At issue is the process by which the AZSLD 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 exchange; and 4) composition of the State Trust Land Board (Sherwood and McKinnon 2005, Nintzel 2005, Riske 2005).

Legislators have balked at proposals favored by organizations such as the Sonoran Institute and the 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 qualifies 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 allowing non-ranchers to bid on state grazing leases as well as a 1990 Supreme Court ruling prohibiting 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 AZSLD 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. Hydroelectric plants alone use over 3 trillion gallons a day, almost ten times as much as offstream withdrawals (Brown 1999). The judicious use of water resources is particularly important in the West, and water is an immediate and everyday concern for Arizona residents. The National Forest System in the state is important as a provider of water resources. Although USFS lands account for only 14% of the total land area in the Southwest, they 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 more than 9 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).

Watershed integrity is of specific importance for the Coronado National Forest as the area is one of the driest forests in Arizona (Baker et al. 1998). Despite its overall lack of rainfall, numerous watersheds dot the area, including California Gulch, East Fork Apache Canyon, Arivaca Lake, and Pena Blanca Lake. The Huachuca Mountains are also a major water resource for the region, because they receive a relatively heavy annual rainfall of 50 cm (TNC 2000).

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 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. One of the major watersheds closest to the outlying areas of the Coronado, the San Carlos, was at only 9% of its total capacity (although this was up from 2% in September of the previous year). 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. 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).

The Sierra Vista sub-watershed is another source of water that is particularly important due to its proximity to the CNF as well as its role in supporting Fort Huachuca and the cities of Sierra Vista and Benson. The CNF has joined other federal, state, and private agencies in a cooperative approach to regional water planning entitled the Upper San Pedro Partnership (USPP). The overall purpose of the USPP is, "to ensure an adequate long-term water supply able to meet the needs of the area's residents, property owners, and San Pedro Riparian National Conservation Area" (USPP 2005).

Much of the reservoir losses registered late last year can be attributed to a general lack of 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).

Meanwhile, the Arizona Department of Water Resources (ADWR) has attempted to address regional water shortages through the creation of groundwater Active Management Areas (AMAs), three of which extend into the area of assessment for the CNF. Municipalities within AMAs are required to provide proof of 100-year water viability before any new development can begin (ADWR 2005).

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 provisions of the compact (Brown 1999).

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). Considering the value of water resources on forest service lands, continuing aggressive management activities while working in partnership with tribal and other nongovernmental agencies is, in the words of Schuster and Krebs (2003), "simply good business."

9.4 Forest access and travel

Earlier chapters discussed forest access and travel, focusing on the transportation characteristics of communities surrounding the Coronado 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

The larger roadless areas in the national forests have long received different treatment than 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 untrammelled 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 lands have become even more important as unprotected areas are increasingly developed and converted to urban uses. Among other benefits, roadless areas provide clean sources of drinking water, 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 Coronado National Forest currently includes approximately 421,000 acres of inventoried roadless area (IRAs) (USFS 2001c).

In 2001, the FS published a final rule that prohibited several activities in IRAs. These activities were banned 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 \$617 million in 2002 in Graham, Cochise, Pima, Pinal and Santa Cruz Counties, representing \$30.8 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, five of the 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). The CNF is not a party to the proposed five-forest amendment, having previously established forest rules regarding cross-country travel. Contrary to existing regulations in the other five 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 allow OHV travel on existing roads but would require that forests conduct a comprehensive Roads Analysis Process (RAP) documenting the needs for, environmental impacts of, and maintenance requirements for all existing roads. 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 Coronado National Forest (CNF) 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 six counties surrounding the CNF increased by over sixty percent between 1980 and 2000. 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, especially homes intended for seasonal use. 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 CNF and surrounding communities.

The economy of southeastern Arizona is also likely to have a substantial impact on future planning and management of the CNF. Data suggest that economic growth in the region has been relatively slow when compared to state averages over the past several years. This is evidenced in part by limited increases in total full- and part-time employment as well as per capita and household income. Meanwhile, recent indicators of dependence on natural resources have shown mixed results: gains in income from tourism and wood products offset by losses in income from special forest products. Although activities such as mining and ranching 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 CNF'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 CNF. 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 CNF 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 and recent data on the Coronado National Forest which demonstrate similar declines in grazing and mining on forest lands. These same reports point toward a substantial increase in recreational uses of national forests in general and the CNF 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 CNF 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 CNF has designated hundreds of 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 southeastern Arizona that are considered special by Native American tribes, descendents of early settlers, and wilderness enthusiasts. In the future, the CNF should continue to seek input from these and other groups in identifying special places and planning for their protection.

Regional trends and Forest Service planning regulations have influenced the relationships between the CNF and surrounding communities. In particular, the protection of wildlife, prevention of forest fire, sustainable management of area watersheds, and enforcement of immigration 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 CNF management objectives.

Finally, data suggest that a number of natural resource issues will continue to influence future management alternatives of the Coronado 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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⁴ N.B.: concerning government documents of which there are several in the same year (i.e. USFS 2003a, 2003b, etc.), non-consecutive lettering in these instances occurs because the citations are labeled as they appear in the complete annotated bibliography to facilitate in cross-referencing. For more information, see the introductory paragraphs to the annotated bibliography.

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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.

Tourism employment*	
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)

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

Appendix B: Indirect Economic Effects of Forest-Related Products in the Coronado National Forest

Output, Value Added and Employment

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July 26, 2005

Base Year: 2002

Industry	Industry Output*	Employment	Employee Compensation*	Proprietor Income*	Other Property Income*	Indirect Business Tax*	Total Value Added*
1 11 Ag, Forestry, Fish & Hunting	908.187	7,810.722	112.534	95.636	70.103	23.511	301.785
19 21 Mining	595.858	2,956.592	167.517	-10.903	134.984	30.637	322.235
30 22 Utilities	832.048	2,273.565	161.175	10.817	277.588	88.277	537.857
33 23 Construction	4,071.245	37,934.968	1,142.298	246.949	160.021	18.387	1,567.655
46 31-33 Manufacturing	7,906.105	36,712.385	2,316.135	59.994	980.841	54.274	3,411.244
390 42 Wholesale Trade	1,241.154	11,174.558	469.612	26.966	195.180	206.834	898.591
391 48-49 Transportation & Warehousing	1,328.547	13,112.765	559.668	67.562	104.877	34.164	766.270
401 44-45 Retail trade	3,335.531	62,894.868	1,367.615	158.849	495.701	483.870	2,506.035
413 51 Information	1,698.627	9,683.947	422.395	60.448	205.707	35.336	723.886
425 52 Finance & insurance	1,777.843	12,281.843	514.607	44.832	453.502	44.306	1,057.247
431 53 Real estate & rental	2,541.427	25,680.557	234.903	185.427	1,051.359	234.854	1,706.543
437 54 Professional- scientific & tech svcs	2,022.610	28,291.959	975.280	329.015	146.885	24.558	1,475.738
451 55 Management of companies	231.651	2,851.464	98.146	1.140	43.582	2.309	145.176
452 56 Administrative & waste services	1,720.987	34,468.337	757.158	82.360	157.597	27.707	1,024.823
461 61 Educational svcs	204.374	4,797.703	97.899	0.797	14.903	3.473	117.071
464 62 Health & social services	3,837.869	55,646.639	1,809.402	194.743	235.712	27.920	2,267.777
475 71 Arts- entertainment & recreation	406.317	11,272.381	129.773	18.753	38.166	22.214	208.906
479 72 Accomodation & food services	1,785.888	43,927.738	618.391	38.339	150.585	96.644	903.959
482 81 Other services	1,672.367	36,904.106	578.943	138.937	39.630	21.022	778.533
495 92 Government & non NAICs	9,660.446	117,428.537	5,511.018	0.000	2,843.897	339.136	8,694.051
Totals	47,779.082	558,105.633	18,044.469	1,750.661	7,800.820	1,819.433	29,415.383

*Millions of dollars